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# Pricing carbon effectively: a pathway for higher climate change ambition

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## ABSTRACT

Closing the gap between current climate change mitigation policies and those needed to deliver on the Paris Agreement's temperature targets requires significant scaling up of policy ambition. This article argues that policy action that aims to reach a minimum level of effective carbon prices can increase countries' ability to implement ambitious climate change policies, including carbon taxes and emission trading schemes (ETSs). Effective carbon prices include prices applied via energy taxes, fossil fuel subsidies, carbon taxes, and ETSs. Action on effective carbon prices can create new synergies among government departments – thereby strengthening their capacity to implement climate policies. Policy action on effective carbon pricing can also integrate finance ministries more directly in climate change policy than focusing exclusively on explicit carbon pricing. Lastly, acting on effective carbon pricing can broaden countries' engagement in carbon pricing policy compared to focusing exclusively on explicit carbon pricing. Civil society actors, governments, and international organizations could foster higher ambition on climate policy by promoting action on effective carbon prices. The article also highlights that analyses of effective carbon pricing gaps – which measure differences between current effective carbon prices and benchmark prices needed to meet the temperature targets of the Paris Agreement – need to be carefully communicated and interpreted so as to avoid undermining climate change policy.

## Key policy insights:

- Policy action on effective carbon prices can unlock in-house synergies in countries that have substantial experience with energy and environmental policy but not in climate policy.
- Climate action that focuses on effective carbon prices can enhance finance ministries' participation in climate policy.
- Policy action centred on effective carbon prices can help to involve more countries in carbon pricing policy.
- Estimates of effective carbon pricing gaps need to be carefully communicated and interpreted to avoid reducing the sense of urgency of acting on climate change mitigation.

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Carbon pricing; finance ministries; climate clubs; capacity building; effective carbon pricing

## 1. Introduction

Current climate change policies are far from sufficient to meet the Paris Agreement's temperature targets (UN Environment, 2020). Although academics and policymakers widely recognize this deficiency, governments struggle to implement more ambitious action. Analysts increasingly look at strategies to enable higher ambition (Carattini et al., 2018; van den Bergh et al., 2020). This article builds on the growing interest among international institutions (IMF, 2019; OECD, 2016, 2018, 2021), academics (Bachus & Gao, 2019), and private sector

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actors (Vivid Economics and ODI, 2019) to develop methodologies to estimate carbon prices imposed via instruments that change the marginal cost of emitting carbon without targeting the emissions or the carbon content of fuels directly (*implicit carbon pricing*). Examples of these ‘unconventional’ carbon pricing policies are fuel taxes<sup>1</sup> and subsidies to fossil fuels consumption (World Bank, 2019a). Governments could use these methodologies to focus their climate action on meeting a minimum level of *effective carbon prices*, i.e. the sum of implicit carbon prices and *explicit carbon prices* (explicit carbon prices are carbon prices imposed via carbon taxes and emission trading schemes (ETSs)). The central thesis of this article is that policy action that targets meeting a minimum level of effective carbon prices can benefit climate change policy. In particular, such action can: (i) create new synergies among government departments – thereby strengthening their capacity to implement more ambitious climate policies; (ii) involve finance ministries more directly in climate policy; and (iii) involve more countries in carbon pricing policy.

The article also argues that estimates of effective carbon pricing gaps – which measure differences between current effective carbon prices and benchmark prices – need to be carefully communicated and interpreted so as not to undermine climate change policy.

The article is structured as follows: Section 2 introduces the concepts of explicit, implicit, and effective carbon prices. Section 3 argues that policy action on effective carbon prices can increase governments’ climate policy capacity and ambition domestically and in international cooperation. Section 4 argues that policy action on effective carbon prices can broaden governments’ engagement in carbon pricing policy. Section 5 discusses the need to carefully communicate and interpret estimates of effective carbon pricing gaps so as to not undermine climate change policy. Section 6 concludes.

## 2. Explicit, implicit and effective carbon prices

There is no consensus on the policies that should be seen as implicitly pricing carbon (see World Bank (2019a) for a discussion). The approach I take in this article – i.e. to focus on fuel taxes and fossil fuel subsidies – is in line with the definitions adopted by the OECD (2016, 2018), the IMF (2019), and the Coalition of Finance Ministers for Climate Action (2019a). Following World Bank (2019a) and IMF (2019), effective carbon prices are defined here as the sum of explicit and implicit carbon prices.

In recent years, the OECD and the IMF have developed methodologies to estimate effective carbon prices. Both institutions include in their estimates explicit carbon prices applied via carbon taxes and ETSs. The OECD adds implicit carbon prices applied via fuel taxes. These implicit prices are estimated by dividing fuel tax rates per unit of fuel or energy by the carbon content of the fuel (OECD, 2016, 2018, 2021). The IMF follows a similar method to estimate implicit carbon prices applied via fuel taxes, but subtracts negative implicit carbon prices applied via fossil fuel subsidies<sup>2</sup> and takes into account the effectiveness of different instruments (e.g. ETSs)<sup>3</sup> to yield emission reductions compared to a hypothetical carbon tax applied to the whole economy (IMF, 2019).

Further estimates of effective carbon prices may become available as a result of the implementation of certain types of border carbon adjustment (BCAs) mechanisms. Mehling et al. (2019) have recently discussed the possibility of adopting BCA mechanisms that credit for effective carbon prices implemented in exporting countries. Along these lines, US Secretary of the Treasury Janet Yellen has suggested designing BCA mechanisms that credit for a broader set of policies than explicit carbon prices alone (US Department of the Treasury, 2021). Implementing BCA mechanisms that credit for effective carbon prices requires estimating effective carbon prices in the importing and exporting jurisdiction to determine the adjustment level. Thus, further estimates of effective carbon pricing may become available if BCA mechanisms of this type are implemented.

Methodologies to estimate effective carbon prices may enable policy action focused on increasing effective carbon prices. Examples of policy action that focuses on increasing effective carbon prices include: (i) the unilateral commitment of a country (for instance, included in a government plan or nationally determined contributions (NDCs)) to reach and maintain a minimum level of effective carbon prices and the subsequent adoption of policies that aim to meet the commitment (i.e. the implementation of explicit and/or implicit carbon pricing); and (ii) the multilateral creation of an *effective carbon pricing club* whereby member countries commit to implementing a minimum level of effective carbon prices and the ensuing implementation of policies that meet the aims of the club.

Ideally, the minimum level of effective carbon prices is determined by considering the prices needed to reach a mitigation outcome or temperature target. Establishing what level of effective carbon prices delivers a mitigation outcome requires estimating the dollar amount of implicit carbon prices (e.g. a fuel tax) needed to deliver mitigation outcomes equivalent to that of a certain level of explicit carbon prices (e.g. a carbon tax). Once the substitutability of explicit and implicit carbon prices is established, it will be possible to identify combinations of implicit and explicit carbon prices that deliver a mitigation outcome.<sup>4</sup>

Some clarifications are due before starting the analysis. This article does not claim that climate action focused on effective carbon prices has no downsides. Notably, instruments that price carbon implicitly are less cost-effective in mitigating climate change than instruments that price carbon explicitly. In addition, building an effective carbon pricing club will require countries to agree on a methodology to estimate effective carbon prices. This is to avoid difficult negotiations on  $n$  dimensions instead of a single explicit carbon price level.<sup>5</sup> The challenges to build an effective carbon pricing club will also depend on its characteristics (e.g. size, legal stringency).<sup>6</sup> In addition, there is no guarantee that the public will support the implementation of implicit carbon prices than explicit ones. Arguably, a climate club or international commitment that focuses on 'hidden' carbon prices may be rejected by segments of the public. There is substantial research on how to address public opposition to explicit carbon pricing (Carattini et al., 2018; Dominioni & Heine, 2019; Klenert et al., 2018; Rabe, 2018; Stokes & Mildenerger, 2020) and some that discusses strategies to address public opposition to implicit ones (Rabe & Borick, 2012). Key insights from this research are that, for instance, 'framing' and 'revenue use'<sup>7</sup> can be important to catalyze public support (Carattini et al., 2018; Klenert et al., 2018; Rabe & Borick, 2012). However, it remains an open question whether these strategies could be sufficient to overcome public opposition to effective carbon pricing. With these caveats in mind, the remainder of this article argues that there are benefits of focusing policy action on effective carbon pricing that go beyond the implementation of effective carbon prices *per se*.

### 3. Increasing climate readiness and ambition through effective carbon pricing policy

In this section, I argue that policy action that aims to meet a minimum level of effective carbon prices can strengthen governments' capacity and ambition in climate policy – especially regarding the implementation of carbon taxes and ETSs. In doing so, I align with Sterner (2007) in recognizing the importance that fuel taxes can play in climate change policy.

#### 3.1. Creating in-house synergies

Policy action aimed at meeting a minimum level of effective carbon prices can help governments realize the existence of in-house resources that enable advancing the implementation of explicit carbon pricing (World Bank, 2019a).

Focusing action on effective carbon pricing broadens the scope of the different branches of government involved in the debate and design of climate change policies, potentially creating new synergies across teams that have a diverse set of relevant in-house knowledge. For instance, the political economy of implementing carbon taxes, energy taxes, and reforming fossil fuel subsidies is similar in many respects because these measures all increase the price of consuming fossil fuels while generating fiscal space (Vogt-Schilb & Hallegatte, 2017). Many governments have direct and recent experience in reducing fossil fuel subsidies or in implementing energy taxes. According to the Global Subsidies Initiative, from 2015 to 2018, at least 50 governments undertook reductions in fossil fuel subsidies (Merrill & Quintas, 2019). These governments can build on these experiences to inform the implementation of carbon taxes. To illustrate, both implementing carbon taxes and reducing fossil fuel subsidies can disproportionately burden low-income households – especially when income levels are taken into account (Couharde & Mouhoud, 2020; Rentschler & Bazilian, 2017; World Bank, 2019b). Evidence suggests that these negative impacts are one of the main factors that hinder public support for carbon taxation (Carattini et al., 2018). Government experience in managing distributional concerns from fossil fuel subsidy reforms can be invaluable for design and implementation of durable carbon taxes (World Bank, 2019a). For instance, broad consultations and engagement with stakeholders are often crucial

to improving the perceived legitimacy and durability of subsidy reforms (Whitley & van der Burg, 2018). Similar approaches may help to implement carbon taxes. In addition, experience with subsidy reforms indicates that compensation schemes targeted at groups particularly vulnerable to energy price increases need to be tailored to the specific situation of a country to maximize their effectiveness (Rentschler & Bazilian, 2017). Such domestic experience with subsidy reforms can thus be invaluable for the design and implementation of carbon taxes when carbon revenues are used to mitigate the impact of these measures on vulnerable groups.

Policy action on effective carbon prices may be particularly beneficial to the design and implementation of carbon taxes in developing countries. Currently, few developing countries have implemented explicit carbon pricing (World Bank, 2022), but many have implemented fossil fuel subsidy reforms in recent years (Merrill & Quintas, 2019). For instance, in 2010, Iran implemented an ambitious fossil fuel subsidy reform where the free market price of diesel increased from Rs 165 per liter to Rs 3,500 per liter (a 2000 percent increase) without much public opposition (details of the reform are discussed in IMF (2011)). A peculiar aspect of this reform was the scheme adopted by the Iranian government to distribute savings to the population; forecasted savings were distributed to citizens with frozen bank accounts before the reform was implemented, and bank accounts were unfrozen only after the reform passed. Antedating the distribution money on visible bank accounts can increase recipients' evaluation of these cash transfers – and thereby reduce public opposition to the environmental tax reform (Dominioni & Heine, 2019). A similar scheme could be replicated with available technologies (e.g. chip cards and mobile money) to support the implementation of carbon taxes, both in developed and developing countries (Dominioni & Heine, 2019).

Another area where expertise can be borrowed to increase effective carbon pricing is industrial competitiveness, which is otherwise one of the main drivers of business and public opposition to carbon pricing (Carattini et al., 2018). While a traditional policy response to industrial competitiveness concerns is to implement policy exemptions, this approach is detrimental to climate change mitigation because there is no incentive to abate in exempted sectors. However, a wide variety of other policy tools can effectively address industry demands for protection while preserving incentives to abate (Pigato, 2019). An example is output-based rebates, meaning a revenue recycling practice where environmental taxes are paid by emission-intensive and trade-exposed industries and revenues from these taxes are returned to producers based on their share of output. In some countries, output-based rebates have been applied to environmental taxes, such as the Swedish NO<sub>x</sub> tax (Braathen, 2012), but it could be similarly applied to carbon taxes. Expertise on how to implement these policies does not necessarily reside in the same departments engaged in implementing carbon taxes and ETSs, but in departments involved in implementing other types of policies that put an implicit price on carbon. Domestic action on effective carbon prices could create collaboration between these departments – unleashing new synergies.

### ***3.2. Involving finance ministries in climate change policy***

Scholars and policymakers recognize that a broader involvement of finance ministries in climate change policy could narrow the gap between current policies and those needed to avoid the disastrous consequences of climate change (Edenhofer et al., 2017; IMF, 2019; Slaughter, 2017). Policy action that focuses on effective carbon pricing can help to involve finance ministries more directly in climate change policy.

In many jurisdictions, the involvement of finance ministries in climate policy is limited. However, this is changing. The G20 involvement in phasing-out fossil fuel subsidies (G20 Research Group, 2009) and the launch of the Coalition of Finance Ministers for Climate Action at COP25 are important examples of this trend (Carattini & Löschel, 2021). The 2019 Coalition of Finance Ministers for Climate Action includes 69 Finance Ministers, and member countries account for about 40 percent of global GHG emissions and 64 percent of global GDP (Coalition of Finance Ministers for Climate Action, 2019b).

Policy action on effective carbon prices involves more finance ministries in climate change policy because the implementation of fuel taxes often falls under the auspices of finance ministries. Thus, government action on implementing effective carbon pricing requires finance ministries to be part of the discussion. This may be an advantage compared to the common focus on promoting the implementation of explicit carbon prices because, in some jurisdictions, the implementation of carbon taxes and ETSs may fall under the auspices of the ministries of the environment (e.g. China ETS, Quebec ETS, France carbon tax) or independent agencies

(e.g. California ETS) (World Bank, 2019b). Sometimes even the use of carbon revenues is not entrusted to ministries of finance, such as the Quebec ETS (World Bank, 2019b), which limits the involvement of these key actors in climate policy. Conversely, policy action that focuses on effective carbon pricing will require the participation of finance ministries in virtually all jurisdictions.

The involvement of finance ministries in policy action on effective carbon pricing is likely to enhance climate change policy for at least four reasons. First, finance ministries have more influence in setting and driving the policy agenda than environmental ministries or independent agencies, and their engagement could allow for more ambition at the domestic level. Second, finance ministries control the budget and, therefore, significantly influence climate-related government spending, for example, on financial support for coal-fired power plants. Third, due to their standing, finance ministries are also better positioned than environmental ministries to catalyze coordinated action at the national or international level, for instance, to form or participate in an international climate club. Fourth, the more finance ministries are involved in climate policy, the more in-house capacity for climate change will be built, for instance, by hiring more environmental economists to advise on policy. Creating a critical mass of staff with climate change policy expertise and background may increase finance ministries' involvement in the design and implementation of climate change policy.

Explicit carbon pricing is an area of climate change policy where finance ministries could become more active, once their capacity in climate change is enhanced. Finance ministries tend to focus on budget issues more than environmental ministries. Thus, finance ministries are likely to favour instruments that create fiscal space, such as carbon taxes, over regulatory approaches, especially given the low administrative costs of implementing carbon taxes upstream (Pigato, 2019). There are already many country experiences where carbon pricing is implemented to raise revenues (Skovgaard et al., 2019; World Bank, 2019b). Thus, action on effective carbon prices may – in the long term – increase ambition on explicit carbon prices and help to close the gap between current prices and those needed to deliver on the Paris Agreement temperature targets (Carbon Pricing Leadership Coalition, 2017).

Finance ministries' increased capacity in climate change could also benefit climate action beyond explicit carbon prices, for instance, in areas like green budgeting, climate-related fiscal risks management, and climate-related spending (e.g. subsidies for renewable energies). The potential engagement of finance ministries in climate policy beyond carbon pricing is especially important in light of the recent literature that: (i) casts doubt on the capacity of explicit carbon pricing to drive significant abatements (Green, 2021) and green technological innovation (Lilliestam et al., 2021), and (ii) highlights the political hurdles that explicit carbon pricing faces in many jurisdictions (Rabe, 2018; Stokes & Mildenerger, 2020).

Evidence shows the existence of learning spillovers between climate change policies, whereby governments that implement some climate policies are subsequently better positioned to implement other climate policies (Pahle et al., 2018). Finance ministries' engagement in areas of climate policy other than explicit carbon pricing could thus be important to strengthen action on climate change overall.

#### **4. Broadening carbon pricing policy through effective carbon pricing**

Besides strengthening capacity and ambition in climate policy, action on effective carbon prices could help broaden governments' engagement in carbon pricing policy.

While the number of jurisdictions that have implemented explicit carbon pricing has increased significantly in recent years,<sup>8</sup> implicit carbon pricing policies have been adopted more widely as virtually every country has fuel taxes in place. Implicit forms of carbon pricing tend to receive less opposition than explicit carbon pricing labelled as a 'tax' or 'carbon-related' instrument (Dominioni, 2020; Rabe & Borick, 2012). Implementing fuel taxes is also less administratively complex than implementing ETSs. Thus, promoting action on effective carbon prices can allow for a broader involvement of countries in carbon pricing policy. For instance, countries that do not have an explicit carbon price in place could join an effective carbon pricing club. This could be particularly important for countries that for political economy reasons (Baranzini et al., 2017; Carattini et al., 2018; Klenert et al., 2018; Rabe, 2018; Stokes & Mildenerger, 2020), or due to capacity constraints, struggle to implement carbon taxes and ETSs.

In principle, the Coalition of Finance Ministers for Climate Action could provide a platform to initiate a discussion on the formation of an effective carbon pricing club. At least, its Helsinki Principle 3 – which promotes ‘work towards measures that result in effective carbon pricing’ (Coalition of Finance Ministers for Climate Action, 2019a) – testifies in this direction. In practice, a smaller group of countries could be better positioned to efficiently reach an agreement (Falkner, 2016; Falkner et al., 2021), especially if the ambition is to reach a legally binding agreement on a minimum level of effective carbon prices. For instance, the G7<sup>9</sup> – or, to start with, even a smaller EU-US club (Tagliapietra, 2020) – could be a sufficiently small forum to allow for adequate bargaining efficiency. However, the ‘broadening effect’ of these unilateral solutions would be limited to few countries.

One way a unilateral effective carbon pricing club – or even a single jurisdiction – can promote action on effective carbon pricing policy outside its borders is by implementing a BCA mechanism that credits for effective carbon prices. If such a BCA mechanism is implemented, exporting countries would be incentivized to increase the level of effective carbon pricing in their jurisdictions to collect revenues that would otherwise accrue to the importing country.

## 5. Avoiding analytical confusion

In the previous pages, I have argued that policy action that aims to meet a minimum level of effective carbon prices can create a policy environment better suited to act on explicit carbon pricing policy. A necessary step to act on effective carbon prices is to develop estimates of effective carbon prices. In this section, I want to stress the existence of a risk in the development and communication of estimates of effective carbon prices. Estimates of effective carbon pricing risk undermining policy action on explicit carbon pricing if governments, businesses, or the general public perceive measures of effective carbon prices as sufficiently high to deliver on the aims of the Paris Agreement.

According to current estimates (IMF, 2019; OECD, 2016, 2018, 2021), many countries have effective carbon prices significantly higher than the explicit carbon price in place. Maintaining momentum for policy action on explicit carbon pricing requires avoiding signalling that there is no need for further action on explicit carbon pricing due to effective carbon prices.

A notable example of policy analysis on effective carbon pricing that risks reducing ambition in explicit carbon pricing policy is the OECD’s Effective Carbon Rates – one of the most widely known estimates of implicit carbon prices (OECD, 2018). In the 2018 report, the OECD also calculates a carbon price gap between Effective Carbon Rates and benchmark carbon price levels (OECD, 2018). One of the two benchmarks employed by the OECD is the mid-point of the Paris-compatible carbon price level range suggested by the High-Level Commission on Carbon Prices for 2020, i.e. 60 USD per ton of carbon in 2020 (OECD, 2018).<sup>10</sup> In estimating the gap in this way, the OECD implicitly suggests that Effective Carbon Rates of USD 40–80 per ton of carbon in 2020 were compatible with achieving the aims of the Paris Agreement. However, it is important to carefully interpret this OECD analysis, to avoid confusing benchmark prices for effective carbon prices and explicit carbon prices.

The price ranges of the High-Level Commission on Carbon Pricing refer to explicit carbon prices alone, to be imposed on top of other instruments (Carbon Pricing Leadership Coalition, 2017). The OECD Effective Carbon Rates include implicit carbon prices imposed via fuel taxes (OECD, 2018), which account for most of the effective carbon prices in all countries considered. Thus, it would be inaccurate to believe that an Effective Carbon Rate of, say, 60 USD in 2020 is a Paris-compatible carbon price level. Communication with governments, businesses, and citizens should be carefully crafted to avoid confusion on this point. Otherwise the risk is to dilute the sense of urgency for more ambitious climate action. To be clear, my claim is not that the price ranges suggested by the High-Level Commission are necessarily accurate for explicit carbon pricing or do not need to be updated. However, before using them as a benchmark for effective carbon prices, one needs to make the case that they are an adequate benchmark for effective carbon prices.<sup>11</sup>

## 6. Conclusions

This article argues that policy action that aims to meet a minimum level of effective carbon prices can narrow the gap between current climate policies and those needed to deliver the Paris Agreement’s temperature goals.

This type of policy action – focused on effective carbon prices – is likely to involve more countries in carbon pricing policy than would efforts focusing exclusively on explicit carbon pricing policies. It would also help to create synergies and build capacity to design and implement climate policy among government departments, including by working more directly with and through finance ministries. Civil society actors, governments, and international organizations can help foster higher ambition on carbon pricing policy by promoting action on effective carbon prices. Lastly, this article warns against the risks of using benchmark prices developed for explicit carbon prices to assess the current status of effective carbon prices. Unless effective carbon pricing gaps are properly assessed and communicated, producing estimates of effective carbon pricing gaps risks inducing governments, businesses, or the general public to think that current levels of effective carbon prices are close to meeting the temperature targets of the Paris Agreement. Ideally, current methodologies to estimate effective carbon pricing gaps will be refined to better guide governments in meeting an adequate, Paris-compatible, minimum level of effective carbon prices and unleash the additional benefits that policy action on effective carbon prices brings.

## Notes

1. In this article, the term ‘fuel taxes’ refers exclusively to taxes that do not target the carbon content of fossil fuels or the emissions released in burning these fuels. Fuel taxes could include, for instance, widely adopted gasoline and diesel excise taxes or excise taxes on coal, such as the one introduced in the Philippines in 2017 (Philippines, 2017).
2. Including lower rates applied to household fuels under general sales taxes and price distortions due to monopolistic markets or market regulation (IMF, 2019). A policy reform that reduces these subsidies would result in a higher estimate of effective carbon prices in the jurisdiction.
3. For instance, the IMF assumes that ETSs cover only a fraction of the greenhouse gas (GHG) emissions that would be covered by an economy-wide carbon tax because ETSs often are applied only to large industries and power generators (IMF, 2019).
4. Each country could then identify the current level of effective carbon prices in its jurisdiction and act to fill the gap (if any exists) between the status quo and the level of effective carbon prices needed to deliver the targeted mitigation outcome.
5. On the problem of negotiating climate change mitigation along  $n$  dimensions instead of one, see Weitzman (2014). However, I want to stress that focusing on effective carbon prices would give more freedom to club members to implement policies that are better aligned to their domestic priorities and are politically easier to implement. For instance, some jurisdictions pose greater legal (constitutional) constraints on the possibility to implement measures such as taxes and levies through an international agreement. Similar legal concerns exist in the context of introducing carbon pricing in international maritime transport through an international agreement (see, for instance, Norway (2021)). Thus, it is not necessarily the case that building an effective carbon pricing club is more difficult than focusing exclusively on a carbon tax.
6. For a discussion on the political feasibility of different types of climate clubs, see Falkner et al. (2021).
7. For forms of explicit and implicit carbon prices that create fiscal space.
8. According to the World Bank, the number of jurisdictions that have implemented a carbon tax or an ETS has increased from 24 in 2012 to 65 in 2022 (World Bank, 2022).
9. Note that all G7 countries have already endorsed Helsinki Principle 3 (Coalition of Finance Ministers for Climate Action, 2019a).
10. In the OECD report, Euros’ prices are expressed, but for this estimate, the OECD assumes Euro-USD parity (see footnote 1 of the OECD report).
11. For transparency, the price ranges suggested by the High-Level Commission on Carbon Pricing depend on assumptions about other policy instruments in place (Carbon Pricing Leadership Coalition, 2017). Thus, if more stringent implicit carbon prices are implemented, the explicit carbon price level needed to deliver the temperature targets of the Paris Agreement would be lower – though how much lower is unclear.

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