Carbon Market Watch

Pricing carbon to achieve the Paris goals

Policy Briefing, September 2017

Executive summary

Putting a price on carbon, based on the polluter pays principle, has the potential to be a powerful policy tool to reduce greenhouse gas emissions in the fight against climate change. A carbon price can come in the form of a tax or a cap and trade system. With a tax, the price of polluting stays constant, while a cap and trade system allows prices to fluctuate based on emissions.

Around the world, more and more governments are implementing various forms of carbon pricing, but so far most prices languish below USD10. While it is impossible to put an accurate price tag on all the damage that climate change causes including biodiversity loss, ocean acidification, sea level rise, drought, famine, spread of tropical diseases, extreme weather events, political instability as well as other yet unforeseen effects, the High-Level Commission on Carbon Prices found that a price of at least USD 40-80/tCO2 by 2020 and USD50-100/tCO2 by 2030 is needed to achieve the Paris climate goals.

To maximize the effectiveness of carbon pricing, there are however also other issues to consider beyond the price level. Implementing a carbon price should be done as part of a portfolio of measures to address various barriers such as split incentives or high cost measures that are likely not overcome with a carbon price. Further, in the case of a cap and trade system, a minimum auction price is important to avoid the so called “waterbed effect” that can greatly undermine prices and the effectiveness of the system. Other counterproductive policy measures need to be avoided and abolished in order to not undermine the effectiveness of carbon pricing. These include fossil fuel subsidies, free allocation of emission permits, tax exemptions, rebates, and the use of carbon offsets.

In addition to fighting climate change, carbon pricing can offer significant co-benefits including reducing other air pollutants, generating revenues for climate measures and a just transition, fighting energy poverty or to reduce other taxes. Wise reinvestment of revenues can lead to a double dividend of economic growth.

The design of effective carbon pricing policies need broad support from civil society. Environmental Non-Governmental Organizations (NGOs) and other civil society groups play an important role in robust climate policy as a vital counterweight to the interests of emitting industries. To achieve a long term rising carbon price, policy making should not be a complicated elitist project, but should be informed by input from civil society.

Key recommendations

- **Price carbon at a minimum of USD40–80/tCO2 by 2020 and USD50–100/tCO2 by 2030to reach the objectives of the Paris Agreement**
- **Flank carbon prices with complementary climate policies**
- **Avoid waterbed effects with a clear and robust price floor for cap and trade systems**
- **Reform and phase out policies that work against the carbon price signal**
- **Factor in important carbon pricing co-benefits and use revenue for a double dividend and a just transition**
- **Engage civil society and cultivate a broad consensus for a long term rising carbon price**

Introduction

Carbon pricing is an important climate policy tool in the fight against climate change. While more and more countries are moving to put a price on carbon, the vast majority of global emissions are still not subject to a price. However, even where there are carbon pricing policies in place, the price levels are often not high enough to make a substantial contribution to reaching the objectives of the Paris Agreement. This briefing aims to introduce carbon pricing for interested civil society actors and policy makers. It provides an overview of the central issues to consider when implementing a carbon pricing system, and makes recommendations based on the experience and lessons from carbon pricing systems around the world.

What is carbon pricing?

The polluter pays principle is a fundamental tenet of environmental policy to ensure that environmental damage inflicted by an activity is reflected in the cost of doing business. The principle is based on the assumption that putting a price on polluting provides an incentive to find better, less polluting ways to conduct business and shift to lower-carbon consumption patterns. Carbon pricing implements the polluter pays principle for greenhouse gases (measured in CO2 equivalent) by imposing a charge on each tonne of emissions released into the atmosphere. Carbon pricing allows for flexibility for private sector investors in terms of when and where to invest in low emission or alternative technology, creating efficiency by providing an incentive to reduce emissions where it is most cost effective. A price on carbon usually takes the form of either a carbon tax or a requirement to purchase a limited number of tradeable permits to pollute, commonly referred to as a cap and trade or emissions trading scheme.

A **carbon tax**, sometimes referred to as a fee, is a constant price for a given tonne of greenhouse gas, measured in CO_2 equivalent or CO_2e. The fee does not fluctuate based on the amount emitted but rather provides a constant and robust price signal to reduce pollution.

A **cap and trade system** on the other hand fixes the total number of pollution permits allowed under the “cap” and allows the price to fluctuate according to the demand and hedging strategies of polluters. The demand for the permits depends on the amount of pollution industry emits and what options they can find to reduce their emissions. The initial supply is sold to emitters usually through an auction providing an initial price, a secondary market price emerges through buying and selling between emitters and other intermediaries.

Carbon pricing in the Paris Agreement

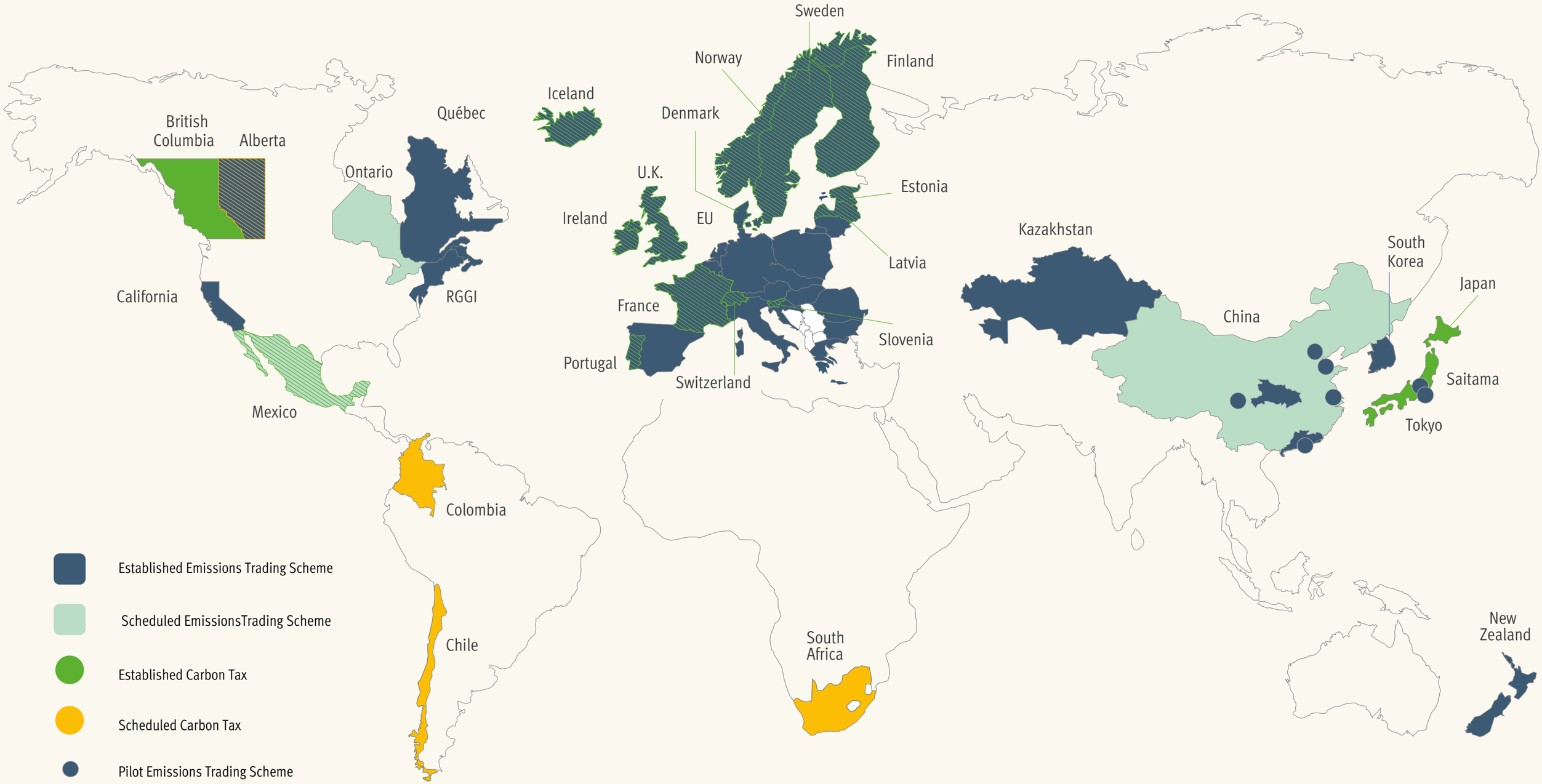
The Paris Agreement provides the overall framework for international cooperation to fight climate change and specifically to hold the increase in the global average temperature to well below 2 °C with best efforts to limit warming to 1.5 °C and to reach net zero emissions by 2050. Carbon pricing is not mentioned in the Paris Agreement, but it is an important policy tool that a growing number of countries and subnational governments are using to reduce emissions to help reach their international climate commitments. Sweden was early to price carbon and established a carbon tax in 1991. The EU established a cap and trade system in 2005, and British Columbia implemented a carbon tax in 2008. Many other countries and jurisdictions around the world have since started to put a price on carbon (see figure 1).

The cost of pollution

The price level is the factor that determines if the instrument will reduce emissions and has a climate impact or not. If a tax is set too low, it is cheaper for emitters to pay the tax and continue polluting rather than invest in technology that reduces emissions; equally, if the cap is set too high in a cap and trade system there will not be sufficient scarcity in the system to produce a price that incentivizes emissions reductions.

2017 National and regional carbon pricing measures

figure 1



According to the International Monetary Fund, most jurisdictions with a carbon price have prices below $10 per tonne (Parry, 2015).

The consequences of climate change are hard to put a price on, especially considering the variety and scope of the damage that it causes: biodiversity loss, public health costs, impacts on labor productivity, spread of tropical diseases, ocean acidification, sea level rise, famine, extreme weather events, and political instability. Avoiding climate disaster is however priceless and gets more expensive the closer we get to critical climate tipping points. In any case, leading economists agree that any price estimate on the damage of greenhouse gas pollution is almost certainly too low.

However, there is an emerging consensus about the carbon pricing levels needed to reach the objectives of the Paris Agreement based on what we know it costs to reduce emissions in different sectors. The High-Level Commission on Carbon Prices, a group of leading economists working with the Carbon Pricing Leadership Coalition, concluded that the explicit carbon-price level consistent with achieving the Paris temperature target is at least **USD40–80/tCO2 by 2020 and USD50–100/tCO2 by 2030** (Stiglitz & Stern, 2017).

The reality of current carbon prices

Most current carbon prices are far from the levels needed. The EU ETS is a prominent example of a system suffering from chronic oversupply and low prices. The Regional Greenhouse Gas Initiative (RGGI) in the Northeastern United States has also had low prices. This is a phenomenon shared with many cap and trade systems, though there are also many taxes at low levels, likely more effective at raising revenue than reducing emissions.

In an effort to reach a higher price, some cap and trade systems such as California/Quebec and RGGI have imposed minimum auction prices to limit the number of allowances sold when prices drop too low. In addition, RGGI has gone through several reforms greatly reducing the cap and cancelling banks of oversupplied allowances. Responding to oversupply in the EU Emissions Trading System (EU ETS), the UK imposed a carbon price floor which was successful in shifting UK electricity production away from coal. Canada plans to implement a national minimum "backstop" price of $10 per tonne of CO2 in 2018 and increase by $10 per tonne annually to $50 per tonne in 2022. Canadian provinces can then decide if they want to implement a carbon tax at that level or a cap and trade system with minimum price levels.

British Columbia and Sweden have particularly successful carbon taxes in line with targets for the Paris Agreement. Both policies have produced robust price signals that have helped them to significantly reduce emissions and grow their economies at the same time.

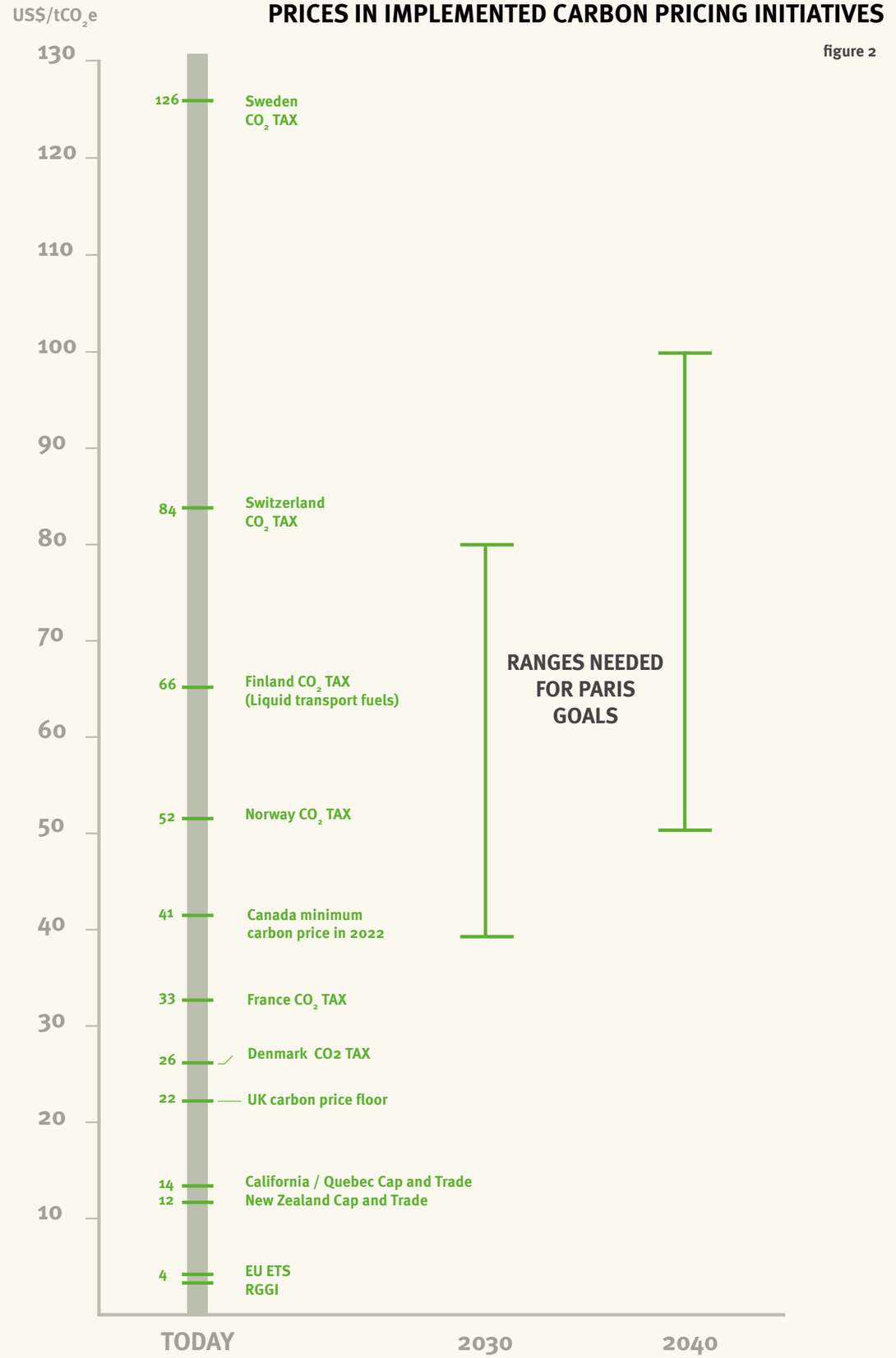
» **Price carbon at a minimum of USD40–80/tCO2 by 2020 and USD50–100/tCO2 by 2030 to reach the objectives of the Paris Agreement**

Carbon pricing as part of a coordinated "climate policy portfolio"

Although carbon pricing is an important part of the solution to climate change, it cannot incentivize all possible emission reduction measures. Carbon pricing should be implemented and conceived as part of a portfolio of measures that address the various barriers that would likely not be overcome through a carbon price, e.g. either because there are other barriers than the price or because the costs are too high with uncertain returns. At the same time, without careful design, these measures can undermine the price of a cap and trade scheme. It is therefore important to map out various options to reduce emissions and identify appropriate policies accordingly (see figure 2).

PRICES IN IMPLEMENTED CARBON PRICING INITIATIVES

figure 2



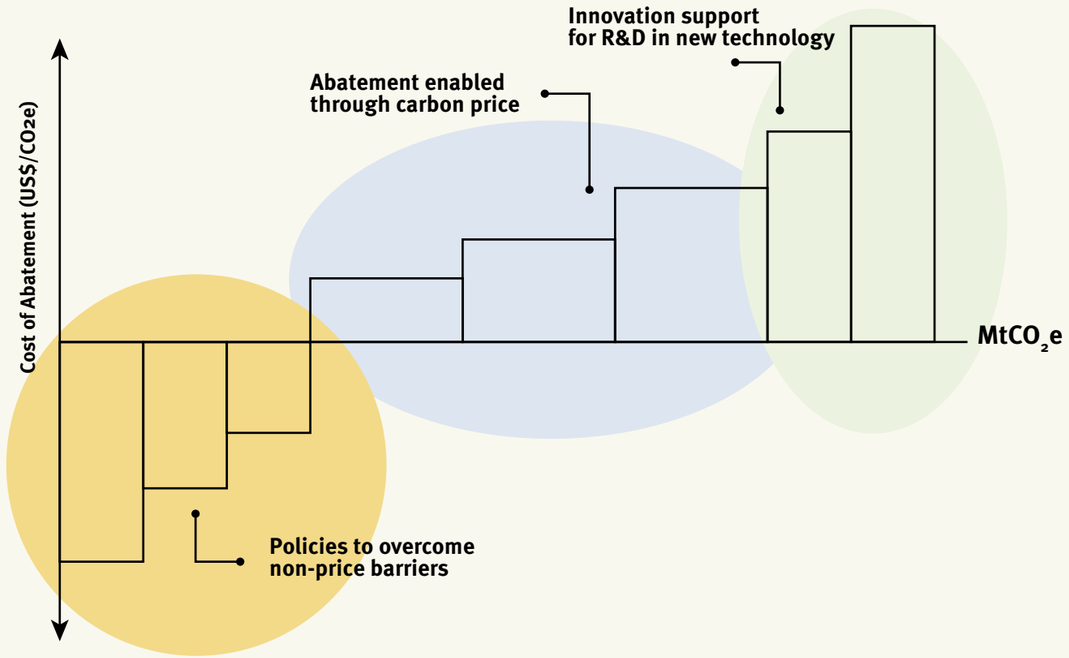
Many energy efficiency measures, as well as research and development for new and improved technology are both examples of climate measures that should complement carbon pricing.

Address barriers unrelated to costs: Some measures to reduce emissions may make economic sense even without a carbon price; for example, insulating a house may save money. The fact that they are not undertaken means there are other barriers that need to be addressed. Specifically for energy efficiency, both a lack of information of the potential savings and/or a split incentive between the person investing and those paying for the cost of energy may prevent even profitable measures from being implemented. When faced with such challenges, other measures complimentary to the carbon price are needed.

Invest in longer term forward looking measures: Similarly, there are some measures to reduce emissions that are expensive or that are beyond the activity area of emitters that would pay a carbon price. Examples include: research and development for improved renewable energy or alternative propulsion technology for transport; public infrastructure, such as urban planning and investments in public transportation. Such policies are worthy of additional financial support beyond the carbon price.

Avoid dampening effects of other policies: Cap and trade systems are also vulnerable to the so called "waterbed effect". This is the phenomenon where other climate policies, such as energy efficiency schemes or renewable feed-in tariffs, are successful in a given sector and reduce the overall demand for carbon permits. This in turn undermines the general carbon price and therefore the incentive to reduce emissions. To counter this effect and to provide a robust, long-term price signal, it is important to ensure at least some degree of price certainty, for example through a minimum auction floor price.

CARBON PRICING AND COMPLEMENTARY MEASURES



- **Flank carbon prices with complementary climate policies**
- **Avoid waterbed effects with a clear and robust price floor for cap and trade systems**

Abolish counter-productive policy measures

Carbon prices can also be undermined with other policy measures. For example, **fossil fuel subsidies** are the opposite of the polluter pays principle: they are equivalent to a negative carbon price, encourage more pollution, foster fossil fuel lock in, and cost governments billions in lost revenue. Oil Change International analysis shows that government subsidies to fossil fuels amount to USD 775 billion to 1 trillion per year (OCI, 2012). Such subsidies can range from incentives for upstream fossil fuel exploration and extraction, to tax breaks for company cars, to grants for heating oil, credit guarantees and subsidized loans for fossil fuel infrastructure development.

Tax exemptions and rebates under a carbon tax can undermine the carbon price signal for a carbon tax. Similarly, in a cap and trade system, **free allocation of pollution permits** is the equivalent of giving free money to polluters allowing them to pollute without having to pay for their pollution. Windfall profits for polluters occur when emitters are able to pass the theoretical market price on to consumers even if they haven't paid for it themselves.

Offsets are not a subsidy per se, but allowing offsets in a cap and trade system essentially expands the cap of the system, allowing for a greater supply of pollution permits, and thereby undermines the scarcity that forms the carbon price and overall emissions. Public carbon pricing revenue is reduced by the undermined scarcity and diverted towards the offset project developer.

- **Reform and phase out policies that work against the carbon price: fossil fuel subsidies, tax exemptions, free allocation, offsets**

Carbon pricing revenue, co-benefits and a just transition

There are many other non-climate co-benefits, not only globally, but also at the national and local levels.

An important co-benefit of carbon pricing is the **reduction of other air pollutants** associated with fossil fuels. These pollutants include nitrogen oxides (NOx) which causes ground level ozone, Sulphur dioxide (SO_2) which along with NOx cause acid rain, toxic mercury (Hg) and particulate matter (PM) which cause asthma attacks, lung tissue damage, cancer, stroke, heart attack and premature death. Aside from air pollution, traffic congestion costs are significant, carbon pricing can help encourage commuters to seek out alternatives to driving.

Perhaps the largest benefit to carbon pricing after reducing global warming is revenue generation which can be put towards useful purposes, a phenomenon economists refer to as the "double dividend" of revenue recycling. The British Columbia carbon tax provides 3 percent of the provincial government budget (Harrison 2013); in Sweden, carbon taxes contribute 1 to 2 percent to the national budget (Stiglitz and Stern 2017).

Significantly, free allocation and offsets not only undermine the effectiveness of the carbon price, they also divert carbon pricing revenues away from general public use. Depending on how revenues are recycled, carbon pricing can lead to net economic benefits and be in a country's own interest even if the global benefit of reduced global warming is not taken into consideration or other countries do not take the step to price carbon (Parry, Veung, & Heine, 2015).

Carbon pricing revenues can be used for:

- **Climate finance** to help fund other policies for mitigation and adaptation action - both domestically and internationally. Developed countries have agreed to mobilize USD 100 billion per year by 2020 to help developing countries mitigate and adapt to climate change. Finance will also be needed at home.

- A "**just transition**" to address the economic and social cost of the shift to a low carbon economy. In particular, workers and communities attached to carbon-intensive industries stand to lose out in the short term as many of the related jobs are bound to disappear. Finance is needed to retrain workers and help regions invest in new low carbon industries.

- **Fighting energy poverty**: lower income groups tend to spend proportionally more of their income on energy and are therefore likely to be disproportionately affected by carbon pricing policies. Spending the revenue from carbon pricing in a way that addresses the energy poverty of lower income households for example through energy efficiency retrofits is therefore important.

- **Reducing other distortionary taxes** such as on labor can help boost employment and economic growth. However, it is important to keep in mind that the more effective policies are in reducing emissions, the more revenues will decline so other sources of tax revenue will be needed in the long run.

» **Factor in important carbon pricing co-benefits and use revenue for a double dividend and a just transition.**

Durability and societal consensus

The durability of a carbon pricing regime is also essential for the economy to invest in climate friendly technology. If investors are uncertain about robust price levels (or even the existence of a carbon price) next year or in five years, they will be less likely to invest in clean technology. In several jurisdictions, special interest groups representing polluting industries have been successful in repealing carbon pricing systems or writing in loopholes to undermine their effect. Environmental NGOs and other civil society groups play an important role in the robust formulation of climate policy and in providing a counterweight to the interests of the fossil fuel industry. Understanding and support for carbon pricing should not be a complicated elitist project, and should ideally be the result of a broad, non-partisan societal consensus with the active input of civil society to support a long term rising carbon price.

» **Engage civil society and cultivate a broad consensus for a long term rising carbon price**

Recommendations

- **Price carbon at a minimum of USD40–80/tCO2 by 2020 and USD50–100/tCO2 by 2030 to reach the objectives of the Paris Agreement**
  Not enough emissions are subject to a carbon price and most existing carbon price levels are far too low. More emissions should be priced at a much higher level in order to reach the temperature goals of the Paris Agreement.

- **Flank carbon prices with complementary climate and energy policies**
  There are various barriers that would likely not be overcome through a carbon price, either because there are other barriers than the price or because the costs are too high with uncertain returns. Carbon pricing should be implemented and conceived as part of a portfolio of measures that address these barriers.

- **Avoid waterbed effects with a clear and robust minimum price floor for cap and trade systems**
  Other climate and energy measures should complement rather than undermine a carbon price policy. A minimum auction floor price can help maintain a robust carbon price signal.

- **Phase out other counterproductive polices: fossil fuel subsidies, tax exemptions, free allocation, offsets**
  Carbon price levels do not represent the real price of carbon paid by companies. Fossil fuel subsidies, tax exemptions, free allocation of emission permits and offsets all undermine the incentive to reduce pollution.

- **Factor in important carbon pricing co-benefits and use revenue for a double dividend and a just transition**
  Effective carbon pricing does not only reduce greenhouse gases, but also has important co-benefits such as reducing air pollution and importantly raising revenue that can be invested for a double dividend and making a just transition to a low carbon economy.

- **Engage civil society and cultivate a broad consensus for a long term rising carbon price**
  Civil society and environmental NGO's play an important role in formulating robust climate change policy and countering polluting industry interest groups which often lobby for abolishing carbon pricing policies or loopholes and exceptions. Civil society support should be cultivated to support a long term rising carbon price.

PRICES NEEDED FOR PARIS

- The US Interagency Working Group on the Social Cost of Carbon (recently dissolved by President Trump) most recently estimated **USD50** of global damages per tonne in 2020 (Revesz et al., 2017).

- The High-Level Commission on Carbon Prices, a group of leading economists working with the Carbon Pricing Leadership Coalition, concluded that the explicit carbon-price level consistent with achieving the Paris temperature target is at least **USD40–80/tCO2 by 2020 and USD50–100/tCO2 by 2030** (Stiglitz & Stern, 2017) **technology, and equipment\ u2014needed to deliver on the temperature objective of the Paris Agreement, in a way that fosters economic growth and development, as expressed in the Sustainable Development Goals (SDGs).**

- The IMF estimates also estimates that prices from **USD50** to **USD100** per tonne or more by 2030 to meet their commitments to reduce carbon emissions.

- UK Climate Change Committee minimum price to reach 2050 goals: GBP 27 (USD 35.77)/tCO2 in 2020 and rising through the 2020s to GBP 70 (USD 92.73)/tCO2 in 2030 (Committee on Climate Change, 2010).

CURRENT CARBON PRICES

Current Carbon Tax Prices:

- British Columbia, Canada CAN$ 30 (US$ 24.64)
- Canada backstop: CAD 10 (USD 8.24) per tonne of CO_2e in 2018 and increase by USD 10 per tonne annually to CAD 50 (USD 41.20) per tonne in 2022
- Sweden: USD 131
- Switzerland: USD 86
- Finland: USD 60-65
- Norway: USD 52
- Denmark: USD 26
- France: USD 25
- Ireland: USD 22

Source: World Bank 2017

Current ETS Prices (early 2017):

- California - Quebec: USD 13.80 (16.05.2017)
- Chinese ETS Prices
  - Beijing CNY 51.18 (USD 7.53)
  - Chongqing CNY 1.50 (USD 0.22)
  - Guangdong CNY 14.88 (USD 2.19)
  - Shanghai CNY 36.45 (USD 5.36)
  - Hubei CNY 13.99 (USD 2.06)
  - Shenzhen CNY 34.52 (USD 5.08)
  - Tianjin CNY 12.20 (USD 1.79)
  - Fujian CNY 23.13 (USD 3.40)
- EU ETS EUR 4.80 (USD 5.45)
- South Korea: KRW 21,500 (USD 18.81)
- New Zealand: NZD 16.50 (USD 12.01)
- Ontario: CAD 18.72 (USD 14.27)
- RGGI: USD 2.53
- Switzerland: CHF 6.50 (USD 6.77)

Source: ICAP

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