

RAISING THE ACCEPTABILITY AND EFFECTIVENESS OF CARBON PRICING

The crucial role of carbon
revenue recycling



November 2018

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ABOUT US

About Navigant

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Carbon pricing forms part of Navigant's core expertise: through Ecofys, a Navigant company, we have advised the European Commission and other stakeholders on the design of the European Union Emissions Trading System since its conception, and we continue to provide analyses on the potential impacts of proposed design changes. Capturing the topic in its global scope, Navigant has been assisting The World Bank in producing their annual flagship report State and Trends of Carbon Pricing over the past six years. We also work with the industry on compliance and internal carbon pricing strategies, and thereby provide a fully rounded perspective on carbon pricing that spans from policies and technological innovation, to impacts at the consumer level.

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About Generation Foundation

The Generation Foundation was established alongside Generation Investment Management in 2004 in order to strengthen the case for Sustainable Capitalism. Their strategy in pursuit of this vision is to mobilise asset owners, asset managers, companies and other key participants in financial markets in support of the business case for Sustainable Capitalism. In an effort to accelerate the transition to a more sustainable form of capitalism, they primarily use a partnership model to collaborate with organisations and institutions across sectors and geographies. In addition, the Foundation publishes in-house research, gives select grants related to the field of Sustainable Capitalism, engages with its local communities and supports a gift matching programme for the employees of Generation. All of the activities of the Foundation, a not-for-profit entity, are funded by an annual distribution from Generation Investment Management.

generation —
foundation



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About Carbon Pricing Unlocked

Today, over 40 national jurisdictions and about 25 cities, states, and regions are putting a price on carbon. Despite this global uptake, harmonisation of carbon pricing policies across different regions remains difficult. Furthermore, carbon prices are often too low to incentivise the investment necessary to decarbonise emissions-intensive value chains. At the end consumer level, the impact of carbon pricing is often insufficient to drive changes towards more low carbon consumption.

How can carbon pricing facilitate sustainable global economic growth? In order to find vital answers to this question, the Generation Foundation has teamed up with Navigant in the Carbon Pricing Unlocked (CPU) research partnership. The research extends over three years from 2016 to 2019 and tackles carbon pricing from a new angle, exploring the role of carbon pricing along value chains up to the end consumers. The partnership aims to deliver quantified insights into the role carbon pricing can play in a 1.5°C future.

Navigant is one of the pioneers in carbon pricing, and has worked on the topic for nearly two decades. The Generation Foundation is the advocacy initiative of Generation Investment Management LLP, which was co-founded by Al Gore and David Blood in 2004, and works on the decoupling of prosperity from resource intensive growth. Combining in-depth expertise with a high-level stakeholder network, Navigant and The Generation Foundation investigate how carbon pricing might be better integrated at an economic policy level in order to unlock its full mitigation potential.

Our partnership welcomes collaboration with interested parties. To receive news and updates about our project, please sign up at cpu@navigant.com.

EXECUTIVE SUMMARY

Carbon pricing is being used in an increasing number of jurisdictions around the world as an economically efficient method to reduce greenhouse gas (GHG) emissions. Over the last decade the number of carbon pricing mechanisms (CPMs) implemented has more than doubled and there is a growing consensus among stakeholders from both the public and private sectors that carbon pricing is fundamental to the transition to a low carbon economy.¹

A CPM's durability and effectiveness is determined in large part by the support it receives from the entities directly affected by the pricing mechanism.² With the widespread application of CPMs and a need to ratchet up global mitigation to avoid the worst effects of dangerous climate change, policymakers must strike the balance between increasing the ambition of the CPM and maintaining support from entities covered by the mechanism. There is a real danger that, as mitigation ambition is increased through a higher carbon price, the level of support from covered entities will fall, ultimately undermining CPMs as tools to avoid catastrophic climate change.

Perhaps unsurprisingly, increasing carbon prices have an inverse relationship to stakeholder acceptability; a higher price tends to lead to less support from those having to pay it. This is not, however, the only characteristic that can affect stakeholder acceptability. The way that revenues raised by the CPM are recycled back into the economy can affect stakeholder

acceptance. Changing the way revenues are spent is one approach that could be used to counter possible stakeholder objections. Understanding the relationship between stakeholder perceptions of revenue recycling is fundamental to the success of the policy, especially if those revenues could be used to further reduce GHGs.

Existing research on the topic of carbon revenue recycling has mainly focused on the potential to reduce the cost impact of carbon pricing and make CPMs 'revenue neutral'.³ Little has been done to understand how revenue recycling can amplify the mitigation potential of a CPM, and facilitate the acceptability of the CPM amongst covered entities. For example, covered entities may be supportive of a higher carbon price if the revenues were used to reduce business tax, or emissions could be further reduced if carbon revenue were spent on emission reduction programmes thereby supporting a lower carbon economy that could limit the severity of future carbon prices were they to be relied on alone.

Key observations on different recycling approaches

In 2017, 34 CPMs⁴ were generating carbon revenues. These CPMs recycle these revenues in a range of different ways which can be grouped into four broad categories and eight sub-categories based upon their end-use objectives and targeted stakeholder groups (Figure I).

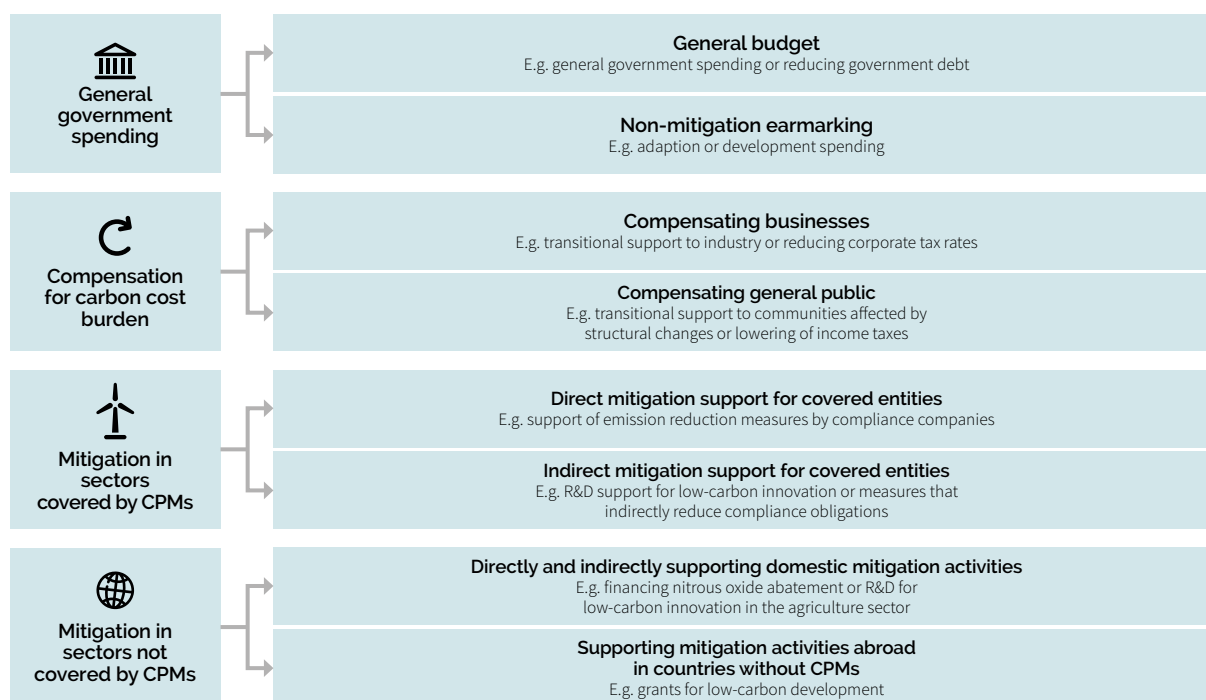
1 World Bank, *Carbon Pricing Dashboard*, 2017

2 See e.g. Tax Policy Center, *How To Use Carbon Tax Revenues*, 2016 or Canada Eco-Fiscal Commission, *Choose Wisely: Options and Trade-Offs in Recycling Carbon Pricing Revenue*, 2016

3 See e.g. Marron, D., & Morris, A. (2016). How Should Governments Use Revenue from Corrective Taxes?, Urban Institute and the Brookings Institution or Carl, J., & Fedor, D. (2012). *Revenue-Neutral Carbon Taxes in the Real World*, Shultz-Stephenson Task Force on Energy Policy

4 34 out of a total of 47 active CPMs generate carbon revenues. The remaining CPMs currently rely on free allocation so do not generate direct revenues for the jurisdictions.

FIGURE I Categories of carbon revenue recycling



To ascertain the relationship between stakeholders' views on different revenue recycling approaches and their impact on overall emission reductions, we assessed and categorised the design elements of the different CPMs in operation around the world and surveyed businesses in these jurisdictions. This research highlighted the following conclusions with respect to mitigation impacts and acceptability of each of the four revenue recycling approaches:



1. General government spending, and especially *General budget*, offers jurisdictional governments the most flexibility on revenue spending and the lowest administrative

burden. This makes general government spending the most widely used approach, applied in some fashion by over 70% of the revenue generating CPMs.

- » The lack of any assurance that the revenue will be spent on further climate mitigation activities means general government spending is the least likely option to generate further emission reductions.

- » The survey revealed that covered entities considered transparency the most important design element for a revenue recycling mechanism. The lack of transparency when revenues are recycled as part of the general budget makes the option one of the least popular to covered entities.



2. Compensation for carbon cost burden is applied by 44% of revenue generating CPMs. Most channel the compensation to the public with only a third of CPMs directing the carbon revenues

to compensate businesses. This appears to be at odds with the views of businesses who, in the survey, indicated that they would prefer to see revenue used to compensate them for their carbon costs.

- » The popularity of compensating businesses and the public for rising carbon costs could facilitate the introduction of higher carbon prices and the setting of more ambitious targets. However, it may also reduce the incentive to change behaviour, which is the basis for the CPM. For example, compensating the general public for carbon costs may reduce the incentive for the public to conserve energy. As such, this approach is less effective at reducing emissions than some of the other approaches.



3. Mitigation support for covered sectors is applied in some form by 44% of the revenue generating CPMs. However, most CPMs choose to spend the revenues on indirect

support, such as research and development, as opposed to direct support such as grants to reduce emissions from industrial processes. Support for covered sectors generally reduces the carbon cost burden for companies affected by a carbon price, but compensation tends to be offered on the condition that the company takes certain measures to reduce emissions. Corresponding reductions need to be made to emission targets, such as ETS caps, to avoid the measures simply lowering the cost of meeting the same targets.

- » Survey responses highlighted the importance companies place on using revenues to increase or reinforce emission reductions; using revenues to generate further emission reductions was cited as the second most important issue for jurisdictions to consider when recycling revenues, and respondents listed 'direct mitigation support' as the most popular revenue recycling approach.



4. Just under half of the revenue generating CPMs recycle revenue by supporting **mitigation activities in industry sectors not already covered by the CPM.** Almost all these CPMs have chosen to

recycle revenue domestically.

- » This method has the greatest potential to generate further emission reductions without raising the carbon price.
- » The most economically efficient method of maximising emission reductions would be to use revenues to support mitigation actions internationally in less industrialised jurisdictions.
- » Despite this approach being most likely to generate additional emission reductions, it is the least applied by jurisdictions and the least popular amongst covered entities. This is a considerable missed opportunity for increasing global mitigation ambitions. To maximise mitigation outcomes, policymakers need to examine ways to improve the acceptability of such revenue recycling approaches.

Considerations for policymakers when designing CPMs

No single revenue recycling approach will be suitable for all jurisdictions and satisfy the concerns of all parties. As such, policymakers should consider adopting a combination of approaches to recycle revenues that can help address the key challenges to increasing mitigation ambition. This is borne out in existing carbon pricing regimes, where 25 out of the 34 revenue generating CPMs apply more than one revenue recycling approach.

When determining the best combination for their jurisdiction, policymakers should be conscious of the inherent benefits and drawbacks of each measure. For instance, using carbon pricing revenues to compensate covered sectors or the general public may raise public support for the CPM, but risks reducing the impact of the carbon price signal. Channelling the revenue to the general budget offers the most flexibility on spending, but the lack of spending transparency makes this option less likely to be widely supported, which could limit appetite and ambition for mitigation.

When combined, the aspects of this study help to illustrate the benefits and drawbacks of different methods of revenue recycling. Specifically, we have assessed each of the revenue recycling approaches against the three most important factors identified in the survey – a) direct financial benefits, b) transparency and c) emissions reduction potential – to derive a combined acceptability rating (Figure II).

Global climate mitigation efforts need to increase significantly to limit global temperature rise to well below 2°C, and carbon revenue recycling offers opportunities to increase emission reductions without compromising support. In the short term, this could be done by supporting mitigation activities within covered sectors, such as grants to help covered entities carry out energy efficiency measures, or to switch to less emission-intensive fuels. However, where these measures affect industries covered by an Emissions Trading System (ETS), the ETS cap needs to be tightened to account for the additional savings from the measures, otherwise the support will simply make achieving the cap easier. Alternatively, recycling the revenue to reduce

FIGURE II Overview of stakeholder acceptability and further considerations for the various carbon revenue recycling approaches

Use of revenues		Direct financial benefit for covered company	Transparency of revenue use	Emission reduction potential	Acceptability to covered entities
General government spending	Adding revenues to the general budget				
	Earmarking of revenues for specific, non-mitigation related activities				
Compensation for the carbon cost burden	Compensating businesses				
	Compensating the general public				
Mitigation activities in sectors covered by the CPM	Directly supporting mitigation activities for covered entities				
	Indirectly supporting mitigation activities for covered entities				
Mitigation activities in sectors not covered by the CPM	Directly and indirectly supporting domestic mitigation activities for uncovered entities				
	Supporting mitigation activities abroad in countries without CPMs				

High    

Medium    

Low    

carbon costs could allow the CPM to become revenue neutral while raising mitigation ambition through tighter ETS caps and higher carbon tax rates.

In the long term, it will be important to address the problem that the approach most effective in mitigating emissions - recycling revenues to non-covered sectors - is also the least popular. More research and outreach

to stakeholders must be done to communicate the opportunity costs, and explore how attitudes and CPM design can be optimised to mitigate emissions most effectively, while promoting acceptance and ambition among industry and the public. This might be achieved through communication, or by blending approaches to help garner support from covered entities to maximise mitigation outcomes.

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1 | REDUCING EMISSIONS BY PRICING CARBON: THE RELATIONSHIP BETWEEN STAKEHOLDER ACCEPTABILITY AND REVENUE RECYCLING

Carbon pricing mechanisms (CPM), such as emissions trading systems (ETS) and carbon taxes (CT), are increasingly popular policy tools designed to reduce greenhouse gas (GHG) emissions in the most cost effective manner. They are widely recognised as an economically efficient tool to help mitigate emissions, with 67 CPMs implemented, or scheduled for implementation, in a range of different countries and subnational jurisdictions around the world.

Carbon pricing schemes work by placing a direct cost on each emission produced. Companies covered by the schemes need to pay for each tonne of CO₂ they emit, either through the purchase of an allowance in an ETS, or through payment of a carbon tax, thereby incentivising them to invest in lower emitting activities. The increase in CPMs has led to a corresponding increase in the revenues raised by these systems. The World Bank estimates that in 2016, governments around the world raised about US\$22 billion in carbon pricing revenues from the sale of allowances, direct payments to meet compliance obligations, and carbon tax receipts.

There is a relationship between the carbon price paid by covered entities and their perception of the policy - the higher the price an entity must pay to cover its emissions, the harder it will be to build support for the CPM. Support from entities covered by a CPM has a significant impact upon the CPM's durability and effectiveness.⁵ With the widespread application of CPMs and a need to ratchet up global mitigation to avoid the worst effects of dangerous climate change, policymakers must strike the balance between increasing the ambition of the CPM and maintaining support from entities covered by the mechanism. There is a real danger that as mitigation ambition is increased through a higher carbon price, the level of support from covered entities falls, potentially undermining the effectiveness of the CPM.

The way that revenues raised by the CPM are recycled back into the economy can affect stakeholder acceptance. Changing the way revenues are spent is one approach that could be used to counter possible stakeholder objections. As such, understanding the relationship between stakeholder perceptions of revenue recycling is fundamental to the success of the policy, especially if those revenues could be used to further reduce GHGs.

Carbon revenue can be spent or 'recycled' in a number of ways, including investment in efforts to further reduce GHG emissions. This is especially important considering the Paris Agreement has committed countries to the ambitious goal of limiting global temperature rise to well below 2°C.

Existing research around carbon revenue recycling has mainly focused upon the potential to reduce the cost impact of carbon pricing on industry. Recycling revenues directly to industry can go a long way in garnering support for the CPM and potentially paving the way for more ambitious targets, however it does not necessarily lead to additional emission reductions beyond those targeted by the CPM itself. There are a range of other options to recycle carbon revenues which can lead to emission reductions that are additional to those that would be achieved by the carbon pricing scheme. The key objective of this research is to explore how carbon revenue recycling mechanisms could be designed to both maximise emission reductions and facilitate support from industry (covered entities).

In chapter 1, we provide a high-level overview of the current global carbon pricing landscape and the relationship between CPM design, revenues, mitigation outcomes and stakeholder acceptability. In chapter 2, we set out the broad categories of revenue recycling approaches available and map out the key implementation impacts of revenue recycling approaches, with a focus on increased emission

⁵ See e.g. Tax Policy Center, *How To Use Carbon Tax Revenues*, 2016 or Canada Eco-Fiscal Commission, *Choose Wisely: Options and Trade-Offs in Recycling Carbon Pricing Revenue*, 2016

reductions and acceptability by covered private sector entities, to create an impact matrix. Chapter 3 provides an overview of the current situation with respect to carbon revenue recycling approaches used around the world. The findings from the global analysis are overlaid with the results of a wide-reaching online survey of covered entities in chapter 4 to assess the real world relationship between practice and stakeholder opinions.

Chapter 5 concludes this study by detailing the key findings of the study. The chapter ends with reflections on the merits of potential revenue recycling approaches that balance increased emissions reduction with covered entity support.

The results of this study should provide new insights into the likely impacts of and the potential support for the different revenue recycling approaches. This should allow policymakers and the entities likely to be covered by such policies to:

- » better understand and identify the revenue recycling approaches that provide the impacts most important to them;
- » better understand which revenue recycling approaches are most (least) supported by covered entities and if these views differ amongst and across the covered entities (e.g. between industry sectors); and,
- » through the above, identify what is most important to covered entities when it comes to the question of how to spend carbon revenues.

1.1 Carbon Pricing Mechanisms

CPMs are designed to encourage emitters to include the costs of carbon in their investment decisions. Higher emitting activities will incur a higher cost over their lifetime when compared to lower emitting activities. This incentivises GHG emission reductions and helps to mobilise investment in clean technology and market innovation, fuelling new, low-carbon drivers

of economic growth.⁶ Using CPMs as policy tools to reduce emissions is often favoured by industry over traditional command and control policies (e.g. building regulations) as they allow companies the flexibility to achieve reductions in the most cost effective way, rather than mandating specific measures or approaches.

Over 42 national and 25 subnational jurisdictions are setting a price on carbon (Figure 1).⁷ In terms of emissions coverage, active CPMs (and those scheduled for implementation) cover about half of the total GHG emissions from their jurisdictions. This represents a total annual coverage of about 8 gigatonnes of carbon dioxide equivalent (GtCO₂e) or about 15 percent of annual global GHG emissions.⁸

Carbon pricing seeks to capture the external costs of GHG emissions and tie them to their sources through a price. A price on carbon helps shift the burden for the damage due to GHG emissions from the general public back to those who are directly responsible for it. This study focuses on two forms of CPM which generate revenues:

- » Carbon taxes, which requires covered entities to pay a price per tonne of carbon dioxide equivalent emitted
- » ETS, which requires covered entities to purchase allowances to partially or fully cover their GHG emissions

The number of carbon pricing mechanisms is likely to grow, as 81 of the 169 countries that submitted National Determined Contributions (NDC) as part of the Paris Agreement, declared that they are considering using a CPM to meet their mitigation targets.⁹

Alongside the growth in CPMs, carbon pricing revenues have grown substantially in recent years, rising from US\$16 billion in 2014 to US\$22 billion in 2016.¹⁰ As new carbon pricing mechanisms are introduced, ETS are

⁶ World Bank, *Carbon Pricing Dashboard*, 2017

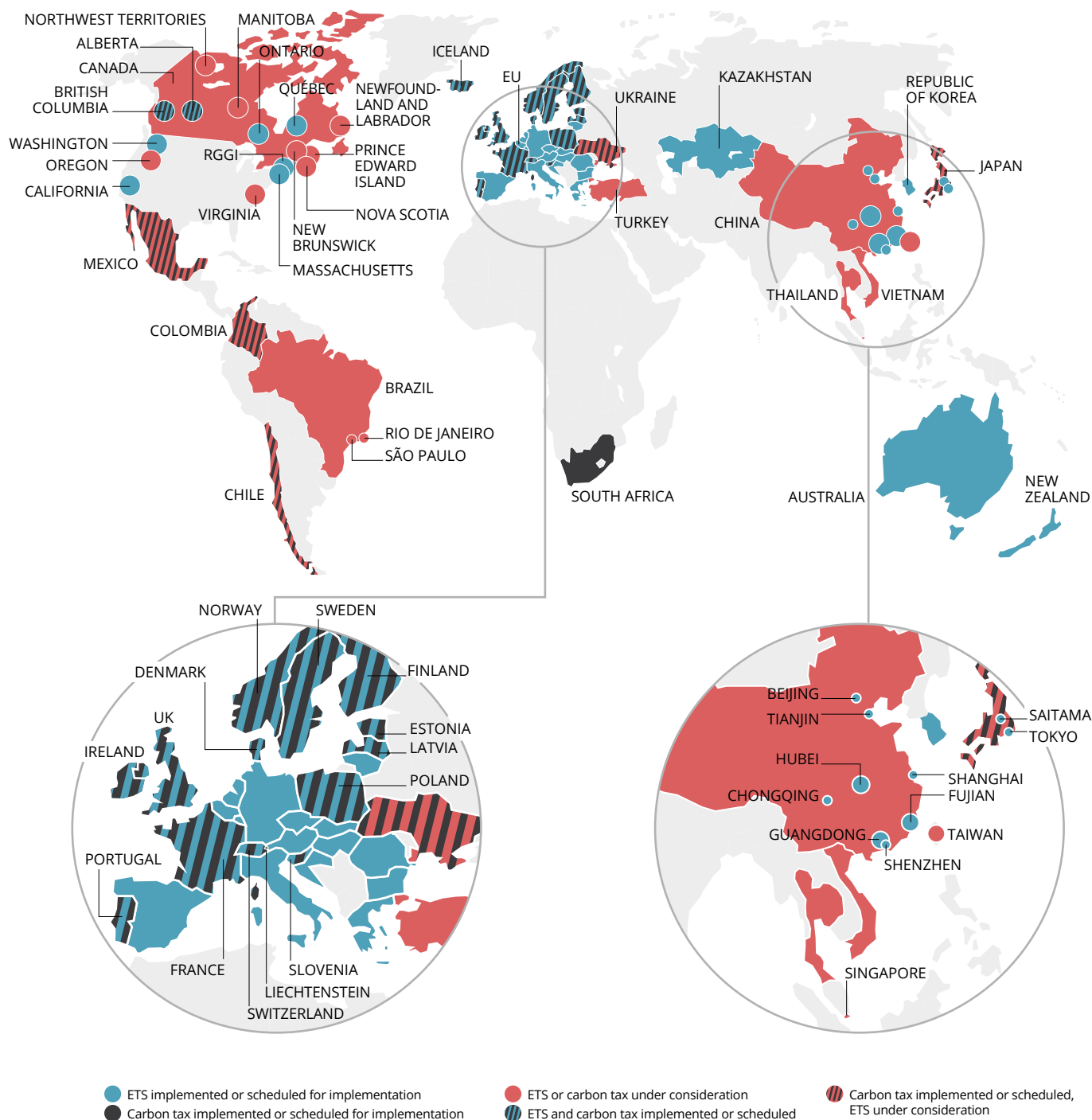
⁷ It is worth noting that some CPMs do not generate revenues and thus cannot bring about any additional emission reductions. For ETS, this is the case when emission allowances are freely allocated rather than auctioned which is a common feature of a pilot/early phase ETS. A carbon tax, in contrast, would normally always generate revenues – though there could be exceptions when many tax break options are offered, for example the South African carbon tax is likely to allow the use of emission offsets which effectively reduces tax obligations and thus also revenues. In the following analysis, we only distinguish actively between carbon tax and ETS revenues where it delivers valuable insights.

⁸ World Bank, *Carbon Pricing Watch*, 2017

⁹ World Bank, Ecofys and Vivid Economics, *State and Trends of Carbon Pricing 2017*, 2017. The study used the 2017 report as it represented the most up to date source of data at the time of the analysis.

¹⁰ There was a decrease in revenues from 2015 - 2016, due to the lower carbon prices in the EU ETS and the Regional Greenhouse Gas Initiative and a large amount of unsold allowances in California and Québec, as well as a drop in revenues from some carbon taxes, in particular, the UK carbon price floor.

FIGURE 1 Map of global implemented and planned Carbon Pricing Mechanisms as of January 2018



Source: World Bank, Ecofys and Vivid Economics, *State and Trends of Carbon Pricing 2017*, 2017.

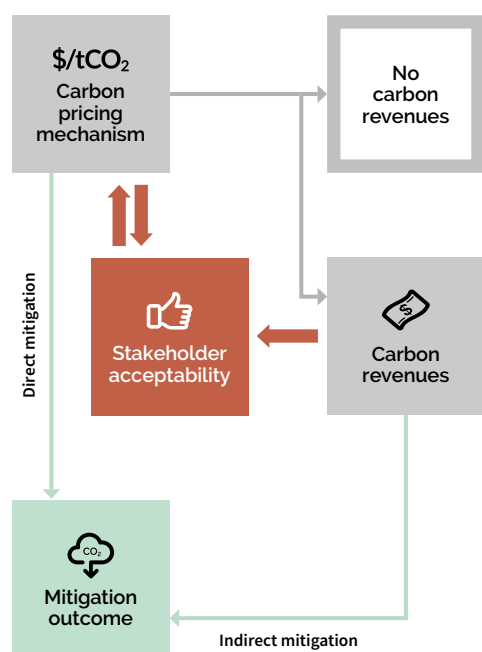
covering more and more sectors and carbon tax rates are rising. Therefore, policymakers are confronted with complex decisions about how best to spend the carbon revenue to bolster the environmental objectives of the CPM and maintain the support of the impacted organisations.

Research by IEA and IRENA estimates that carbon prices in all developed countries should reach US\$120/tCO₂e by 2030 and need to rise to US\$190 by 2050 in order to limit global warming to 2°C.¹¹

1.2 Interactions between mitigation, acceptability and revenue recycling within a carbon pricing mechanism

By putting a price on the emission of GHGs, CPMs incentivise mitigation actions. We refer to this as direct mitigation (Figure 2). Logically, the higher the carbon price, the greater the incentive to reduce emissions and fewer GHGs will be emitted. Putting a price on carbon, however, creates a cost to industry and if the cost is passed on, this burden will affect other sectors, ultimately raising prices for consumers. As can be expected, this increase in cost reduces public and industry support for the CPM, which in turn could adversely impact its durability. Simply raising carbon prices therefore, while effective in reducing emissions in the short term, may create sufficient negative sentiments from covered entities which jeopardises the overarching aim of reducing emissions sufficiently to limit global temperature rise to well below 2°C.

FIGURE 2 Interactions between CPM design, revenues and mitigation outcome



Yet, as shown in Figure 2, there is a third variable that affects both the mitigation outcome and the stakeholder acceptability for revenue generating CPMs: how the carbon revenue is recycled. An appropriate carbon revenue recycling approach could increase both the mitigation outcome of the CPM and the level of stakeholder support for the CPM.

Carbon revenue recycling can impact the mitigation outcome of the CPM in two major ways:

1. Carbon revenues could be used to offset some of cost burden to stakeholders due to the carbon price. This then allows for a higher carbon price to be set without overburdening industry. We refer to this as direct mitigation.
2. Carbon revenues could be used to support further emission reductions activities especially those in sectors not covered by the CPM. This then creates emission reductions beyond those of the CPM allowing for the achievement of mitigation goals without raising the carbon price. We refer to this as indirect mitigation.

Of the two mitigation pathways mentioned above, we believe that channelling carbon revenues to indirect mitigation holds the greatest potential to help increase global mitigation ambitions but has yet to be the focus of in-depth research.

The way in which a CPM's revenues are used can influence the acceptability by covered entities.¹² We determine 'acceptability' by how receptive and cooperative covered entities are to the revenue recycling approach, which translates into the level of support they exhibit for the CPM and associated emission mitigation targets.

A literature review of existing studies revealed that stakeholder acceptability for a CPM can only be predicted broadly and is very dependent upon the specific design elements of the CPM – including how the revenues are recycled. Acceptability of a CPM generally depends on the carbon price level set and on how effective covered entities perceive the mechanism to be in reducing emissions.¹³ Perhaps not surprisingly, spending carbon revenues in a way that benefits stakeholders in some way is generally expected to receive strong support from the likely beneficiaries.

The next section examines the existing categories of revenue recycling approaches and their expected impacts on stakeholder acceptability and further mitigation.

12 Baranzini, A., & Carattini, S. (2017). Effectiveness, earmarking and labelling: testing the acceptability of carbon taxes with survey data. *Environmental Economics and Policy Studies*, 19(1), 197-227.

13 Bristow, A. L., Wardman, M., Zanni, A. M., & Chintakayala, P. K. (2010). Public acceptability of personal carbon trading and carbon tax. *Ecological Economics*, 69(9), 1824-1837.

2 | CARBON REVENUE RECYCLING APPROACHES

Revenue recycling is the term given to the process of using (spending) carbon revenues. Specifically, the term ‘recycling’ refers to the concept where the revenues are fed back into the system to the benefit of the jurisdiction. There is no common categorisation system for carbon revenue recycling approaches, but many such revenue recycling options share common characteristics with respect to the end uses and end users. Therefore, we proposed to study revenue recycling options from this perspective and classify them into four broad approaches:

Categorising revenue recycling approaches allows us to analyse their application across the world and the attitude of covered entities. An overview of each revenue recycling approach and their expected impacts on acceptability and mitigation increases are provided in this section, please refer to Annex I for additional details on each revenue recycling approach.

1.



- a. **Adding revenues to the general budget:** Revenues are directly transferred to the treasury without any form of hypothecation of where specifically these revenues should be spent.
- b. **Earmarking of revenues for specific, non-mitigation related activities:** Revenues are earmarked for spending on specific activities which are not specifically targeted at reducing emissions, for example, spending on climate change adaptation (domestically or abroad) or development activities.

2.



- a. **Compensating businesses:** Through direct payments or reduced taxes to domestic businesses, revenues are used to offset the cost burden on businesses due to the CPM or to stimulate the overall economy.
- b. **Compensating the general public:** Through direct payments or reduced taxes to domestic citizens, revenues are used to offset the cost burdens on the general public due to the CPM or as a share of the CPM's proceeds.

3.



- a. **Directly supporting mitigation activities for covered entities:** Revenues are spent on measures that aim to directly reduce or incentivise the reduction of GHG emissions from industrial sectors already covered by the CPM. This is different from compensation, as support is dependent upon predetermined mitigation actions.
- b. **Indirectly supporting mitigation activities for covered entities:** Revenues are spent on measures that aim to reduce GHG emissions from the industrial sectors already covered by the CPM by targeting activities outside of the covered sectors.

4.



- a. **Directly and indirectly supporting domestic mitigation activities for uncovered entities:** Revenues are spent on measures that aim to reduce domestic GHG emissions which are outside the scope of the CPM. This differs from indirect support to covered sectors, as the mitigation outcomes would not overlap with emissions from covered sectors.
- b. **Supporting mitigation activities in other jurisdictions:** The spending of revenues on measures that aim to reduce GHG emissions in other jurisdictions which are outside the coverage of any existing CPMs.

2.1 General government spending

The ability to further reduce emission reductions beyond the CPM depends on whether the government spends the revenue on additional mitigation activities. Carbon revenue sent to the general budget could be spent on a variety of activities with no links to environmental issues. Considering that there is a lack of assurance that funding would be spent on mitigation activities, we assume that this approach is less likely than others to achieve emission reductions beyond those incentivised directly by the CPM.



Actual Example: UK Carbon Price Floor (CPF)

Revenues (2016): US\$1,168.9 million

The UK Carbon Price Floor (CPF) aims to support the price signal provided by the EU ETS by underpinning the price of carbon at a level that incentivises low-carbon investments. The CPF applies to the UK power generators already covered by the EU ETS. As suggested by the name, the CPF sets a minimum price level for the cost of emitting a tonne of CO₂ equivalent of GHGs. If the price for EU ETS allowances falls below this level, businesses have to pay the difference.

The UK Government has generally opposed earmarking tax revenues for purposes directly related to their source, on the grounds that spending priorities should not be determined by the way in which money is raised.¹⁴ In line with this tradition, CPF revenues are largely retained by the UK Treasury.

For other examples of this approach and further analysis, see the full case study in Annex II.

2.2 Compensation for carbon costs¹⁵

Compensation approaches generally incorporate designs that channel carbon revenue to offset existing taxes, such as taxes on employment, which could support wider policy aims, such as increasing employment or promoting certain goods or services. There may be knock on effects that indirectly result in reduced emissions. For example, a reduction in commercial taxes may mean some businesses have more funds to spend on decarbonisation. In addition, compensation could result in further emission reductions if it increases stakeholder buy-in for higher carbon tax rates or tighter ETS caps. Based on these assumptions, we conclude that the use of carbon revenues to compensate for carbon costs can potentially lead to additional emission reductions.

Actual Example: EU Emissions Trading System (ETS) and German Energy and Climate Fund (EKF)



Revenues (2016): US\$4,214.6 million

The EU ETS is the cornerstone of the EU's climate policy. It was the world's first cap-and-trade programme and is currently in its third phase (2013-2020). All German EU ETS revenues are directly allocated to an energy and climate fund (EKF). Despite a focus on climate and energy, the EKF also funds compensatory measures. As such, more than 20% of the revenues (€244 million / US\$275 million) have been used in 2015 to provide transitional support to industry by compensating energy intensive industries for the indirect carbon cost due to higher energy prices.¹⁶

For other revenue uses under this mechanism and further analysis, see the full case study in Annex II.

¹⁴ House of Commons Library, United Kingdom, *Hypothecated Action*, 2011.

¹⁵ On the compensation approach, please note that as the focus of this study lies on the use of actual CPM revenues. Free allowance allocations, tax exemptions and other direct rebates that decrease the revenue basis are not considered as compensatory revenue use. Please refer to the Annex for further details.

¹⁶ German Federal Ministry for Economic Affairs and Energy (BMWi), *2017 Draft Budget*, 2017.

2.3 Mitigation (covered sectors)

The use of revenue for mitigation activities in industry sectors already covered by the CPM is usually targeted directly at facilitating or accelerating the decarbonisation of the sector. This is done through, for example, research and development grants or tax reductions for certain low carbon equipment. However, whilst the revenue is used to support decarbonisation activities, it may not lead to an overall decrease in reductions from the sector. To achieve emission reductions beyond what would be achieved under the CPM, the emissions reduction targets for the CPM must account for any additional expected reductions from measures funded by the recycled revenue. Otherwise, the measures will simply facilitate the reductions which would otherwise accrue under the CPM. This could be done at the start of the CPM scheme, or post-hoc through an adjustment to targets. For example; under an ETS, a cap is set in line with the targeted emission reductions from the sector. All the emission reduction measures taken by covered entities will help them meet the sector target. If some of these measures are supported by revenue raised by the scheme, it will reduce the costs of meeting the targets, but not lead to a decrease in emissions.

▶ **Actual Example: Québec Cap-and-Trade (C&T) System**

Revenues (2016): US\$336.1 million

The Québec Cap-and-Trade System's objective is to cut GHG emissions in the highest emitting sectors by promoting energy efficiency, as well as the use of renewable energy. The C&T system aims to foster innovation through the emergence of new low-carbon drivers for economic development. All revenues raised through the scheme are allocated to the Québec Green Fund to finance the implementation of the province's 2013-2020 Climate Action Plan. Almost all of the actions under this plan for which emissions reduction potentials have been quantified will be achieved in the transport, buildings and industry sectors, i.e. sectors covered by the C&T system.

For other revenue uses under this mechanism and further analysis, see the full case study in Annex II.

Recycling revenue to sectors covered by the CPM can help those organisations affected to meet their targets and potentially open the door to strengthening caps or increasing the carbon tax rate, which would in turn increase the overall emissions reduction.

2.4 Mitigation (sectors not covered by the CPM)

This revenue recycling approach earmarks spending of carbon revenue on activities that would reduce emissions in sectors not covered by the original CPM. As a result, this approach ensures spending is targeted at achieving the scheme's objectives, but does not have as much risk on duplicating efforts because the activities funded are not included in any CPMs. Therefore, from the design we assume recycling revenues into mitigation activities in sectors not covered by the CPM would result in further emission reductions.

Actual Example: California Cap-and-Trade Program (CTP)

Revenues (2016): US\$901.1 million

The California Cap-and-Trade Program seeks to create incentives for technological innovation and investments in clean technologies. These should spur the reduction of the state's emissions to 1990 levels by 2020 and achieve an 80% reduction from 1990 levels by 2050.

Revenues are fed into a special fund, the Greenhouse Gas Reduction Fund (GGRF). Almost half of the emission reductions to be achieved through the GGRF before 2020 will be achieved in the waste, agriculture, forestry and other land use sectors, i.e. sectors not covered by the CTP. In addition, the GGRF is expected to achieve substantial emission reductions beyond 2020, which mainly will be achieved through a new interstate high-speed rail system from 2025 onwards. As exact caps have not been set yet for the years beyond 2020, these caps could consider emissions reduction impacts of climate action funded through the GGRF to ensure that these emission reductions are additional to those incentivised by the CTP itself.

For other revenue uses under this mechanism and further analysis, see the full case study in Annex II.

2.5 Summary of impacts

Based upon the analysis of the design features of revenue recycling approaches, we can anticipate the effects of CPM design that are likely to be most relevant to policymakers in terms of reducing emissions.

Figure 3 maps out the expected relationship between revenue recycling approaches and potential emission reductions.

Stakeholder support may be independent of the emissions reduction impact: When the revenue recycling approaches are mapped against potential stakeholder acceptability, the existing literature indicates that stakeholder support may be independent of the emissions reduction impact, as both general government spending and mitigation in sectors not covered by CPMs appeared to be less favourable to covered entities (Figure 4). This may be because, unsurprisingly, companies tend to support policies that directly benefit their bottom line. Revenue recycling approaches that do not bring direct benefits to the covered entities are unlikely to be popular. Whilst this is true in the short term, policymakers should explore whether better communication about the long-term benefits of recycling

revenue to sectors outside of the CPM (lower cost overall mitigation reducing the risk of stricter regulation on the target sectors), might lead to covered entities being more supportive of these approaches.

FIGURE 4 Expected trade-off between emissions reduction and stakeholder acceptability

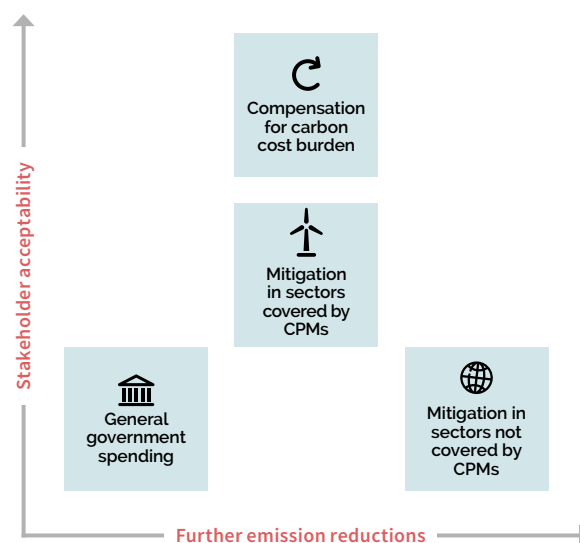
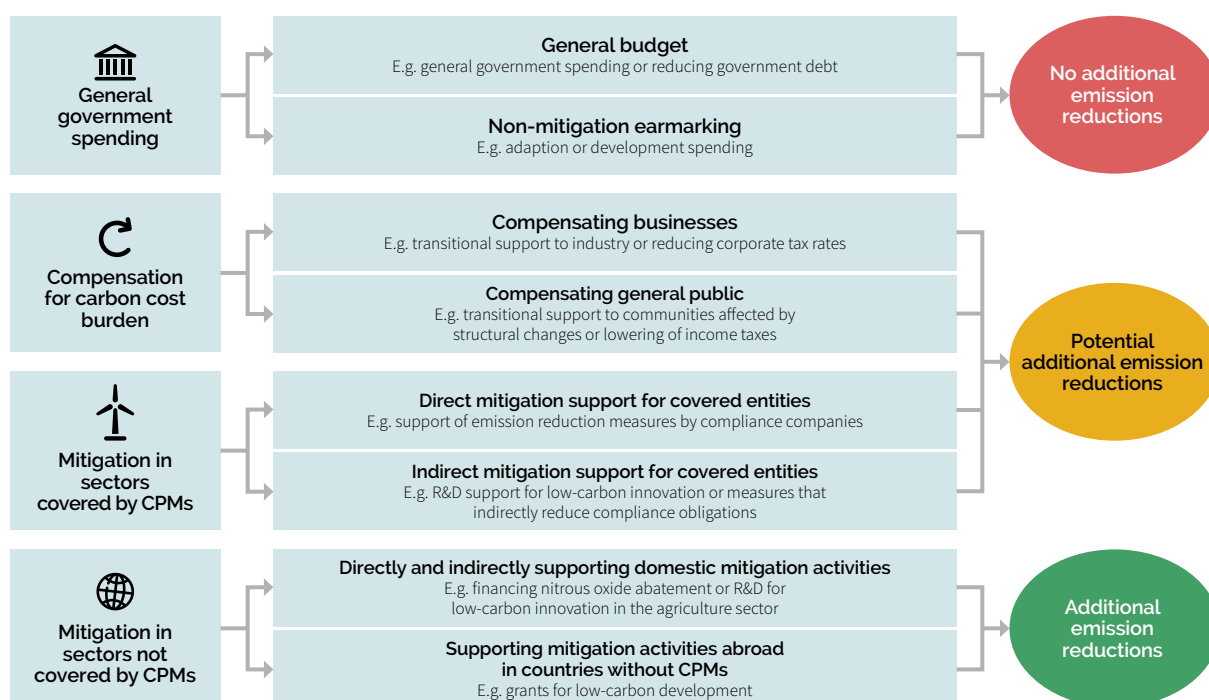


FIGURE 3 Carbon revenue recycling approaches and their emissions reduction effects



3 | REVENUE RECYCLING IN PRACTICE

Key takeaways

- » General government spending is by far the most widely applied revenue recycling approach and is applied in some fashion by over 70% of the revenue generating CPMs, despite it being the approach least likely to generate additional emission reductions.
- » Just under half of the revenue generating CPMs recycle revenue by supporting mitigation activities in industry sectors not already covered by the CPM. Of these almost all CPMs recycle revenue domestically. Only 9% of CPMs recycle revenue internationally, despite the fact that this approach is the least costly way to generate further emission reductions.
- » A blend of revenue recycling approaches could be applied to tailor the approach to the particular objectives and requirements of the CPM jurisdiction. This combination approach is taken by 73.5% of revenue generating CPMs

This section explores the different approaches to recycling revenue applied by CPMs. It systematically examines the details of every national and sub-national CPM. Further details of how different CPMs deploy the revenue raised can be found in Annex II.

3.1 General observations

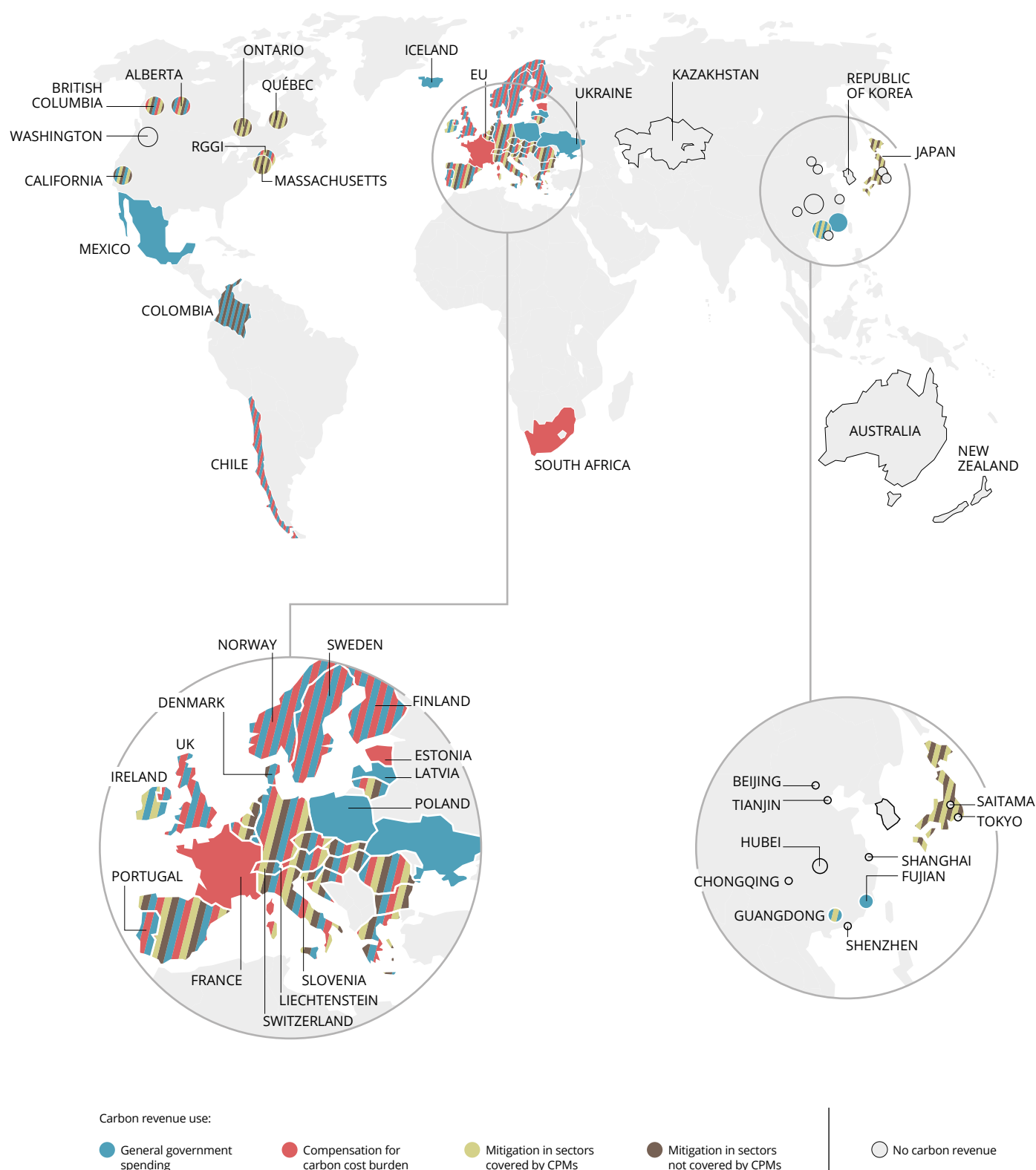
As of January 2018, there are 47 Carbon Pricing Mechanisms, covering 67 jurisdictions, in place or scheduled for implementation.¹⁷ Based on our

analysis, more than a quarter of these CPMs (28%) do not yet generate any revenue (Figure 5). However, this figure is higher in middle income countries¹⁸ where around half of the mechanisms (54%) are not revenue raising. A key factor for this is that most ETs are still in early phases with the majority (if not all) allowances being allocated or free, which effectively means no revenue for the scheme's administrators.

¹⁷ World Bank, Ecofys and Vivid Economics, *State and Trends of Carbon Pricing 2017*, 2017.

¹⁸ Based on World Bank country classifications by income level.

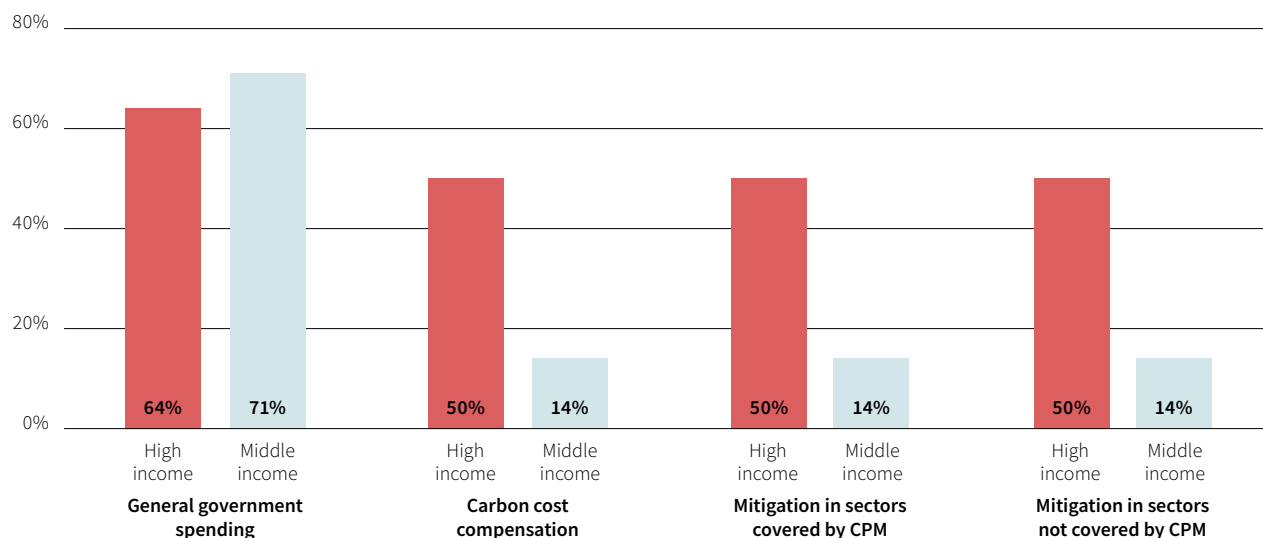
FIGURE 5 Active CPMs around the world which recycle carbon revenues



Note: This is an adaptation of an original work by The World Bank. Responsibility for the views and opinions expressed in the adaptation rests solely with the author or authors of the adaptation and are not endorsed by The World Bank.

Source of original work: World Bank, Ecofys and Vivid Economics, *State and Trends of Carbon Pricing 2017*, 2017.

FIGURE 6 Proportion of CPMs applying various revenue recycling approaches (No. of CPMs with respective approach/Total no. of revenue generating CPMs) - by jurisdiction's income level



Of the CPMs that do recycle revenue, there are a number of general overarching trends:

- » **Most CPMs combine different approaches to recycling revenues to balance various priorities;** nearly three quarters (71%) of the revenue generating CPMs use a combination of different revenue recycling approaches.
- » **When it comes to how revenues are spent, there was a marked difference between national and subnational CPMs** and the level of development of the CPM's host nation (Figure 6).
- » Revenues raised by national CPMs, especially in middle income countries, are less likely to be spent on mitigation activities than general government

spending (Figure 6 and Figure 7), and much more likely to go to general government spending or compensation for carbon costs.

- » Conversely, CPMs that have been developed at a sub-national level focus much more on mitigation activities, rather than on general government spending and compensation (Figure 7).
- » While carbon tax revenues are more likely to be spent on carbon cost compensation, revenues from an ETS are more likely to be used to support mitigation activities (Figure 8). It is worth noting, however, that an ETS offers the possibility to compensate companies through free allowance allocations which usually compensate businesses in emission-intensive sectors to avoid carbon leakage.

FIGURE 7 Proportion of CPMs applying various revenue recycling approaches (No. of CPMs with respective approach/Total no. of revenue generating CPMs) - by jurisdictional level

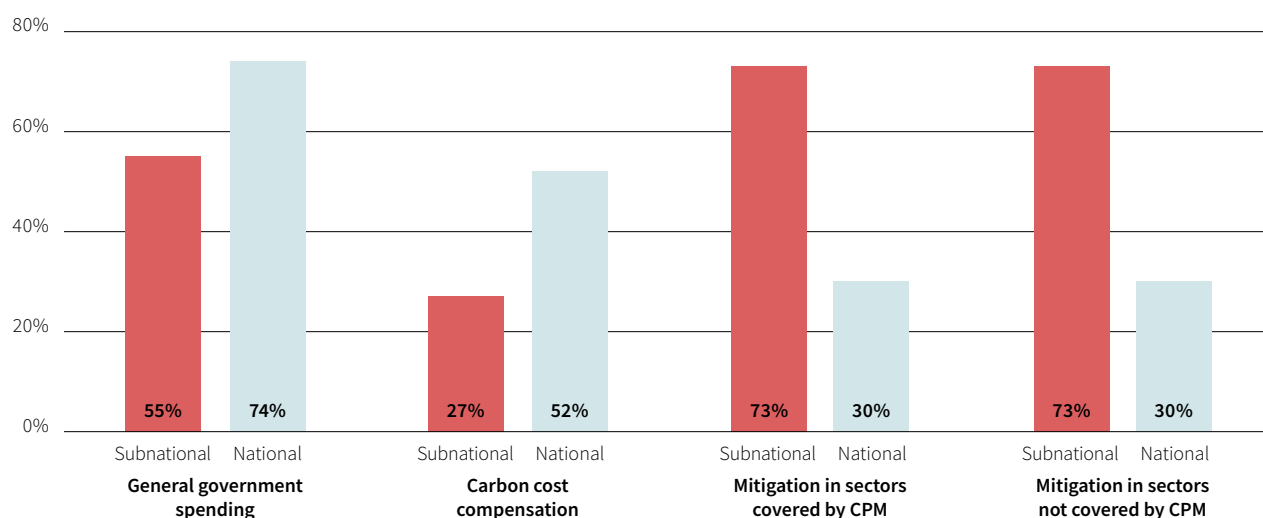
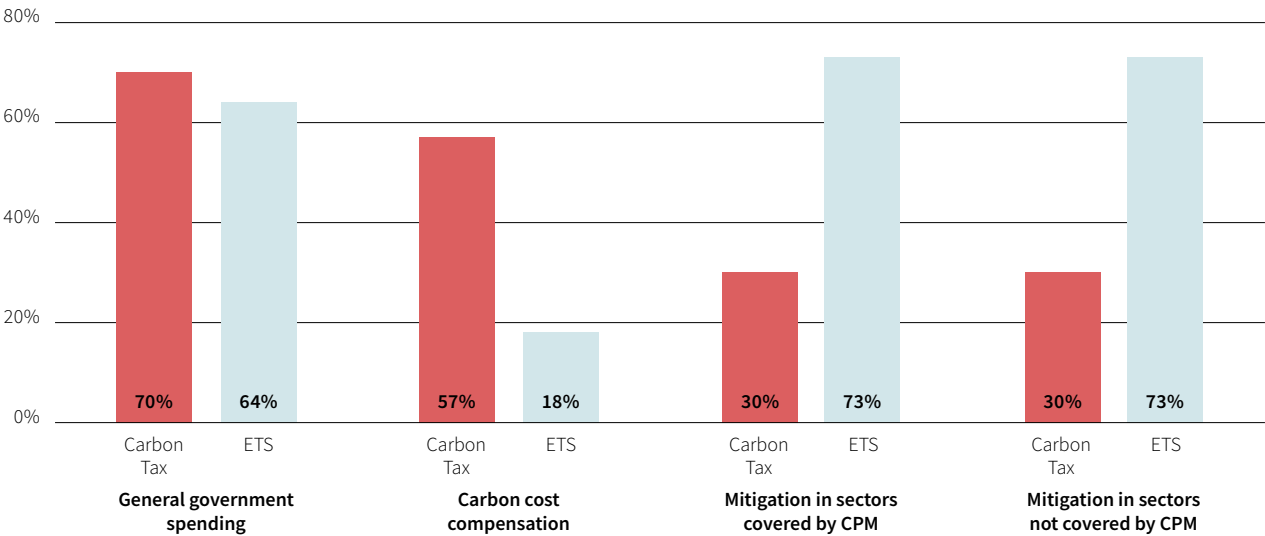


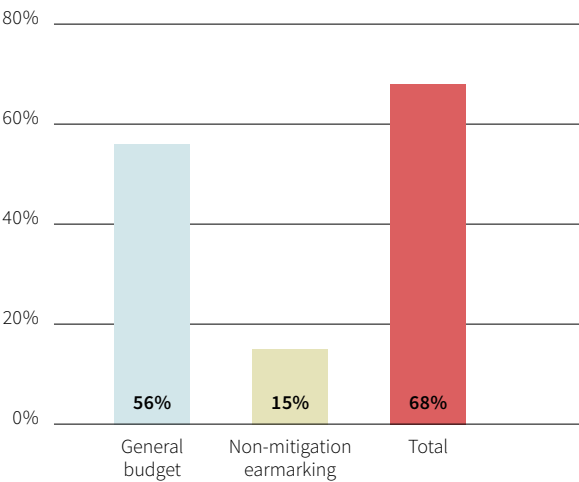
FIGURE 8 Proportion of CPMs applying various revenue recycling approaches (No. of CPMs with respective approach/Total no. of revenue generating CPMs) - by CPM type



The key trends found for each broad revenue recycling category are presented in more detail in the following subsections, please note that the percentages of the bars in the charts do not add up to 100% as some jurisdictions use CPM revenues for multiple purposes.

3.2 General government spending

FIGURE 9 Proportion of CPMs recycling carbon revenues through government spending

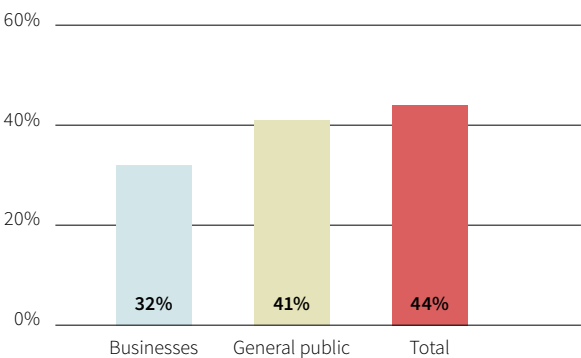


Of the four broad revenue recycling approaches, the most common approach is general government spending. More than two thirds of revenue generating CPMs apply this approach either exclusively or in combination with other approaches.

In this framework, we categorise ‘General government spending’ as inclusive of both general budget spending and spending earmarked for causes beyond the scope of the CPM. General budgeting is the most commonly applied revenue recycling option, used by over half of the existing revenue generating CPMs (Figure 9). This approach is particularly popular in middle income countries (Figure 6) and in mechanisms on the national level (Figure 7).

3.3 Compensation for carbon costs

FIGURE 10 Proportion of CPMs recycling carbon revenues through compensating carbon pricing costs



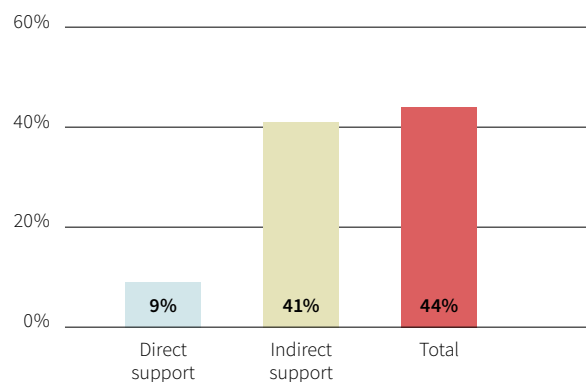
Carbon cost compensation is an approach wherein the revenue generated is used to compensate the public or businesses for carbon costs through, for example,

a reduction in employment taxes.¹⁹ This compensation may counteract, for example, higher costs of fuel for businesses and consumers. 44% of CPMs deploy some form of compensation approach, with compensation for the general public slightly more prevalent than compensation for businesses (Figure 10). However, two thirds of the CPMs that take this approach provide compensation to both groups.

This compensation approach is more likely to be associated with schemes applying a carbon tax, as opposed to an ETS. In jurisdictions employing an ETS, the revenues tend to be used to support mitigation activities in covered entities (Figure 8).

3.4 Mitigation (covered sectors)

FIGURE 11 Proportion of CPMs recycling carbon revenues through mitigating emissions in industry sectors already covered by the CPM

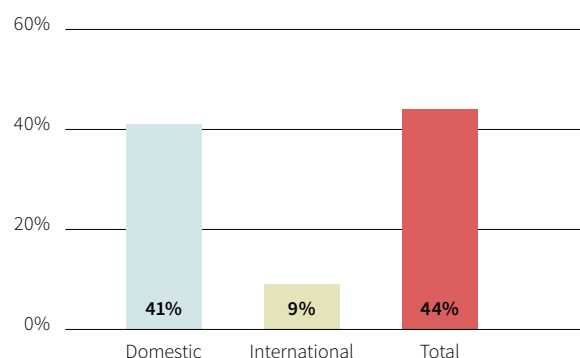


The mitigation for covered sectors approach – the use of carbon revenue to support further mitigation activities in sectors covered by a CPM such as supporting research and development – is used by 44% of CPMs. However, most jurisdictions pursue this through indirect means (Figure 11), e.g., by supporting households and companies to improve energy efficiency, which reduces the carbon cost burden for electricity generators and consumers.

In general, the use of revenues for mitigation activities in sectors covered by the CPM is more prevalent in high income countries (Figure 6) and in ETSs (Figure 8).

3.5 Mitigation (sectors not covered by the CPM)

FIGURE 12 Proportion of CPMs recycling carbon revenues through mitigating emissions in sectors not covered by the CPM



Carbon revenues are used by 44% of CPMs to support mitigation activities in sectors and/or jurisdictions outside of the CPM. There is a strong preference from jurisdictions to recycle this revenue domestically (41% of CPMs) rather than by supporting international projects (9%) (Figure 12). Unsurprisingly, these jurisdictions are all high income, which is also reflected in the general popularity of this approach among high income jurisdictions (Figure 6).

One possible explanation for the limited uptake of international mitigation is that international mitigation may jeopardise the strength of domestic carbon prices. This form of revenue recycling covers the use of international offsets in a CPM. As such, this trend is inevitably linked with the state of the international carbon market. Currently in the international carbon market there is an oversupply of emission allowances and offsets. This has led to price depreciation and concerns that use of international credits would cause collapse of domestic carbon prices. Thus, the large difference in the number of CPMs recycling revenue domestically as compared to internationally may be a reflection of CPM administrators' concern with protecting the domestic carbon price.

¹⁹ For the purposes of this study we do not consider free allocation of allowances or reductions in carbon taxes, as forms of revenue recycling. Whilst both are approaches to compensate covered entities for carbon costs, they reduce the intake of revenue rather than recycling revenue raised by the schemes.

4 | TESTING STAKEHOLDER ACCEPTABILITY

Key takeaways

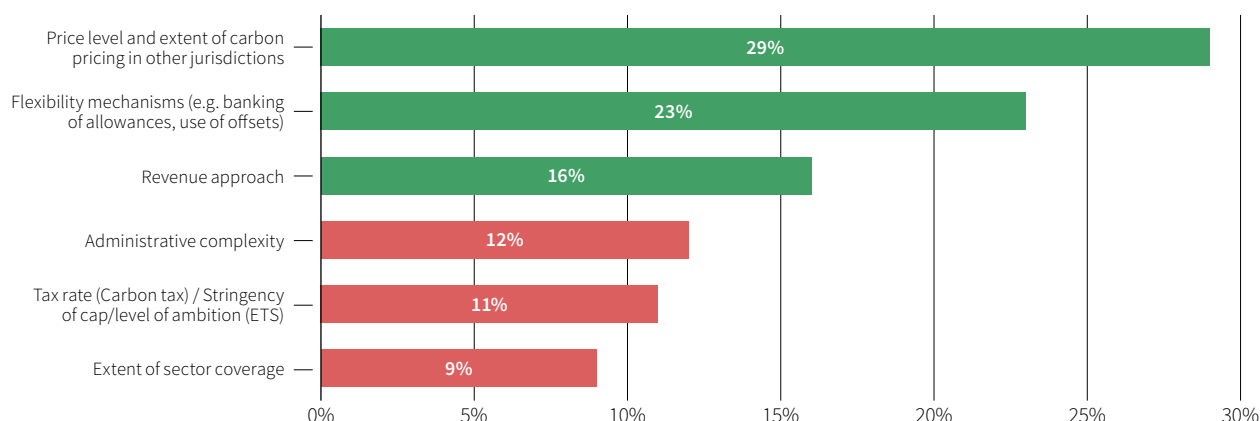
- » Direct mitigation support was the most popular approach for the surveyed entities covered by a CPM. However, indirect support, such as research and development, is more commonly applied by CPMs than direct support such as grants to reduce emissions from industrial processes.
- » The survey revealed that to covered entities, transparency was the most important design element for a revenue recycling mechanism. In spite of that preference, the least transparent mechanism of revenue recycling—general budget spending—is the most commonly applied.
- » A revenue recycling mechanism's capacity to generate further emission reductions was the second most important issue to the surveyed covered entities.
- » The survey of covered entities revealed a strong preference for carbon costs to be used to compensate business rather than the general public, however only a third of CPMs recycle revenues in this way.
- » Using carbon revenues to support mitigation in sectors not covered by the CPM (especially internationally) was the least popular amongst the surveyed covered entities.

This section seeks to identify stakeholders' acceptability of the different revenue recycling approaches identified in the previous section. Stakeholder perception of the effectiveness of a policy instrument will influence its success and durability.²⁰ To help identify the revenue recycling approaches and design elements favoured by covered entities, we conducted an online survey of entities affected by different carbon pricing schemes around the world. The survey questions were designed to test stakeholder views on a range of different elements of revenue recycling, and specifically how they related to the recycling approach's ability to increase emission reductions.

In total 65 responses were received of which 37 considered to be complete. Whilst the number of responses received is too small to draw definitive conclusions, they cover a wide range of jurisdictions, sectors and company sizes and therefore provide some interesting insights. Responses were received from companies with operations in 41 countries worldwide. More than half of the complete responses came from either the oil & gas or power sectors, but responses were also received from the industrial & manufacturing, chemicals, transport & logistics, metals & mining and IT & telecom sectors. The majority of respondents were large companies with more than 2000 employees, but roughly a quarter of responses were received from companies with less than 50 employees.

20 Baranzini, A., & Carattini, S. (2017). Effectiveness, earmarking and labelling: testing the acceptability of carbon taxes with survey data. *Environmental Economics and Policy Studies*, 19(1), 197-227.

FIGURE 13 Importance of carbon pricing mechanism features determining covered entity support (Rank order score)²¹

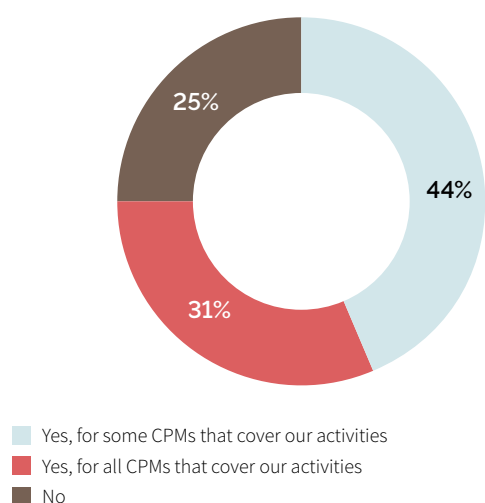


4.1 Importance of revenue recycling

When asked which issues shaped a company's perception of a CPM, unsurprisingly the price charged per tonne of carbon was the most important feature. The way that revenue is recycled was ranked among the top three issues shaping their view of a CPM's acceptability (Figure 13).

4.2 Awareness of revenue recycling

FIGURE 14 Awareness of revenue use from CPMs that cover a company's activities



In general, the results of the survey reveal that awareness of carbon revenue use is already high amongst business entities, and that the direct business impact is one of the most important factors determining their revenue recycling preferences (Figure 16). Almost half of the surveyed entities are already covered by CPMs and indicated that they are broadly aware what carbon revenues from their CPMs are used for (Figure 14).

4.3 Preference for approach

Of the revenue recycling options, unsurprisingly perhaps, the most popular was recycling revenue back to covered entities, either through direct support for mitigation, or compensation for increased costs (Figure 15). Conversely, the least popular options appear to be those which are least likely to channel the revenues back to covered entities. Specifically, the least popular option was to use carbon revenues to support mitigation or development activities for entities not subject to a carbon price. The results clearly indicate that the covered entities attach greater importance to revenue recycling impacts that provide them with direct financial benefits.

²¹ The rank order scores are weighted scores in which revenue uses selected first receive a higher value than the next ones in the list. This value is exponential and depends on the total number of revenue use options. For example, the most preferred option will receive a value of 64 (8²), the second most preferred option 49 (7²) and the third one 36 (6²). The values per response option are added together for all respondents and subsequently the percentages shown are calculated.

However, the survey responses indicate that businesses recognise the value of carbon pricing and are not only seeking to minimise their financial burden. For instance, businesses rank direct support for mitigation activities slightly higher than direct compensation. This indicates that achieving further mitigation results through revenue recycling is a key impact that covered entities look for and that there is a clear recognition that mitigation is an aim to be achieved as opposed to CPMs just being a compliance burden.

4.4 Importance of revenue recycling design elements

The transparency of the approach taken by the jurisdiction was rated as more important than receiving direct financial benefits from the mechanism (Figure 16). This is despite the importance companies place on seeing the revenues from CPMs recycled back to them either in the form of support for mitigation activities, or compensation (Figure 15).

Companies, especially those already covered by a CPM, value the emissions reduction potential of the approach. However, there is limited appetite for using carbon revenue to provide international development co-benefits. This seems to reinforce the earlier findings

that respondents prefer to see revenue used to support domestic projects rather than on international development issues.

Interestingly, there is a wide divergence in opinion between companies who are covered already by a CPM and those who are not yet covered when it comes to the question of using carbon revenue to compensate the public. Companies not yet covered by a CPM were more inclined to see revenues used to support low income households to cope with indirect carbon costs, than companies that are already covered. This may be explained by the fact that companies that are not yet covered by a CPM are more active in middle income countries, where income inequalities tend to be higher compared to high income countries. Alternatively, it could simply suggest that when faced with a real cost rather than a theoretical one, companies are less inclined to take an altruistic view about how that money is used.

The popularity of direct financial benefits is unsurprising and in line with general business interests in reducing their overall cost base. For example, when asked for reasons behind choosing their most preferred options, one of the respondents stated that “ensuring competitiveness and decreasing the risk of business closure and job losses” was key for the decision.

FIGURE 15 Revenue use options ranked by order of importance to covered and uncovered companies (Rank order score)

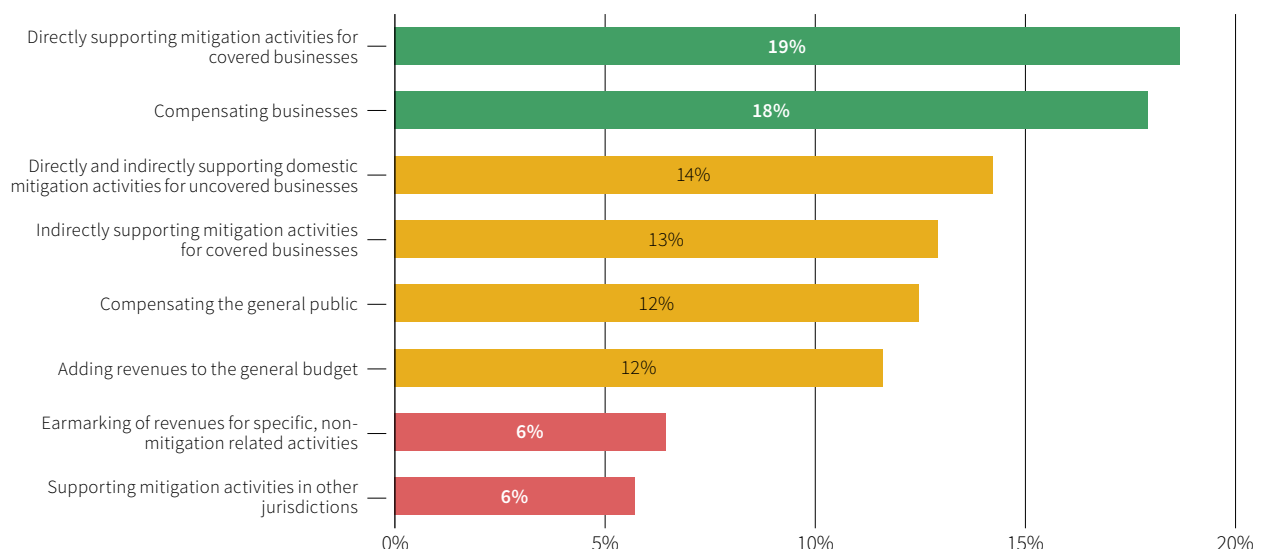
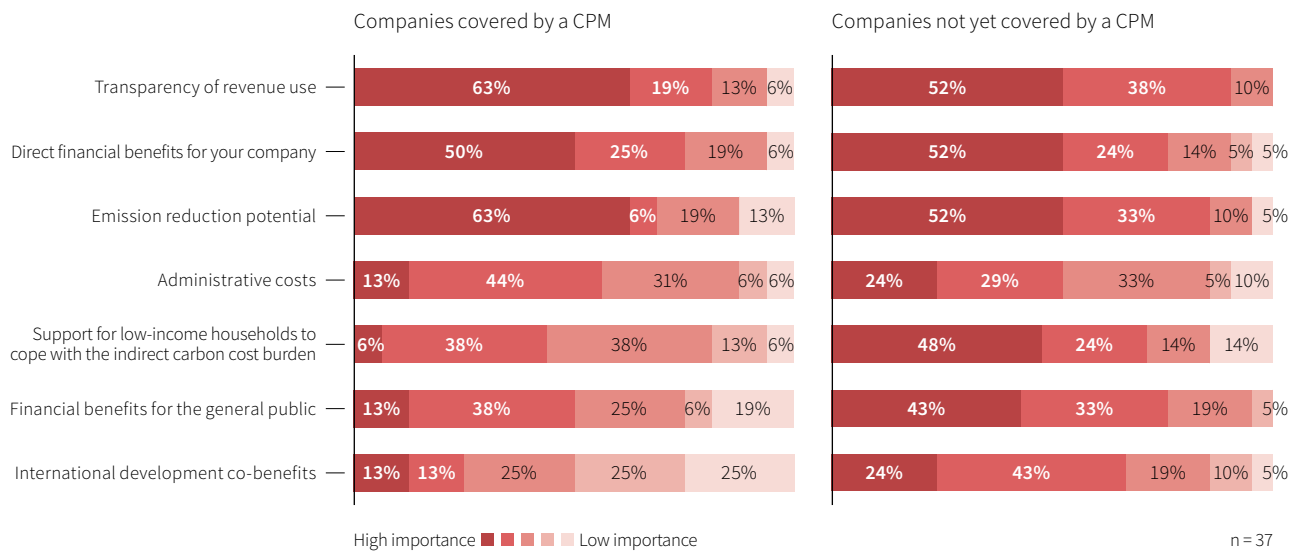
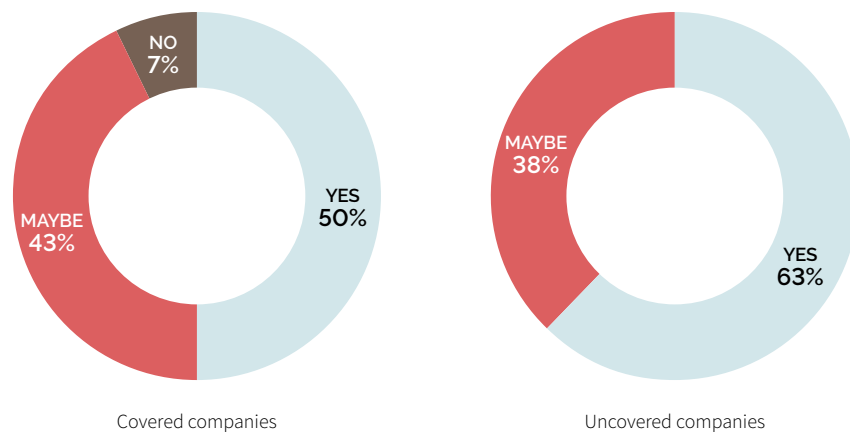


FIGURE 16 Importance of revenue use design elements for companies

4.5 Carbon taxes vs other taxes

Responses to the survey indicate that lowering other business taxes to compensate companies for the costs incurred by carbon pricing would improve business

acceptance of carbon pricing – 93% of covered entities might be willing to accept higher carbon prices if other taxes were lowered (Figure 17). This suggests that clearly communicating that reductions in other taxes are being brought in to compensate business for new or higher carbon taxes could alleviate concerns over increased costs and support greater emissions reduction.

FIGURE 17 Willingness to accept higher carbon prices if other taxes are lowered²²

²² Shares in figures on this page do not always add up to 100% due to rounding.

5 | CONCLUSIONS AND KEY TAKEAWAYS

Key takeaways

- » As the number of CPMs implemented worldwide increases, carbon revenue use is an issue of increasing relevance. Revenue recycling influences the mitigation potential and support amongst covered entities, both of which in turn influence the likelihood of policy success.
- » Covered entities are more inclined to support the CPM if they can see where the carbon revenues are spent, or if revenue recycling applications offer them a direct financial benefit.
- » Currently, the most common method of recycling carbon revenues is general government spending, which is the approach least likely to generate further emission reductions and is among the least popular choice for covered entities due to the lack of transparency.
- » Recycling carbon revenue by supporting uncovered sectors, especially internationally, is likely to generate the greatest emission reductions, but it is the least popular choice for both CPM administrators and covered entities. This implies a considerable missed opportunity for increasing global mitigation.
- » Considering the need to increase global climate mitigation efforts to limit global temperature rise to well below 2°C, carbon revenue recycling offers several opportunities to increase emission reductions without compromising support.
- » If business acceptance is required for policy support, the options most likely to balance mitigation and acceptability are:
 - › supporting mitigation activities within covered sectors; and,
 - › reducing other tax burdens to allow for a higher carbon price.
- » To maximise mitigation outcomes in the long term, policymakers need to examine ways to improve the acceptability of recycling revenue to support mitigation in uncovered sectors especially outside the original jurisdiction.

With the on-going growth in CPMs and the need to ratchet up efforts to reduce emissions policymakers should recognise the importance of the redistribution

of carbon revenues and in particular how they could be used to build and maintain support from covered entities. The priorities for government

spending, covered entity concerns and mitigation targets are often not aligned, meaning that no single revenue recycling approach will satisfy all parties. A combination of approaches that balances advantages and disadvantages of different revenue uses would offer the best solution to addressing the sometimes-competing objectives of the different parties.

When combined, the aspects of this study help to illustrate the benefits and drawbacks of different methods of revenue recycling. Specifically, we have assessed each of the revenue recycling approaches against the three most important factors identified in the survey – a) direct financial benefits, b) transparency and c) emissions reduction potential - to derive a combined acceptability rating (Figure 18).

FIGURE 18 Overview of stakeholder acceptability and further considerations for the various carbon revenue recycling approaches

Use of revenues		Direct financial benefit for covered company	Transparency of revenue use	Emission reduction potential	Acceptability to covered entities
General government spending	Adding revenues to the general budget				
	Earmarking of revenues for specific, non-mitigation related activities				
Compensation for the carbon cost burden	Compensating businesses				
	Compensating the general public				
Mitigation activities in sectors covered by the CPM	Directly supporting mitigation activities for covered entities				
	Indirectly supporting mitigation activities for covered entities				
Mitigation activities in sectors not covered by the CPM	Directly and indirectly supporting domestic mitigation activities for uncovered entities				
	Supporting mitigation activities abroad in countries without CPMs				

High    

Medium    

Low    

A revenue recycling approach that combines these three factors is likely to win support from covered entities. While general government spending is the simplest and most flexible way to use carbon revenues, it is also among the least popular with covered entities. The fact that transparency is the most important element for covered entities suggests that there is concern that CPMs are treated as another revenue source by its administrators as shown in other studies.²³ That companies prefer revenue uses which offer a direct financial benefit for them may not be surprising but the fact that equal importance is attached to emissions reduction suggests that companies recognise the importance of reducing emissions but are concerned about the additional cost burden.

The primary aim of a carbon pricing scheme is to reduce emissions to limit global temperature rise. Using revenues for general government budget is the most commonly applied approach but also the method least likely to generate reductions and the least popular. This suggests that significant additional emission reductions could be delivered by global CPMs if this were this revenue was used to support mitigation activities. This study has not quantified this potential, however further research could be conducted to assess the potential additional emission reductions which could be derived from this untapped potential.

There is currently very limited support for using carbon revenue to support mitigation activities outside of the local CPM jurisdiction. This is despite international mitigation activities offering significant potential to generate emission reductions – a factor highly valued by stakeholders. The current trend would suggest while companies are in favour of revenue uses that enhance the emissions reduction potential of carbon pricing, they also want the benefit from carbon pricing revenues to remain domestically.

For policymakers, revenue recycling offers an opportunity to maintain support from covered entities and further reduce emissions without raising carbon price levels. In the short term, using revenues to reduce the cost to business of decarbonising offers policymakers the best balance between emission reductions and stakeholder acceptability. For example, recycling carbon revenue by reducing taxes elsewhere may result in CPM administrators being able to apply a high carbon price which not only results in no loss of revenue, but greater emission reductions. However, policymakers should carefully consider how benefits for companies and emissions reduction effects interact to ensure additional mitigation outcomes beyond the direct emissions reduction impact of the CPM (and hence its cost effectiveness).

In the long term, policymakers should explore ways to increase support for using revenue to support international mitigation projects – the least popular revenue recycling approach, but also the one offering greatest mitigation potential. Considering the need to significantly reduce global emissions in line with the Paris Agreement, the lack of support for international mitigation activities in less developed countries indicates more work must be done to convince stakeholders of its importance. This could be through improved communications or by blending the approach with others which are more acceptable to covered entities. At the very least, more research and outreach to stakeholders must be done to communicate the cost of lost opportunities and explore how attitudes and CPM design can be changed. Facilitating a scenario where more CPMs include supporting international mitigation efforts as a component of its revenue recycling policy could reap significant rewards in both climate change mitigation and development.

23 Baranzini, A., & Carattini, S. (2017). Effectiveness, earmarking and labelling: testing the acceptability of carbon taxes with survey data. *Environmental Economics and Policy Studies*, 19(1), 197-227.

6 | ANNEX

6.1 Annex I – Revenue recycling approaches



Revenue Recycling Approach 1: Use of revenues for general government spending

Adding revenues to the general budget

Definition: Revenues are directly transferred to the treasury without any form of hypothecation of where specifically these revenues should be spent.

Administratively, the simplest way of using carbon pricing revenues is to add them to the general budget. Under this approach, revenues support general government spending which is a common feature of CPMs in emerging economies such as China or Mexico. CPM revenues may also be used to reduce government debt, as has been the case in e.g. Ireland and Iceland in the aftermath of the 2008 global financial crisis.²⁴

Potential key implementation impacts:

I. Emissions reduction impact

A small proportion of the revenues could eventually lead to further emission reductions via general budget allocations. However, most general government spending would be unrelated to climate change mitigation, and therefore this effect is considered negligible.

II. Covered entities support

Greater transparency on how the revenue would be spent can increase acceptability.²⁵ However, if revenues are added to the general budget, there is a lack of transparency which can generate considerable distrust and objections.²⁶ To avoid this lack of support from the private sector, the carbon tax in British Columbia for example was designed to be revenue-neutral rather than to add financial resources to the general budget.²⁷

Other potential key implementation impacts

For developing countries considering the implementation of carbon pricing, allocating revenues to the general budget can increase often tight government budgets.²⁸ Moreover, this approach avoids some of the challenges that emerge when earmarking revenues. For example, there is no natural relationship between carbon pricing revenues and spending needs to further reduce emissions. If too little revenue is generated, it might be difficult to fight for additional funding out of the general budget.²⁹ Besides, legislators lack the freedom to make regular trade-offs among spending priorities when revenues are earmarked.

Earmarking of revenues for specific, non-mitigation related activities

Definition: Revenues are earmarked for spending on specific activities which are not specifically targeted at reducing emissions, e.g. spending on climate change adaptation (domestically or abroad) or development activities.

24 Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. *Energy Policy*, 96, 50-77.

25 Canada's Ecofiscal Commission, *Choose Widely: Options and Trade-Offs in Recycling Carbon Prices Revenues*, 2016.

26 Ricardo Energy & Environment, *Assessment of Market Based Climate Change Policy Options for Turkey*, 2017.

27 Murray, B., & Rivers, N. (2015). British Columbia's revenue-neutral carbon tax: A review of the latest "grand experiment" in environmental policy. *Energy Policy*, 86, 674-683.

28 World Bank, *Report of the High Level Commission on Carbon Prices*, 2017.

29 Ulbrich, H. (2010). To Earmark or Not to Earmark. *Policy Brief*, Strom Thurmond Institute, Clemson University.

Earmarked applications can still be related to the source of the revenues, though, if for example earmarked for adaptation purposes either domestically or internationally. For instance, a proportion of the German revenue from the EU ETS is used to fund projects to improve climate resilience in developing countries.³⁰ Revenues could also be used to promote sustainable socio-economic development, e.g.; by providing access to basic infrastructure such as water or sanitation.

Potential key implementation impacts

I. Emissions reduction impact

As this category is composed of those purposes that explicitly exclude mitigation activities such as e.g. adaptation activities as in the case of parts of the German ETS revenues, no additional emission reductions would be achieved.

II. Covered entities support

Earmarking revenues increases transparency of public spending which in turn makes it more preferable from a stakeholder perspective.³¹ By linking revenues to uses that are regarded as worthwhile by the population, political feasibility of the CPM could be increased.³² A number of surveys have shown that respondents often favour issue-linked revenue recycling approaches.³³ Stakeholder support for adaptation spending could therefore be potentially higher than e.g. education or health spending, for example, due to the direct link between the revenue source and the object of the earmarking. Covered entities, however, might be more critical than the general public and prefer earmarks from which they benefit more directly, e.g. improved road infrastructure.

Other potential key implementation impacts

A recent study has shown that carbon pricing revenues could potentially close investment gaps for most types of basic infrastructure in developing countries.³⁴ Revenues from a domestic carbon tax of US\$30/tCO₂ could also be sufficient to protect households that suffer from severe droughts in the Sahel region.³⁵



Revenue Recycling Approach 2: Use of revenues to compensate for the carbon cost burden³⁶

Compensating businesses

Definition: Through direct payments or reduced taxes to domestic businesses, revenues are used to offset the cost burden on businesses due to the CPM or to stimulate the overall economy.

CPMs can be designed in a revenue-neutral way from a government's perspective. In British Columbia or Estonia, for example, carbon pricing revenues are used to reduce corporate and income taxes to compensate businesses directly and indirectly, respectively.³⁷ Some countries such as Germany also use revenues to provide transitional support to industry by compensating energy intensive industries for the indirect carbon cost due to higher energy prices.³⁸

Potential key implementation impacts

I. Emissions reduction impact

Decreasing distortionary taxes such as corporate taxes can raise the desirable level of a carbon tax under certain

30 Bundesministerium der Finanzen (BMF), *Bericht des Bundesministeriums der Finanzen über die Tätigkeit des EKF 2012 und über die 2013 zu erwartende Einnahmen- und Ausgabenentwicklung*, 2017.

31 Wilkinson, M. (1994). Paying for public spending: is there a role for earmarked taxes?. *Fiscal studies*, 15(4), 119-135.

32 Jakob, M., Chen, C., Fuss, S., Marxen, A., Rao, N. D., & Edenhofer, O. (2016). Carbon pricing revenues could close infrastructure access gaps. *World Development*, 84, 254-265.

33 Sælen, H., & Kallbekken, S. (2011). A choice experiment on fuel taxation and earmarking in Norway. *Ecological Economics*, 70(11), 2181-2190.

34 Jakob, M., Chen, C., Fuss, S., Marxen, A., Rao, N. D., & Edenhofer, O. (2016). Carbon pricing revenues could close infrastructure access gaps. *World Development*, 84, 254-265.

35 World Bank, *Report of the High Level Commission on Carbon Prices*, 2017.

36 Free allowances, tax exemptions and other direct rebates are an important element of compensation under a CPM. However, they are not considered as compensatory revenue use as they are more of a virtual compensation from a revenue use perspective and reduce the overall volume of carbon revenues to be used for specific approaches. Therefore, we see free allowances, tax exemptions and other direct rebates as less directly linked to the use of revenues and we consider it as going beyond the scope of the report to include them in the study.

37 Vivid Economics, *Carbon Taxation and Fiscal Consolidation: the potential of carbon pricing to reduce Europe's fiscal deficits*, 2012.

38 German Federal Ministry for Economic Affairs and Energy (BMWi), *2017 Draft Budget*, 2017.

conditions.³⁹ Covered businesses could be willing to accept higher carbon tax rates if other corporate tax rates are reduced. With unchanged marginal abatement costs (MAC), a higher tax could potentially lead to higher mitigation outcomes compared to scenarios where revenues are not recycled back to the covered entities.

As long as carbon pricing covers only a limited share of global emissions, emission intensive firms may fear competitiveness issues if they face international competition. By recycling some of the revenue to reduce the carbon cost burden for these firms, carbon leakage, i.e.; a relocation of emission intensive production to jurisdictions that are not covered by carbon pricing, can be avoided. However, the design of such rebates needs to be considered carefully to avoid that less cost-effective abatement being pursued in other sectors.⁴⁰ For example direct cash compensation to businesses for the cost of compliance may reduce the impacts of the CPM and distort the price signal on emissions.

II. Covered entities support

When covered entities reap the majority of the benefits from carbon pricing revenues through e.g. compensation for the occurred carbon cost, CPMs are likely to become more palatable for these entities. For instance, revenues collected under the carbon tax in British Columbia were redirected to businesses and households through tax cuts to ensure support for the tax by the business community.⁴¹

Other potential key implementation impacts

Lowering distortionary taxes such as business taxes is a preferred approach by many economists as it has the potential to enhance economic growth. This “double dividend” of mitigating climate change while reducing economic distortions can arise when pollution rather than economic output is taxed.⁴²

In developing countries, using revenues to reduce corporate taxes could potentially incentivise companies to abandon operations in the informal sector, i.e. the

part of an economy that is neither taxed, nor monitored by any form of government.⁴³ As a consequence of lower corporate taxes, the tax burden gap between the formal and informal sector decreases. Therefore, such tax reductions could provide greater social protection to employees and increase other tax revenues if more companies enter the formal sector.

Compensating the general public

Definition: *Through direct payments or reduced taxes to domestic citizens, revenues are used to offset the cost burdens on the general public due to the CPM or as a share of the CPM's proceeds.*

Other examples of revenue-neutral approaches include providing direct support for lower-income households, lowering income tax rates, providing transitional support to communities affected by structural changes and/or providing other means of compensation for the general public. For example, carbon tax revenues in British Columbia are partly used to cut personal income taxes for lower-income households.⁴⁴ Another example is the German government's use of part of the EU ETS revenues to fund structural adjustment measures in mining regions.⁴⁵

Potential key implementation impacts

I. Emissions reduction impact

If compensating households makes higher carbon tax rates and tighter caps, respectively, more feasible, more emissions could be reduced. However, as households are generally only indirectly affected by carbon pricing (through, for example, costs passed through on energy bills), the case for potentially higher carbon prices and abatement quantities enabled by household compensation might be weaker as compared to the case where businesses receive compensation. Direct subsidies to help low-income households pay their energy bills could undermine the effectiveness of the CPM by partly offsetting the price signals necessary to motivate households to undertake low-cost mitigation activities such as switching to LED lighting.⁴⁶

39 World Bank, *Report of the High Level Commission on Carbon Prices*, 2017.

40 Branger, F., & Quirion, P., Climate policy and the 'carbon haven' effect. *WIREs Clim Change* 2013. doi: 10.1002/wcc.245

41 Murray, B., & Rivers, N. (2015). British Columbia's revenue-neutral carbon tax: A review of the latest "grand experiment" in environmental policy. *Energy Policy*, 86, 674-683.

42 Bovenberg, A. L., & De Mooij, R. A. (1997). Environmental tax reform and endogenous growth. *Journal of Public Economics*, 63(2), 207-237.

43 World Bank, *Report of the High Level Commission on Carbon Prices*, 2017.

44 Murray, B., & Rivers, N. (2015). British Columbia's revenue-neutral carbon tax: A review of the latest "grand experiment" in environmental policy. *Energy Policy*, 86, 674-683.

45 German Federal Ministry for Economic Affairs and Energy (BMWi), *2017 Draft Budget*, 2017.

46 Dinan, T. (2012). *Offsetting a carbon tax's costs on low-income households*. Microeconomic Studies Division, Congressional Budget Office.

II. Covered entities support

Covered business entities do not directly benefit from general compensation. However, they might indirectly benefit from lower income taxes as they might be able to pay lower wages. Besides, this revenue use often goes hand in hand with reductions in corporate taxes as e.g. in British Columbia or France (see Annex IV).

Other potential key implementation impacts

General compensation may help to increase the durability of CPMs by providing immediate and tangible benefits to households affected by carbon pricing.⁴⁷ Furthermore, lowering personal income tax is another way of reducing distortionary taxes and thus enabling a double dividend from an economic perspective.



Revenue Recycling Approach 3: Support mitigation activities in sectors covered by CPM

Directly supporting mitigation activities for covered entities

Definition: Revenues are spent on measures that aim to directly reduce or incentivise the reduction of GHG emissions from industrial sectors already covered by the CPM. This is different from compensation as support is dependent upon predetermined mitigation actions.

Carbon pricing revenues can be used to directly support entities that face obligations under CPMs. For example, revenues of the pilot ETS in Guangdong are used for energy saving and other emissions reduction measures by compliance companies.⁴⁸ Similarly, ETS revenues in Québec are partly used to subsidise energy efficiency measures for industrial processes.⁴⁹

Potential key implementation impacts

I. Emissions reduction impact

Using carbon revenues to fund overlapping policies such as support schemes for renewable energy which operate in parallel to CPMs might lead to tensions with the carbon pricing signal.⁵⁰ As these policies partly create the same incentive effects, they may increase the social cost of reducing emissions rather than generating additional mitigation outcomes. By providing additional financial resources for activities that are already incentivised or penalised by the CPM, such policies can raise the cost of mitigation from a societal perspective. However, if the policies are complementary, the incentives from the CPM and from the carbon revenue funded support schemes could provide a double “carrot-and-stick” incentive that reinforces the effect of the CPM.⁵¹

Under an ETS, the cap should be adjusted downwards to ensure emission reductions financed through carbon revenues do not impede the effectiveness of the ETS. Allowances that were set free by the new mitigation activities would lower allowance prices under a fixed unchanged cap. Other entities would then buy these allowances which would lead to a reallocation of allowances rather than further emission reductions (“waterbed effect”). In addition, lower allowance prices could undermine the longer-term low-carbon investment signal.⁵² However, these negative effects can partly be avoided through dampening measures. In the case of the EU ETS, the Market Stability Reserve (MSR)⁵³ which will enter force in 2019 has been shown to absorb some of the additional emission allowances that result from supplementary mitigation measures in sectors covered by the EU ETS.⁵⁴ Under the current design of the MSR, 40% of the additional allowance surplus by complementary mitigation policies would be taken up by the reserve.⁵⁵ Moreover, the ETS will allow member states to voluntarily cancel allowances to offset national climate and energy policies that reduce emissions arising from electricity generation in its post-2020 phase.⁵⁶

47 World Bank, *Report of the High Level Commission on Carbon Prices*, 2017.

48 Sun Yat-sen University and ICIS China, *Guangdong Pilot Emissions Trading Scheme Report (2013-2014)*, 2015.

49 Government of Québec, *Québec's 2013-2020 Climate Change Action Plan*, 2012.

50 World Bank, Ecofys and Vivid Economics, *State and Trends of Carbon Pricing 2016*, 2016.

51 World Bank, *Carbon Tax Guide: A Handbook for Policy Makers*, 2017.

52 World Bank, Ecofys and Vivid Economics, *State and Trends of Carbon Pricing 2016*, 2016.

53 The MSR monitors and regulates the number of allowances in circulation, by either feeding permits into or releasing them from the reserve.

54 Ecofys, *The waterbed effect and the EU ETS: An explanation of a possible phasing out of Dutch coal fired power plants as an example*, 2016.

55 Ecofys, *The waterbed effect and the EU ETS: An explanation of a possible phasing out of Dutch coal fired power plants as an example*, 2016.

56 European Union, *Post-2020 reform of the EU Emissions Trading System*, 2017.

An example of emission reductions in covered sectors is the Québec Green Fund, whose funding comes mainly from the province's ETS. Most of the fund's investments for which emissions reduction potentials have been quantified will be achieved in the transport, buildings and industry sectors, i.e. sectors covered by the ETS (see Annex II).

In the case of a carbon tax, revenues to support mitigation activities in covered sectors may reward stakeholders for actions they would pursue anyway in response to the tax.⁵⁷ This revenue recycling approach would therefore not lead to increased emission reductions, unless they are complementary enough to reinforce the emissions reduction incentive of the CPM (see above).

II. Covered entities support

Stakeholder acceptability is likely to be high if they can benefit from the mitigation activities such as subsidies to support energy efficiency measures as, for example, in Québec. These support mechanisms will effectively reduce the carbon cost burden for covered entities and may involve other co-benefits from modernising equipment. In case of the EU ETS, the MSR has seen support from stakeholder groups such as the European electricity sector association Eurelectric even though the reserve decreases the allowance surplus.⁵⁸

Other potential key implementation impacts

A recent survey has shown that the general public finds CPMs more appealing when revenues are earmarked for mitigation purposes, because they see the policy as a contribution to the climate.⁵⁹

Indirectly supporting mitigation activities for covered entities

Definition: Revenues are spent on measures that aim to reduce GHG emissions from the industrial sectors already covered by the CPM by targeting activities outside of the covered sectors.

Through this approach, covered entities benefit indirectly as measures that target e.g. household or industry energy efficiency measures decrease compliance obligations for electricity generators. In Japan, for example, producers of the fossil fuels covered are liable for payment of the carbon tax. However, these covered entities benefit from the support for energy-efficient equipment for small and medium-sized businesses, which is enabled through the carbon tax revenues.⁶⁰

In this category, revenues can also be used to support climate action indirectly, e.g.; by providing R&D funds to foster low-carbon innovation and facilitating knowledge sharing in these sectors. For example, revenues from Québec's ETS are partly used to support research and development in the field of clean technology.⁶¹ Similarly, the EU ETS Innovation Fund will support large-scale demonstration of activities in carbon capture and storage (CCS), renewable energy and low-carbon innovation in energy intensive industry, including carbon capture and use from 2020 onwards.⁶² The encouraged technology improvements could then ultimately benefit covered entities.

Potential key implementation impacts

I. Emissions reduction impact

Complementary policies can help to address barriers that prevent covered entities from responding to the carbon price signal.⁶³ By supporting low-carbon innovation through financing R&D or public information programmes in sectors covered by the CPM, marginal abatement costs can be lowered.⁶⁴ If the carbon tax rate remains unchanged, more emissions could therefore be reduced (Figure 19).

57 Marron, D., & Morris, A. (2016). How Should Governments Use Revenue from Corrective Taxes?, Urban Institute and the Brookings Institution

58 European Union, *Reform of the EU Carbon Market: From backloading to the market stability reserve*, 2014.

59 Baranzini, A., & Carattini, S. (2017). Effectiveness, earmarking and labelling: testing the acceptability of carbon taxes with survey data. *Environmental Economics and Policy Studies*, 19(1), 197-227.

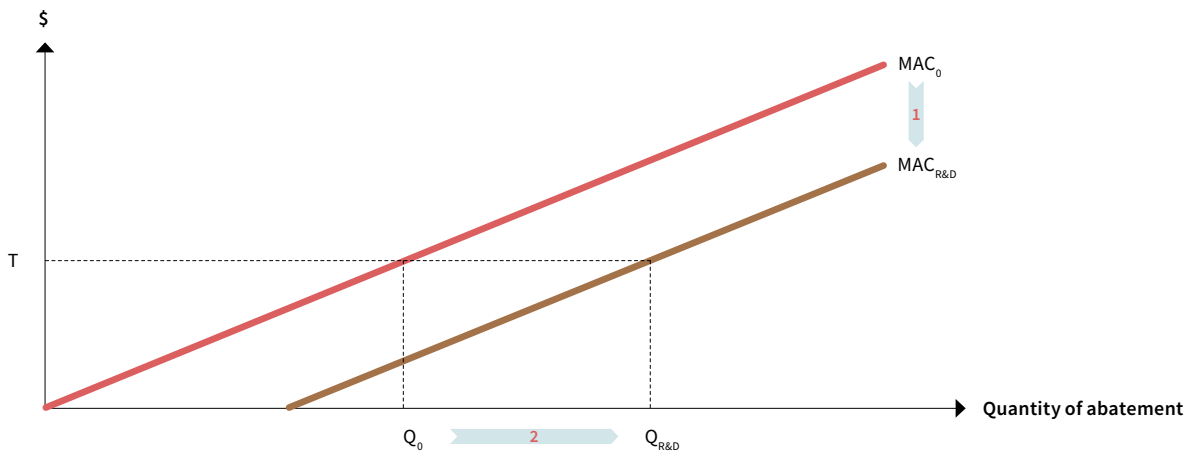
60 Ministry of the Environment, Japan, *Details on the Carbon Tax (Tax for Climate Change Mitigation)*, 2012.

61 Government of Québec, *Québec's 2013-2020 Climate Change Action Plan*, 2012.

62 European Commission, *Summary Report of Expert Consultations for Finance for Innovation: Towards the ETS Innovation Fund*, 2017.

63 World Bank, Ecofys and Vivid Economics, *State and Trends of Carbon Pricing 2016*, 2016.

64 World Bank, *Carbon Tax Guide: A Handbook for Policy Makers*, 2017.

FIGURE 19 Lower marginal abatement costs leading to more emission abatement

If revenues are used to support emissions reduction measures by end-users of electricity etc. such as households and businesses, the end-users could potentially be rewarded for actions they would pursue anyway in response to electricity cost impacts of the carbon tax. The Japanese government for example assumes the emissions reduction effect from recycling revenues to support mitigation activities of households and businesses to complement the emissions reduction effect driven by the carbon price itself.⁶⁵

Under an ETS, both types of measures could facilitate emission reductions, but as long as the cap is not adjusted to reflect the new situation, the waterbed effect could occur as in the case of direct mitigation support, i.e. allowances additionally set free could still be used by other covered entities.⁶⁶ Even though some entities would benefit from achieving emission reductions more easily and the remaining entities from lower allowance prices, the overall amount of emission reductions would be unchanged and the low-carbon investment signal would be lowered. However, if the cap is adjusted as e.g.; in the case of the EU ETS Market Stability Reserve, this waterbed effect can be partly avoided.⁶⁷

II. Covered entities support

Most stakeholders are likely to benefit from technology and process innovations which could help them reach their obligations. However, covered entities would only benefit from this approach with a time lag as technology

advancements may take several years to materialise. Besides, requirements for R&D support can be strict and thereby limit low-carbon R&D investments. It also should be considered that stakeholders would not benefit from such a measure if ETS caps were tightened accordingly. In this case, the measures would result in further emission reductions rather than in reduced carbon cost burdens for covered entities. Nonetheless, there has been support by EU ETS stakeholders for the MSR.⁶⁸

In terms of indirect mitigation support, stakeholders might be in favour of knowledge sharing measures as they could see immediate benefits.

Other potential key implementation impacts

Using revenues for overlapping policies can be done in a complementary way to support mitigation activities that were not sufficiently incentivised or made available.⁶⁹ For example, ETS revenues in California are partly used to improve pedestrian and cycling infrastructure which is needed to e.g. enable commuters to bike to work.⁷⁰

Moreover, the general public can benefit from some measures in this category such as energy efficiency measures for households. In addition, the thematic coherence of this spending option with the CPM's main goal could be appealing to the general public and therefore increase the durability of the mechanism.⁷¹

⁶⁵ Ministry of the Environment, Japan, *Details on the Carbon Tax (Tax for Climate Change Mitigation)*, 2012.

⁶⁶ I4CE – Institute for Climate Economics and Enerdata, *Exploring the EU ETS Beyond 2020*, 2015.

⁶⁷ Ecofys, *The waterbed effect and the EU ETS: An explanation of a possible phasing out of Dutch coal fired power plants as an example*, 2016.

⁶⁸ European Union, *Reform of the EU Carbon Market: From backloading to the market stability reserve*, 2014.

⁶⁹ World Bank, Ecofys and Vivid Economics, *State and Trends of Carbon Pricing 2016*, 2016.

⁷⁰ State of California, *Cap-and-Trade Auction Proceeds Second Investment Plan: Fiscal Years 2016-17 through 2018-19*, 2016.

⁷¹ Carbon Pricing Leadership Coalition (CPLC), *What are the Options for Using Carbon-Pricing Revenues?*, 2016.



Revenue Recycling Approach 4: Support mitigation activities in sectors not covered by CPM

Directly and indirectly supporting domestic mitigation activities for uncovered entities

Definition: Revenues are spent on measures that aim to reduce domestic GHG emissions which are outside the scope of the CPM. This differs from indirect support to covered sectors as the mitigation outcomes would not overlap with emissions from covered sectors.

Revenues from CPMs in sectors such as industry or energy could be used to finance mitigation activities in sectors not covered by the CPM. Most CPMs do not cover the agriculture or waste sectors as those emissions are often difficult to monitor. Therefore, the emissions from those sectors might be better targeted by results-based mechanisms that are funded by revenues from other sectors. For example, revenues from Québec's ETS are partly used to support mitigation activities in the waste sector.⁷² Revenues could also be used to support R&D in uncovered sectors to foster low-carbon innovation in the long run.

Potential key implementation impacts

I. Emissions reduction impact

Emissions reductions resulting from such an approach would be additional as they were not incentivised by the CPM itself because the sector was not in its scope. The revenue recycling approach is thus complementary to the direct mitigation effect of the CPM. In Québec, for example, ETS revenues are partly used to support a programme for farms which is expected to save 8,300 tCO₂e by 2020.⁷³ In addition, further indirect emission reductions are expected to be triggered through the support of new innovative technologies and behavioural changes in the agriculture sector in the long-term.

II. Covered entities support

Stakeholder acceptability is likely to be low, as covered entities would not directly benefit from these activities and support schemes. Besides, if revenues were invested in R&D for other sectors, benefits would take even longer to materialise, potentially decreasing stakeholder acceptability further.

Other potential key implementation impacts

Uncovered sectors that directly or indirectly receive targeted spending from CPM revenues could potentially reap wider benefits arising e.g. from modernising agricultural production.

Supporting mitigation activities in other jurisdictions

Definition: The spending of revenues on measures that aim to reduce GHG emissions in other jurisdictions which are outside the coverage of any existing CPMs.

Low-carbon development in developing countries could be funded by carbon pricing revenues collected in other jurisdictions that already have introduced CPMs. For example, German EU ETS funds are partly used to support GHG mitigation in developing countries through the International Climate Initiative.⁷⁴ Future forms might also include cooperative mitigation agreements between developing countries.

Potential key implementation impacts

I. Emissions reduction impact

Further emission reductions could be generated if targeted sectors abroad are not yet covered by CPMs.

II. Covered entities support

As in the case of support of entities in uncovered sectors, stakeholders would not directly benefit from mitigation activities abroad. For instance, when identifying funding sources for international climate finance, the Swiss government assumed that support from private sector entities covered by the Swiss ETS would be low for this revenue recycling option.⁷⁵ However, the government may benefit from the knowledge transfer in the form of business opportunities if it can help implement the emissions reduction activities.

⁷² Government of Québec, *Québec's 2013-2020 Climate Change Action Plan*, 2012.

⁷³ Ministère du Développement Durable, de l'Environnement et de la Lutte contre les Changements Climatiques. *Comptes du Fonds vert 2015-2016*, 2017.

⁷⁴ Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. *Mitigating Greenhouse Gas Emissions*, 2018.

⁷⁵ Bundesamt für Umwelt (BAFU), Schweiz, *Neue Finanzierungsinstrumente für die Schweizer Beiträge an das internationale Klimaregime*, 2011.

Other potential key implementation impacts

Supporting mitigation activities in other countries will often involve co-benefits such as improving local air quality or socioeconomic development aspects.

6.2 Annex II - Examples of revenue recycling approaches in CPMs

Four example CPMs were selected based upon their development (more developed CPMs generally are able to provide more complete and detailed data) and their representation of the four overarching revenue recycling approach categories. Research was mainly conducted through desk-based research. Given resource considerations, in total four jurisdictions were selected – one to represent each of the revenue recycling categories identified. While this allows the best balance between resourcing and capturing more granular details from on the ground learnings the use of only four jurisdictions does have its limitations as well. Primarily the limited number of examples means that there may be risks of bias in the findings. However, as the intention is not to derive absolute conclusions from the examples, these risks should not adversely impact the findings.

Use of revenues for general government spending - UK Carbon Price Floor (CPF)

CPM TYPE	Carbon tax
YEAR IMPLEMENTED	2013
SECTORS COVERED	Power generation (Great Britain only, Northern Ireland is exempted from the CPF)
SHARE OF JURISDICTION'S GHG EMISSIONS COVERED (2016)	120 MtCO ₂ e (~23%)
REVENUES (2016)	US\$1,168.9 million ⁷⁶

Revenue generation

The CPF generates revenues whenever allowance prices for the EU ETS fall under a minimum price that would be required in view of the UK government to sufficiently incentivise low-carbon innovation. Currently, this price is set at £18 (US\$23.17) per tonne of CO₂.⁷⁷ As EU ETS prices have been well below this level in the past years and are currently hovering around €5 (US\$5.65) per tonne of CO₂, the CPF generated substantial revenues for the UK Treasury. In 2016, the revenues amounted to £988 million (US\$1.3 billion).⁷⁸ However, the continued switch away from coal-fired to gas-fired electricity generation has put downward pressure on CPF revenues, as the tax rate is lower for gas-fired electricity generation due to the lower carbon footprint.⁷⁹ This development illustrates that an effective carbon price will ultimately reduce its revenue base and thereby the amount of revenues generated unless tax rates increase accordingly.

Revenue use

Earmarking revenues has never been a common feature of the UK tax system and governments have generally opposed its adoption on the grounds that spending priorities should not be determined by the way in which money is raised.⁸⁰ In line with this tradition, CPF revenues are largely retained by the UK Treasury. However, when the tax was launched, the UK government introduced an associated cost compensation mechanism for downstream consumers in trade-exposed, energy-intensive industries which amounted to £100 million (US\$165 million) per year through 2015.⁸¹ Although the funding for the compensation mechanism is not directly linked to the CPF revenues, the UK case can be considered an example of indirect earmarking with functionally linked spending for a part of the overall carbon revenues.

Emissions reduction considerations and stakeholder views

This partial departure from the UK's standard revenue allocation approach is likely to be a response to the call by the Confederation of British Industries (CBI) before the launch of the tax that the government should support the UK's industrial competitiveness.⁸²

⁷⁶ World Bank, *Carbon Pricing Dashboard*, 2018.

⁷⁷ House of Commons Library, United Kingdom, *Carbon Price Floor (CPF) and the price support mechanism*, 2018.

⁷⁸ World Bank, *Carbon Pricing Dashboard*, 2018.

⁷⁹ UK Office for Budget Responsibility, *Economic and Fiscal Outlook*, 2016.

⁸⁰ House of Commons Library, United Kingdom, *Hypothecated Action*, 2011.

⁸¹ Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. *Energy Policy*, 96, 50-77.

⁸² House of Commons Library, United Kingdom, *Carbon Price Floor (CPF) and the price support mechanism*, 2018.

However, industrial and commercial sectors continue to complain of competitiveness risks, as allowance prices have remained persistently low and businesses have faced higher carbon costs compared to other EU countries. Therefore, the UK government decided to cap the CPF to limit the competitive disadvantage faced by business and reduce energy bills for consumers.⁸³ Although higher CPF rates in combination with targeted compensations could have achieved the same outcome while increasing the emissions reduction impact of the CPF, it would have implied increased administrative complexity and costs.

Use of revenues to compensate for the carbon cost burden – EU Emissions Trading System (ETS) and German Energy and Climate Fund (EKF)

CPM TYPE	Emissions trading system
YEAR IMPLEMENTED	2005
SECTORS COVERED	Power and heat generation, industry (incl. industrial process emissions) and aviation sectors
SHARE OF JURISDICTION'S GHG EMISSIONS, 2017	1969 MtCO ₂ e (~45%)
REVENUES (2016)	US\$4,214.6 million

Revenue generation

EU ETS revenues arise from the auctioning of emission allowances. Currently, only half of the allowances are auctioned, while the remaining allowances are allocated freely to energy-intensive and trade-exposed sectors.⁸⁴ EU wide revenues amounted to EUR 3.9 (USD 4.2 bn) in 2016.⁸⁵

Revenue use

Germany raised €1.1 billion (US\$1.2 billion) in revenues in 2015, which was almost a quarter of all EU ETS revenues in that year, and the largest amount raised by any EU member state. In all member states, at least 50%

of revenues generated from auctioning ETS allowances should be used for climate and energy related purposes, according to the EU ETS Directive. In Germany, 100% of the EU ETS revenues are used in line with this target, as all revenues are directly allocated to an energy and climate fund (EKF). Although focused on e.g. support for energy efficiency measures and electromobility, these climate and energy related purposes also include compensatory measures. As such, more than 20% of the revenues (€244 million / US\$275 million) have been used in 2015 to provide transitional support to industry by compensating energy intensive industries for the indirect carbon cost due to higher energy prices.⁸⁶ The compensations are meant to maintain the international competitiveness of electricity-intensive companies, and to help avoid carbon leakage, i.e. the relocation of industries and associated emissions to countries not covered by carbon pricing policies. In 2015, more than 300 companies, mainly from the chemical and iron and steel sectors, have received compensation. The amount of the compensation is based on product specific electricity consumption efficiency benchmarks, which limit incentives to increase energy consumption.

Due to persistently low allowance prices in the EU ETS, revenues have been well below the initially expected level of €2.2 billion annually (US\$ 2.5 billion).⁸⁷ Consequently, the volume of the entire EKF fund has been regularly topped up with additional funds from the general budget by up to €700 million (US\$789 million) a year.⁸⁸ This underlines a critical challenge of earmarking varying revenues, but also illustrates a way to allow for targeted earmarking while ensuring programmes and projects are sufficiently funded. However, topping up funds may also weaken support for the mechanism if additional government funds are needed over longer periods of time.

Emissions reduction considerations and stakeholder views

Although the compensation does not directly target emission reductions (as do the other measures supported by the fund), the compensation fosters the affordability and, consequently, the acceptability and

⁸³ House of Commons Library, United Kingdom, *Carbon Price Floor (CPF) and the price support mechanism*, 2018.

⁸⁴ European Commission, *EU ETS Auctioning*, 2018.

⁸⁵ European Commission, *Analysis of the use of Auction Revenues by the Member States*, 2017.

⁸⁶ Deutsche Emissionshandelsstelle (DEHSt), *Beihilfen für indirekte CO₂-Kosten des Emissionshandels (Strompreiskompensation) in Deutschland für das Jahr 2015*, 2017.

⁸⁷ Öko-Institut e.V., *Das Emissionshandelssystem der Europäischen Union und der Energie- und Klimafonds für Deutschland*, 2014.

⁸⁸ Bundesrechnungshof, Deutschland, *Feststellungen zur finanzwirtschaftlichen Entwicklung des Bundes*, 2013.

durability of the EU ETS. In addition, it helps avoid carbon leakage, as emission intensive companies are less likely to relocate outside the European Union. Since the Federation of German Industries (BDI) sees the compensation as an effective measure to compensate the German industry sector for rising carbon prices,⁸⁹ the measure is also likely to increase the acceptability of higher allowance prices among industry stakeholders in the future. The compensation thus could enable EU policymakers to tighten the EU ETS cap further and achieve emission reductions in line with a 1.5-2°C pathway.

Use of revenues for mitigation activities in sectors covered by the CPM – Québec Cap-and-Trade (C&T) System

CPM TYPE	Emissions trading system
YEAR IMPLEMENTED	2013
SECTORS COVERED	Power generation, industry (incl. industrial process emissions), distribution and import of fossil fuels notably for transportation, building and small business sectors.
SHARE OF JURISDICTION'S GHG EMISSIONS COVERED (2017)	61 MtCO ₂ e (~85%)
REVENUES (2016)	US\$336.1 million ⁹⁰

Revenue generation

The Québec Cap-and-Trade System generates revenues through auctioning emission allowances. Sectors facing international competition such as e.g. cement or aluminium industries receive a portion of free allowances. In 2016, the C&T system generated US\$336 million.

Revenue use

All revenues raised through the scheme go to the Québec Green Fund to finance the implementation of the province's 2013-2020 Climate Action Plan. The plan includes 150 actions on improving the energy efficiency of buildings, vehicles and industrial processes, upscaling public and electrified transport, promotion of renewable energy and related research, as well as adaptation action. The fund does not necessarily invest the same amount of money in the year the revenues were generated. Due to higher revenues in previous years, as well as associated investment incomes, the fund disbursed CA\$ 593 million (US\$457) in fiscal year 2016-17.

Emissions reduction considerations and stakeholder views

For almost two thirds (62%) of these investments, emissions reduction potentials have been quantified until 2020, amounting to 2.2 MtCO₂e. However, almost all (96%) of these emission reductions will be achieved in the transport, buildings and industry sectors, i.e. sectors covered by the ETS (Figure 20), as the focus of the Climate Action Plan is to enhance investment decisions that will enable emission reductions in ETS sectors through business incentives and support programmes.⁹¹ For example, the Écocamionnage programme is expected to save 325 ktCO₂e by 2020 by improving fuel efficiency and promoting the use of alternative fuels for heavy goods vehicles and light commercial vehicles. As fuel importers and distributors are covered by the ETS, the programme will reduce the compliance burden for these companies.

However, given that the annual emission caps are fixed (though gradually decreasing) until 2020, unused allowances resulting from the programme are likely to be purchased and used by other companies. Mitigation action in sectors covered by the ETS will therefore not result in further emission reductions beyond those achieved by the ETS itself, i.e. incentivised mitigation action as a response to tighter caps and corresponding higher allowance prices.

⁸⁹ Bundesverband der Deutschen Industrie e.V., *Reform des Europäischen Emissionshandels (EU ETS)*, 2016.

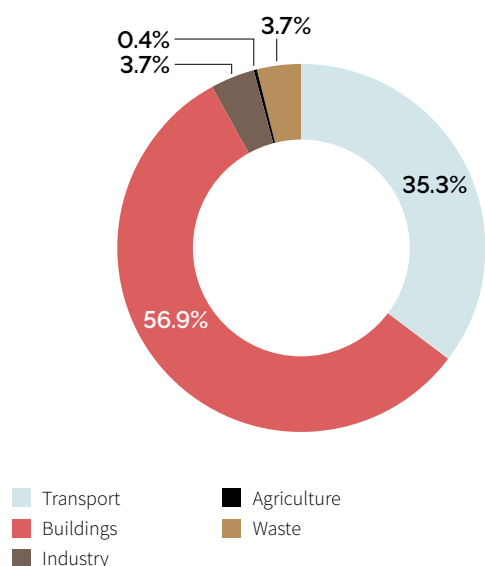
⁹⁰ World Bank, *Carbon Pricing Dashboard*, Retrieved from http://carbonpricingdashboard.worldbank.org/map_data, February 2018.

⁹¹ Government of Québec, *Québec's 2013-2020 Climate Change Action Plan*, 2012.

⁹² Ministère du Développement Durable, de l'Environnement et de la Lutte contre les Changements Climatiques. *Comptes du Fonds vert 2016-2017*, 2017.

⁹³ Barrington-Leigh, C., Tucker, B., & Lara, J. K. (2015). The short-run household, industrial, and labour impacts of the Québec carbon market. *Canadian Public Policy*, 41(4), 265-280.

FIGURE 20 Emission reductions incentivised by the Green Fund by 2020⁹²



Most of the remaining projects for which no emissions reduction potential has been identified at this point could facilitate substantial mitigation potential in the future, as they support low-carbon innovation projects. For example, the Technoclimat programme provides assistance for projects that seek to develop or commercialise new climate-friendly technologies. In the long term, these technologies could make mitigation action less costly for covered entities.

In 2014, a study highlighted that transparency in the intended allocation of the Green Fund revenues could be increased.⁹³ The study also stressed that industries impacted by the ETS do not sufficiently benefit from the current revenue allocation. In contrast to revenue-neutral schemes such as British Columbia's carbon tax which uses carbon revenues to lower other taxes, Québec's ETS might be more easily repealed by future governments that oppose the scheme, as it would not require unpopular raises in other taxes to keep government revenues at a stable level.

IEDM, a Montreal-based think tank, proposed that Québec's carbon revenues should rather be used to lower corporate taxes as the Green Fund has only reduced 0.7% of the province's emissions so far.⁹⁴

Besides, emission reductions have been achieved at costs 60-100 times above prices currently paid per tonne of carbon at allowance auctions. Québec's Minister of the Environment admitted that the results will have to be improved, but also emphasised that the fund is currently undergoing a review, and that the full contribution and the overall efficiency of the fund can only be judged after several years of operation.⁹⁵

Use of revenues for mitigation activities in sectors not covered by the CPM – California Cap-and-Trade Program (CTP)⁹⁶

CPM TYPE	Emissions trading system
YEAR IMPLEMENTED	2013
SECTORS COVERED	Power generation, industry (incl. industrial process emissions), distribution and import of fossil fuels notably for transportation building and small business sectors.
SHARE OF JURISDICTION'S GHG EMISSIONS COVERED (2017)	370 MtCO ₂ e (~85%)
REVENUES (2016)	US\$901.1 million ⁹⁷

Revenue generation

The California CTP primarily generates its revenues from the auctioning of emission allowances⁹⁸. This represents the primary source of carbon revenue, and US\$4.4 billion has been raised to date from allowances auctioned by the state⁹⁹.

Revenue use

Revenues are fed into a special fund, the Greenhouse Gas Reduction Fund (GGRF). California has legislative statutes on the key principles and requirements that must be adhered to when spending revenues held in the GGRF.

94 Belzile, G. (2017, May 15). *Le Fonds vert doit disparaître*. Retrieved from <https://www.iedm.org/fr/70052-le-fonds-vert-doit-disparaitre>, February 2018

95 Melançon, I. (2017, October 17). «On doit mieux expliquer» le Fonds vert (M. Croteau, Interviewer). La Presse. February 2018.

96 California Air Resources Board, *Cap-and-Trade Program*, Retrieved from <https://www.arb.ca.gov/cc/capandtrade/capandtrade.htm>, February 2018.

97 World Bank, *Carbon Pricing Dashboard*, Retrieved from http://carbonpricingdashboard.worldbank.org/map_data, February 2018.

98 Consigned allowances are not considered to be within the scope of this study.

99 Legislative Analyst's Office (LAO), *The 2017-18 Budget: Cap-and-Trade*, 2017.

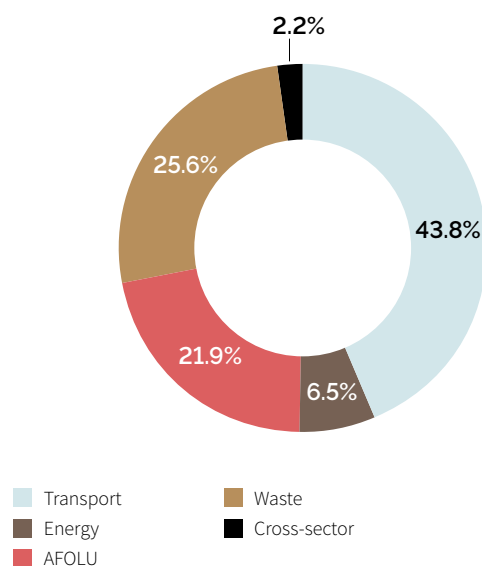
The state applies a broad mix of revenue approaches to balance different stakeholder demands, while aiming to promote substantial emission reductions and to achieve wider co-benefits such as improved local air quality. All auction proceeds must be used to reduce GHG emissions and often also must contribute to a number of objectives that falls within the 'compensation' category for revenue recycling approaches (e.g. spent on the community or to stimulate economic development).

Emissions reduction considerations and stakeholder views

In fiscal year 2016-17, the GGRF appropriated US\$900 million of the CTP's auction proceeds.¹⁰⁰ So far, emissions reduction potentials have been quantified for almost all (91%) of the funds allocated since the implementation of the GGRF, amounting to 73.9 MtCO₂e over the respective lifespans of the projects and 4.3 MtCO₂e by 2020. Almost half of the emission reductions before 2020 will be achieved in the waste, agriculture, forestry and other land use sectors, i.e. sectors not covered by the CTP (Figure 21). For example, the Forest Health programme aims to reduce GHGs and promote the long term storage of carbon in trees and soils, whilst also protecting upper watersheds where the State's water supply originates, and contributing to overall forest health.

In addition, the GGRF is expected to achieve substantial emission reductions beyond 2020, accounting for 94% of all emission reductions of the fund. The majority (84%) of these savings will be achieved through a new interstate high-speed rail system from 2025 onwards over a 50 year period. As exact caps have not been set yet for the years beyond 2020, these caps could consider emissions reduction impacts of climate action funded through the GGRF to ensure that these emission reductions are additional to those incentivised by the CTP itself.

FIGURE 21 Emission reductions incentivised by the GGRF by 2020 by sector¹⁰¹



When the CTP was extended to 2030 in July 2017, the California Chamber of Commerce and other important business groups representing manufacturers and agriculture interests backed the extension of the mechanism.¹⁰² Although carbon revenue use in California mostly does not directly benefit companies covered by the CTP (and the California Chamber of Commerce had in fact tried to challenge the lawfulness of the mechanism in the past), businesses will directly benefit from tax breaks that have been agreed on to gain the necessary support of the scheme. While e.g. the extension of a manufacturing tax break is not funded through the GGRF, the expected future carbon revenues will partly counterbalance foregone revenues as a result of the tax breaks.¹⁰³ Besides, the deal between Democrats and Republicans to secure the extension of the mechanism included a proposed constitutional amendment which could give Republicans, who will likely continue to be in the minority in the state and who oppose that revenues are used for the high-speed rail system, more say over future CTP revenue allocations.¹⁰⁴

¹⁰⁰ California Air Resources Board, *Cap-and-Trade Auction Proceeds: Budget Appropriations*, 2018.

¹⁰¹ California Air Resources Board, *Cap-and-Trade Auction Proceeds: Annual Report*, 2017.

¹⁰² Mason, M. and Megerian, C. (2017, July 17). *California Legislature extends states cap-and-trade program in rare bipartisan effort to address climate change*. 2018.

¹⁰³ Busch, C., *California's Cap-And-Trade Compromise is a Big Step Forward, Not a Win for Polluters*, 2017.

¹⁰⁴ Mason, M. and Megerian, *California Legislature extends states cap-and-trade program in rare bipartisan effort to address climate change*, 2018

6.3 Annex III – Survey questions and responses

1. Please list the country(ies) in which your company operates.

Note: Shares in this section do not always add up to 100% due to multiple answer options and rounding.

COUNTRY	NO. OF RESPONSES	SHARE (%)
Canada	9	24%
United States	9	24%
Germany	7	19%
France	3	8%
United Kingdom	3	8%
Australia	2	5%
Brazil	2	5%
Chile	2	5%
India	2	5%
Japan	2	5%
Mexico	2	5%
Morocco	2	5%
Portugal	2	5%
Thailand	2	5%
Algeria	1	3%
Andorra	1	3%
Argentina	1	3%
Austria	1	3%
Belgium	1	3%
Burundi	1	3%
Cambodia	1	3%
China	1	3%
Colombia	1	3%
Czech Republic	1	3%
Denmark	1	3%
Greece	1	3%
Hungary	1	3%
Kenya	1	3%
Mongolia	1	3%
Peru	1	3%
Poland	1	3%
Qatar	1	3%

COUNTRY	NO. OF RESPONSES	SHARE (%)
Romania	1	3%
Russian Federation	1	3%
Slovak Republic	1	3%
Slovenia	1	3%
South Africa	1	3%
Spain	1	3%
Sweden	1	3%
Ukraine	1	3%
Vietnam	1	3%

2. Please choose the industrial sector(s) in which your company operates.

SECTOR	NO. OF RESPONSES	SHARE (%)
Power	15	35%
Oil & Gas	8	19%
Industrial & Manufacturing	7	16%
Chemicals	4	9%
Food & Beverages	1	2%
Transport & Logistics	2	5%
Metals & Mining	3	7%
IT & Telecom	2	5%
Retail	1	2%

3. How many people are employed at your company?

SIZE	NO. OF RESPONSES	SHARE (%)
1-49	10	27%
50-249	4	11%
250-499	3	8%
500-999	2	5%
1000-1999	1	3%
2000+	17	46%

4. Are your company's activities covered by a carbon pricing mechanism (Carbon Tax or ETS)?

RESPONSE	NO. OF RESPONSES	SHARE (%)
Yes	16	43%
No	19	51%
I don't know	2	5%

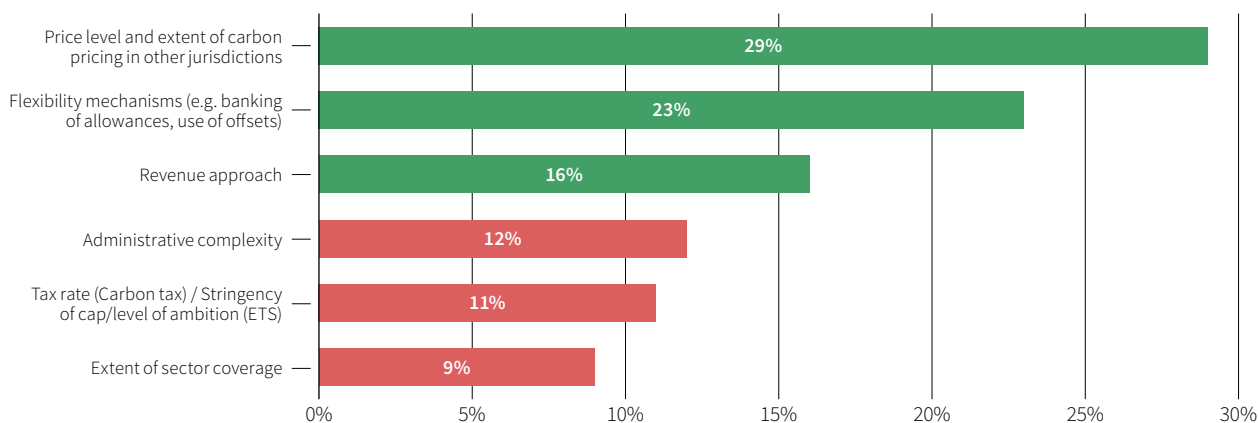
5. Please select the carbon pricing mechanism(s) that cover(s) your company's activities.

CPM	NO. OF RESPONSES	SHARE (%)
EU ETS	9	27%
Ontario Cap-and-Trade	4	12%
Australia ERF + SGM	2	6%
California Cap-and-Trade	2	6%
Japan Carbon Tax	2	6%
Mexico Carbon Tax	2	6%

CPM	NO. OF RESPONSES	SHARE (%)
Portugal Carbon Tax	2	6%
Québec Cap-and-Trade	2	6%
Alberta Carbon Tax	1	3%
Chile Carbon Tax	1	3%
Denmark Carbon Tax	1	3%
Ireland Carbon Tax	1	3%
Poland Carbon Tax	1	3%
RGGI (Regional Greenhouse Gas Initiative) ETS	1	3%
United Kingdom Carbon Price Floor	1	3%
Washington Climate Action Reserve	1	3%

6. From your company's point of view, which are the most important elements of a carbon pricing mechanism that determine your support for the scheme? Please rank the following criteria.

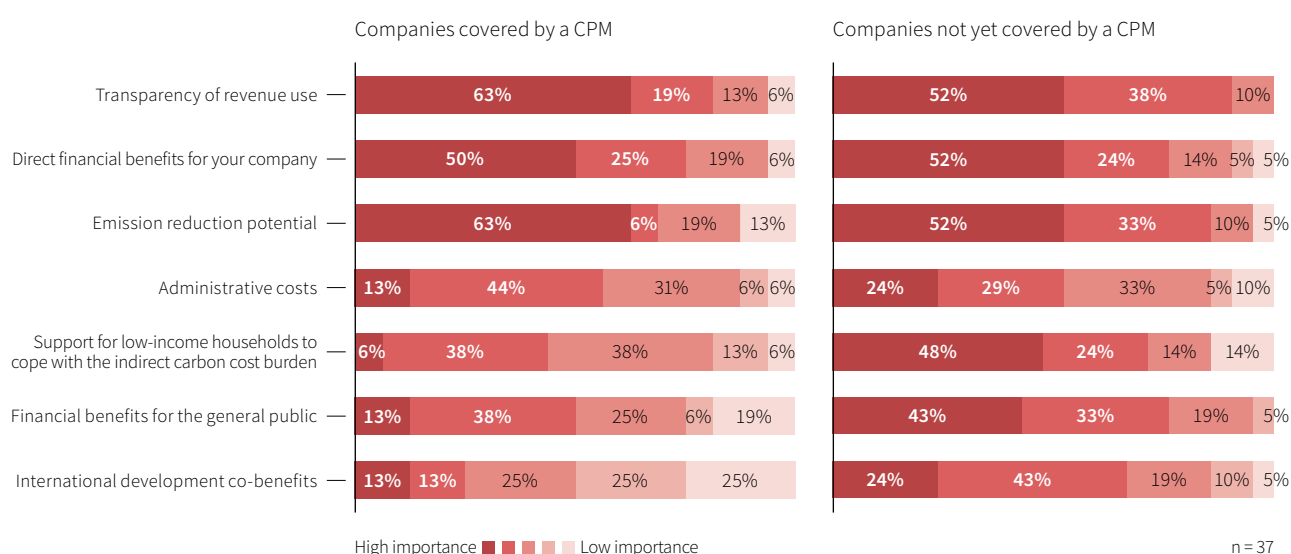
FIGURE 22 Importance of carbon pricing mechanism features determining covered entity support (Rank order score)



7. Covered companies: If you were to choose what revenues from the carbon pricing mechanism(s) that cover(s) your company's activities are used for, how would you rate the following elements from "High importance" to "Low importance"?

Uncovered companies: Imagine your company's activities were covered by a government imposed carbon pricing mechanism. If you were to choose what revenues from the mechanism are used for, how would you rate the following elements from "High importance" to "Low importance"?

FIGURE 23 Importance of revenue use design elements for companies



8. Covered companies: Are you aware what revenues from carbon pricing mechanism(s) that cover(s) your company's activities are used for?

RESPONSE	NO. OF RESPONSES	SHARE (%)
Yes, for some carbon pricing mechanisms that cover our activities	7	44%
Yes, for all carbon pricing mechanisms that cover our activities	5	31%
No	4	25%

9. Covered companies: Would your company be more supportive of the carbon pricing mechanism(s) if you knew what revenues are used for?

RESPONSE	NO. OF RESPONSES	SHARE (%)
Highly likely	2	50%
No change	2	50%

10. Covered companies: Irrespective of the current revenue use in the mechanism(s) that cover(s) your company's activities, please rank the following approaches to use revenues from carbon pricing mechanisms from "High preference" to "Low preference".

Uncovered companies: Please rank the following potential revenue use approaches from "High preference" to "Low preference".

FIGURE 24 Revenue use options ranked by order of importance to covered companies (Rank order score)

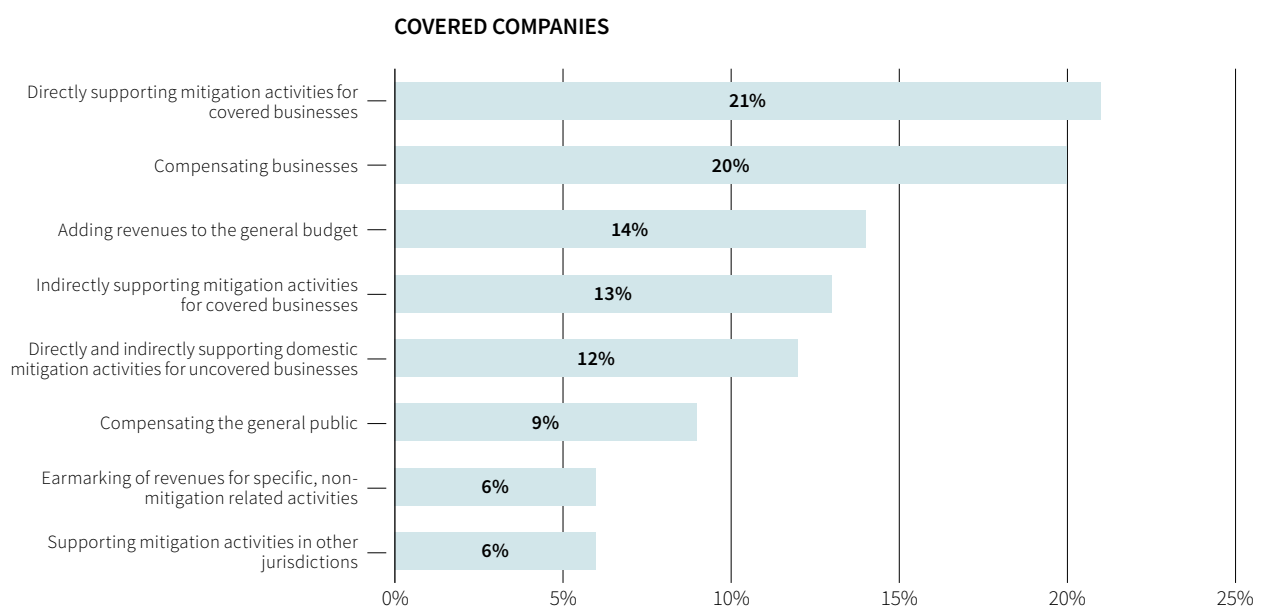
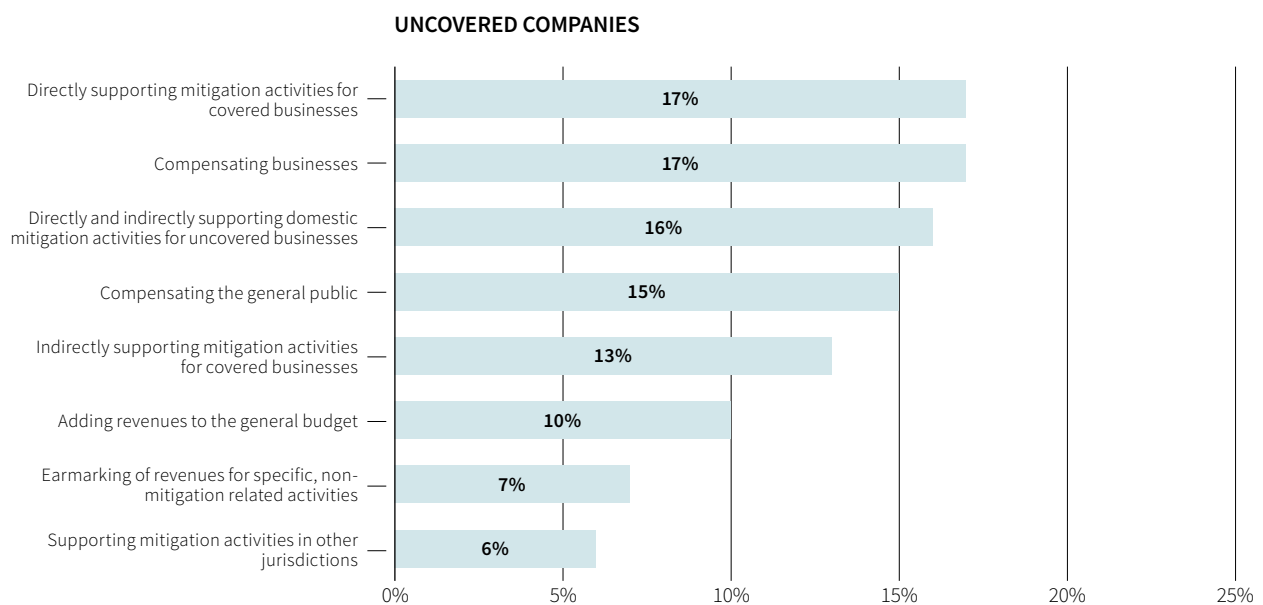


FIGURE 25 Revenue use options ranked by order of importance to uncovered companies (Rank order score)



11. For your most preferred option, what are the reasons for your preference?

COVERED COMPANIES

RESPONSE	NO. OF RESPONSES	SHARE (%)
Emission reduction potential (Ability to fund or incentivise emission reductions beyond the ones achieved by the carbon pricing mechanism itself)	8	29%
Transparency of revenue use	4	14%
Direct financial benefit for your company	5	18%
Financial benefits for the general public	4	14%
Support for low-income households to cope with increased electricity bills and other burdens arising from the carbon pricing mechanism	1	4%
International development co-benefits	3	11%
Low administrative costs	1	4%
Other: » Ability to transform the business » Ensuring competitiveness and decreasing the risk of business closure and job losses.	2	7%

UNCOVERED COMPANIES

RESPONSE	NO. OF RESPONSES	SHARE (%)
Emission reduction potential (Ability to fund or incentivise emission reductions beyond the ones achieved by the carbon pricing mechanism itself)	11	32%
Transparency of revenue use	5	15%
Direct financial benefit for your company	3	9%
Financial benefits for the general public	5	15%
Support for low-income households to cope with increased electricity bills and other burdens arising from the carbon pricing mechanism	6	18%
International development co-benefits	1	3%
Low administrative costs	2	6%
Other: » Social buy-in	1	3%

12. For your least preferred option, what are the reasons for your lack of support?

COVERED COMPANIES

RESPONSE	NO. OF RESPONSES	SHARE (%)
Low emission reduction potential (Low ability to fund or incentivise emission reductions beyond the ones achieved by the carbon pricing mechanism itself)	5	15%
Low transparency of revenue use	5	15%
Lack of direct financial benefit for your company	7	21%
Lack of financial benefits for the general public	4	12%
Lack of support for low-income households to cope with increased electricity bills and other burdens arising from the carbon pricing mechanism	4	12%
Lack of international development co-benefits	3	9%
High administrative costs	4	12%
Other: » Social buy-in	1	3%

UNCOVERED COMPANIES

RESPONSE	NO. OF RESPONSES	SHARE (%)
Low emission reduction potential (Low ability to fund or incentivise emission reductions beyond the ones achieved by the carbon pricing mechanism itself)	4	13%
Low transparency of revenue use	4	13%
Lack of direct financial benefit for your company	5	16%
Lack of financial benefits for the general public	6	19%
Lack of support for low-income households to cope with increased electricity bills and other burdens arising from the carbon pricing mechanism	3	10%
Lack of international development co-benefits	3	10%
High administrative costs	5	16%
Other	1	3%

13. Covered companies: Would you be willing to accept a higher carbon price in the mechanism(s) that already cover(s) your company's activities if other corporate tax rates were reduced?

RESPONSE	NO. OF RESPONSES	SHARE (%)
Yes	7	50%
Maybe	6	43%
No	1	7%

Uncovered companies: Under a potential future carbon pricing scheme, would you be willing to accept a higher carbon price if other corporate tax rates were reduced?

RESPONSE	NO. OF RESPONSES	SHARE (%)
Yes	10	63%
Maybe	6	38%
No	0	0%

6.4 Annex IV - CPM database

GENERAL CPM INFORMATION				REVENUE USE								SOURCES	
				Revenue recycling approaches	 General government spending		 Compensation for carbon cost burden		 Mitigation in sectors covered by CPMs		 Mitigation in sectors not covered by CPMs		
					General budget	Non-mitigation earmarking	Businesses	General public	Direct support	Indirect support	Domestic (direct and indirect)		International
Jurisdiction	CPM	Year of implementation	Revenues (2016, US\$ m)	› General budget › Reduction of personal national and local income taxed level and employer social security contributions	✓	✗	✗	✓	✗	✗	✗	✗	Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. Energy Policy, 96, 50-77
Finland	CT	1990	1,262.2	› General budget	✓	✗	✗	✗	✗	✗	✗	✗	Égert, B. (2012), Climate Change Policies in Poland: Minimising Abatement Costs, OECD. Economics Department Working Papers, No. 953, OECD Publishing
Poland	CT	1990	1.1	› General budget	✓	✗	✗	✗	✗	✗	✗	✗	Partnership for Market Readiness, Carbon Tax Guide : A Handbook for Policy Makers. World Bank, Washington, DC, 2017
Norway	CT	1991	1,486.9	› General budget › Reduced income and capital taxes › Contributions to the Global Government Pension Fund	✓	✗	✗	✓	✗	✗	✗	✗	Bowen, A., Carbon Pricing: How Best to use the Revenue? Grantham Research Institute and Global Green Growth Institute, 2015; Partnership for Market Readiness, Carbon Tax Guide : A Handbook for Policy Makers. World Bank, Washington, DC, 2017
Sweden	CT	1991	2,556.0	› General budget › Reductions in personal income taxes and employers' social security contributions › Reduced corporate taxes	✓	✗	✓	✓	✗	✗	✗	✗	Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. Energy Policy, 96, 50-77; Bowen, A., Carbon Pricing: How Best to use the Revenue? Grantham Research Institute and Global Green Growth Institute, 2015
Denmark	CT	1992	531.8	› General budget › Reduced carbon tax rates for energy intensive industries › Personal tax and employer social security contributions reduction › Business energy efficiency subsidies	✓	✗	✓	✓	✗	✓	✓	✗	Ecolex, Law on natural resources tax, 2017
Latvia	CT	1995	6.4	› "• Biodiversity conservation • Environmental monitoring • Strengthening of the environmental protection institutions' capacities • (Radioactive) waste management	✗	✓	✗	✗	✗	✗	✗	✗	Ecologic Institute, Assessment of climate change policies in the context of the European Semester - Country Report: Slovenia, 2012
Slovenia	CT	1996	79.1	› General budget › Energy efficiency and other mitigation measures	✓	✗	✗	✗	✗	✓	✓	✗	FOES, Carbon taxation and fiscal consolidation: the potential of carbon pricing to reduce Europe's fiscal deficits, 2012
Estonia	CT	2000	2.7	› Reduction of income and corporate tax rates	✗	✗	✓	✓	✗	✗	✗	✗	
EU	ETS	2005	4,214.6	At least half of the revenues to be used for "climate-and-energy-related purposes" according to the European Commission. Examples: › Germany: Building restoration and energetic urban renewal; compensation of energy costs for electricity-intensive enterprises; support for electromobility, renewable energy and energy efficiency; national climate action programmes; refunding liquidity loans; international climate financing (incl. climate change adaptation and environmental protection) › France: National Housing retrofitting of social housing › Romania: 71% of projects submitted by various ministries to the National Administration of the Environmental Fund › Czech Republic: Around 50% for energy efficiency in buildings, international climate finance and energy efficiency in district heating and industry › Finland: 100% to climate action within development cooperation › Hungary: 50% used for climate change related spending	✓	✓	✓	✓	✓	✓	✓	✓	European Commission, Analysis of the use of Auction Revenues by the Member States, 2017; Germanwatch, Using EU ETS auctioning revenues for climate action, 2013

GENERAL CPM INFORMATION				REVENUE USE									SOURCES
				Revenue recycling approaches	 General government spending		 Compensation for carbon cost burden		 Mitigation in sectors covered by CPMs		 Mitigation in sectors not covered by CPMs		
					General budget	Non-mitigation earmarking	Businesses	General public	Direct support	Indirect support	Domestic (direct and indirect)	International	
Jurisdiction	CPM	Year of implementation	Revenues (2016, US\$ m)										
Alberta	SGER	2007	101.9	› Climate and environment-related technology research › Development and demonstration projects in Alberta and internationally	✓	✗	✗	✗	✗	✗	✓	✓	Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. Energy Policy, 96, 50-77
British Columbia	CT	2008	902.3	› Reductions in business and personal taxation › Compensations for low-income households › Targeted tax credits for e.g.small business venture capital and provincial film industry	✗	✓	✓	✓	✗	✗	✗	✗	Murray, B. & Rivers, N. (2015). British Columbia's RevenueNeutral Carbon Tax: A Review of the Latest 'Grand Experiment' in Environmental Policy. NI WP 15-04. Durham, NC: Duke University
Liechtenstein	CT	2008	4.8	› Building renovations measures › Investments in renewable energy › Waste heat recovery	✗	✗	✗	✗	✗	✓	✓	✗	Tax News, Liechtenstein Offers Exemption From CO ₂ Tax Rise, 2013
New Zealand	ETS	2008	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017.
Switzerland	ETS	2008	4.0	› General budget	✓	✗	✗	✗	✗	✗	✗	✗	Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. Energy Policy, 96, 50-77
Switzerland	CT	2008	1,002.0	› Support for renewable energy and energy efficiency measures in the building sector › Household-level lump sum rebates and employer payroll rebates › Funding of low-carbon projects through green "Technology Fund"	✗	✗	✓	✓	✗	✓	✓	✗	Federal Office for the Environment, CO ₂ Levy, 2017
RGGI (Regional Greenhouse Gas Initiative)	ETS	2009	266.5	› General budget › Energy efficiency measures (business and residential sector) › Clean and renewable energy › Household and business energy audits › Low-income home weatherisation programs › Lighting and appliance retail rebates › R&D of advanced energy technologies › Utility bill assistance	✓	✗	✓	✓	✗	✓	✓	✗	Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. Energy Policy, 96, 50-77
Iceland	CT	2010	31.6	› General budget	✓	✗	✗	✗	✗	✓	✗	✗	Partnership for Market Readiness, Carbon Tax Guide : A Handbook for Policy Makers. World Bank, Washington, DC, 2017
Ireland	CT	2010	465.1	› General budget › Energy efficiency measures for low-income households	✓	✗	✗	✗	✗	✗	✗	✗	Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. Energy Policy, 96, 50-77
Tokyo	CaT	2010	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017.
Saitama	ETS	2011	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017.
Ukraine	CT	2011	3.2	› General budget	✓	✗	✗	✗	✗	✗	✗	✗	Frey, M. (2016). Assessing the impact of a carbon tax in Ukraine, Climate Policy, 17:3, 378-396
California	CaT	2012	901.1	› Low-carbon transportation infrastructure (rail, high speed rail, bus) › Rebates and vouchers for hybrid and zero emission cars › Installation of energy efficiency and renewable energy measures in low-income households and public buildings › Climate smart agriculture › Wetlands and Watershed Restoration › Waste Diversion › Reforestation and forest health restoration	✗	✓	✗	✗	✗	✓	✓	✗	Air Resources Board, Cap-and-Trade Auction Proceeds Second Investment Plan: Fiscal Years 2016-17 through 2018-19, 2016

GENERAL CPM INFORMATION				REVENUE USE									SOURCES
				Revenue recycling approaches	 General government spending		 Compensation for carbon cost burden		 Mitigation in sectors covered by CPMs		 Mitigation in sectors not covered by CPMs		
					General budget	Non-mitigation earmarking	Businesses	General public	Direct support	Indirect support	Domestic (direct and indirect)	International	
Jurisdiction	CPM	Year of implementation	Revenues (2016, US\$ m)										
Japan	CT	2012	2,340.9	› Promotion of lithium ion batteries › Support for energy-efficient equipment for small and medium-sized businesses › Promotion of energy efficiency and renewable energy through "New Green Deal Fund" financing › Subsidising "Joint Crediting Mechanism" to foster emission reductions in developing countries	✗	✗	✗	✗	✗	✓	✗	✓	Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. Energy Policy, 96, 50-77
Beijing	Pilot ETS	2013	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. Energy Policy, 96, 50-77
Guangdong	Pilot ETS	2013	1.6	› General budget › Energy saving and other emission reduction measures by compliance companies	✓	✗	✗	✗	✓	✗	✗	✗	Sun Yat-sen University RCLCTE, Guangdong Pilot Emissions Trading Scheme Report (2013-2014), 2015
Kazakhstan	ETS	2013	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017.
Québec	CaT	2013	336.1	› Energy efficiency measures for buildings, industrial processes and vehicle fleets › Support for the development of mass and active transit › Electrification of transport › Support of renewable energy sources in all activity sectors › Research and development in the field of clean technology	✗	✗	✗	✗	✓	✓	✓	✗	Government of Quebec, 2013-2020 Climate Change Action Plan, 2013
Shanghai	Pilot ETS	2013	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017.
Shenzhen	Pilot ETS	2013	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017.
Tianjin	Pilot ETS	2013	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017.
United Kingdom	CPF	2013	1,168.9	› General budget › Carbon cost compensation for energy-intensive industry	✓	✗	✓	✗	✗	✗	✗	✗	Hirst, D. (2018). Carbon Price Floor (CPF) and the price support mechanism, House of Commons Library Briefing Paper Number 05927, 8 January 2018
Chongqing	Pilot ETS	2014	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017.
France	CT	2014	4,062.6	› Reduction of income and corporate taxes › Energy assistance to low-income households	✗	✗	✓	✓	✗	✗	✗	✗	Partnership for Market Readiness, Carbon Tax Guide : A Handbook for Policy Makers. World Bank, Washington, DC, 2017
Hubei	Pilot ETS	2014	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017.
Mexico	CT	2014	440.4	› General budget	✓	✗	✗	✗	✗	✗	✗	✗	Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. Energy Policy, 96, 50-77
Korea	ETS	2015	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017.
Portugal	CT	2015	133.1	› General budget › Reduction of income tax	✓	✗	✗	✓	✗	✗	✗	✗	"Pereira, R. & Rodrigues, P., A New Carbon Tax in Portugal: A Missed Opportunity to Achieve the Triple Dividend?, College of William and Mary Department of Economics Working Paper Number 161, 2016"
Australia	ERF/SGM	2016	–	› No revenues generated	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017.

GENERAL CPM INFORMATION				REVENUE USE									SOURCES
				Revenue recycling approaches	 General government spending		 Compensation for carbon cost burden		 Mitigation in sectors covered by CPMs		 Mitigation in sectors not covered by CPMs		
					General budget	Non-mitigation earmarking	Businesses	General public	Direct support	Indirect support	Domestic (direct and indirect)	International	
Jurisdiction	CPM	Year of implementation	Revenues (2016, US\$ m)										
British Columbia	GGIRCA	2016	N/A	› Research support for innovative clean technologies	✗	✗	✗	✗	✗	✓	✓	✗	Government of British Columbia, Environment and Climate Change Strategy: World's cleanest LNG legislation comes into force, 2015
Fujian	Pilot ETS	2016	0.5	› General budget	✓	✗	✗	✗	✗	✗	✗	✗	Partnership for Market Readiness, ETS News from China, 2017
Alberta	CT	2017	N/A	› Carbon rebates to help low- and middle-income families › Green infrastructure support, e.g. public transit › Support for large scale renewable energy, bioenergy and technology › Energy efficiency programs and services for households and businesses › Cuts in small business tax rate › Coal community transition payments and payments as part of coal phase out agreements › Assistance for Indigenous communities to transition to a cleaner economy	✗	✗	✓	✓	✗	✓	✓	✗	Alberta Government, Carbon levy and rebates - Carbon Levy, 2016
Chile	CT	2017	N/A	› General budget, intended for health and education spending	✓	✗	✗	✓	✗	✗	✗	✗	Partnership for Market Readiness, Carbon Tax Guide : A Handbook for Policy Makers. World Bank, Washington, DC, 2017
Colombia	CT	2017	N/A	› Reduction of deforestation › Promotion of sustainable agriculture › Climate change adaptation › Reduction of deforestation	✗	✓	✗	✗	✗	✗	✓	✗	Government of Colombia (Minambiente), \$1,3 billones se recaudarian a través de paquete de tributos verdes, 2017
Ontario	CaT	2017	N/A	› Cycling infrastructure › Energy efficiency and lower GHG emissions in public schools › Homeowners to reduce their energy bills › Electric vehicle stations across Ontario › Energy efficient repairs and retrofits for social housing units and buildings › Small, medium and large-sized businesses to adopt leading-edge technologies, increase energy efficiency and reduce greenhouse gas emissions › Economic growth in First Nations communities by reducing reliance on diesel fuel and provide them with the training, tools and infrastructure to address climate change	✗	✗	✗	✗	✗	✓	✓	✗	Government of Ontario, Ontario Announces Results of June Cap and Trade Program Auction, 2017
Washington	CAR	2017	N/A	› No revenues expected	✗	✗	✗	✗	✗	✗	✗	✗	World Bank, Carbon Pricing Dashboard, 2017
Massachusetts	ETS	2018	N/A	› Clean energy › Vehicle electrification › Adaptation to the impacts of climate change › Mitigation or adaptation programs or projects involving communities that are already adversely impacted by air pollution	✗	✗	✗	✗	✗	✓	✓	✗	Government of Massachusetts, 310 CMR 7.74: Reducing CO ₂ Emissions from Electricity Generating Facilities, 2017
South Africa	CT	2018	N/A	› Reduction in electricity generation levy and renewable electricity premium › Income Tax Allowance on Energy Efficiency Savings	✗	✗	✓	✓	✗	✗	✗	✗	Government of South Africa, Release of carbon tax bill for introduction in parliament and public comment (Media Statement), 2017

6.5 Annex V – List of references

- » **Baranzini, A., & Carattini,** *Effectiveness, earmarking and labelling: Testing the acceptability of carbon taxes with survey data. Environmental Economics and Policy Studies*, 2017.
- » **Barrington-Leigh, C., Tucker, B., & Lara, J. K.,** *The short-run household, industrial, and labour impacts of the Québec carbon market. Canadian Public Policy*, 2015.
- » **Belzile, G.,** *Le Fonds vert doit disparaître*, 2017, May 15, retrieved from <https://www.iedm.org/fr/70052-le-fonds-vert-doit-disparaitre>, February 2018.
- » **Bovenberg, A. L., & De Mooij, R. A.,** *Environmental tax reform and endogenous growth. Journal of Public Economics*, 1997.
- » **Bristow, A. L., Wardman, M., Zanni, A. M., & Chintakayala, P. K.,** *Public acceptability of personal carbon trading and carbon tax. Ecological Economics*, 2010.
- » **Bundesamt für Umwelt (BAFU), Schweiz,** *Neue Finanzierungsinstrumente für die Schweizer Beiträge an das internationale Klimaregime*, 2011.
- » **Bundesministerium der Finanzen (BMF),** *Bericht des Bundesministeriums der Finanzen über die Tätigkeit des EKF 2012 und über die 2013 zu erwartende Einnahmen- und Ausgabenentwicklung*, 2017.
- » **Bundesrechnungshof, Deutschland,** *Feststellungen zur finanzwirtschaftlichen Entwicklung des Bundes*, 2013.
- » **Bundesverband der Deutschen Industrie e.V.,** *Reform des Europäischen Emissionshandels (EU ETS)*, 2016.
- » **Busch, C.,** *California's Cap-And-Trade Compromise is a Big Step Forward, Not a Win for Polluters.* Retrieved from <https://www.forbes.com/sites/energyinnovation/2017/07/12/californias-cap-and-trade-compromise-is-a-big-step-forward-not-a-win-for-polluters/#449ca3843ea0>.
- » **California Air Resources Board,** *Cap-and-Trade Auction Proceeds: Annual Report*, 2017.
- » **California Air Resources Board,** *Cap-and-Trade Auction Proceeds: Budget Appropriations*, Retrieved from <https://www.arb.ca.gov/cc/capandtrade/auctionproceeds/budgetappropriations.htm>, February 2018.
- » **California Air Resources Board,** *Cap-and-Trade Program*, Retrieved from <https://www.arb.ca.gov/cc/capandtrade/capandtrade.htm>, February 2018.
- » **Canada's Ecofiscal Commission,** *Choose Widely: Options and Trade-Offs in Recycling Carbon Prices Revenues*, 2016.
- » **Carbon Pricing Leadership Coalition (CPLC),** *What are the Options for Using Carbon-Pricing Revenues?*, 2016.
- » **Carl, J., & Fedor, D.,** *Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. Energy Policy*, 2016.
- » **Branger, F., & Quirion, P.,** *Climate policy and the 'carbon haven' effect. WIREs Clim Change* 2013. doi: 10.1002/wcc.24
- » **Deutsche Emissionshandelsstelle (DEHSt),** *Beihilfen für indirekte CO₂-Kosten des Emissionshandels (Strompreiskompensation) in Deutschland für das Jahr 2015*, 2017.
- » **Dinan, T.,** *Offsetting a carbon tax's costs on low-income households. Microeconomic Studies Division, Congressional Budget Office*, 2012.
- » **Ecofys,** *The waterbed effect and the EU ETS: An explanation of a possible phasing out of Dutch coal fired power plants as an example*, 2016.
- » **European Commission,** *Analysis of the use of Auction Revenues by the Member States*, 2017.
- » **European Commission,** *EU ETS Auctioning*, Retrieved from https://ec.europa.eu/clima/policies/ets/auctioning_en, February 2018.
- » **European Commission,** *Summary Report of Expert Consultations for Finance for Innovation: Towards the ETS Innovation Fund*, 2017.
- » **European Union,** *Post-2020 reform of the EU Emissions Trading System*, 2017.
- » **European Union,** *Reform of the EU Carbon Market: From backloading to the market stability reserve*, 2014.

- » **Federal Ministry for the Environment**, *Nature Conservation and Nuclear Safety. Mitigating Greenhouse Gas Emissions*, 2018.
- » **German Federal Ministry for Economic Affairs and Energy (BMWi)**, *2017 Draft Budget*, 2017.
- » **Government of Québec**, *Québec's 2013-2020 Climate Change Action Plan*, 2012.
- » **House of Commons Library, United Kingdom**, *Carbon Price Floor (CPF) and the price support mechanism*, 2018.
- » **House of Commons Library, United Kingdom**, *Hypothecated Action*, 2011.
- » **I4CE – Institute for Climate Economics and Enerdata**, *Exploring the EU ETS Beyond 2020*, 2015.
- » **Jakob, M., Chen, C., Fuss, S., Marxen, A., Rao, N. D., & Edenhofer, O.**, *Carbon pricing revenues could close infrastructure access gaps. World Development*, 2016.
- » **Legislative Analyst's Office (LAO)**, *The 2017-18 Budget: Cap-and-Trade*, 2017.
- » **Marron, D., & Morris, A.**, *How Should Governments Use Revenue from Corrective Taxes?*, Urban Institute and the Brookings Institution or Carl, J., & Fedor, D., 2012. *Revenue-Neutral Carbon Taxes in the Real World*, Shultz-Stephenson Task Force on Energy Policy, 2016.
- » **Mason, M. and Megerian, C.**, *California Legislature extends states cap-and-trade program in rare bipartisan effort to address climate change*, 2017, July 17, Retrieved from <http://www.latimes.com/politics/la-pol-ca-california-climate-change-vote-republicans-20170717-story.html>, February 2018.
- » **Melançon, I.**, « On doit mieux expliquer » le Fonds vert (M. Croteau, Interviewer). *La Presse*. February 2018.
- » **Ministère du Développement Durable**, *de l'Environnement et de la Lutte contre les Changements Climatiques. Comptes du Fonds vert 2015-2016*, 2017.
- » **Ministry of the Environment, Japan**, *Details on the Carbon Tax (Tax for Climate Change Mitigation)*, 2012.
- » **Murray, B., & Rivers, N.**, *British Columbia's revenue-neutral carbon tax: A review of the latest "grand experiment" in environmental policy. Energy Policy*, 2015.
- » **OECD/IEA and IRENA**, *Perspectives for the Energy Transition: Investment Needs for a Low-carbon Energy System*, 2017.
- » **Öko-Institut e.V.**, *Das Emissionshandelssystem der Europäischen Union und der Energie- und Klimafonds für Deutschland*, 2014.
- » **Ricardo Energy & Environment**, *Assessment of Market Based Climate Change Policy Options for Turkey*, 2017.
- » **Sælen, H., & Kallbekken**, *A choice experiment on fuel taxation and earmarking in Norway. Ecological Economics*, 2011.
- » **State of California**, *Cap-and-Trade Auction Proceeds Second Investment Plan: Fiscal Years 2016-17 through 2018-19*, 2016.
- » **Sun Yat-sen University and ICIS China**, *Guangdong Pilot Emissions Trading Scheme Report (2013-2014)*, 2015.
- » **Tax Policy Center**, *How To Use Carbon Tax Revenues, 2016 or Canada Eco-Fiscal Commission, Choose Wisely: Options and Trade-Offs in Recycling Carbon Pricing Revenue*, 2016.
- » **UK Office for Budget Responsibility**, *Economic and Fiscal Outlook*, 2016.
- » **Ulbrich, H.**, *To Earmark or Not to Earmark. Policy Brief*, Strom Thurmond Institute, Clemson University, 2010.
- » **Vivid Economics**, *Carbon Taxation and Fiscal Consolidation: The potential of carbon pricing to reduce Europe's fiscal deficits*, 2012.
- » **Wilkinson, M.**, *Paying for public spending: is there a role for earmarked taxes?. Fiscal studies*, 1994.
- » **World Bank**, *Carbon Pricing Dashboard*, Retrieved from http://carbonpricingdashboard.worldbank.org/map_data, February 2018.
- » **World Bank**, *Carbon Pricing Dashboard: What is Carbon Pricing?*, 2017.
- » **World Bank**, *Carbon Pricing Watch*, 2017.
- » **World Bank**, *Carbon Tax Guide: A Handbook for Policy Makers*, 2017.
- » **World Bank**, *Ecofys and Vivid Economics, State and Trends of Carbon Pricing 2016*, 2016.
- » **World Bank**, *Ecofys and Vivid Economics, State and Trends of Carbon Pricing 2017*, 2017.
- » **World Bank**, *Report of the High Level Commission on Carbon Prices*, 2017.

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