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CANADA'S CLIMATE CHANGE POLICY: WHAT MAKES SENSE NOW?

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Richard Hyndman
September 14, 1944 – October 23, 2011

Rick Hyndman spent his professional life working on public policy, mostly in the energy and environment area, in university, consulting, government and industry. He was Senior Policy Advisor for the Canadian Association of Petroleum Producers from 1998 to 2010, focusing primarily on climate change and air pollution issues. In that time, he was very active in Canada's national climate change process, working with stakeholders and governments in developing policy and giving numerous presentations at conferences outlining the oil and gas industry perspective on climate change policy.

He spent 13 years in the Alberta Department of Energy (1984 to 1997), in the policy area working on a variety of issues including natural gas deregulation, royalty revisions, and the first stage of electricity deregulation. In the final two years, he was Deputy Minister.

For seven years, before and after his time at the Alberta Government, he was a lecturer and visiting professor of economics at the University of Alberta, in the Department of Economics and the Alberta School of Business.

Rick Hyndman passed away on October 23, 2011. This thoughtful public presentation at the University of Alberta in the spring of 2011 characterizes how well Rick could shape the way we look at a very difficult but important topic. It is noted that Rick was not able to review this publication.

Canada's Climate Change Policy: What Makes Sense Now
CN Trade Relations Forum, March 17, 2011[1]

I've been working on Climate Change since 1998, about 13 years, and so my remarks come from that experience, but what I'm about to say is not an announcement of any CAPP policy position. CAPP has been in favour of carbon pricing for that time. Since 1998/99 we've been saying that carbon pricing should be a core element of a climate change strategy but the exact level stringency and design is a little more nuanced and has evolved over time and is still part of the policy discussions that happen within CAPP and between CAPP and other stakeholders and governments. So, in a way I'm speaking today more from my status here as an adjunct of the School of Business.

I'm going to go through the background first and look at emissions and then talk about carbon pricing in detail and then I will end with my suggestion on what we should do in Canada -- and not surprisingly, it involves carbon pricing -- and what we should do in the face of a policy stalemate in the US.

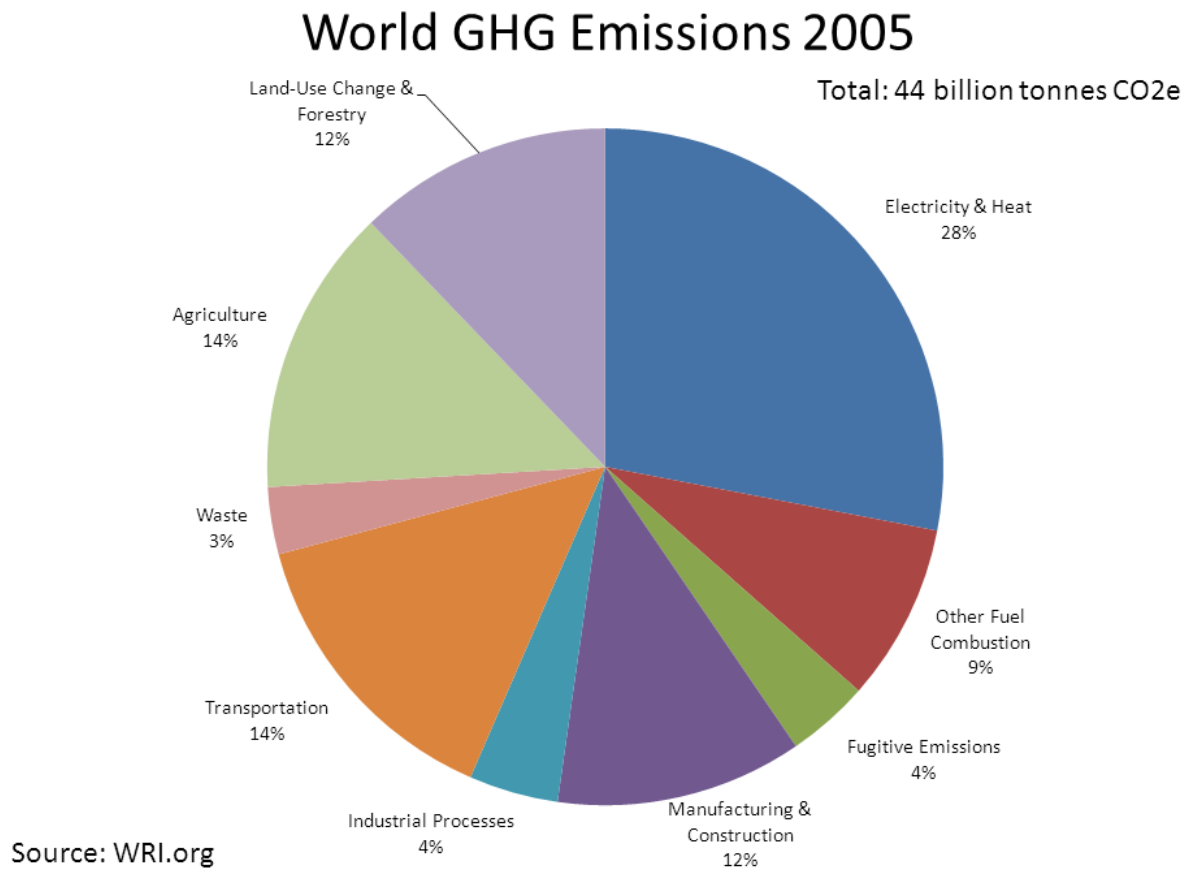
An important question to start with is what about the scientific proof with regard to climate change? There is an increasing amount of noise around this and it is ideological. I'm an economist not a climate scientist and so I'm not really competent to judge all the detailed arguments about whether the trends in emissions is reflecting human GGE's or whether the change in temperatures is following that closely and what's really going on. I get bombarded by my CAPP members and others with evidence that suggests that human GGEs are not serious and so we should be cautious about doing anything about it. But my stand on it is really quite simple. I've never seen refuted the concept that the amount of CO2 in the atmosphere now and the beginning of the industrial period, even makes the difference between this world being habitable and uninhabitable in many of its regions (certainly up here which is barely habitable to begin with!). If we took the CO2 that's in the atmosphere out, the basic science tells us that it would be bloody cold here and basically uninhabitable. So my simple logic says, "Do you really want to run the experiment of tripling or quadrupling the amount of CO2 in the atmosphere if what's there now is essential, and makes the difference between the world being uninhabitable and habitable?" Tripling or quadrupling it is sure to cause something serious and there may be all kinds of positive feedbacks, there may be negative feedbacks, but the question is: do you really want to run that experiment? And I think if you can avoid it you should. So we should do what we can to mitigate the emissions of GGEs, move to a low-emitting society as fast as pragmatically possible and try to avoid this experiment if we can. That's my comeback to the people who send me all the detailed scientific or supposedly scientific

[1] This lecture by Rick Hyndman is based on the editing of the recorded transcript of the event.

information that says it's not an issue or others who say the world will end in 2015 if we don't stop driving our cars or heating our homes. I think it's a kind of middle road or safe ground as far as I'm concerned.

Here is some background to warm you up. *[See Figure 1].* The reason I go through this world GGEs chart is because what it's showing is the emissions from various sources *[mentioning labels and numbers on chart].* The ones I want to focus on here are electricity, transportation, and this big one: agriculture, land-use change and forestry. They account together for a quarter of total global emissions. So that is non-energy stuff. This is the animal waste and gas-release and the land-use changes from, largely, deforestation in the developing countries. And transportation emissions are only 14% compared to that. So while we get excited about driving our cars and flying around the world, there's some really big stuff out there that we should be going after as well as making our transportation more efficient. And on most of these we should be trying to figure out how we move off fossil fuels, or at least fossil fuels emitting GGEs.

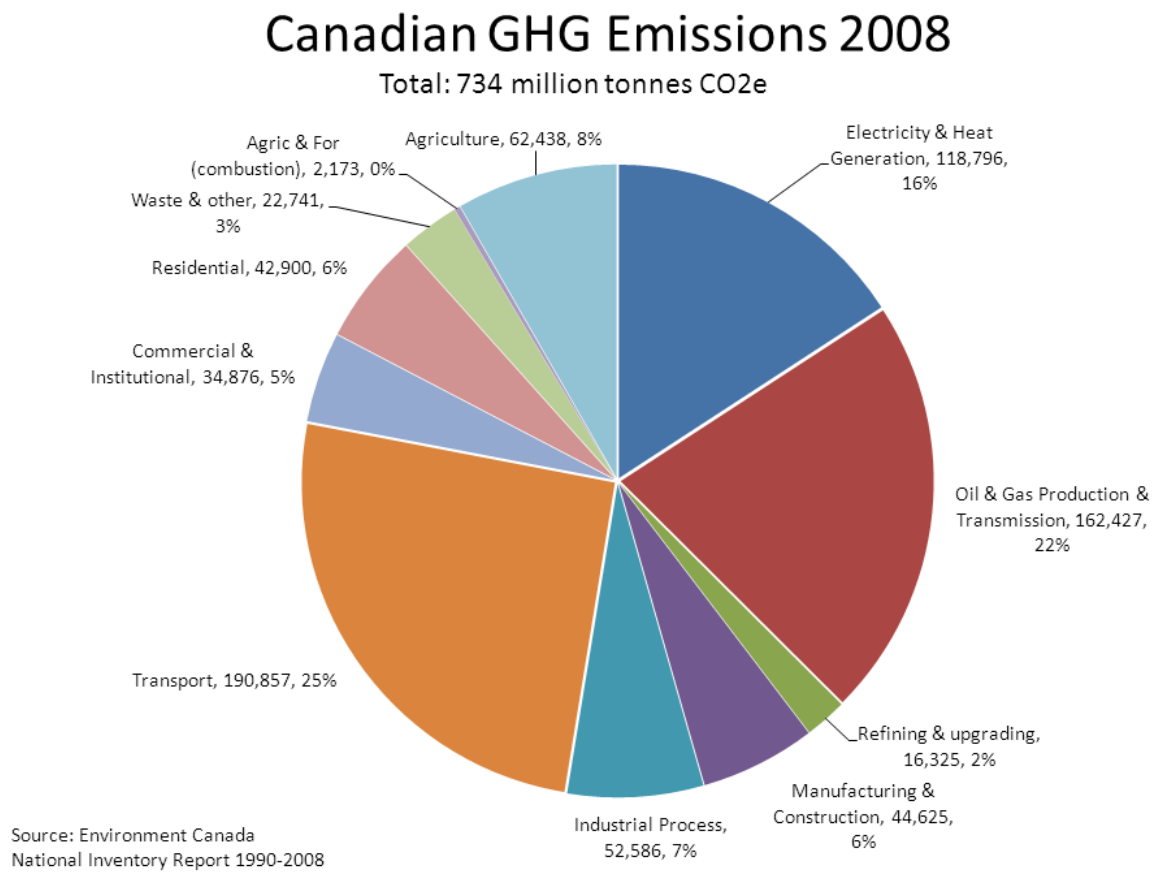
Figure 1



So that is the scope of emissions globally.

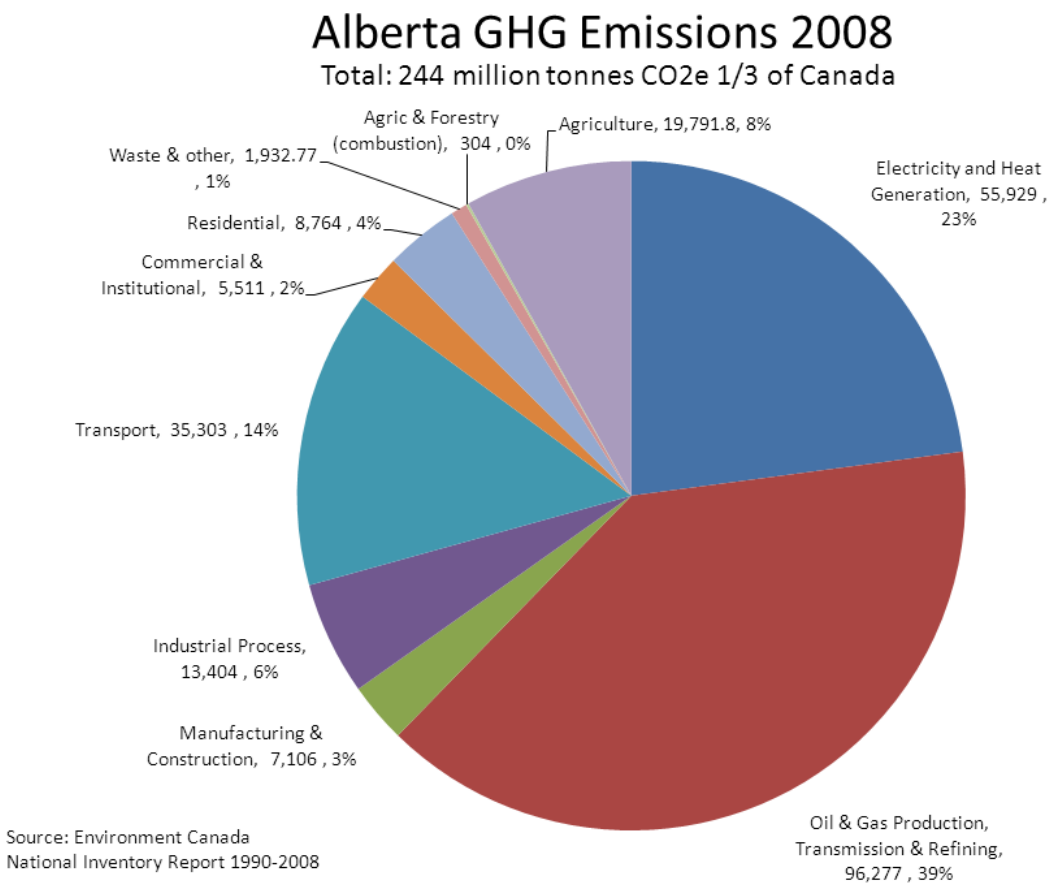
Now, to bring it down to Canada. *[See Figure 2.]* In Canada because we are such a huge net-exporter of oil and gas, we not only produce all of it for ourselves but export over half of it to the United States. Oil and gas production is a big element. Even though we are very hydro and nuclear oriented as a country, coal-fired and natural gas-fired electricity is still significant here. So electricity and heat generation is still 16% of the total emissions in Canada in 2008. And then we have manufacturing and processing and transportation at 25%. Not only are we travelling in cars and flying, we are moving goods by rail and planes and so on. But even here agriculture is not trivial, though it is nowhere near as significant as it is globally, but it is still not a trivial element of our emissions. And deforestation, well actually we're growing here: in 2008 the environment Canada data showed that the forestry sector land-use change in forestry, actually reduced GGEs by absorbing more carbon than was emitted by cutting and clearing wet lands and so on.

Figure 2



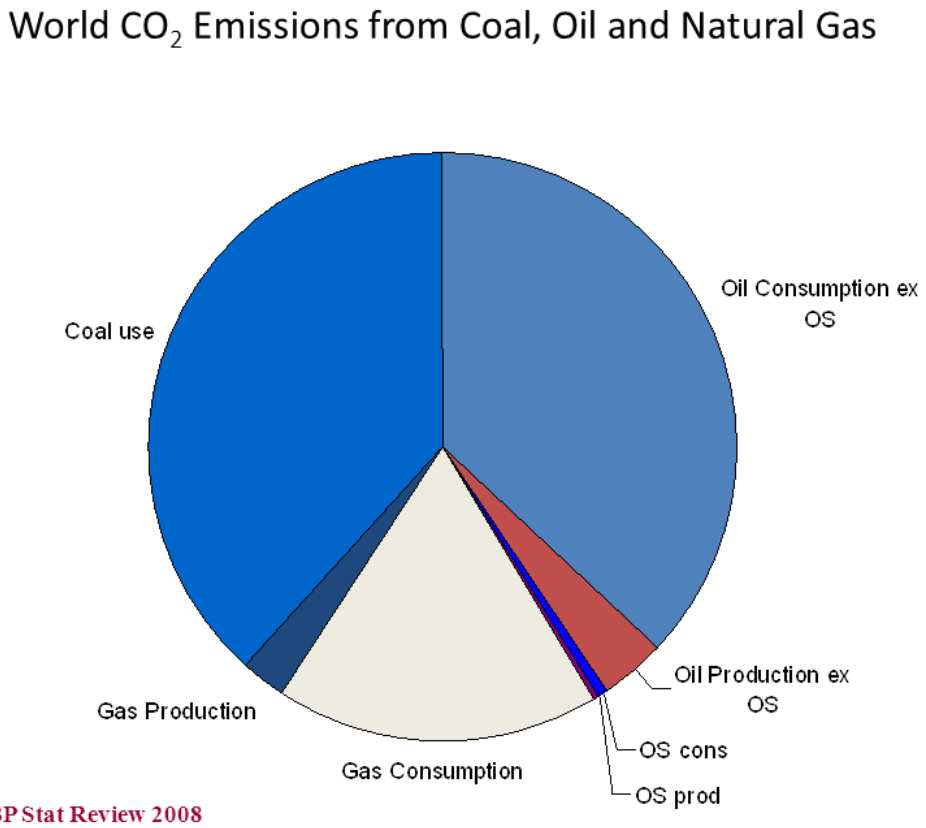
Finally, for Alberta, where the oil industry is even bigger and our power is mainly coal and natural gas-fired, we can see that those two sectors, electricity generation and oil and gas, are really a big part of our emissions and transportation is smaller only because of the proportional size of these other big areas (oil and gas etc.) – and, after all, we probably drive just as much per capita as the rest of the country. *[See Figure 3.]*

Figure 3



So that is sort of the pattern of GGEs that our policy needs to get at. I need to make an obligatory side comment on oil sands. We hear from some of our critics that oil sands are a global greenhouse gas catastrophe. That the oil sands are going to ruin the global environment and that these greenhouse gases are so terrible that we just have to stop developing the oil sands. These are some data *[See Figure 4.]* that I derived from the BP statistical review of energy, just to put oil sands in the context of global coal, oil and natural gas. So we have oil consumption…globally etc. *[pointing to chart and its features]* and you can see the oil sands production, which is what everyone seems to be getting excited about, is this little sliver here. So not surprisingly, we produce something under 3 million bbls/day of oil in the country and the oil sands are a smaller part of that, out of a global oil consumption of 85-90 million bbls/day, and coal, which is even bigger than oil, given all the coal-fired power in the US, China, India and Russia and so on.

Figure 4

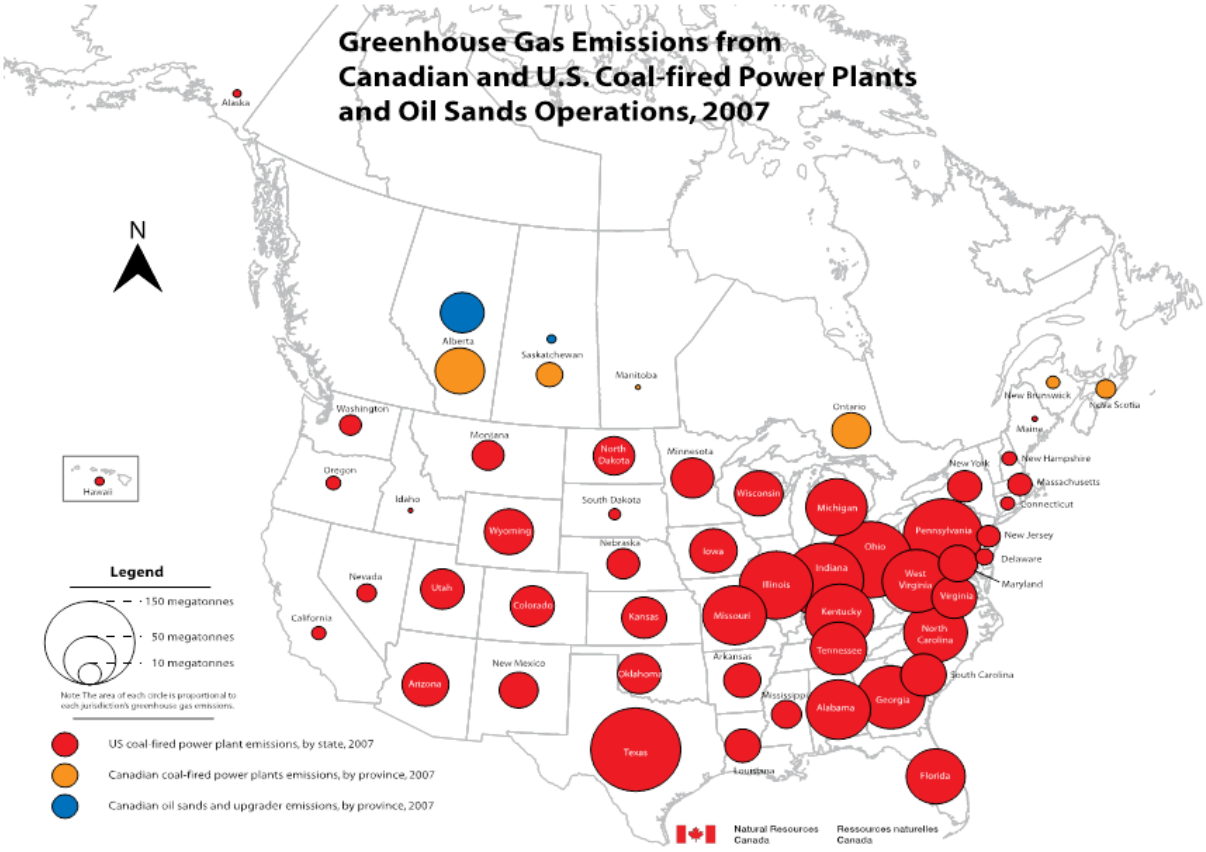


So, a simple fact: oil sands are not the global greenhouse catastrophe that critics of the oil sands would have you believe. The real issue, the thing that we can concentrate on, is the coal use, because there are alternatives, easy alternatives – maybe they are expensive – but there are readily available alternatives to coal use if we're willing to bear the costs of switching from coal-fired generation to some alternative. (This is not the week for me to make a pitch for nuclear power, but I still believe that if you don't build your nuclear power plants on a fault line, right next to the shore where tsunamis come in, it's probably fairly safe and better than the effects on human health from coal-fired power.)

One more thing on the oil sands just to give you context….even in North America [*see Figure 5, a favorite graph for defending the oil sands industry*], these figures by Natural Resources Canada show the proportionate size of oil sands production emissions compared to other emissions in North America in 2007. Relative to what else is happening in North America we see that the oil sands emissions are roughly like the emissions from coal fired power in South Carolina – and not including the other states (Texas, Ohio etc.), that have even more plants – so oil sands are just not the big issue, even in North America, when speaking in terms of GGEs.

Figure 5

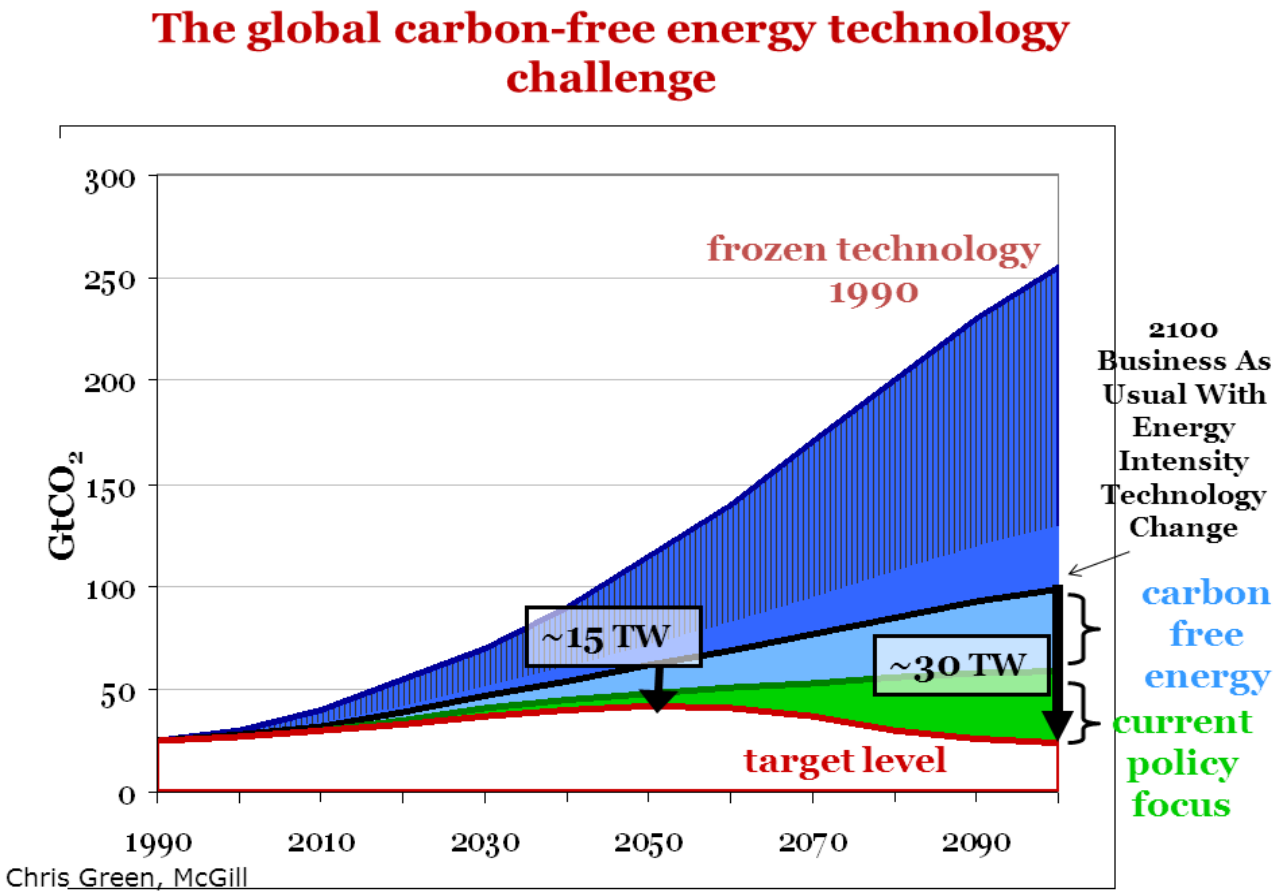
North American GHG Emissions – OS Production & Coal Power



Ok, back to the main theme…Let me say a few things here about the nature of the challenge that we face in going from an energy system that is fundamentally dependent on fossil fuels to some emission-free, carbon-free, energy source. Figure 6 is a graph that was put together by Chris Green out of McGill, who has done a lot of good work for the Copenhagen Consensus on policies that should be followed to reduce global GGEs. He has gone back and looked at the projections of the International Panel on Climate Change (IPCC) and asked "what would happen if we didn't have technological change after 1990?" What would global emissions be given the path of economic growth and energy consumption that we would see to 2100? By freezing technology at the 1990 level in terms of energy efficiency of use and the energy intensity of the economy, and the amount of carbon free energy that was there, these two things *[the blue area on overhead]* are things that change in the forecast because of the technological advance that is built in to the outlook to 2100 that has been done for the IPCC. So the IPCC 'business as usual' projection is the top of this green line. What Chris is trying to illustrate here is the enormous amount of technological change that we already assume when we're looking at what the nature of the challenge is to switch off of the fossil fuel energy that's emitting greenhouse gases. So this stuff is already assumed and a lot of it is coming out of the technological change, advances in carbon free energy, and so on, and is already built into the forecast and the focus of the policy to reduce greenhouse gases to a level that wouldn't be dangerous is ongoing from that 'business as usual' *[black line on the graph]* on down to the target level *[red line on graph]*. So instead, if the technology were frozen our emissions would be going up like that *[top line]*. Because of technological progress which we get anyway (and which we have had over the last centuries), the 'business as usual' line one would look like this, so we need further policy according to this analysis to get us down to the target level.

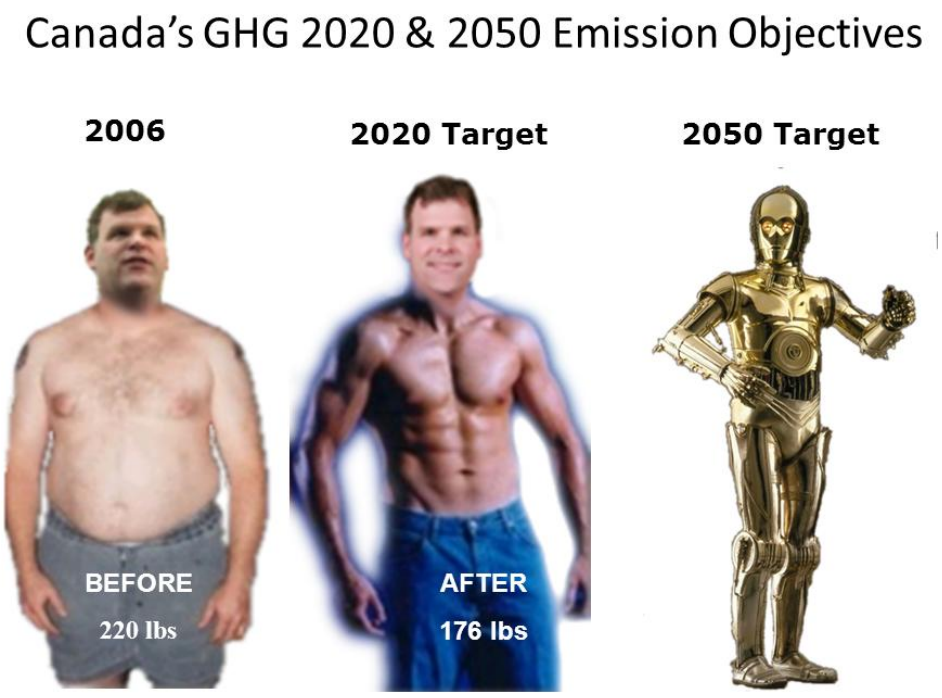
What Chris is pointing out is that in 2050 we were looking for 15 terawatts of non-carbon energy to meet that scenario of reducing greenhouse gases and 30 terawatts of non-emitting energy by 2100. By comparison, global energy now I think is 16 terawatts and of that oil is about 6 terawatts, so there is a huge amount of new energy capacity, non-fossil fuel energy capacity, that is required to meet this. This is a major challenge. This is not putting up a few windmills in southwestern Alberta. This is a huge transformation of the energy system if we want to get off carbon-emitting energy, which is a major source.

Figure 6


The global carbon-free energy technology challenge
300
250
200
150
100
50
0
GtCO2
1990
2010
2030
2050
2070
2090
frozen technology 1990
2100 Business As Usual With Energy Intensity Technology Change
~15 TW
~30 TW
target level
carbon free energy
current policy focus
Chris Green, McGill

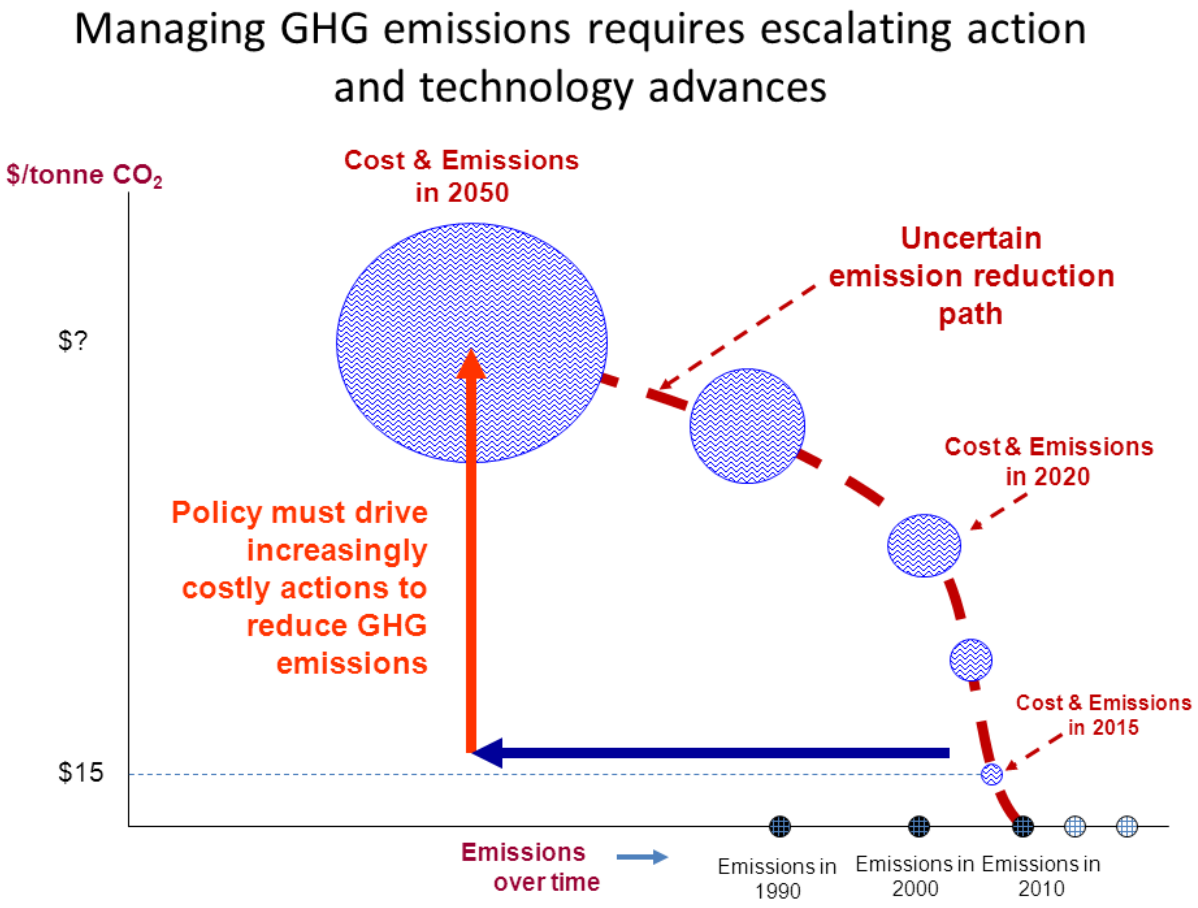
Ok, let me bring it back to Canada. Our current government provided a target in 2006 when they came into power, that Canada's GHG emission target in 2020 would be 17% below the level in 2005. I have this little cartoon here that some of you have seen. *[See Figure 7.]* It shows John Baird, the Minister of the Environment at the time, saying in 2006 that we're a little flabby in terms of our energy use and we really need to get fit. By 2020 we need to lose some weight. Now I have never had this problem but I can imagine that going from 220 (pounds) to 176 is no mean feat. I mean, it may not win you the prize on the "Biggest Losers" but it is no small feat, but it's a serious challenge. So what is the question for our 2050 target which was to get down 60-65%? Well this is something totally different. I use this cartoon to reinforce on you subconsciously and visually the need for improvements in technology if we're going to get down to much lower levels of greenhouse gas emissions; either in both our energy efficiencies, so that we use less energy to get the things we want -- the lit rooms, heated buildings, transportation and so on, but also in generating the supply of energy. This isn't a simple little belt-tightening. There is no notch on our belts that would meet that 2050 target using today's technology. We just couldn't do it.

Figure 7


Canada's GHG 2020 & 2050 Emission Objectives
2006
2020 Target
2050 Target
BEFORE
220 lbs
AFTER
176 lbs

Here is a little more analytical representation of the nature of the challenge – and we're measuring emissions over time from left to right here (and some people measure reductions from left to right and I find that hard to think about). *[See, Figure 8.]* The 1990 emissions are shown on the Graph at this point...In 2000 they'd gone up; and in 2010 they went up; and if we keep going along the axis they continue to rise. In one scenario we are not doing anything. But what would happen if we did agree to incur the costs associated with a reduction? For 2015, which is right around the corner, the figure looks ambitious, and in 2020 we incur some even higher costs. A bigger effort is represented by the bigger circle here and right on up to 2050. The increased efforts, higher costs per ton of reduction, takes us up to the target set by Government for 2050. So really, we have an uncertain path over time if we put in place policies that require industries, households, businesses and governments to incur costs -- to do things that are more expensive to get fewer emissions. So we need increasingly costly policies if we are going to get down to the emission levels we aspire to. And the exact shape of the curve on Figure 8 and how far up we have to go on costs, depends on what technologies are available. The more technology that comes along that allows us to switch from high emission to low emission ways of producing energy or ways of consuming energy or getting rid of emissions out of agriculture and forestry in Canada and around the world, the lower the costs that we will incur to get down to that target. So technology, we have stressed for 10 years now, is a critical part of the overall strategy to meet our greenhouse gas objectives. If we can invest in new technology and bring down the costs we might be able to provide the options (that are necessary) to reduce greenhouse gas emissions.

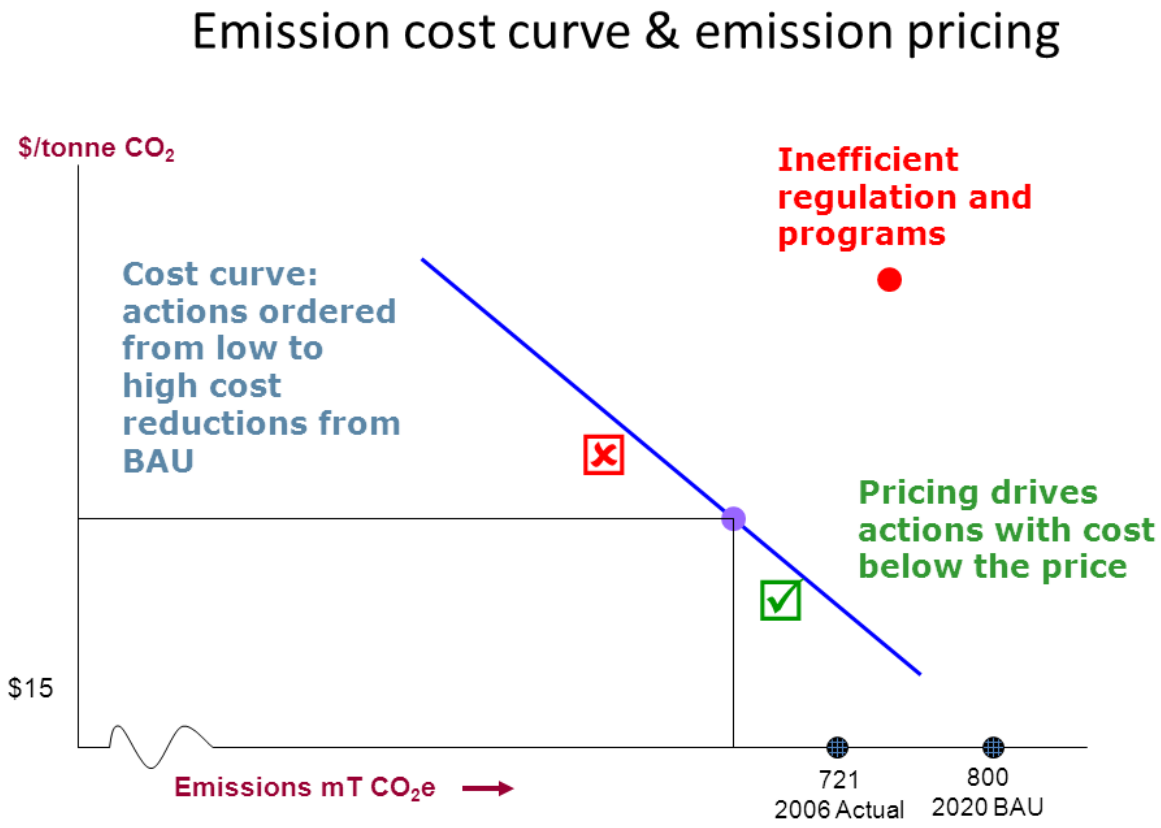
Figure 8


Managing GHG emissions requires escalating action and technology advances
$/tonne CO2
Cost & Emissions in 2050
Uncertain emission reduction path
$?
Cost & Emissions in 2020
Policy must drive increasingly costly actions to reduce GHG emissions
Cost & Emissions in 2015
$15
Emissions over time
Emissions in 1990
Emissions in 2000
Emissions in 2010

Let me switch now into a simple run-through of carbon-pricing (and with apologies to my economist friends and others in the room who have seen this before, but it is part of the story). *[See Figure 9.]* So measuring left to right, this is a kind of an emissions-demand curve. For economists it's basically saying, as in that previous chart, we are willing to incur higher costs to avoid emissions, and that we can get to lower levels of emissions. We have a curve that is more formalized now as a cost-curve than in the previous picture, and the idea behind emission pricing is that you set a charge on carbon emissions and people do things to reduce their emissions that cost less than that charge. The whole idea is to march up this cost curve by people doing things – insulating their houses, putting in a more efficient furnace (and I'm speaking quite personally now), buying a more efficient car, and that sort of thing. You can move up this cost curve until you get to the level of the carbon charge. And the other side of the story is that you're not supposed to do the things that cost more. The policy says that as a society we want to go out and do all the things that are less costly than the carbon charge that we're setting, were not asking you to do things that are twice as expensive as that.

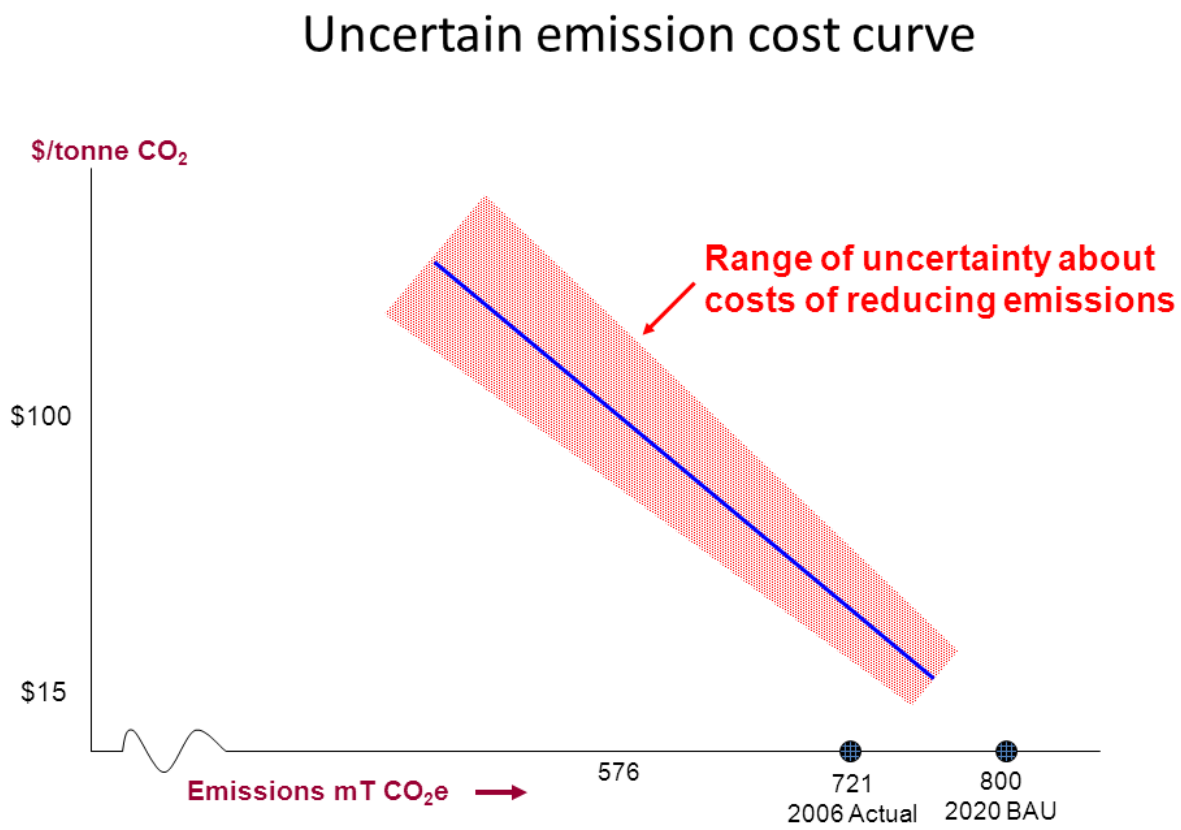
Now what Governments usually do, is they go out and think that they have to make the decisions about where the reductions should come. They draw-up inefficient regulations and programs which, in terms of tonnes of reductions per dollar of expenditure, have very high costs per tonne. You've all heard the criticism of the advertising campaigns etc. that the Federal Government ran over the past years for the Rick Mercer "One Ton Challenge". If you add up the costs of that program and look at plausible estimates of the reductions you get, I'm sure its way up here on the right side of the graph. You get fewer reductions for higher costs than you would if you sent a price signal out across the economy and let individual decision makers decide if one could save money by doing things to reduce our energy consumption and emissions.

Figure 9


Emission cost curve & emission pricing
$/tonne CO_2
Inefficient regulation and programs
Cost curve: actions ordered from low to high cost reductions from BAU
Pricing drives actions with cost below the price
$15
Emissions mT CO_2e
721
2006 Actual
800
2020 BAU

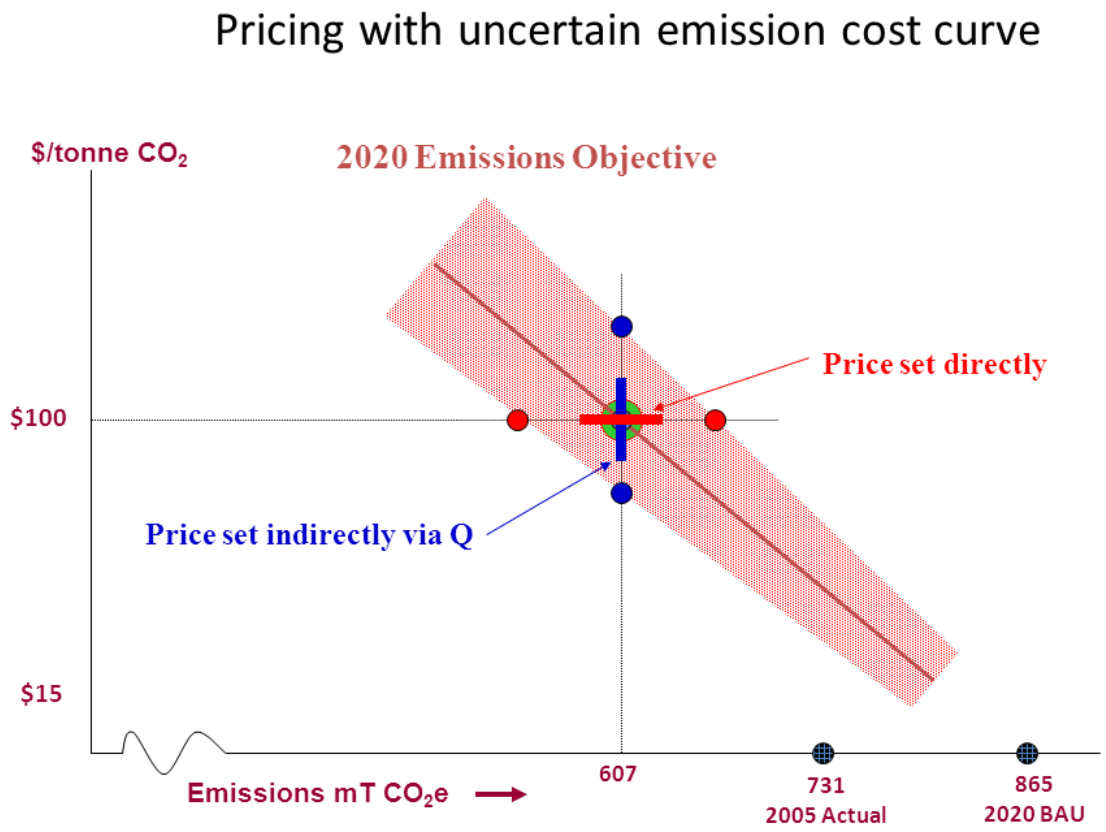
Well the cost curve in Figure 9 is the kind of thing we draw in our Economics 300 lectures. It's actually a very uncertain cost. *[Figure 10.]*We don't know exactly where it lies. It can bounce around on a yearly basis, [due to] the state of the economy -- and there is a general uncertainty -- and because there are things we don't even know about that are out there to reduce emissions. That's why pricing is such an efficient tool: the information of what to do rests more with people like yourselves than it does with policy-makers. You know your own situation. The policy-maker is saying, "Okay, you shall do this." It may turn out that insulating your house is just a marginal improvement and costs a great amount, but if you know or can see the heat coming off the walls of your house when you come home then you probably have a good idea that you're wasting gas to heat it. Anyway, it's a very uncertain cost curve and this is hypothetical and illustrative of the situation.

Figure 10



Now I want to talk about the alternative ways of pricing carbon. Let's suppose you want to reach the federal government's target of 607 mega tonnes in 2020 and this *[See Figure 11*] is the cost curve as we imagine it. Let's even say we are looking forward from today: in 2020, what is the relationship between what the price of carbon would have to be and what the level of emissions would be? And you need some lead time. If you were asking, what does it look like for tomorrow and it is vertical; then there is nothing I can do between today and tomorrow, so the cost is not driving things. In terms of doing things more efficiently, the shorter the time frame the less you can do. We're looking out nine years here, imagining that this is the kind of relationship that we want to get to about here *(another point on curve),* the analysis suggests that it would be about a $100/tonne or maybe a $150/tonne, but this is good enough to illustrate the point.

Figure 11



Now we had a debate on carbon pricing between people who think that the way to do it is to fix that quantity of your target, say 607 mega tonnes. After all, that's our target, right? So we should do something to fix the level of emissions in 2020 and do what it takes to get there. We know it takes, in this example, about a $100/tonne to get there. But we don't really know because of the uncertainty of the cost curve, whether it's going to be less than that or more than that. And so shouldn't we just fix it and let us find out through individual decisions and the market as to what the actual cost is of achieving that target? That's the so-called cap and trade approach. The way you fix the target is to require all the emitters that you're going to cover, to submit tonnage permits for every tonne of emissions they have. You limit the total number of permits to 607 mega tonnes and you issue them somehow. You give away some free; you auction some, and people have to go out and acquire the permits. But they'll only be able to find 607 mega tonnes -- unless you're in Europe where there is theft and crime in the thing (*laughter*) -- but let's leave that aside and suppose you get that under control. So you issue 607 mega tonnes of permits, and people scramble and a secondary market shows up. The price of those permits goes up and down. And from this simple illustration we know that the price could end up somewhere between the upper and lower ends of our uncertainty on the cost curve -- that's if we had any faith in the cost curve. It could be worse than that.

The other way to do it is to just fix the price: you know that $100/tonne would get you about there, (and so) you fix the price -- this is normally called a carbon tax by some people. By fixing the price of emissions for every tonne of emissions, instead of submitting a permit for a tonne of emissions, you submit $100.00. And that drives you to do all the things that you could do to reduce emissions that cost you less than $100.00/tonne. Now the problem with that to some people is, well, we don't know if we are going to get to the target; we could end up here, above the target, but if we picked an honest, objective estimate of what the cost curve looks like, we could just as easily remain below the target as above the target. So the usual argument that cap and trade gives you certainty on the level of emissions and uncertainty on the price, and the carbon tax gives you no guarantee that you'll meet the target, isn't quite stated correctly. The carbon tax doesn't give you certainty on the quantity, but the expectation, if you're honest, is the same, and you don't have the price bouncing up and down, and you don't have a lot of middle men telling you what the policy price of carbon needs to be. That's pretty simple isn't it?

I mean that's carbon pricing. The problem in the debate we've had on carbon pricing is that the communication among people in the debate has been very difficult. It's been like the Tower of Babel. *[See Figure 12].* People have different terms, they focus on different parts of the policy and they slander the ones they don't like ...the debate has been pathetic in my opinion! We spent, the Federal Government spent, I forget how much now, I think it was at least $25 million of their own money, not to mention all the costs of all the people

involved, to run these so-called National Climate Change Issue Tables. These had anywhere from a dozen at some of the better, smaller ones, to 60 to 80 people. And the meetings were across the country. I got to see everywhere from Whitehorse to St Johns' and Charlottetown in these meetings. It was a very nice tour of the country but it didn't really come out with -- despite all of the good work that was done -- any definitive recommendations about what the policy ought to be. One of the worst (elements) was the carbon pricing discussions in some of the forums. People just didn't advance their understanding or get to a common vocabulary and we had basically a Tower of Babel discussion on carbon pricing and it continues somewhat today.

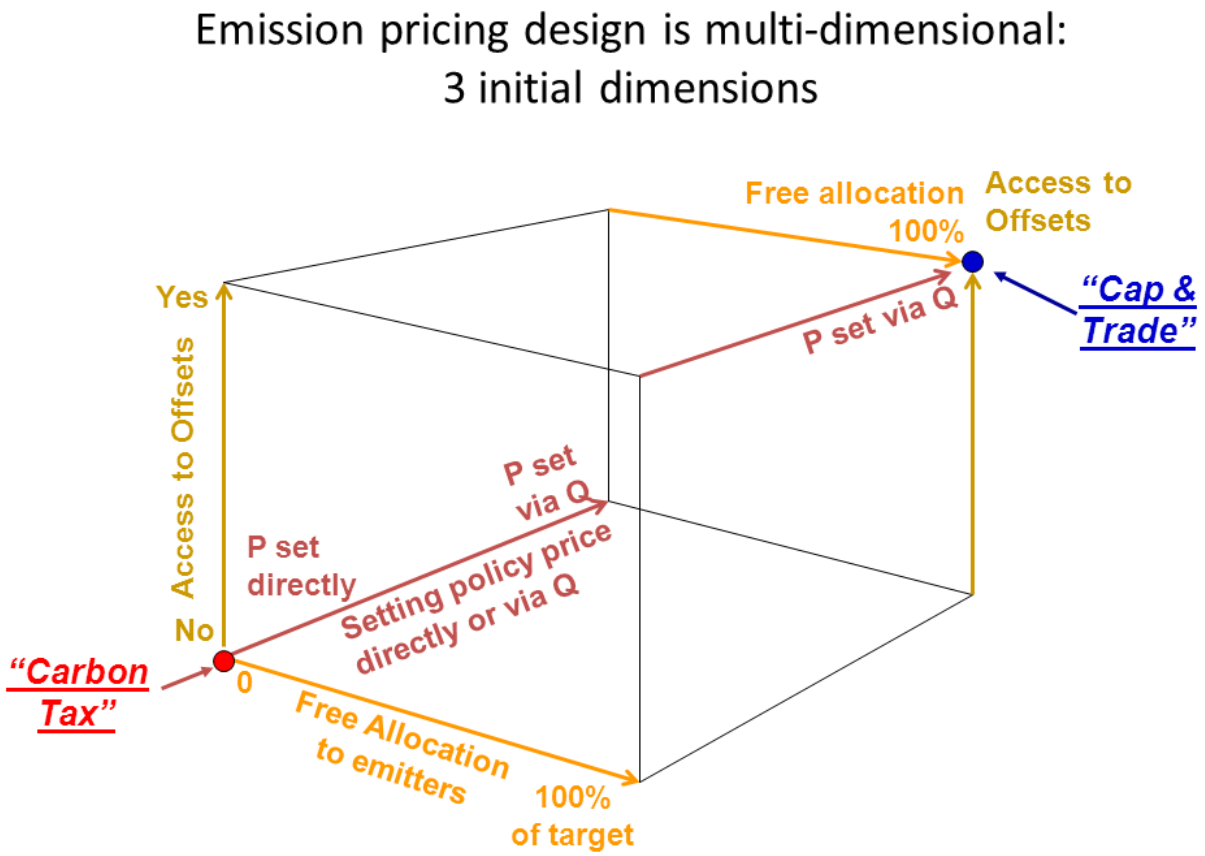
Figure 12

Communication in the emission pricing debate is difficult

Tower of Babel, Pieter Bruegel the Elder, 1563

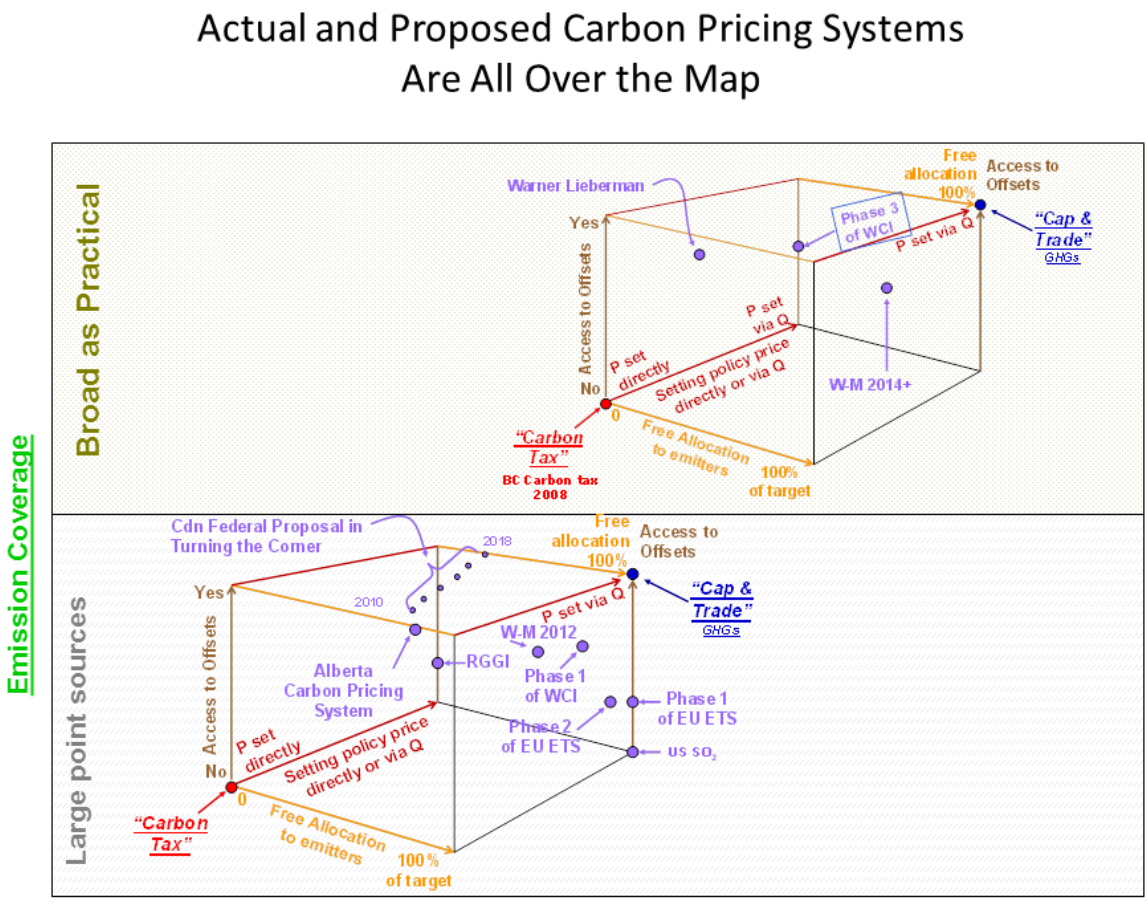
I decided to put my own organizing framework on this for you. *[See Figure 13.]* Some of my colleagues think this is over the top. Anyway, so carbon pricing is more complex than I showed you earlier in that it involves fixing the quantity, or fixing the price. That's one of the dimensions in the usual discussion. There's another dimension though, which is: do you give the permits away free? Or do you recycle all the revenue from their issue back to the emitters? Another dimension is: do you have access to offsets so the carbon pricing system applies in a mandatory way to a defined sub-set of emitters, with those outside that are able to do things to reduce emissions: create credits and sell them into the system? (The access to offsets). So we put this into a three-dimensional graph, and the usual view is that -- the carbon tax is down at in the bottom left corner -- you set the price directly. There's no free allocation and there's no access to offsets, you just charge emissions at X dollars a tonne. And the cap and trade system is, you know, to give out 100% of the target as free allocations to emitters; you allow offsets; and you let the market for permits set what the price is going to be.

Figure 13



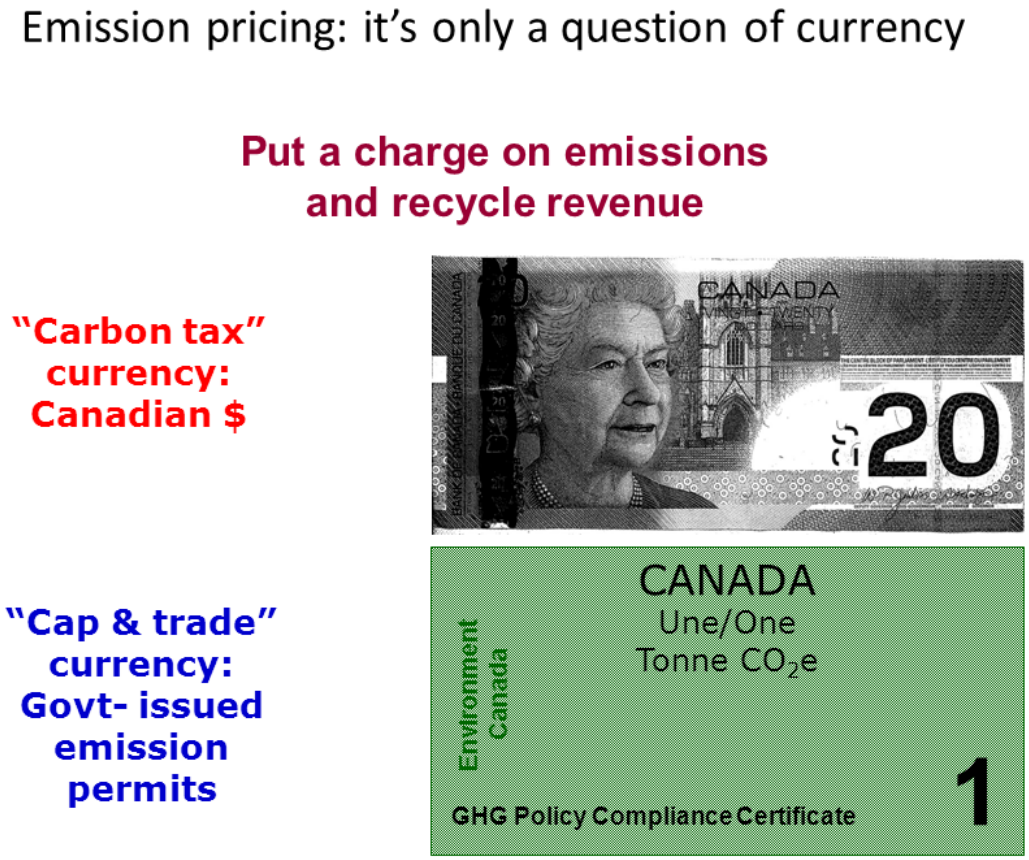
Okay, but if you look at the actual and proposed carbon pricing systems, they're all over the map. *[See Figure 14.]* There is a set of them that are large point source emissions only, they cover industry mainly. Then there's some that are as broad as practical, and cover emitters beyond industry. I'm not going to go through all of these details. We have had the EU emissions trading system Phase 1, Phase 2, and Phase 3 coming up in 2013. We've got the Regional Greenhouse Gas Initiative for electricity generators in the US Northeast. We have the Alberta carbon pricing system. We have the Western Climate Initiative Proposal, sort of Phase 1 - Phase 2. We have the bills in the US Congress, Waxman-Markey, and Kerry-Liebermann, which propose a number of things in a number of phases. They're really a mix of different elements of design from one to the other. Say, if you're south of the border, the vocabulary is "Tax = Bad". So "Carbon Tax = Bad". "Cap and Trade" used to be "Good", but now it's "Bad" too, so now they're down to regulation. It's a very poor discussion when you're really dealing in 3 or 4 dimensions here about the nature of the policy – and you've got it down to one dimension in the discussion. And I think we've suffered from that.

Figure 14



While carbon pricing is very complex -- and that was the point of those earlier slides a few slides ago -- it's really a simple matter here. I'm going to bring it down to one dimension in a way, you could design all of those elements, but it really boils down to a question of currency. *[See Figure 15.]* You know, if you have a carbon tax, as people use the term, the currency is in, say, Canadian dollars here (in my earlier example, it's a $100.00/tonne). And if you have cap and trade, the currency is government issued carbon currency, emission permits (for each tonne). Now if the world price worked out along those lines, like in the example I showed, these would be worth $100.00/tonne in 2020, when you had to comply with the cap. But in designing a carbon pricing system you have to decide which currency you are going to use. All of the other dimensions on that previous chart are variables that could be in either system. And so, whether you use this (method) or this (method) as a way of emitters covering their emissions, it shouldn't be decided on whether you like this aspect of one system or that aspect of another, because you could do them both...you could use aspects of either of these things. Let me give you my favourite example, British Columbia went from thinking about a carbon tax in -- I think it was in December 2007 -- to deciding that they were going to do one, designing it, setting-up the administration and collecting revenue in 6 months. California has been talking about cap and trade now for a decade. They have a gazillion people out there making a living telling people how to work under cap and trade. If you plug into this network, like me, you will get dozens and dozens of e-mails a week telling you about this conference or that conference which can tell you how to comply and what you have to prepare for under the cap and trade system. I've never seen one conference telling people how to pay their carbon tax in BC. You know, you cut the cheque, you report your emissions on a system that was largely there, and you mail it in. Now, BC could have done exactly the same thing in almost the same time frame and said, look when you're going to cut a cheque don't send me money, send me one of these permits for every tonne of your emissions. And the natural question would be: "where do I get those?" And they say, right over there, I have a little window where we sell them and actually we're going to hold an auction every now and then and sell these off. All the other aspects of their system, which was incredibly pragmatic, was built on existing administrative systems, like where they measure gasoline, diesel and natural gas and so on; all of those elements of the system could have been exactly the same, they require people to submit 'these' instead of 'those', and it would have been simple. A simple little addition: like saying "I have an auction market for that", but what would they get out of that? Well the uncertainty about what the price would be would cause things to go up and down, so maybe you could get the financial sector business built up in BC to try and hedge that. Maybe you could get a whole bunch of people to try and convert the fluctuating value of 'these' things into 'those' things (for people who don't want the whole thing bouncing up and down which is almost all of us).

Figure 15

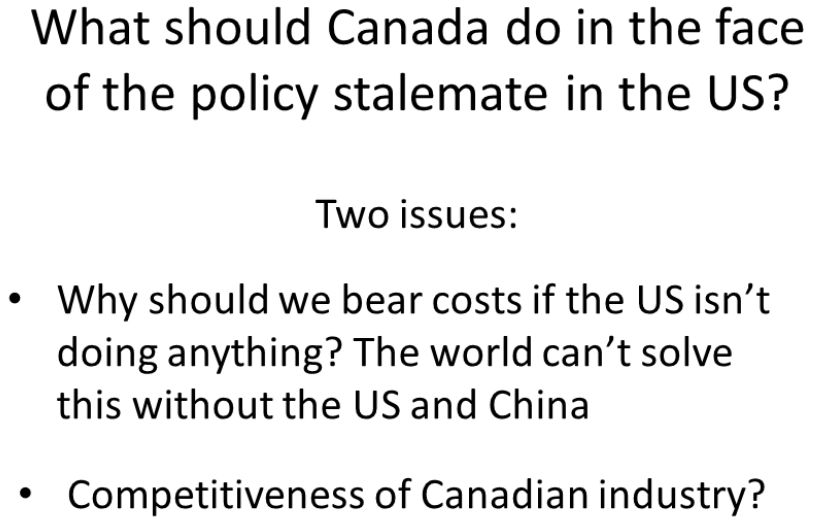


My whole point in all of this is to state that the carbon tax debate is very confusing to people outside of it. A lot of the issues that are compounded or confounding doesn't need to be. The design elements can be split apart and dealt with on an individual basis, on their own merits. The fundamental issue about whether you use dollars or permits as the way to force compliance on this should be a technical decision. Do you want a fluctuating price that drives the need for a whole financial sector to turn it into a predictable price, or do you just want to set the price and have a rule for increasing that over time? And I'm sure my bias shows through…I obviously think the latter idea is better.

Let me turn to the main topic of my remarks today. (But) I'm going to have another digression on theory here first: what should Canada do in the face of a policy stalemate in the US? *[See Figure 16.]* This is over-simplifying it, but there are really two issues. The first issue is: they are not doing anything south of the border, and the US is critical to (our) dealing with the global greenhouse gas issue; why should we -- with our 2% of global emissions, and however individually guilty we are of having high emissions per capita -- why should we go out and do something very expensive when the US is doing nothing? We can't really solve the global problem unless the US, China, India and others are on side and doing something. You know the usual story, that Canada's 2% of total emissions gets wiped out in a matter of months (maybe it's more than 12)...but all it takes is the building of a few new coal-fired power plants in China, as they rush to meet the rising energy demands there -- as they should, but maybe not with coal -- but as they should. So that's one question: if the US isn't doing anything, then why should we?

And the second issue is: if we do things and put in place costs -- and all the discussions so far given by politicians in this country outside of BC or outside of Gordon Campbell don't put anything cost-wise on the voters -- 'we'll just put it on large industry', and if we do that, then our industry will have costs that their competitors in the US and other countries, with whom we're competing, won't have and that will undermine the competitiveness of Canadian industry.

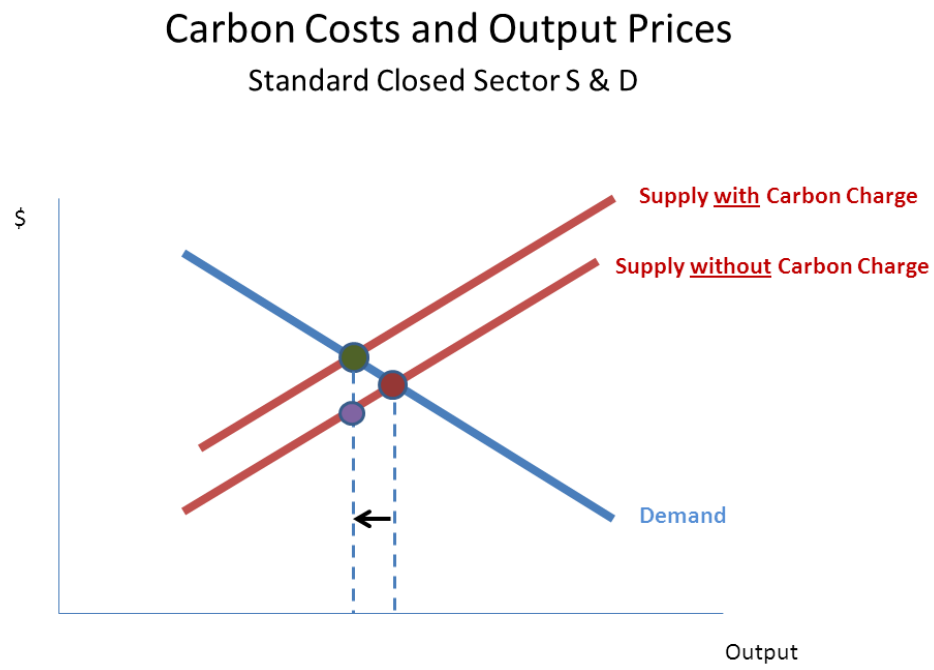
Figure 16



So I need to do a little digression for non-economists here, to hammer home that point.

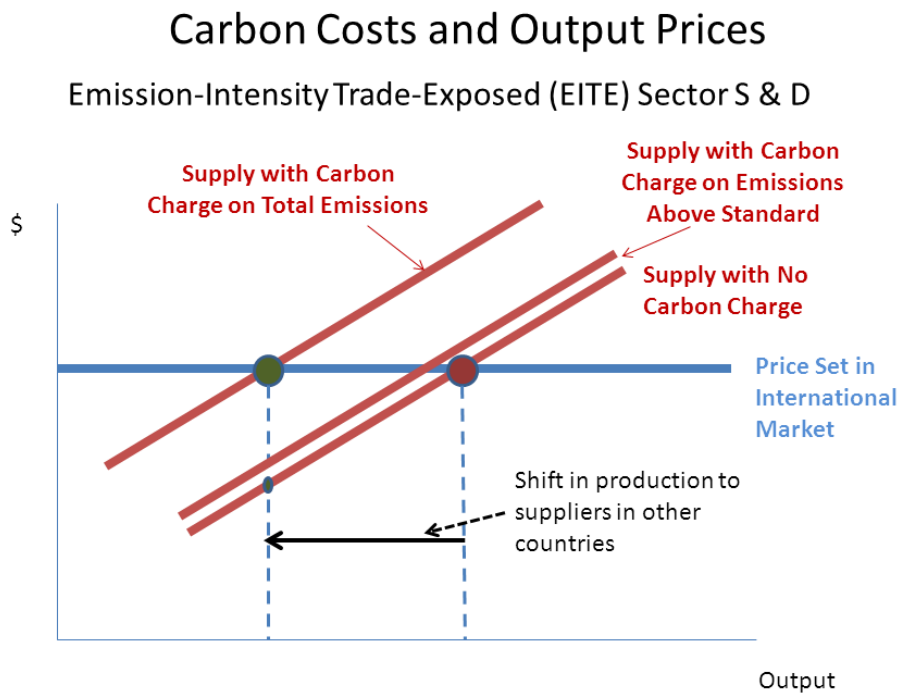
In a standard closed economy, supply and demand intersect and tell you what the equilibrium market price and quantity is. So if we have no carbon charge, we have the situation shown on Figure 17. And if we put a carbon charge on *[Figure 17]*, it raises the cost of producing things. It's basically, in most cases, an add-on, because now you're paying for the energy and the cost of the emissions that come off it when you burn it. That raises your cost. The simple answer is, in a closed economy, that'll drive-up the price to consumers; it will drive-down the price to producers; the quantity demanded and supplied will drop; and the price of those goods gets reflected through the economy…That's exactly what we want if we want to internalize the GG emission externality. We want consumers to see the costs of carbon in the goods and services they buy. If we were in a closed economy we could do this. You'd put on the charge. Prices would change. It would cost more to have leaky houses. It would cost more to drive bigger cars. It would cost less to go to opera and come to lectures like this and so on. The idea is that if you do that, businesses have an incentive to try and do things more efficiently and consumers have an incentive to shift from higher to lower energy intensive goods and services. But the issue that we're dealing with when we're talking about putting a carbon charge on large industry in Canada, is that for the most part, almost all these industries that are emission-intensive are also trade-exposed.

Figure 17



Now we're facing a different situation. We have the supply with no carbon charge, but the price is set in the international market *[See Figure 18.]* This is an exaggeration for some industries because there is some good trade theory that tells us the demand curve internationally is downward sloping, but in the case of oil this is pretty close. So the price is set in the international markets and that determines how much we can supply profitably in Canada and that's the point on our supply curve. For those of you in resource economics this is also a little bit of a simplification but it's still good enough for illustrating the point. If we put the charge on carbon in the producing of these things, then again it's going to shift up the cost curve by the amount of carbon involved in producing a unit of production and carbon emissions, mostly the energy emissions that come from that. And that is going to drive down [output] -- the international price is independent of what we do in Canada -- and so now at the international price, with higher costs (that only we can afford), we only have profitable production at a lower level. We shift down our production and really what is happening to supply is that the global market industry looks at Canada and says oh, there are higher costs now, I'm going to do it somewhere else. So you shift production to suppliers in other countries, but of course those suppliers have greenhouse gas emissions in their production too. So while you drive down Canadian emissions, global emissions might stay the same or even go up, depending on the whole story about greenhouse gas emissions around the two sources of supply.

Figure 18



What can we do about that? Well we have a lot of suggestions. The best suggestion, the current one, is that instead of applying the carbon charge to the total of emissions of an industry, we set a performance standard that says: if you were producing efficiently, and you can look around the world to see what an efficient producer would have in the way of greenhouse gas emissions per unit of output, we won't charge you. But if your emissions are higher than that performance standard, we'll charge you on the difference. And if your emissions are lower, we will actually refund you the difference. So now the net carbon charge on the industry is much smaller.

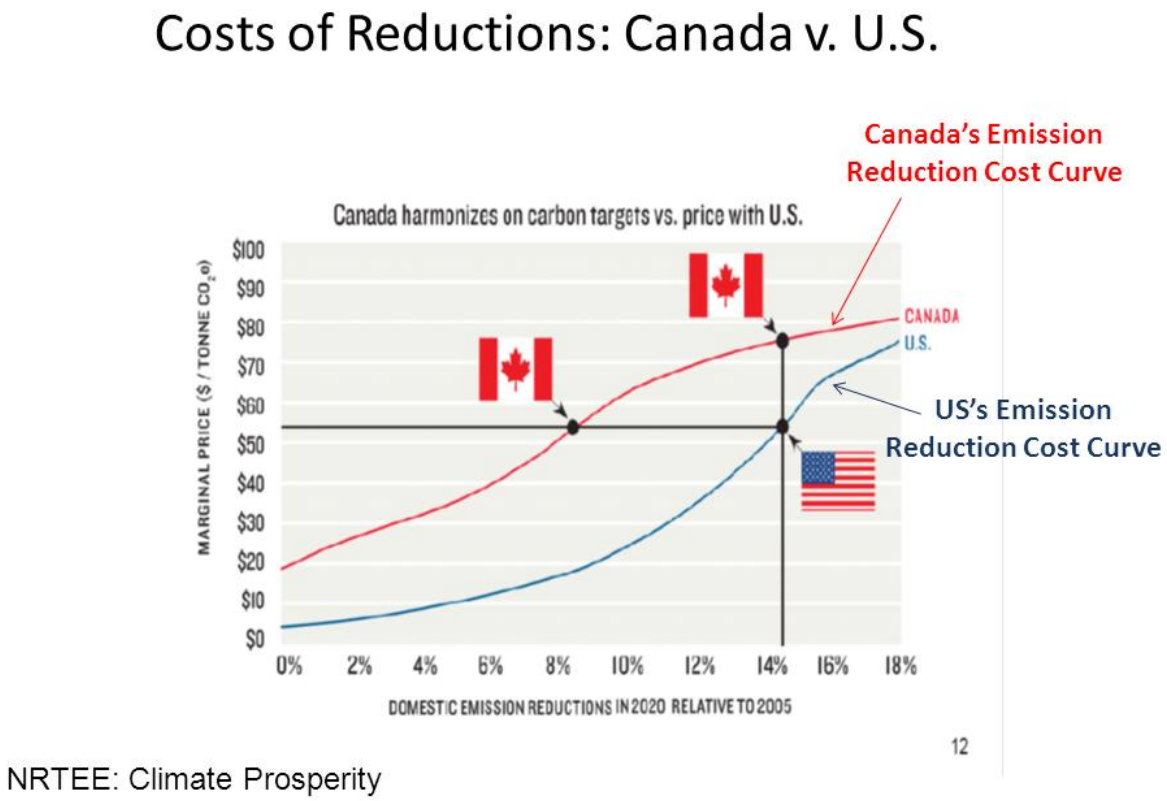
Instead of 100%, it might be something like 90% or 95% or 85%, depending on the facility involved. We get a much smaller charge per unit of production, much less impact on the supply from that sector, much less loss in output in Canada, but we still have the incentive for the industry at the carbon price to improve the way it does what it does. If the carbon charge was $20 a ton, the firm would have a $20 a ton incentive to emit less for every unit of production. But if the carbon standard is 90% of its total emissions, then it would only have a charge, or a net cost, of $2 a ton. The numbers aren't the same, but that is sort of what Alberta's is like. So that's the policy design on carbon pricing for emission-intensive, trade-exposed sectors. It's sort of the standard of good policy around the world now.

The EU has this policy for 2013. Australia had its own version, proposed in its cap and trade system. It's in the WCI in the form negotiated. It's in the Alberta system. It's just (that) everybody is trying to design a policy that allows a country to go ahead with carbon pricing without disadvantaging its industries significantly. By doing it this way, you can do that. That's where I'm going to end up.

But just before we do, let me draw on this graph from the National Roundtable on the Environment and the Economy in a report that came out recently. *[See Figure 19.]*. What should we be doing in Canada given that the US is not going to price carbon, certainly not at the federal level, and the state level is struggling a bit? Well one thing is that our government fixed on the same reduction target from 2005 as the US and it's 17%. The National Roundtable said "well we'll go get foreign credits for 3% of that and do 14% domestically," and they then modeled that and asked what it would cost. What they found from their models of the US and Canadian economies, and this is now measuring reduction -- to the right on Figure 19, with emissions going to the left -- to reduce the emissions by these percentages from the 2005 level, these curves show what the emission reduction cost curve are for Canada and the US. And what everybody already knew before this, because lots of work had been done ahead of time, is that Canada's cost curve is a lot higher than the US. The reason for that is that we have a lot of projected growth in our energy-intensive, trade-exposed sectors, and in particular, in the oil sands. The projected growth is a lot higher than in the US, as the US is not growing its energy-intensive, trade-exposed industries. And so the reduction from where you'd otherwise be in 2020 in Canada is a lot bigger than it is in the US. We have to go to much higher costs to get to the same level of reduction from 2005.

What the National Roundtable proposed, is that instead of fixating on doing and claiming that we're doing the same percentage reduction as the US is doing, we should switch over and say that if we price carbon, i.e. pursue emission reductions up to a common cost with the US, then we're making the same effort to reduce emissions. We have a different outcome because we have different circumstances, but we should harmonize on price with the US and argue that, 'hey, we're doing just as much on anything that you're doing'. If we reached a common policy or common price in both countries, that would put our industries on a more or less level playing field.

Figure 19


Costs of Reductions: Canada v. U.S.
Canada's Emission Reduction Cost Curve
Canada harmonizes on carbon targets vs. price with U.S.
MARGINAL PRICE ($ / TONNE CO_2e)
$100
$90
$80
$70
$60
$50
$40
$30
$20
$10
$0
0%
2%
4%
6%
8%
10%
12%
14%
16%
18%
DOMESTIC EMISSION REDUCTIONS IN 2020 RELATIVE TO 2005
CANADA
U.S.
US's Emission Reduction Cost Curve
12
NRTEE: Climate Prosperity

What should we do in the face of a US stalemate? *[See Figure 20.]* In my opinion, we should price carbon -- no surprise from what I've said so far. The question is why should we do this? The reason we should be doing this is that if you look at future scenarios of where the world may be, at least one such scenario is that the world will actually get serious about reducing greenhouse gases. It hasn't yet, despite all the rhetoric in Europe. There isn't anybody really incurring huge costs on any widespread basis to reduce greenhouse gas emissions. There are some things here and there that are impressive, but the world is not yet serious. Should the world get serious, we're going to be in a different environment from what we have seen lately and what we would otherwise see, if we get more of the same for the next decade or so.

The point of pricing carbon is to start sending a signal explicitly to households, industries and governments that carbon emissions are going to have a cost. They have a cost and it's going to escalate over time. The more serious the world gets and the sooner it gets serious, the sooner and higher the price will become and people need to take that into account in all of their decision-makings. They should be thinking forward. Once you have a price out there, they should be thinking forward, "Now what the heck is the price going to be out a few years?" When you buy your car you shouldn't only look at the price at the pump, you should think about what it's going to be in the future. Now it might be going down, but it could easily go up. So trying to build that consciousness into the decision-makers throughout the economy, who all know what their options are and where they could save money, is a good risk-management strategy for the significant probability that the world will get serious about climate change.

Figure 20

So what should we do?

Price carbon

Invest in low emission technology

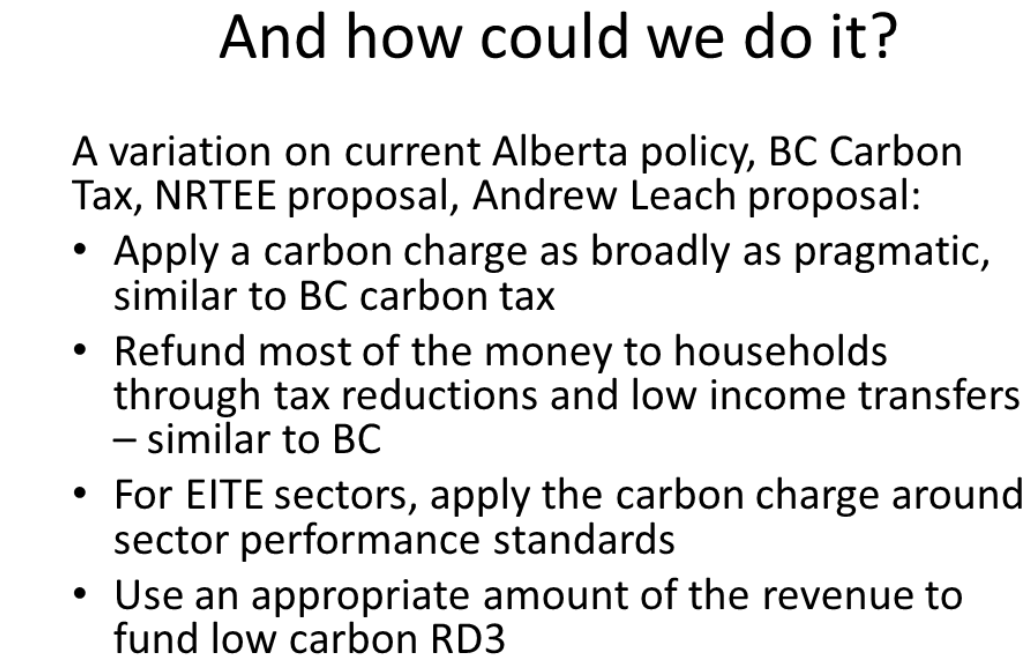
Why should we do it?

Risk Management

Help Canadian industry, households and governments prepare for a scenario in which the world gets serious about managing GHG emissions.

How should we do this? *[See Figure 21.]* Well, basically what I've outlined should be a variation on what we see now in Canada (in place and proposed). Alberta has its policy in place. It's somewhat like what I said about the performance standard only the standards are individual, facility-specific and it gets to be quite complex this way. BC put in a carbon tax (as I described) across all combustion emissions, covering about 80% of their emissions. The National Roundtable has made a proposal to bring in a performance standard based carbon-pricing system. (It's got some flaws in my opinion). And our colleague here, Andrew Leach, has made a proposal along the performance standard idea of calling Europe's bluff and saying; "We'll price our carbon at the same level as you, and set performance standards around which that carbon price will apply." So you start off, you apply it as broadly as pragmatic, similar to the BC tax. You refund most of the money from that to households through income tax cuts and low income transfers like BC did. The net effect on households of paying more for their gasoline and their natural gas is (and remember, the reduction in tax revenue is more or less zero) that some people will be losers and some will be winners. But the average person would be no worse off in terms of the cost to them of the policy and the offsetting tax cuts or transfers.

Figure 21



For trade-exposed sectors we apply the carbon charge around the performance standard that, unless you've got a real dog of a facility, it should be not far off your actual emissions. The cost to you should be a fraction of the carbon charge or carbon price, and we should siphon off an appropriate amount of revenue from this pricing scheme to fund low carbon emission technology. If we don't have low cost alternatives for people in 10 or 20 years, it's going to be very difficult to get lower income people around the world to shift from low cost emitting energy to higher cost non-emitting energy. It's critical that we advance and reduce the costs of non-emitting energy supply technology, energy-efficiency and other things, the other aspects of greenhouse gas emissions. Well with that, let me thank you for your attention and patience with my basic economic diagrams.