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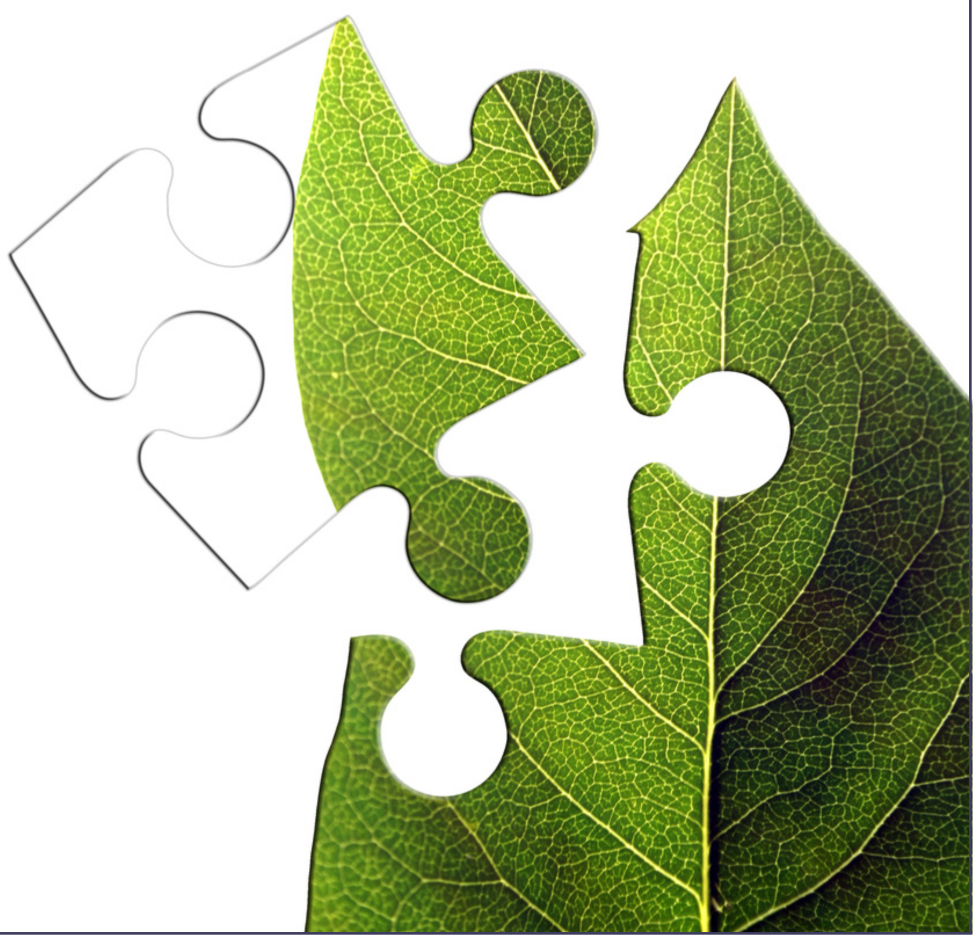
"Hybrid" Carbon Pricing

Issues to consider when carbon taxes and cap-and-trade systems interact



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Sustainable Prosperity is a new research-policy initiative aimed at building a healthy environment and economy, by making markets work *for* the environment.

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What Issues Arise When Cap-And-Trade Systems and Carbon Taxes Interact?

Two different types of carbon pricing are emerging in Canada: carbon taxes and cap-and-trade systems. In a few jurisdictions, those systems are poised to interact. The consequences of such a "hybrid" approach have not been closely considered. This report seeks to anticipate some of those issues and to consider how problems might be avoided.

British Columbia and Quebec have implemented carbon taxes that establish one economy-wide price on carbon for consumers and businesses alike. They, along with other Canadian jurisdictions, are also planning cap–and-trade systems; a policy that applies a carbon price to "large emitters" of greenhouse gases – coal-fired power plants, major industrial manufacturing facilities etc. Alberta launched its system in 2007, the Canadian federal government has been designing one for many years and seven U.S. States and four provinces are partners in the Western Climate Initiative.

Under a cap-and-trade system, large emitters get permits to pollute, either for free or at an auction, and can trade the permits between themselves as their needs increase or decrease. The carbon price is the trading price of the permits on any given day, just like the price of a company's shares in the stock market is the result of trading on any given day.

Cap-and-trade systems often leave a significant portion of emissions unpriced (e.g. emissions from cars, trucks, office buildings and smaller industries). Under Canada's proposed federal program, for example, this amounts to about half of Canada's total emissions.

Proposals exist for trading systems that cover the whole economy or to grow current trading systems beyond large emitters, but large-scale action on those fronts remains to be seen. For now the dialogue seems focused on capping and trading emissions from large emitters and doing something else for all the other emitters; in other words, a hybrid approach to carbon pricing.

The neglected question is: how will these two pricing systems interact? This paper considers the case of a cap-and-trade system for large emitters applied in conjunction with a carbon tax on other emissions such that most greenhouse gas emissions are priced, but not necessarily at the same price. Three sets of issues arise from such a system:

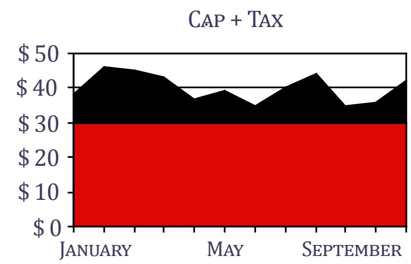
1. **Price Interaction**
2. **Revenue Recycling and Adverse Impacts**
3. **International Alignment**

Issue 1: Price Interaction

Two carbon pricing mechanisms will lead to two different carbon prices. The result is a different price burden for a given tonne of greenhouse gas emissions.

The two price mechanisms can be kept largely separate, relying on ad hoc adjustments to the carbon tax, perhaps informed by trading prices or maybe to set carbon taxes explicitly higher or lower to favour one group of emitters over another.

The prices can also be linked. For example, the carbon tax can double as a maximum or minimum trading price in the cap-and-trade system or the trading price can be used to set the carbon tax rate. Emissions permits in the trading system could also be required in addition to paying carbon taxes or used as a credit against carbon taxes due.



Linking carbon taxes to a cap-and-trade system can reduce the volatility of a cap-and-trade system, thereby reducing business risk, but can also reduce the effectiveness of the cap-and-trade system. The example on the right, based on a chart from The Sightline Institute, is an example of a cap in addition to a tax[1]. The tax sets the minimum price for emissions at $30 per tonne (red) and, to the extent that the cap requires a $40 carbon price, on average, to sufficiently reduce emissions, permit trading prices add another $10 per tonne (black), on average, to the total price. Volatility is reduced.

If, on the other hand, the carbon tax is also applied as the maximum trading price (aka safety valve), there is effectively no cap on emissions and the cap-and-trade system's effectiveness is reduced.

As discussed above, there are a number of ways for carbon prices to interact with each other in a hybrid system and, on the surface, the issue seems to offer as many opportunities as challenges. Looking closer, as is done in following sections, the challenges become more complex. Many of the challenges discussed are not unique to a hybrid system, but having two different carbon prices makes the challenges more problematic.

Issue 2: Revenue Recycling and Adverse Impacts

Revenue Recycling

Revenue neutrality for governments is considered a desirable feature of carbon tax and cap-and-trade systems since, outside of administrative costs, there is no inherent need to increase government spending to implement effective carbon pricing. This section looks at the complexities of revenue recycling with hybrid carbon pricing.

With a carbon tax, revenues can be redistributed (aka recycled) through tax cuts and direct rebates with a fairly high degree of certainty about the carbon tax revenues collected one to three years into the future.

Revenues from a cap-and-trade system, in the case where government auctions permits instead of giving them away, can be handled the same way although in this case government revenues could be quite volatile based on how each auction unfolds.

Linking the prices results in a mix of implications for revenue neutrality. If carbon trading prices are used to set future carbon tax rates, then volatility is added to the challenge of carbon tax revenue recycling. If carbon tax rates are used to set minimum or maximum or trading prices, then volatility is reduced for auction revenues.

Supply Chains and Multiple Carbon Prices

Many products that we buy include carbon emissions from multiple processes. Gasoline, for example, involves emissions from producing oil, refining oil into gasoline and other products and the end-use combustion to run a car. In the case of an economy-wide carbon tax, the same emissions price would be applied to each process. In the case of hybrid systems, different prices apply to different processes.

Note that if emissions permits are treated as carbon tax credits then carbon tax revenues face downward risk meaning that any related income tax cuts or rebates may be set too high and the revenue shortfall would need to be covered. This happens in the case where permits are sold at auction for less than the carbon tax rate (e.g. $15 per tonne instead of $30); as credits against the carbon tax, government receives the auction revenue instead of carbon tax revenue from permit holders. If permits are auctioned above the carbon tax rate then auction revenues will be sufficient to recover the full carbon tax revenues with additional auction revenues being available for recycling.

Adverse Impacts

Given that large emitters often produce internationally traded products and are, therefore, subject to competition from other jurisdictions, a lower carbon price or total cost of emitting for such businesses may be considered. Carbon taxes implemented in European countries reflect such considerations; reduced rates or exemptions have been provided for large emitters. Government could also directly fund exposed industries using carbon revenues.

In the case of cap-and-trade systems, instead of relying solely on auctions government could give away free permits (aka allocations) to exposed industries to reduce total costs while maintaining an active trading system. In addition, various forms of a “safety valve” that limits trading prices could be applied, but doing so could sacrifice the emissions cap.

Social equity concerns, particularly regarding home heating, should also be considered when developing carbon pricing, although the scale is generally smaller than for internationally active industries. Low-income households, for example, can be given direct compensation for average (but not marginal) cost increases. Such an approach is similar to free permit allocation; individuals are given a fixed amount of free emissions but would still save money if they emitted less than their free allocation.

Calculating appropriate allocation or compensation for industries and households can become quite complex in the cases where emissions costs are fully or partially passed through from a capped industry to a taxed consumer. This affects how much compensation is appropriate, who the appropriate recipient is and, in the case of revenue neutrality, whether the funds come from permit auctions or carbon tax revenue.

While emissions costs, tax cuts and rebates for individuals and smaller businesses are contentious, they can be managed locally – different fuel taxes for individuals already exist in Europe and Canada, for example. The bigger challenge is aligning carbon pricing across national borders. In the case of allocations or compensation for industry, other countries may object to what they perceive to be subsidies for favoured trading industries.

Without one clear carbon price, it is easier to blend hidden subsidies with carbon pricing and revenue recycling practices or, conversely, easier to claim that hidden subsidies are in place even if they are not.

Issue 3: International Alignment

Alignment through Equivalent Prices

The political challenge of international alignment is sometimes raised as a reason for large-emitter cap-and-trade systems. The effectiveness of climate change policies, relative to other countries, can be objectively evaluated if there is a transparent price on greenhouse gas emissions and the most transparent price signal would be a single economy-wide carbon tax. This section considers some of the more complex options to consider when using the hybrid approach.

An equivalent price means that the countries are placing an equivalent value on the earth's atmosphere. With price equivalency, however, actual emissions reductions may be significantly different across jurisdictions given their mix of industries and carbon cost curves.

In a hybrid system, the price of emissions for a given product may need to be pieced together from multiple points along a supply chain, each of which may have different pricing mechanisms. Given evolving technologies for each point on the supply chain (and changing supply chains) alignment will be difficult because the effective price on carbon for a given product or service is unknown – the price must be estimated. Specific design elements, discussed below, can address this weakness of hybrid pricing.

Alignment through Equivalent Reductions

A tonne of greenhouse gases may be the same no matter where it is emitted, but eliminating a tonne of emissions requires varying degrees of effort in different jurisdictions. One approach to target setting, used for the Kyoto Protocol, is to align the percentage of emissions reductions from a base year. The approach can include deeper reduction targets for some countries, but the price on emissions is left to be determined, resulting in uncertain economic consequences.

For example, trying to reduce emissions by 20% can result in different trading prices, when using a cap-and-trade system, or require different carbon tax rates depending on a given country's circumstances. The potential price difference represents different economic impacts relative to how an economy and its associated emissions would have unfolded without carbon pricing.

Population growth, demographic patterns, urban density, available natural resources, technology development for a country's dominant industries, industrial structure and other factors will influence the economic and environmental impact of the emissions target. Without a transparent method to align carbon prices, equivalence is a highly subjective concept.

When Equivalent is Not Equivalent: The Home Version

It matters where you start and where you are headed when calculating so-called equivalent emissions reductions, whether as an individual or a country.

If someone buys a new R-2000 house equipped with a geothermal heat pump and solar panels to meet all their energy needs, it could cost them a great deal of money to reduce their home's emissions by one more tonne (or by 20%) – they don't have any more tonnes to reduce.

Compare them to someone who owns an older home with a 30-year old furnace that is about to break. They could reduce their emissions by a tonne (or 20%) at no cost because, regardless of climate change policy, they will have to replace their furnace with a new model that will undoubtedly be far more efficient.

Another way to set a target is to base it on a forecast of where emissions would have been in the absence of emissions reduction policies (aka, "business as usual" or BAU emissions). This allows for accounting of population growth, economic structures, etc. Unfortunately, like any prediction of a country's future, the exercise is complex and results in a high degree of uncertainty. The difficulty with the "versus BAU" approach is evident in an Ecofys report evaluating national allocation plans for the EU Emissions Trading Scheme[2]:

> *"The independent estimate of BAU emission projections is in most cases below the official BAU figures, except for Portugal, Spain and the UK. In the majority of countries the proposed cap is higher than the independent estimate of BAU emissions. Comparing currently proposed caps to the independent BAU estimate of emission projections the EU ETS there would be 53 Mt CO2/year surplus of allowances in the EU ETS in Phase II, which corresponds to 2.5 % of the total emissions within the EU ETS."*

So balancing international commitments through setting equivalent emission reduction targets remains difficult.

Alignment through Intensity-Based Caps

Alternatively, a country may use an intensity-based cap to reduce the unintended economic consequences that can result from standard emissions reduction targets. Intensity-based caps are the current method of choice for the Government of Canada.

An intensity-based cap is not a cap on the total level of emissions ('hard cap') and is therefore considered to have lower environmental effectiveness. (Intensity-based systems can, however, be set to add up to a hard cap.) In general, the advantage of an intensity-based cap is that it addresses a number of inter-jurisdictional concerns and thus favour alignment.

Even with intensity caps, unintentional economic consequences can still occur. For example, using the case of –10% intensity targets, a pulp and paper industry that has already switched to using biomass could have a lot more trouble finding another 10% of reductions compared to an electricity generation industry with old coal-fired power plants, plants that may require replacing for non-climate change goals, such as improved air quality. Money would flow from the pulp and paper industry to the electricity generation industry, despite the latter still having higher total emissions and, therefore, causing more environmental damage, because the generation industry can reduce its emissions by far more than 10% for less money.

Alignment of Specific Industry Targets Across Jurisdictions

Industries with high emissions-intensity or products with high-emissions supply chains that compete internationally may, in the process of carbon pricing, be disadvantaged relative to competitors that do not face similar constraints[3]. As we have discussed, a country could take direct action to mitigate industrial impacts or try to align their cap-and-trade systems with other countries. This could be done through targeted economic advantages (cash subsidies) and subsidies in the form of free emissions permits.

Industry-specific intensity-based caps can also improve alignment and sidestep a number of concerns. Under such a system, each industry's cap is based on emissions per unit of production and the percentage reductions required can be unique to each industry. While this approach does not address inherent environmental effectiveness (e.g., are the emissions caps low enough?), it can address relative effectiveness in that a given industry faces the same expectations across jurisdictions.

The table below shows an example where, across countries, a given industry faces the same carbon price but different industries face different prices and each country applies a unique price to its own mass market consumers.

	Country A	Country B	Country C
Industry 1	$40 per tonne	$40 per tonne	$40 per tonne
Industry 2	$30 per tonne	$30 per tonne	$30 per tonne
Mass Market	$50 per tonne	$20 per tonne	$20 per tonne

Put another way, a common international carbon price for specific international industries can be preferable to different national prices within those industries. Internationally aligned, carbon prices for each industry can reduce the risk of large transfers of money between industries and, ultimately, transfers between the countries and regions that house these industries[4].

Mass Market Emitters, Offsets and Cap and International Alignment

Emissions from mass market consumers (e.g. individuals and small businesses), can indirectly affect international alignment through the decision to include or exclude them from a cap-and-trade system. Including such emissions in a cap could make reductions more expensive[5] and, to protect its industries, a country may choose to avoid this and use a hybrid approach instead. Alternatively, when combined with vehicle efficiency standards or unexpectedly high oil prices, mass market emissions could drop faster than expected (i.e., end up below BAU forecasts), thus giving a country's industries more room under the emissions cap and cheaper emissions permits.

Emissions offsets will also influence the effectiveness of a cap-and-trade system and, therefore, carbon prices and the ability to be aligned with other systems. Systems with looser offset rules will either not be able to link to other systems or attract investment for these extra offsets projects due to lower prices. Through offsets, local regulations can become a factor in aligning emissions pricing systems: why require tougher local home energy efficiency standards if someone else will pay for it and call it an offset?

Conclusion

There are a number of ways for carbon prices to interact with each other in a hybrid system and, on the surface, the issue seems to offer as many opportunities as challenges. Looking closer, the challenges become more complex. Many of the challenges discussed in this paper are not unique to a hybrid system, but having two different carbon prices makes the challenges more problematic.

Without one clear carbon price, it is easier to blend hidden subsidies with carbon pricing and revenue recycling practices or, conversely, easier to claim that hidden subsidies are in place even if they are not.

The political challenge of international alignment is sometimes raised as a reason for large-emitter cap-and-trade systems. The reality of carbon pricing is more complex and the hybrid approach does not provide a clear advantage.

Overall, hybrid carbon pricing can be made to work but it adds a great deal of unnecessary complexity to the political, economic and environmental challenge without providing clear benefits. Hybrid carbon pricing is a second-best option.

Notes

[1]"Cap-and-Trade or Carbon Tax? Both!" Sightline Daily, May 14, 2008. Recommended reading for an alternative perspective on hybrid carbon pricing.

[2]Note that high-emissions industries should be paying more relative to low-emissions industries given that high-emissions means more environmental damage. The highlighted concern focuses on the case where high-emissions industries in one country are materially and unreasonably disadvantaged relative to the same industry in another country.

[3]Furthermore, industry-specific caps could then be used to calculate better-aligned country targets by adding up the relevant industrial components because each industrial component would be treated the same, regardless of the country.

[4]If capped emissions must be reduced by a fixed percent (e.g., 20%), including vehicles and buildings in the cap means more emissions to reduce in total. Furthermore, because vehicle and building emissions are connected to many non-financial attributes (how many people buy the cheapest and most fuel-efficient car available?), reducing their emissions can require significantly higher carbon prices than for industries which continually focus on least-cost solutions.

About the Author

Robert Joshi has eight years experience in the energy industry and the energy-environmental-economic policy interconnection. Previous work experience includes economic modelling and regional analysis with the Bank of Canada, royalty forecasting and oil sands project analysis with the Alberta Department of Energy and strategic planning and regulatory analysis with EPCOR Utilities. More recently, in his role as senior policy advisor to the Canadian Gas Association, Robert provided analysis and strategic design of policy advocacy and communications materials, including economic advice on the demand-side management market potential study. As Executive Director of Climate Change Policy with the B.C. Climate Action Secretariat, Robert lead the province's greenhouse gas projection project and contributed to related policies, primarily in the fields of end-use energy efficiency, energy technology and bioenergy.

Robert has a Master's of Economics from Carleton University and a Bachelor of Economics from the University of Western Ontario.

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