

**Sustainable Prosperity** is a national research and policy network, based at the University of Ottawa. SP focuses on market-based approaches to build a stronger, greener, more competitive economy. It brings together business, policy and academic leaders to help innovative ideas inform policy development.

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This Issue Summary is based on an SP Background Paper, "The Political Economy of California and Quebec's Cap-and-Trade Systems" by Mark Purdon, David Houle and Erick Lachapelle. The paper is available on the Sustainable Prosperity website at: <http://sustainableprosperity.ca/article3877>

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## Gains from (Cap and) Trade Linking Quebec's and California's Carbon Trading Systems

### Key Messages

- Research sponsored by Sustainable Prosperity<sup>1</sup> shows that the linkage between Quebec and California's emission trading systems is expected to be an economically efficient way to address greenhouse gas (GHG) emission reduction objectives in both jurisdictions.
- The research finds that allowing flexibility in the linked systems has been important - particularly given the substantial differences in the economies and emissions profiles, the design features of the cap-and-trade systems, and the use of revenue from allowance auctions.
- Early analysis suggests that both jurisdictions will gain as the linking of emissions trading systems will bring down total costs of reducing emissions. The benefits are expected to be higher for California, because firms in the state will receive net inflows of carbon finance as Quebec industries purchase relatively lower-cost California allowances while only slightly increasing California allowance prices. Linked cap-and-trade systems are not the silver bullet in climate change mitigation policy, but are important examples of market based instruments that can be very effective to both reduce emissions and create positive economic conditions.
- In the absence of a national climate change policy framework in either the U.S. or Canada, pursuing the linkage of emerging and future state and provincial emissions trading systems may be the most likely scenario for comprehensive climate policies in North America. The results of the first linked auction, to take place in June 2014, will provide an opportunity for further analysis of the economic and environmental benefits of linked cap-and-trade systems.

### The Issue

January 1st, 2014 marked not only the beginning of a new year, but also the beginning of a new era of carbon policy in North America. For the first time, Quebec and California committed to using market-based instruments to reduce GHG emissions by officially linking their cap-and-trade systems. The cap-and-trade systems of Quebec and California were launched in 2013 as a creation of state and provincial legislation, though their operation is guided by a set of rules known as the Western Climate Initiative (WCI). The WCI is a voluntary partnership of US states and Canadian provinces, but to date only Quebec and California are actively pursuing integrated cap-and-trade systems. The objective of the linked systems is to allow trade in emission allowances between jurisdictions in order to reduce emissions in the most cost-effective manner.

This Issue Summary is based on research outlined in the background paper entitled "The Political Economy of California and Quebec's Cap-and-Trade Systems"<sup>2</sup> and examines the mutual economic benefits that can be gained from the adoption of linked systems between distinct jurisdictions. While it is too early to fully assess the success of the partnership, the research demonstrates that linkages can be successful even if the conditions between partners are not homogenous.

# The Knowledge Base

## Cap-and-trade Systems

A cap-and-trade system is a policy tool used by governments to reduce GHG emissions by setting a quota on emissions in a specific jurisdiction. This quota is allocated as emission allowances amongst firms and reduced over time. A cap-and-trade system has two components: the “cap” is the limit on GHG emissions set by government that defines the jurisdiction’s emissions quota, and the “trade” occurs through the creation of a market for emission allowances. This market requires firms polluting more than their share to buy extra allowances from those who have polluted less than their share by reducing emissions below their allocated quota. As part of the cap, governments distribute emission allowances to polluting industries, either freely or through an auction (see text box). Cap-and-trade systems not only help meet emission reduction targets but also encourage industrial innovation by offering financial incentives for companies to meet or exceed their allocated pollution limits.

A cap-and-trade system prices carbon through the cost of purchasing emission allowances on the carbon market composed of an annual auction, inter-firm trading and carbon offsets. An emission allowance is equal to 1 metric ton of CO<sub>2</sub> equivalent, and the most recent price floors in Quebec and California are reported at CAD \$11.39<sup>3</sup> and US \$11.48<sup>4</sup> per allowance, respectively.<sup>5</sup>

Under WCI rules, governments can freely distribute allowances or auction off allowances to the entities that are covered by the cap (or some combination of the two). If an auction is part of the allocation policy, then policy decisions need to be made about the revenues raised through the auction (which can be substantial). Leading up to linkage, Quebec held two independent auctions -the most recent was held on March 4, 2014 during which almost all units available for sale were sold. During this auction, 1,035, 000 emissions allowances were sold at a price of CAD \$11.39 (the floor price).<sup>6</sup> California held its sixth independent auction on February 19th, 2014, when 19,538,695 emission units were sold at a price of US \$11.48 (slightly above the floor price).<sup>7</sup> The first joint auction is planned for June 2014, and subsequent auctions will occur quarterly.<sup>8</sup> The joint auction will include a joint price floor that will be set according to the highest price floor between the two jurisdictions.<sup>9</sup> The auction of emissions allowances is expected to generate significant government revenue. It is estimated that through 2020, the cap-and-trade systems in Quebec and California will raise \$2.4<sup>10</sup> and \$7.7<sup>11</sup> billion in revenue, respectively.

Table 1: Expected State/Provincial Revenues from Cap-and-trade (by 2020)	
Quebec	California
2.445 billion (CAD\$)	7.7 billion (US\$)

## Linking Cap-and-trade Systems

Quebec and California have independently created their own cap-and-trade systems through their respective state and provincial governments. On January 1, 2014 the two systems became officially linked. This means that regulated firms in either Quebec or California can trade their allowances between each other to meet their respective quotas at the lowest cost. Many other regions, including Europe, Australia, Japan, New Zealand, and South Korea, have already established or are currently developing their carbon markets, but this is a first step in a North American context.

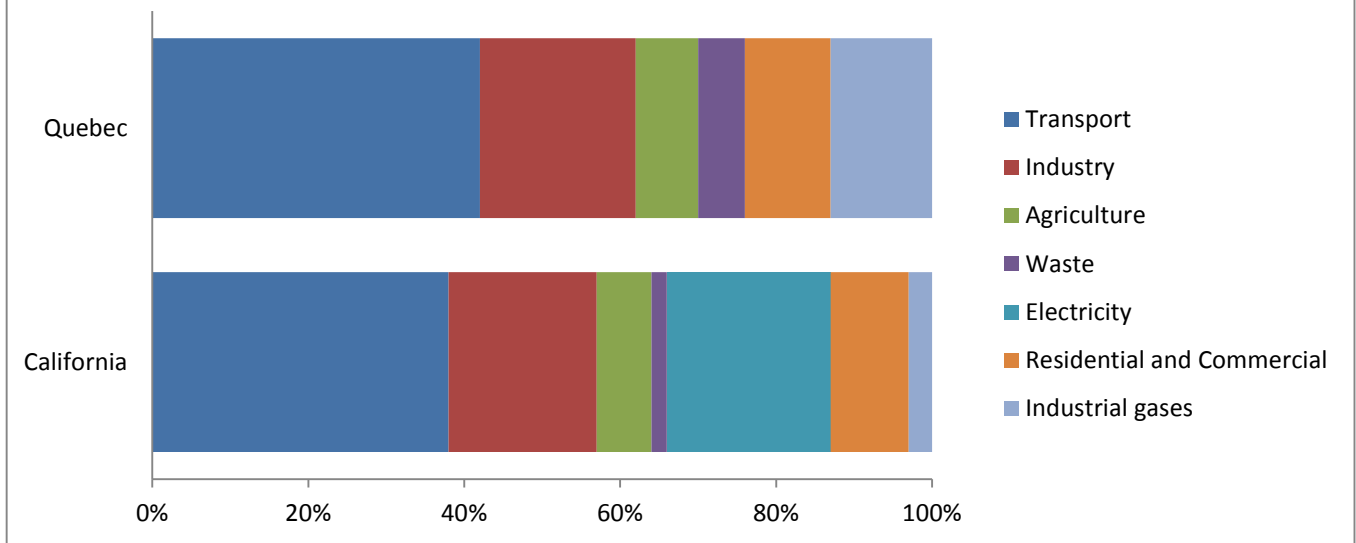
Guiding the inclusion of Quebec and California into the WCI is largely the commitment to climate change policy in both jurisdictions. Strong political leadership encouraged by favourable public opinion drives this commitment to climate policy. For example, a California poll in summer 2013 saw a record number of Californians in favour of immediate emissions reductions actions.<sup>12</sup> In Quebec, public opinion polls have consistently demonstrated that Quebecers prefer taking action now and look to government to spur action on climate change.<sup>13</sup> Other drivers of strong climate policy support in both Quebec and California include a technical capacity and understanding of climate policy both inside and outside of government.

## Differences in California and Quebec’s Socio-economic and Policy Profiles

At first glance, an emissions trading partnership between two jurisdictions on opposite sides of the continent may appear farfetched. Aside from geographic separation, the differences between Quebec and California encompass their economic profiles, their emissions profiles, and their emission reduction targets.

- **Economic Profile:** Quebec and California have vastly different economies. For example, the latest estimates report Quebec’s GDP at \$357.9 billion (2012)<sup>14</sup> whereas California has one of the largest economies in the world<sup>15</sup> at \$2.0035 trillion (2012).<sup>16</sup>
- **Emissions Profile:** Quebec and California differ significantly in terms of their emissions by sector (Figure 1). While transport represents the largest share of emissions in both jurisdictions, industrial gases account for a larger share of emissions in Quebec than in California, largely due to the significant contribution of Quebec’s aluminum industry where such gases are generated.<sup>17</sup> Electricity is the second largest source of emissions in California, while Quebec’s power is quite clean given the province’s large hydroelectric capacity.

**Figure 1: Percent Emissions by Sector, 2010 (MtCO<sub>2</sub>e)**



Sources:

Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs du Québec. (2013). *Inventaire québécois des émissions de gaz à effet de serre en 2010 et leur évolution depuis 1990*. Retrieved from <http://www.mddep.gouv.qc.ca/changements/ges/2010/inventaire1990-2010.pdf>

California Air Resources Board. (2013). *2000-2011 Inventory by IPCC category - Full Detail, Sixth Edition*. Retrieved from [http://www.arb.ca.gov/cc/inventory/data/tables/ghg\\_inventory\\_by\\_ipcc\\_00-11\\_2013-08-01.xlsx](http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_by_ipcc_00-11_2013-08-01.xlsx)

- Reduction Goals:** GHG mitigation policy is an important component of the climate change portfolio in both Quebec and California, and each jurisdiction has seen their emissions drop since 2000. California's per capita emissions have shrunk from 14.5 to 12.1 tCO<sub>2</sub>e while Quebec's have fallen from 12.0 to 10.4 tCO<sub>2</sub>e. However, while California has committed to reducing its emissions to 1990 levels by 2020; Quebec has a more ambitious target of reducing emissions by a further 20% below 1990 levels in the same time period (Figure 2). Quebec's more ambitious reduction target means that the province is expected to be a net buyer of allowances from California.

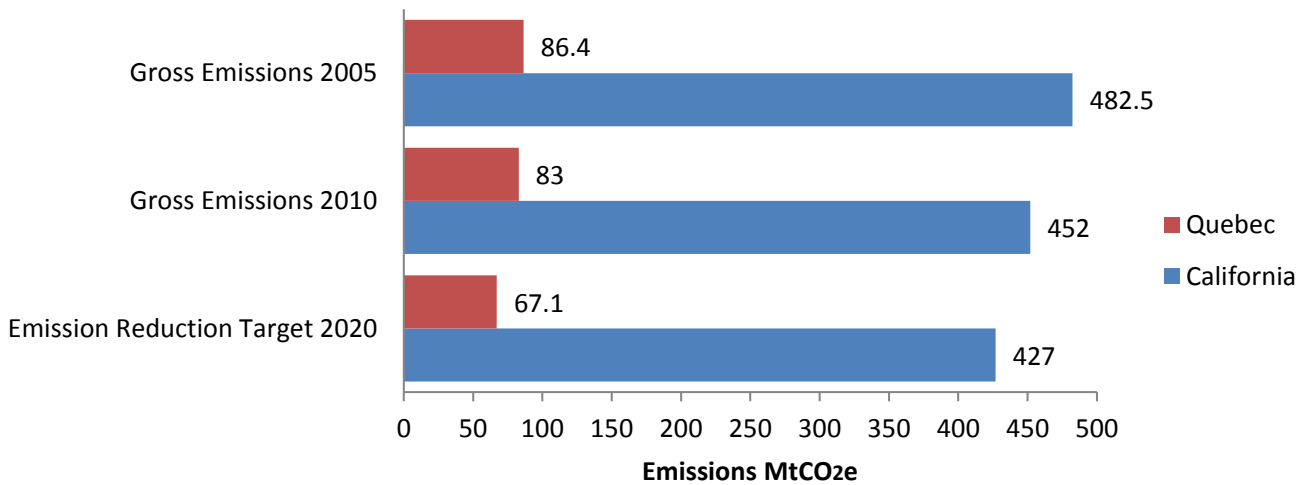
**Differences in Quebec and California's Respective Cap-and-trade Systems**

As Quebec and California have coordinated the design of their cap-and-trade systems under the auspices of the WCI, the two systems are largely similar. However there are still differences in terms of the type of offset projects permitted, allowance allocations in the electricity sector and the use of system revenues generated through the auctioning of allowances.

- Use of Offsets:** Quebec and California differ in their use of offsets from forests management in the design of their cap-and-trade systems. While in California the emission reductions accrued through sustainable forest management can be used in the cap-and-trade system, in Quebec (and in Canada as a whole), carbon sinks are not accounted for given concerns that forests will become net sources of emissions as climate change proceeds.<sup>18</sup>
- Allowance Allocation in the Electricity Sector:** In California, the need to balance emission reductions with affordable electricity has resulted in a considerably more complex system for allocating emission allowances. Due to the province's large hydroelectric resource, this is much less an issue in Quebec.

Due to California's larger economy and population, its emissions are significantly greater than those in Quebec. On a per capita basis, however, California's levels are only slightly greater than Quebec's levels; (12.1t CO<sub>2</sub>e and 10.4t CO<sub>2</sub>e respectively).

**Figure 2: Emissions and Emission Reduction Targets**



- Use of Revenue:** Another point of divergence is how revenue from the cap-and-trade system is used. In Quebec, the revenues from trading will be allocated to initiatives described in the 2013-2020 Climate Change Action Plan.<sup>19</sup> However, revenue use is more complex in California and it is assumed that auction revenues cannot be used towards California’s fiscal challenges. The recently released Cap-and-trade Auction Proceeds Investment Plan: Fiscal Years 2013-14 through 2015-16 proposes investing \$500 million from auction proceeds in programs supporting emission reductions.

**Table 2: Estimated Impacts of Linking on Allowance Prices in California and Quebec**

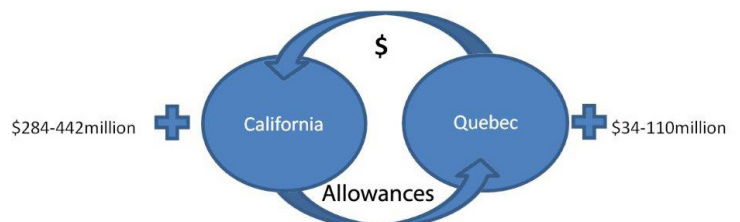
	California Unlinked Price \$/tCO <sub>2</sub> e	Quebec Unlinked Price \$/tCO <sub>2</sub> e	Linked Price \$/tCO <sub>2</sub> e
2013 Prices	\$15.0-34.0	\$37.0-43.0	\$15.8-34.5
2020 Prices	\$27.0-54.0	\$59.0-69.0	\$31.0-55.0

**Benefits of Linked Systems**

Despite these differences, Quebec and California are moving forward with linked cap-and-trade systems. The linked systems will still accommodate the unique design features of Quebec and California’s individual systems, and for the different economic and policy profiles of each jurisdiction. It is expected that linked emissions trading systems will contribute to the economic and emissions reduction goals of each jurisdiction. This is because linked systems provide competition to industry leaders to reduce their emissions at a lower cost than in an unlinked system. Moreover, the greater pool (liquidity) of the overall, linked, system tends to push the price of the allowances down. These allowances still “represent” a reduction regardless of jurisdiction, but their lower price reduces the overall cost of the program. Linkage is expected to considerably bring down allowance prices for Quebec firms while those in California will be largely unchanged (Table 2).

Preliminary analysis projects that the linked cap-and-trade programs in Quebec and California are expected to generate considerable amounts of revenue through the auctioning or trading of allowances. This is because Quebec firms are expected to seek out lower cost allowances available in California, reducing their costs but also contributing to the balance sheets of Californian firms.

**Figure 3: Expected Gains from Trade between California and Quebec**



Simply put, California could be a net exporter of allowances. Californian firms might be able to sell their allowances at a higher price to the Quebec market than they would otherwise receive in the California-only market. This could result in net gains from trade at \$284-442 million for California. Similarly, firms in Quebec might be able to purchase allowances for a lesser cost in California that they would otherwise pay for in a Quebec-only market. Compared to an unlinked scenario, Quebec is expected to benefit by \$34-100 million from buying excess allowances purchased in California (Figure 3).<sup>20</sup>

Although these are preliminary calculations and include a number of assumptions about Quebec and California's economies, existing research is optimistic that linked trading systems will provide net benefits for both jurisdictions.

### Cap-and-trade Systems and Complementary Policies

While the gains from trade that both Quebec and California will realize from linking their systems are important, cap-and-trade markets, as a policy tool, must be seen as part of the larger strategies that each jurisdiction will employ to reduce carbon emissions. For example, California expects that only 15% of its emission reductions will be reached through the cap-and-trade systems specifically, while the remaining emissions will be reduced through complimentary policies. Though similar estimates for Quebec's complementary policies are unknown, it is safe to assume they will also play an important role.

## Implications for Policy Makers

- The economic conditions, emissions profiles or emission reduction goals of jurisdictions considering linkage do not necessarily need to be homogenous to link carbon trading systems. This can be encouraging for policy makers in other jurisdictions considering similar initiatives.
- The ultimate success of the cap-and-trade systems lies in their ability to deliver cost-effective emissions reduction opportunities. Early experience with the Quebec-California partnership seems to suggest that linking systems can provide such cost-effectiveness.
- Successful implementation of linked cap-and-trade systems in Quebec and California could also provide a blueprint for an eventual federal or even continental carbon pricing mechanism. As the results of the first linked auction are assessed, further analysis will be beneficial to provide further evidence of the economic and environmental benefits of linked cap-and-trade systems.

## Endnotes

1. The SP background paper, "The Political Economy of California and Quebec's Cap-and-Trade Systems" is available on the Sustainable Prosperity website at: <http://sustainableprosperity.ca/article3877>
2. Available at: <http://sustainableprosperity.ca/article3877>
3. Government of Quebec. (2014). Auction of Québec Greenhouse Gas Emission Units on March 4, 2014: Summary Report Results. Retrieved from: <http://www.mddep.gouv.qc.ca/changements/carbone/resultats-vente20140304-en.pdf>
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5. For more information on SP's work on carbon pricing, read our Issue Summary at <http://sustainableprosperity.ca/article3877>
6. Government of Quebec, 2014
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19. Ministry of Finance of Quebec. (2012). Québec and Climate Change: A Greener Environment. Retrieved from <http://www.budget.finances.gouv.qc.ca/Budget/2012-2013/en/documents/climate.pdf>
20. The above description is only a summary of the net trade benefits to Quebec and California. Complicating this discussion is the differences in carbon prices between the jurisdictions, and linked systems would raise costs in California. This is described further in the research supporting this Issue Summary.