Carbon Pricing Brief #1 – First Principles

The market failure

The basic rationale for pricing carbon is to correct an important market failure. Market prices do not reflect the real and significant costs that Greenhouse Gas (GHG) pollution imposes on society (an 'externality' in economic terms). Therefore there is little private incentive to reduce GHGs or to create substitute products or technologies that might result in lower GHG emissions. The result is that we emit far too much of it, imposing large and growing costs on society.

Simply put, because we do not pay the real costs of GHG pollution, we are behaving in a way that is not in our environmental or economic self-interest. The most effective way to correct this market failure is by putting a price on GHG emissions.

A GHG (or "carbon") pricing policy aims to do that: by aligning the price of an activity to the social cost it generates, particularly climate damages. This policy "internalizes" the external cost of the activity, which leads to the optimal social outcome in which the marginal social cost of the product equals its marginal benefit to the consumer. The leading forms of such carbon pricing instruments are described further below.

To help guide policy-makers in understanding what GHG emissions "cost" us (in climate change impacts), economists can estimate a "social cost of carbon" using what is known of the global damage created by GHG emissions (in a $/t CO2 equivalent format). Things like the financial cost of mountain pine beetle outbreaks and changes in the Great Lakes-St. Lawrence water levels are Canadian examples of such damage. Both the American and Canadian governments use SCC numbers in policy and regulatory development. The US's estimated SCC (recently updated) stands at US$37/t for 2015. The Canadian number (which reflects older U.S. analysis,) is C$28.50 (in 2009$)

An estimated SCC is important for cost-benefit analyses, but having a precise estimate it is not essential for moving forward with carbon pricing policies. For example, Ontario has set a GHG reduction target, and a carbon price can be designed to help achieve that target. Given that our current carbon price is zero (or very little); a price that moves closer to the actual SCC is beneficial.

It is important to note that policies other than pricing can also be used to address this market failure; command-based regulation, such as limits on the emissions rate or technology used, is the clearest alternative. However, a considerable body of evidence (both economic research and real-life application) shows that pricing instruments are the most economically efficient pollution control option, since they provide flexibility about *how* to reduce emissions and provide more direct incentives to innovation (which is critical to low carbon growth and competitiveness). Moreover (as will be discussed in Note #2),

the substantial revenues that can be generated by pricing policies give governments greater scope to address and offset the distributional and competitiveness concerns a pricing policy can create. Finally, well-designed pricing policies can help position Ontario firms to prosper in the emerging low-carbon economy (as will be discussed in Note #3).

Carbon pricing approaches

Carbon pricing is a policy mechanism that puts a monetary price on the emissions of carbon dioxide -- typically expressed in dollars per tonne of carbon dioxide equivalent ($/CO2e). There are three basic approaches to pricing carbon, an example of each already being in place in Canadian provinces.

Carbon tax

A carbon tax or fee sets a fixed price per unit of CO2e emitted. It can be levied "upstream" at the point of production of the fossil fuel (based on its emissions intensity), or downstream at the point of sale for the product (based on per unit emissions). The British Columbia carbon tax is a downstream carbon tax, with a level of $30/t. Tax revenues can be redistributed to reduce the burden on regulated sources or households, or for other purposes, as discussed in note #2.

Cap-and-trade

In a cap-and-trade system, the total amount of emissions is fixed for regulated entities. Most commonly, the system issues a fixed number of allowances, tied to the emissions cap, and requires sources to submit allowances for each tonne emitted. The allowances can be traded among entities, which will establish a market price. The allowance allocation process can be used to reduce the burden on regulated sources or others (as discussed in note #2). Quebec has a cap-and-trade system that is based on the Western Climate Initiative template, which offers the advantage of creating an allowance that is fungible in trading terms with other WCI-based systems (which is right now limited to California), and potentially others.

Baseline and credit, intensity-based, or tradable performance standards (TPS)

In this system, a regulation establishes a target emissions rate per unit of output or input, rather than an absolute limit on emissions. Sources emitting below the target rate earn credits. Those emitting above the target must buy credits equal to the volume by which they exceed the target. Trading between these two groups will establish a price for those credits. Because the emitters' liability is only on the variance from the emissions rate, these types of systems generally reduce the cost burden on the emitters relative to a tax or cap-and-trade system wherein all emissions impose a liability (a tax payment or an allowance requirement). This approach works best in sectors where there is a measureable, common input or output across regulated firms (e.g., megawatt-hours of electricity). One reason for adopting it would be if a jurisdiction expects rapid growth in carbon intensive industries (like Alberta, see below).

An example of such a system is Alberta's Specified Gas Emitters Regulation (SGER): a baseline and credit policy, under which major industrial facilities must reduce their "emissions intensity" (i.e. emissions per unit of production) by up to 12 per cent, relative to their typical performance or "baseline" level. The SGER introduces the additional compliance option of allowing firms to pay a $15/t penalty for every tonne it is over its target, with the proceeds transferred to a low carbon technology fund.

Some critical points of distinction between these three approaches are:

- A carbon tax provides price certainty, while a cap-and-trade provides emission reduction certainty.
- A baseline-credit/TPS system controls the emission intensity of production, but not the absolute level of emissions (which can increase if the rate of growth in the covered sectors outpaces the reduction in emissions intensity).

Hybrid and portfolio approaches

It is possible to create hybrid carbon pricing systems by adding policy measures like price ceilings, price floors or technology funds to a cap and trade or baseline and credit system. Similarly, a portfolio of carbon pricing systems can exist simultaneously. Many European countries, for example, have carbon taxes but are also part of the European Emissions Trading System (ETS). Closer to home, Quebec had until very recently had both a carbon tax on fuel distribution and a cap-and-trade on power producers and large industrial emitters. The cap-and-trade has since January 1st, 2015 been extended to cover fuel distribution, and the carbon tax has been discontinued.

The main advantage to such hybrid approaches is to combine the price (and revenue) certainty of a tax with the emission reduction certainty of a cap. The main disadvantage comes in the greater complexity of the overall policy and the potential (in poorly designed portfolio approaches) of certain sources/activities being subject to two policies at once.