

Good for the Economy.
Good for the Environment.

North American Carbon Markets: Economic Impacts

Jeremy Mohr, WSP Sr. Project Director & E2 member
Tom Potiowsky, Portland State University

Legislative Briefing
11/14/2017



Outline

- Carbon Pricing Overview
- Programs in Other Jurisdictions
- Economics of Oregon’s Proposed Program



About E2

National community of 1,000 volunteer members from the business community. Our members come from all industries, but share the belief that good environmental policy can be a driver for the economy. We have nine chapters across the country, including Oregon.

About NERC

Northwest Economic Research Center (NERC) is based at PSU. NERC focuses on economic research that supports private and public-policy decision-making, and relates to issues important to Oregon and the Portland Metropolitan Area.

Good for the Economy.
Good for the Environment.



E2 and NERC are providing an unbiased look at what we know of economic impacts from carbon programs in other jurisdictions, and then we will relate that back to the proposal within SB 1070.

Cap & Invest:

- Synonymous with Cap & Trade
- Established cap on emissions; covered parties may trade permits for carbon emissions.
- Price of these permits set by market
- Money collected may be used as direct rebates or investments
 - Revenue varies, but emissions reduction known.

Carbon Tax:

- No cap on emissions; established price for all carbon emissions.
- More predictable revenue collection
- Money collected may be used as direct rebates or investments
 - Businesses and households know future prices which assists in planning; actual reduction in emissions can vary from predicted amount.

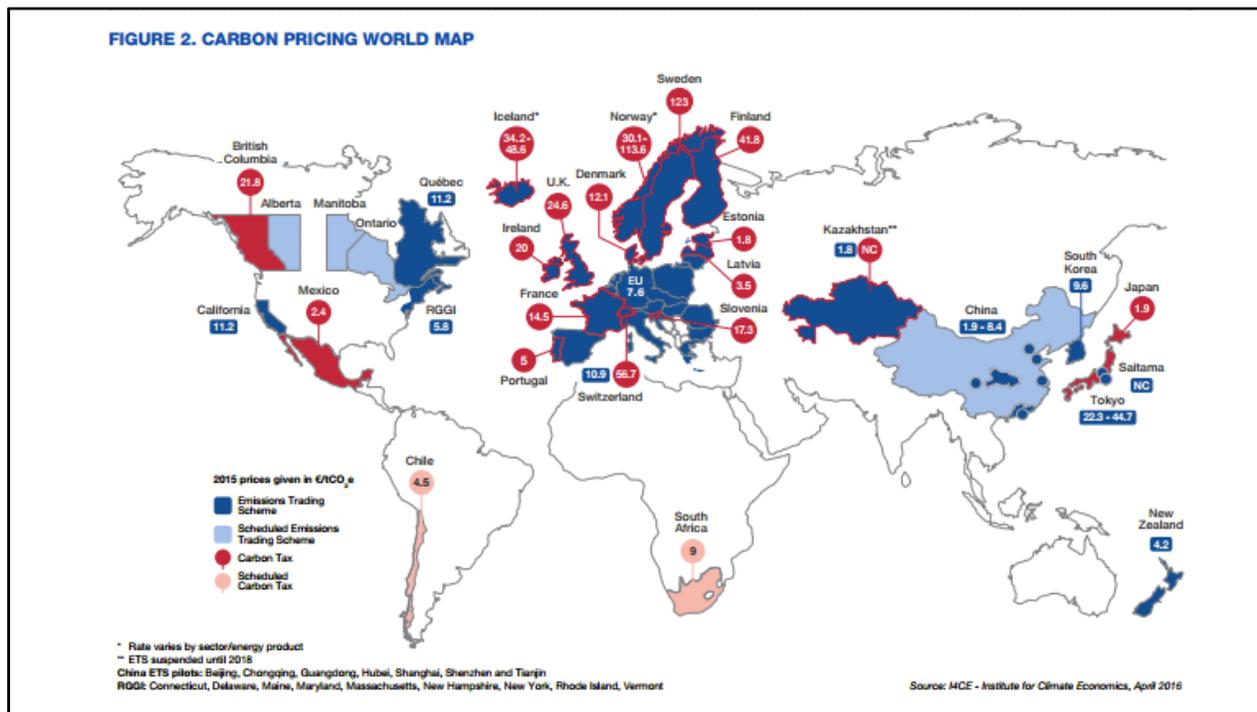
Good for the Economy.
Good for the Environment.



There is a spectrum of programs available to help economies value carbon. Two primary types are Cap & Invest, as well as carbon tax.

Both programs establish what economists agree is needed: a price on carbon. We only value what we price.

There are merits to both programs, but the state & businesses in Oregon are most interested in and currently assessing a proposed Cap & Invest program. Therefore our discussion will focus on Cap & Invest.



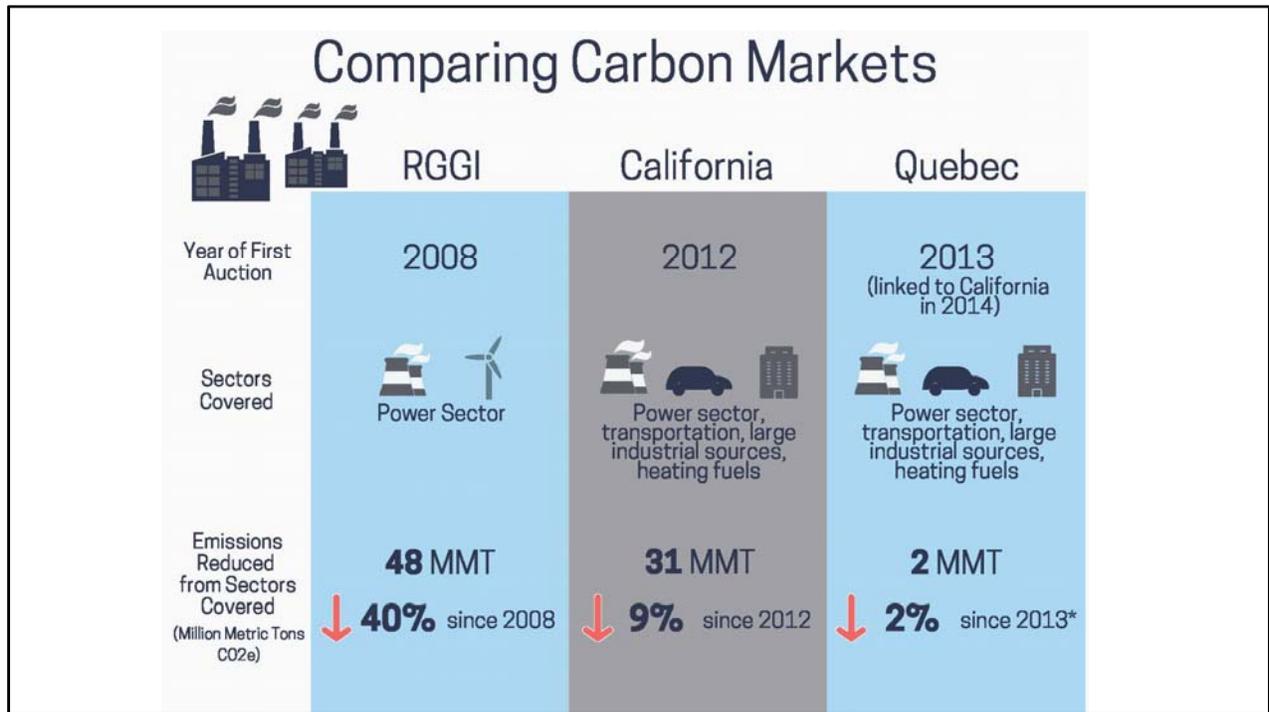
Here, an Emission Trading Scheme is synonymous with a Cap & Trade, or Cap & Invest program. According to the World Bank, some 40 countries and more than 20 cities, states and provinces already use carbon price mechanisms, with more planning to implement in the future. 13% of global emissions are covered by some form of a carbon program (either carbon tax or Cap & Invest). There has been a three fold increase over last decade of emissions covered by carbon pricing programs.

Source, World Bank Report. <http://www.worldbank.org/en/programs/pricing-carbon#CarbonPricing>

After last week's elections, Governor Inslee has also announced his intention to pursue a carbon program for Washington. Also, both Virginia & New Jersey's new governors have indicated interest in hitching their states to the Northeast program, known as RGGI, which would greatly expand the impact of that program.

With the news that Syria joined the Paris Accord, all other countries in the world are committed to reducing emissions, outside the U.S.

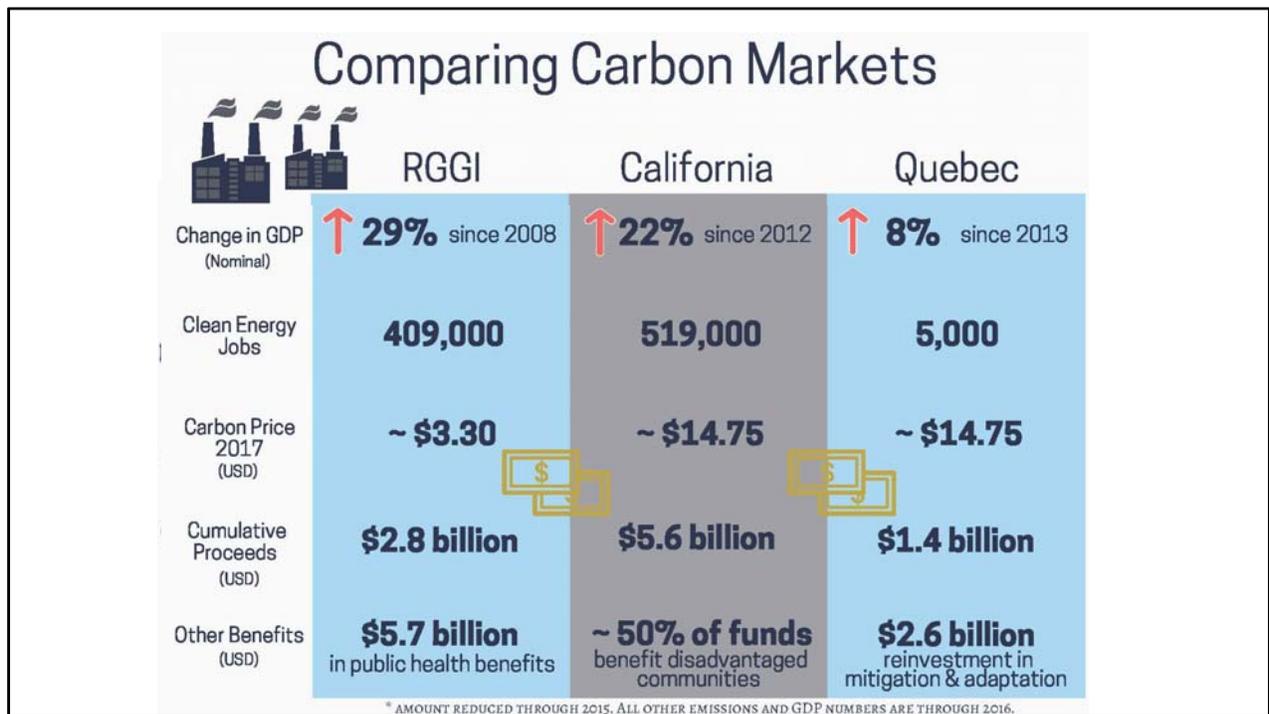
Side note, per the World Bank report Kazakhstan temporarily suspended its emissions trading system from 2016-2018



Currently in North America, there are Cap & Trade programs in Ontario, Quebec, California and the Northeast. Here we look at RGGI (Regional Greenhouse Gas Initiative) or the Northeast, California and Quebec only since Ontario's program just came online in 2017, and its results are not yet very significant. Still, it is already trending similar to these other regions. The first of these programs, RGGI, only applies to the power sector. California, Quebec and Ontario have programs that are economy wide, as is the case with the Oregon proposal.

Looking at other Cap & Invest programs in North America, there are some commonalities:

- 1) Emissions have declined as predicted
- (continue to next slide)*



2) Market prices to reduce emissions have been relatively low for these Cap & Trade programs, with \$14.75 as the highest price. British Columbia's current carbon tax rate is ~\$23 (US) per ton.

And what has happened in the broader economy?

- Although carbon programs have not been the cause, it's notable that GDP has continued to rise after integrating a carbon market.
- For comparison, since 2008 U.S. GDP has risen 28%; 14% since 2012. So we can see that jurisdictions with carbon programs are outperforming the national average.
- In some jurisdictions, like California, extremely strong Clean Energy employment is helping drive this GDP growth.
- Household impacts, especially to low & moderate income households, are mitigated through decisions about how to allocate revenue.

<h2 style="color: #00AEEF;">Ontario</h2> <ul style="list-style-type: none"> • Population: 14 million • GDP: \$625 billion (US) • Industries: <ul style="list-style-type: none"> • Manufacturing (auto assembly), agriculture, forestry, mining • 37% reduction by 2030, relative to 1990 levels <ul style="list-style-type: none"> • First auction: March 2017 yielded \$472 million • Link to other jurisdictions in 2018 	<h2 style="color: #00AEEF;">Oregon</h2> <ul style="list-style-type: none"> • Population: 4 million • GDP: \$227 billion • Industries: <ul style="list-style-type: none"> • Manufacturing (electronics), agriculture, forestry, services • SB 1070: 45% by 2035, relative to 1990 levels <ul style="list-style-type: none"> • First auction: 2021 • Would link to California, Quebec & Ontario
<p>Good for the Economy. Good for the Environment.</p> 	

Perhaps the closest assimilation in economies is Ontario. They established a Cap & Trade program in 2016. Their first auction was this year, and they will link to California & Quebec in early 2018. Ontario’s program won the support of many industry players. Representatives from [agriculture](#) and the [cement](#), pulp and paper, fuel, [insulation](#), and [real estate](#) industries have all [supported](#) the cap-and-trade program.

In addition to verbal support, several companies have responded with – or continued – strong efforts to reduce emissions. St. Marys Cement plant, which [produces](#) 540,000 metric tons of CO₂ per year, plans to increase the capacity of a small bioreactor that absorbs CO₂ to grow algae, [currently offsetting](#) about 36 metric tons per year. Goldcorp, a large mining company, [promises](#) to reduce emissions through efficiency measures and is working to open [the world’s first fully electrically-powered mine](#) this year. Enbridge, one of the largest natural gas providers in the world, [plans to offer](#) geothermal heating and cooling solutions for homes in Ontario, helping homeowners cover the large up-front costs that accompany geothermal systems.

The industry support for the carbon market goes hand in hand with Ontario’s booming economy. The province, which is a crucial financial services center and [consistently ranks](#) as one of the greatest recipients of direct foreign investment in North America, has shown strong economic growth over the past couple of years. In June of 2016, [General Motors chose Ontario](#) as the location for its new autonomous vehicle center, a decision that demonstrates industry’s commitment to develop and grow despite the carbon caps. In 2017, household spending has increased, [real GDP has grown by 2.4%](#) and the unemployment rate [dropped below 6%](#) for the first time since 2001.

To temper the negative economic impacts and reduce the costs for individuals, Ontario will reinvest the revenue in emissions reduction programs. For example, the government [plans to use the revenue to invest](#) \$377 million to help homeowners lower their energy bills and reduce GHG emissions, \$657 million to improve

social housing, and \$100 million to support municipalities with energy efficiency improvements.

Source of Ontario GDP, using 2016 numbers and then converting based on current conversion of \$1 US : \$0.78 CA. <https://www.fin.gov.on.ca/en/economy/ecupdates/update.html>

Other Economic Impacts & Design Choices

Leakage

- Competitive issue, concern of possible businesses leaving the state
- Design of the allowances can help mitigate leakage issues
- Minimal research exists ex-post; but both California and RGGI have found that leakage issues have been mitigated or not of significant concern

Offsets

- Modeling pre-AB32 showed a nearly 100% increase in allowance price when offsets aren't considered (\$19 with; \$34 without)

Linking

- Produces more economically efficient emission reductions
- Administrative tools exist (e.g., auction platform and allowance tracking)

Good for the Economy.
Good for the Environment.



Leakage occurs when businesses move across state lines to seek lower prices, and therefore their emissions still are not reduced. While there is not empirical evidence of the impacts of leakage, the data that is available from the Northeast and California indicates that this has not been significant, and programs have been adequately designed to lessen these impacts. This is done by offering low or zero cost allowances to particular industries.

Offsets, an issue of importance to Oregon forestry and agriculture, allows some sectors to provide credits into the program. Oregon forests already produce carbon credits for California, but with a Cap & Invest, as conceived, they would also be able to offer up to 8% of the allowances here. Modeling in California shows that removing allowances could potentially increase allowance prices by 100%, so it is a good design choice to allow offsets in Oregon.

Finally, the platform between California, Ontario and Quebec is known as the Western Climate Initiative, or WCI. Linking Oregon's carbon market to WCI allows us to not only buy and sell allowances across a larger market, making price competition greater (and thus allowances lower cost), but also to take advantage of the administrative tools available. These administrative tools, like the auction platform, regulation & verification of allowances and more, provides the oversight needed for our program without us taking on all the personnel.

California leakage stat: Appears to be mitigated in Cal, but limited research:

<http://www.lao.ca.gov/Publications/Report/3553>

RGGI leakage: <https://fas.org/sqp/crs/misc/R41836.pdf>: Minimal leakage is found, but the imported electricity actually has a 5% carbon reduction of the non-RGGI elec.

AB32 Offsets: <https://www.arb.ca.gov/cc/capandtrade/meetings/111609pm/icfssipresentation.pdf>

Overall Impacts of Carbon Pricing

- Emissions reduction + positive economic impacts
- Significant revenue generating potential
 - Reinvestment in large public works
 - Investing in clean energy projects or technology may increase speed of transition to less fossil fuel use and reduce costs to businesses and households
- Where do positive economic impacts come from?
Targeted repatriation & Low-income support
 - Corporate income tax cuts → important
 - Personal income tax cuts → less important
- Commercial sector ↑ | Transportation sector ↓
Industrial sector ↔ | Residential sector ↔
- Disproportionate impacts can occur

NeRC

Good for the Economy.
Good for the Environment.



Keep in mind that loss in transportation jobs represents well under 1% of OR employment. Even though in the most extreme scenarios, transportation loses 7% of jobs, because transportation sector is so small, this has a modest negative effect on overall economy. Recall from an earlier slide, carbon pricing is a market-oriented approach to reducing emissions. Besides the longer term health benefits of reducing emissions, the Cap & Invest approach redirects the revenue obtained through the permitting process to assist businesses and households to reduce their use of carbon intensive sources and move jobs into expanding and new alternative energy sectors.

One aspect of positive economic impacts: Some jurisdictions have reduced other taxes utilizing the revenue from a carbon program – although that is not the current consideration in Oregon. In economic sectors impacted by the carbon pricing program, we see that heavily carbon –oriented transportation sector will likely be negatively impacted. Energy-intensive, trade-exposed industries may be more impacted than other sectors. This can be considered and mitigated in the program design, for example, by offering low or zero cost allowances to some businesses, as is the case in the Oregon proposal.

Besides disproportionate impacts on business sectors, certain households can be impacted. It is important that low-income impacts be considered and mitigated to the extent possible. Many of the likely macroeconomic impacts from carbon pricing would be similar to those found in the following report: *Liu, Jenny H.; Renfro, Jeff; Butenhoff, Christopher; Paruszkiewicz, Mike; Rice, Andrew. 2014. "Economic and Emissions Impacts of a Clean Air Tax or Fee in Oregon (SB306)". Northwest Economic Research Center (NERC). Portland State University, College of Urban and Public Affairs.*

Economic Impacts of SB 1070

Applying lessons from other locations:

A carefully designed Cap & Invest program can result in no harm to the Oregon economy, even possibly result in increased jobs while addressing the following issues:

- Reduce the regressive nature of rising energy prices
- Border issues are less problematic, since the proposal links to CA and eventually WA.
- Reinvestment of permits fees can help businesses reduce the costs of lowering emissions, improve traffic flow by reducing congestion, early establishment of moving to clean energy and thus expertise to help other regions,....

NeRC

Good for the Economy.
Good for the Environment.



Here's what we think will happen in Oregon:

Low income impacts can be abated by careful revenue rebates.

Border issues (or leakage) are mitigated when programs are linked.

We can be a leader in this area. Climate change is a collective issue and needs collective solutions. By joining a growing number of states, we can show that well designed cap and invest programs and efficiently reduce emissions and do no harm to the economy, in fact, spend the transition away from carbon intensive use before planning time to do so runs out. Through our growing expertise in carbon pricing and reinvestment, we can assist other government entities make this inevitable switch.

Clean Energy Jobs

- California: 519,000
- Northeast (RGGI): 409,000
- Canada: 55,000
- Oregon: 54,000
 - 41,869 Energy Efficiency Jobs
 - 12,455 Renewable Energy Jobs
 - Solar: 6,892
 - Woody biomass: 2,080
 - Wind: 1,190
 - Storage: 1,922
 - Smart Grid: 267
 - Natural Gas (fuel): 55
 - Other ethanol: 49



Good for the Economy.
Good for the Environment.



Here are the employment impacts from clean energy. In comparison to California's 519,000 clean energy jobs, the state employs 79,000 people in traditional energy jobs like coal, oil and natural gas.

In the Northeast, there are 33,000 people employed in coal, oil and natural gas. Oregon has decent clean energy employment, considering the size of the state, but based on what we've seen in places like California, we could expect this number to rise with the establishment of Cap & Invest.

Sources:

California – <https://www.e2.org/wp-content/uploads/2017/06/CaliforniaJobsBreakdown.pdf>

California methodology: https://www.e2.org/wp-content/uploads/2017/06/E2_CAJobsMethodology.pdf

NE (RGGI) -

https://energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report%20State%20Charts%202_0.pdf Aggregated total for nine RGGI states

Canada - [http://analytica-](http://analytica-advisors.com/sites/default/files/2017%20Canadian%20Clean%20Technology%20Industry%20Report%20Synopsis%20FINAL.pdf)

[advisors.com/sites/default/files/2017%20Canadian%20Clean%20Technology%20Industry%20Report%20Synopsis%20FINAL.pdf](http://analytica-advisors.com/sites/default/files/2017%20Canadian%20Clean%20Technology%20Industry%20Report%20Synopsis%20FINAL.pdf)

Thank You!

Questions & Answers?

Contact info

- *Jeremy Mohr: mohrj@me.com*

- *Tom Potiowsky: potiowskyt@pdx.edu*

Good for the Economy.
Good for the Environment.

