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PANEL: BALANCING ACTS - ENERGY INNOVATION IN A COMPLEX MARKET

Moderator: Mark Purdon

Speaker: David Hults

Speaker: Gitane De Silva

Speaker: Chris Zeigler

ASSOCIATE PROFESSOR PARRAN: Okay. Thank you, everybody. And I'm glad we had a moment to refresh yourselves and get back to it. At this point, we are going to change to another topic that is very important in our relationship and one that has seen a fair amount of changes, that is, climate policy. We have a diverse group here with some, hopefully, very interesting and different perspectives on the issue, and without further ado, I turn it over to Mark, Mark Purdon, of IQ Carbone.

PROFESSOR PURDON: (Greeting in French.) I will be certainly providing the session in English, but I guess I will just briefly introduce myself, but I want to really turn it over to our panelists who are coming from far and wide, as well as here in Ohio.

So my name is Mark Purdon. I represent IQ Carbone. It's the Quebec Carbone Institute. We're a new non-profit research institute. We're independent, but I'm also a visiting researcher at the University of Montreal, Department of Political Science, but we have with us a panel that we are going to be discussing energy and environment issues, especially linkages to climate change and climate policy. We have a quite excellent panel, and I'm just going to sort of maybe introduce them briefly, but they will probably be able to give a better introduction of themselves and their organizations. But we have Mr. David Hults, who has come from California. He represents the California Air Resources Board where he is assistant chief counsel. We also have, in the center, Mr. Chris Zeigler, who is the executive director of the American Petroleum Institute, which is based here in Ohio.

MR. ZEIGLER: We are the Ohio Division, yes.

PROFESSOR PURDON: Ohio Division. And finally, we have Gitane De Silva, the senior representative of the Province of Alberta to the United States. So we have West Coast, the Prairie Mountains, and sort of a local representative, and if need be, I can chime in on the Quebec-Eastern Canada front, but I'm going to let our panelists do the talking today. So without any further ado, I'll turn it over to David.

MR. HULTS: Okay. Thank you very much, Mark, and thank you all for coming here today, and I hope this will be an interesting dialogue on energy and

environmental issues with respect to the U.S.-Canada relationship by giving you a bit of context for my interests representing the California Air Resources Board and energy and environmental issues, especially as they relate to Canada.

The California Air Resources Board, or CARB, is the state agency in California that is charged with addressing and regulating air quality and climate change matters. CARB has a broad range of issues that it engages in as part of that clean air and climate umbrella. We have special authority under the U.S. Federal Clean Air Act to regulate, to promulgate standards for motor vehicles, and that's under Section 209 of the Clean Air Act. It allows for California to, if certain criteria are met, to avoid the preemption that might otherwise exist under the Federal Clean Air Act, and if California receives a waiver from the U.S. Environmental Protection Agency under that provision, then California can set independent standards, and other states in the country can choose to follow California's lead for the federal government, USEPA's lead. So that's one area. [It] is somewhat unique in environmental law where California acts as, in some ways, a separate national regulator of U.S. air quality issues, and that includes greenhouse gas regulations from motor vehicles, and that's one market CARB leads on.

Another that has been in the news of late is with respect to certain defeat devices for emissions in automobiles. We have led an investigation into Volkswagen's defeat devices along with the U.S. Environmental Protection Agency, and so that's something that has led to certain changes with respect to Volkswagen as an entity and with respect to their automobiles. These defeat devices allowed the vehicles to circumvent certain testing of air quality pollutants, and again, we were at the forefront of the investigation in discovering these devices that existed.

A third area that I point to is with respect to climate change, so California has the most ambitious climate targets in North America for reducing greenhouse gases. We have a mandate to reduce emissions, greenhouse gas emissions to 1990 levels by 2020 and to achieve a 40 percent reduction below 1990 levels by 2030. And we had a suite of measures that we implemented to achieve those goals. One of them is a cap-and-trade program, a market based program to reduce greenhouse gases, and as part of that cap-and-trade program, we have relationships with one Canadian province, Quebec, and we are pursuing another one with Ontario, and I will discuss that more a bit later.

So that's a brief sense of what CARB does. We have about 1,400 staff scattered across northern California and southern California, and we are quite busy. So that's what we do, and that provides some take on where I come from or where my agency comes from with respect to the topic of energy innovation. So I think there are different ways that you could look at that issue—energy security, energy costs. My agency's perspective, and my own perspective, is getting energy prices right to reflect the externalities of energy use and, in addition, spurring renewable sources of energy. So that's where, that's the context in which I view these issues.

So from that broader view, I want to just briefly touch on three topics. One, I want to give a flavor from where I stand on the relationship between the United

States and Canada with respect to energy and climate issues, and then I will drill down a little more into California's role and then kind of speak broadly to California and other subnational jurisdictions like Ontario and Quebec who are in a champion fight against climate change.

So the U.S.-Canada relationship, I noted in the dinner last night the topic of softwood lumber came up. I just note as an aside, prior to going to law school, I worked at the U.S. Department of Commerce, and that brought me into contact with the softwood lumber dispute, and that was my opportunity to see much of Canada. So I know that we have, there are a variety of issues that cross the plate of U.S.-Canadian relations, softwood lumber being one of them, but energy and climate as well. Also, one other note of biography, again before law school, I served for three-and-a-half years at the U.S. Department of State, and I worked in the Bureau of Western Hemisphere Affairs, and our relationship with Canada was paramount in a variety of engagements that we had in the western hemisphere. That was true ten years ago, and I think it is even more true today.

So, as an example of other relationships between the U.S. and Canada, I know a couple of matters where we have engaged in energy of late. So in March of 2016, the leaders of Canada and the United States met and there was a joint statement that was issued on cooperating on matters of climate, energy, and in the Arctic. And that had several issues. There was a commitment, a joint commitment by each country to reduce methane emissions by 40 to 45 percent from 2012 levels by the year 2025. There was also a commitment to coordinate in carrying out the Paris Agreement, which was agreed to in December of 2015, under the framework of the United Nations Framework [Convention] on Climate Change [(“UNFCCC”)], and Canada and the U.S. agreed to goals to coordinate, they agreed to goals to meet the ambitions of the Paris Agreement, and they agreed to coordinate on those goals in March of 2016. Fast forward to February of this year, and there was another joint statement issued between Canada and the United States, but this time the president of the United States, who now is Donald Trump. So there remained a commitment to cooperate on energy matters, and that included, that includes issues like the Keystone Pipeline and also some environmental matters such as the Great Lakes. The discussion of climate was absent from that statement as best I can tell.

So you know, in some respects, the contours of engagement between the federal governments appear to be changing on climate matters. I would note that this week's executive order from President Trump on matters relating to energy did not include any suggestion that the United States would withdraw from the Paris Agreement. It did lay out several steps to reconsider the United States' plan for reducing greenhouse gas emissions from existing power plants, which is called the Clean Power Plant. It also called for reconsidering standards for new power plants and for oil and gas facilities, and it also called for reopening leases on federal public land to coal use, and it pulled back on President Obama's Climate Action Plan. It called for the federal government not to consider the social costs of carbon in promulgating new rules and regulations—the social costs of carbon being when an agency issues rules and regulations. Those have

different costs and impacts, costs and benefits on the United States, and a full accounting of those costs and benefits might take into account the social costs that occur from greenhouse gas emissions. So the Trump Administration or President Trump in his executive order indicated that explicit consideration of social cost of carbon would be revised going forward. So there were a lot of takeaways from the executive order that we here in California are studying and the other entities are evaluating. Though, again, I note that as of now the United States' participation on the Paris Agreement has not changed. We'll see where these other steps lead.

A take away, though, that I would like to leave you with is California. You know, we operate in the federal system here in the United States as in Canada, and so California's own interests need not be the same as the U.S. federal government's in every respect. And you know, I think on these matters California will vigorously defend its interests in leading the fight against climate change and continuing to protect our air quality. I note that while some contours of the federal relationship between the United States and Canada on climate matters may have shifted between March of 2016 and February of 2017, that is, an omission of federal cooperation on climate matters, that is only a narrow sense of the ways in which Canada and the United States cooperate on environmental and climate matters. Specifically, we have our own cooperation with Canadian provinces, and that's principally through our cap-and-trade program to reduce greenhouse gas emissions.

So, brief primer on what that means. So cap-and-trade is a market-based mechanism to reduce greenhouse gas emissions, entities that emit more than a certain amount of greenhouse gas emissions, need allowances, instruments that are issued by the State of California—allowances or offsets, which is a related type of instrument to cover their emissions that affect California's greenhouse gas emissions profile. They can obtain those emissions in a variety of ways. They can obtain them through auctions that are held by the State of California four times a year. They can obtain them on the secondary market, or they, of course, reduce their own emissions, which lessens their need for compliance instruments to cover those emissions. So it is designed as a way to achieve greenhouse gas reductions in a cost effective way, and I think we have seen a lot of success with that program. We are well on our way to meeting the 2020 target of reducing greenhouse gas emissions to below, to 1990 levels, and we see cap-and-trade as being an important part of achieving our 2030 goals as well. Cap-and-trade has been in existence within the State of California since 2012.

Since 2014, we have been linked with the cap-and-trade program of Quebec's. So we now hold our auctions together on a quarterly basis, and linkage in our view provides a number of advantages. It expands the market for finding least cost mitigation opportunities to reduce greenhouse gases. It also can tip the balance in some cases to provide economies of scale where a jurisdiction might not otherwise have the incentive to reduce greenhouse gases through a cap-and-trade program on its own. As part of a linked framework, the economies of scale might exist where a jurisdiction is so incentivized in addition to our linkage with the Province of Quebec we are proposing, and that's part of a current slate of

regulatory amendments to link with the Province of Ontario. So this would be a trilateral linkage among three jurisdictions. We are proposing that the linkage begin January 1st of next year.

And I just note that cap-and-trade is just one of a suite of measures that we are pursuing over in California. We also have a low-carbon fuel standard designed to reduce the carbon intensity of fuels within the State of California. We have our motor vehicle standards, which, again, we have special authority to issue under the Federal Clean Air Act or arrange other measures, so we are committed, regardless of what happens at the federal level to continuing the fight to reduce climate change and being a global leader in that respect.

A final note that I would make is that, you know, in some ways, you might ask why California has this commitment to fighting climate change. California, itself, is the source of about one percent of emissions on a global scale. But California has a long history of taking the lead within the United States on environmental matters, and part, that's because of the special geography of California. We have air that collects in certain basins like in LA, [which] can lead to poor air quality. I think, in part, it is because we have a very beautiful state, and so we have a special interest in environmental matters.

So California has long been an environmental leader upon air quality issues, and we have been given special authority to regulate in that manner under the Federal Clean Air Act. In fact, the Federal Clean Air part under special authority envisions a model of cooperative federalism where states individually figure out what approaches best meet their local needs—and what we have done in implementing greenhouse gas.

A variety of greenhouse gas programs, including cap-and-trade, [are], in my view in the best spirit of this idea of cooperative federalism. It is something that has enabled California to act as a laboratory of innovation. It has enabled California to position itself as a leader in what we see will be an emerging industry of green-tailored jobs.

I think it is also in keeping with what we are seeing play out internationally. What's happening on climate change has parallels to what you see in international trade as well and a variety of other matters. I think that broadly there has been a move from multilateral institutions being the end of the story, whether that's the WTO in the context of trade or the UNFCCC in the context of climate change, these multilateral institutions making decisions at the nation's state level. That remains an important part of the story as we see through the Paris Agreement, but it's only a part of the story.

So in international trade, there has been a diffusion of trade agreements, including NAFTA, that take place outside the direct context of the WTO, and in the climate context, you see a range of subnational institutions and national institutions engaging in relationships to take the lead on climate change of their own accord. So some scholars refer to this as the development of "climate clubs," like-minded jurisdictions that take action together. I think what California—what you are seeing in California—is both fully within the spirit of this idea of cooperative federalism under the Federal Clean Air Act, and it is also

in keeping with this spirit of a diffusion of approaches to tackling global problems. I think we welcome, very much, our cooperation with Canadian partners in achieving these goals.

PROFESSOR PURDON: Thank you very much. I think we will pass to Chris. Would you be willing to speak now?

MR. ZEIGLER: Sure. I will give a little background on who I am, who I work for, and then a little context in terms of our relationship with Canada.

My name is Chris Zeigler. I'm the Executive Director of API Ohio or the American Petroleum Institute in Ohio. The API is the only national trade association that represents all aspects of the oil and natural gas industry. That would include the upstream, downstream, and midstream sectors. We have approximately 625 members nationally. In Ohio, I represent our members that have assets in the state. And there are around 30 that I actively work with, and they also represent the full spectrum here in Ohio with regard to upstream, downstream, and midstream: the upstream sector with the development of our shale resources in the state; and midstream with pipeline and processing elements and natural gas; and downstream with our refinery members in getting refined product to consumers.

The API traces its beginnings back to World War I when Congress came to the domestic well and natural gas industry in search of help for fueling the war effort. What they found at that time was that in trying to get resources where they needed to get them, a pipeline or infrastructure in one producing field, may not necessarily match up with pipe-liner infrastructure in other fields. So in 1924, API became the world's leading standard-developing organization for the oil and natural gas industry, and these are standards that provide certainty with regard to equipment and operations for our industry. You can find these standards among federal agencies like [the Environmental Protection Agency ("EPA")], Bureau of Land Management, [Occupational Safety and Health Administration ("OSHA")] as well as in state, state statutes and state regulations.

My primary responsibility as executive director here in Ohio is to engage in policy issues. At the state and local level, that may impact our members or the industry. Secondly, I reach out in terms of educational activities or engaging with groups such as today.

So in terms of our relationship or how we view our relationship with Canada, it's a very special relationship as Canada is the number one energy-trading partner with the U.S. This includes crude oil, refined products, natural gas, natural gas liquids, electricity, and coal. This bilateral relationship is the closest and most extensive in the world. Energy markets, both in Canada and the U.S., are characterized by free enterprise, meaning that the allowance of private investment in energy resources development is very important. Our emerging North American energy market, which also includes Mexico, is likely to provide increased opportunity for cross-border trade and greater energy independence and security for the continent. And while the value of the bilateral energy trade between Canada and the U.S. has changed a bit over recent years because of difference in commodity prices, the overall structure has remained the same.

So in terms of policy issues that we do engage in, on the federal side, we have a whole federal division that handles those issues, but we are seeing impacts here in the state with regard to some recent decisions impacting the Great Lakes. There was the executive order with regard or the approval of the Keystone Pipeline moving forward, at least, on the federal side. That is an issue that is still going to be dealt with in Nebraska. The state still has concerns about that. On the state side, we expect, in the next several weeks, there's going to be a robust debate regarding our overall energy policy here in Ohio with regard to where and how electricity is produced for the state. So these are important issues.

This is a relationship that is very valuable, the U.S.-Canadian relationship, but we believe that further development of our resources contributes to the overall health, economic health of both our countries.

PROFESSOR PURDON: Okay. Thank you very much. I'm just going to have sort of introductory remarks, and then we are going to have a bit of a panel discussion, and then we'll open it up to the floor.

So Gitane, if you would like to speak on the Alberta perspective.

MS. De SILVA: Okay. Well, thanks, Mark, and good afternoon everybody. So as Mark mentioned, my name is Gitane De Silva, and I have the honor and privilege of representing Alberta here in the United States.

I usually like to start with a bit of a description of Alberta. I hope that many of you have visited my fine province, but for those who haven't, we are located immediately north of Montana. We are about the size of Texas. We have about 4 million people. [We have] two great cities, Edmonton and Calgary, for hockey fans out there, and also [are] home to such great places as Banff, Lake Louise, and Jasper National Parks. And I would like to start with a little description of the parks because Alberta is known for its parks, but [they] mean much more to us than that, and we are very proud of our parks and working to protect them. Alberta also represents 11 percent of Canada's population, 16 percent of its GDP because what fuels our economy and, in fact, across much of Canada, is the energy economy. Canada is home to the third largest crude oil reserves in the world, and the overall majority of that is in Alberta, home to about 167 billion barrels of oil. We're very significant energy producers and produce around 3 million barrels a day, 23.5 million of that from the Oil Sands, and another half million from conventional oil.

We're very, very proud of our energy resources. We're not the only ones. As the Prime Minister has said, no country would sit on a resource of that magnitude and leave it in the ground, but we do take responsibility of stewarding that resource very, very seriously, and we are committed to producing our energy resources in the most responsible way possible.

So Alberta is typically a Conservative political jurisdiction. Some of you may be aware that in May of 2015 for the first time in our history we elected a left-of-center government. Rachel Notley, who is member of the [Alberta New] Democratic Party, she campaigned in taking action on climate change. So the new government was elected in May, and in November, Alberta announced its climate future plan, which is a pretty bold step for a province specifically, that

the citizens of Alberta were keen to see happen. So there are four elements to our climate plan, the first being a price on carbon. So, like California and Ontario, they are the same: cap-and-trade. Alberta has taken an approach similar to British Columbia, and we introduced an economy-wide price on carbon. It came in at CAD \$20.10 January 1st of this year and will rise to CAD \$30.10 in January 2018. When implemented, it will cover between 78 and 90 percent of our economy, which poses the broadest coverage in all of Canada. The revenue generated by this price on carbon is being reinvested. All of it stays in the province, which is a real key for the citizens of Alberta. So that money gets returned to Alberta and is directly in the form of tax credits or refund checks. So middle-income [] Albertans will have a refund check sent to them, and then the rest of that money is going for things to further encourage economic growth and economic education, so things like R&D regarding emissions, green infrastructure, and energy efficiency.

The second big part of our climate plan was focused on electricity. If you look at Alberta's fuel and gas emissions, about 17 percent of our emissions come from the electricity sector, and that's because just right now just over 40 percent of all the electricity generated in the province comes from coal. So the current government has made a decision that we are going to move away from that, and Alberta is aiming to achieve zero emissions from electricity generation by 2030. We're going to replace two-thirds of that coal electricity with natural gas and a third by renewables, and we are targeting to have 30 percent of our total electricity generation from renewables by 2030.

The third element and another really big one is, for the first time ever, we have a cap on emissions from the Oil Sands, so we applied a hundred megaton cap to that sector in our economy. It's a cap on emissions and not a cap on production. The goal really there is to continue to drive down the emissions, per barrel emissions, because we know we can grow our emissions without permit, but we do intend to continue to grow our economy and to do this in a way that continues to incentivize innovation and technological developments.

And the fourth element, as was mentioned earlier about work on methane, Alberta is committed and will remain committed to move forward to reduce our overall methane emissions by 25 percent by 2025, and we are in the process of introducing the regulations in the legislation with all that in place. I did also want to highlight Alberta has become increasingly part of the debate here in the United States. Our climate plan was not developed unilaterally by the government; it's quite unique. When the Premier announced the plan, she had up on stage with her major energy companies. She had NGOs, and she had operational leaders, and the average community in Alberta is very key to our success, and it is one that the government has worked very hard to improve this relationship with.

So Alberta has, in fact, adopted the UN Declaration on the Rights of Indigenous Peoples, and is really trying to move forward to bring our economy forward. And, obviously, we have had some challenges within the province due to the depressed price of commodities. But we're really working to make sure that all of Albertans benefits move forward in economic growth, and the indigenous communities are very, very key to that.

We do know in Alberta that climate change is real and caused by human activity. As I said before, we are very committed to developing a resource in the most responsible way possible, but we also know that a transition to a low-carbon economy is not going to happen overnight, and that fossil fuels will continue to play an important mix in the world's energy sources for the foreseeable future. So what we would like to do is become the supplier of choice.

Alberta is already very key here in the United States. As Chris mentioned, Canada is the number one supplier of energy to the U.S., and although Canada supplies 40 percent of the U.S. crude oil imports, Alberta alone is about 34 percent, so obviously our role here in the U.S. economy is key. So as we move forward and continue to grow the economy with energy being a pillar, we really believe that climate change is important, and we believe that taking action on climate change is helping to change the conversation.

In Canada in recent months, we have seen the approval of two pipelines by the federal government, the first being the transcontinental pipeline that would take increased oil exports from Alberta through to the Canadian West Coast there, and when the Prime Minister approved that pipeline, he specifically said that he would not have been able to do so with Alberta not taking those concrete actions to address the climate change. We also are very keen, it's important for us to be able to act in the Asian market, so that market diversification we believe is important. However, we continue to be keenly interested in maintaining the access that we have here in the United States to our number one customer and trading partner. So the federal government also approved Enbridge's Line 3 Replacement Program, which is an upgrade of a pipeline of about 760,000 barrels a day of oil from Alberta through Wisconsin, and that, obviously, will play a very key role in North American energy security. And then, of course, last week we saw the approval of the presidential permit for the Keystone Pipeline, which we, the province welcomed, and we will continue to watch as that pipeline and the process evolves in Nebraska and along the route.

I just also wanted to take advantage of the fact that while I have the microphone to echo some of the comments made earlier about the importance of trade, how vitally important it is for economies on both sides of the border. Oil producers spend millions of dollars every year in research and development to improve the environmental performance of their industry, and they also spend millions, in fact, billions of dollars on products and services. Here in the United States, there are 49 states that have companies that are supplied by the Oil Sands in Alberta, and so when we are talking about growing the economy, we're not just talking about growing it in Alberta for Albertans but, in fact, here in the United States as well. Alberta's trade with the U.S. last year was about \$19 billion dollars, and we are the main supplier into [Petroleum Administration for Defense District ("PADD") 2]. Here in the U.S., we've got our refinery here in Ohio, [which] actually has the oil—very key, important ties—and as we look, this looks to bring back manufacturing and to grow the economy. And a very important part of that is the access to secure, reliable, and affordable sources of

energy, which we're very happy to continue to provide. So thank you. I will leave it there.

PROFESSOR PURDON: Thank you very much. So are there any quick questions for any of the speakers directly, and then we'll maybe have a bit of a discussion here?

MINISTER JIM PETERSON: I'd very much like to hear discussion between David and Gitane briefly about why cap-and-trade is better than carbon tax and vice versa. I don't like to see this fraction. I think it would be better for all of us if we had one.

PROFESSOR PURDON: A combined carbon tax and cap-and-trade?

MINISTER JIM PETERSON: Well, either a single tax or a single cap-and-trade.

PROFESSOR PURDON: Well, do you want to address that?

MS. De SILVA: Sure. I mean, I can start. As you well know, we have a system in Canada of equalization payments. So the federal government collects all the taxes in Canada and redistributes that across the country to ensure a minimum level of social programs and public infrastructure across the country. Alberta is historically what is known as a "have province," which means we pay more into the federal government than we receive back in equalization payments.

Alberta is 11 percent of Canada's population but 37 percent of Canada's greenhouse gas emissions. If we were to enter into a cap-and-trade program, it just, frankly, wouldn't be politically feasible for the provinces. It would be seen as a transfer, a further transfer.

Albertans, I'm sure every state here in the U.S. has their own issues with the federal government, and Alberta is probably the most proud of its historical debates with our federal government. So anything that is seen in that regard as, you know, here in the U.S., you have the same issues about state jurisdiction and federal jurisdiction. We have the same issues in Canada, so it's just not something that is politically feasible in the province. It was very important as we developed our own Alberta solution climate change that the revenue generated by that climate program stayed in the province to be reinvested in the province and to ensure that our economy continues to grow and that people benefit from the revenue generated there. So that's why Alberta has chosen to go that route.

MR. HULTS: And from California's perspective, so there was an effort early in the Obama Administration for a federal level cap-and-trade program. That effort failed, or did not move forward, and whether such a proposal was likely to have any legs under the current administration—so I'm not sure that a national approach, whether it's a carbon tax or cap-and-trade, are likely in the United States, at least during the term of the current administration.

I'm aware that in Canada there is a different debate. There's a federal commitment to achieving certain reduction goals, and the Canadian federal government has been, my understanding is, has been in consultation with the provinces, allowing for different approaches to achieve those climate goals. Again, just note we are in a bit of a different context here in the United States.

As to the choice of cap-and-trade versus a carbon tax, they are both market-based solutions to achieving greenhouse gas reductions. They provide certainty

on different fronts. So a tax provides certainty for a pricing regime. Along the lines of a tax, it provides certainty with respect to the costs for the businesses that are paying those levies, but it does not provide certainty as to the environmental outcomes.

Cap-and-trade program, on the other hand, provides that certainty to achieve greenhouse gas reduction goals. But there can be uncertainty as to the amount of costs. California, to some degree, to a substantial degree mitigates the cost uncertainty because we have a hybrid cap-and-trade system with both a price floor, and then it's not a hard price ceiling, but we have a reserve through which covered entities, entities subject to the cap-and-trade regulation can buy allowances so instruments to cover their emissions at certain costs, specified costs.

So with cap-and-trade, there is, I think, a vibrant academic debate between, on the merits of cap-and-trade versus a carbon tax. I think that, you know, in my view, they are both highly cost effective approaches to achieving greenhouse gas reductions. There are important differences in certain respects with respect to the certainty of the reductions achieved, but I don't want to overstate those differences. I think there are ways of getting at the same problem and potentially under many sets of facts with equal cost efficiency.

The last point I would note, so both cap-and-trade and the carbon tax also generate revenues, and in California, the revenues, so we obtain revenues from the state auctions of allowances that occur on a quarterly basis, and those revenues are invested within the State of California. There's also a certain portion of proceeds from the auctions that go to rebate consumers. Those do not directly occur from the state sold allowances, but there's also a rebate program to account for, in part, the costs of a cap-and-trade program on consumers. And in addition, we're reinvesting proceeds in a range of products that would reduce greenhouse gases, including affordable housing, near transit centers, [to] increase public transit, [and] solar panels on low-income homes. So we have a variety of measures that are benefiting the state economically and helping to reducing emissions from those pursuits.

MR. ZEIGLER: If I may add . . .

PROFESSOR PURDON: Sure.

MR. ZEIGLER: in terms of market-based decisions, I would suggest that's happening now. With the move from coal-generated power generation to natural gas, we are seeing the lowest CO₂ emissions in nearly 30 years. Sixty percent of that's attributed to moving from previous generation resources to natural gas, and it has been projected that without any additional carbon reduction policies, CO₂ emissions will be 30 percent less by 2030 compared to 2005 levels. In Ohio, we are looking at over 9,000 megawatts of natural gas combined-cycle power plants coming on line, two later this year, so that will certainly contribute to less emissions being produced here in our state.

PROFESSOR PURDON: Thank you. Actually, that's, I think it would be good to kind of maybe build on that, the relationships between fossil fuel

consumption, fossil fuel production and climate objectives. I don't know if, Gitane, you wanted to comment further on that relationship at that point.

MS. De SILVA: Well, I mean, in Canada and in Alberta, what we're trying to do is delink GDP growth from emissions growth, right? So you can continue to grow your economy while driving down your emissions, so we're committed to that number in a number of ways, both on the production side, but also on the usage side, and that's what we are hoping that a price in carbon will do, is that it will change behavior. So we think that's very important, and we are also looking to diversify our energy economy. We've got a huge oil resource, but we also have an abundance of natural gas. We have on average 330 days of sunshine a year in Calgary, so we have a growing solar industry, and wind industry as well, so they are all important elements for us, as well as the provinces.

PROFESSOR PURDON: Dave, I don't know if you were, California is usually portrayed, in my investigations, it is portrayed as a re-coursing. I don't know if that is true; certainly, maybe in terms of fossil fuel reserves, but how do the linkages, the tradeoffs with renewal energy, importing power from other states, which is perhaps importing fossil fuel from Canada, is it true that California has a sort of regulation surrounding importation of Oil Sands oil? Is that something that falls into that bracket of trying to figure out the best, cleanest energy mix for California?

MR. HULTS: So we do regulate imported electricity as part of our suite of climate change measures. So you know, a few points. California does not have oil resources on the scale of Alberta's currently, but California, California was, in part, founded on gold, was, in part, founded on the entertainment industry, but it was also founded on oil. Oil in Southern California was very important in the state's early development, and it does remain a part of our economy today, to some extent in the [Los Angeles] basin but, particularly, in the Southern San Joaquin Valley, which is the southern, the Central Valley around Bakersfield, there remains something of an oil industry. And that's a part of our profile as a state.

Earlier this month, we passed regulations, CARB, to regulate emissions from oil and natural gas production facilities. They're viewed as the most aggressive set of regulations within the country, both at the federal level, or at the state level. So, you know, energy is a part of, you know, we're not strictly a state of energy consumers; we're also a state of energy producers, and we're committed as part of our stewardship of those resources to enacting regulations that address the adverse environmental impact of the facilities in a cost effective way.

PROFESSOR PURDON: Maybe one thing that I think comes up a lot in these discussions is reconciling the activities that are happening in jurisdictions like California, Alberta, Ohio, I would be a bit more interested to know what's happening in Ohio, but sort of the amplitude of what seems to be required of us at the international level in terms of what the scientists are suggesting we should do for climate change. And maybe I guess before opening up the floor, I just wanted to see if there are any comments on that relationship between energy and climate with regard to what some scientists are telling us are objectives, what we need to do to avoid dangerous climate change.

MS. De SILVA: Well, I think we need to be pragmatic in our approach, right? The reality is Alberta that energy is the cornerstone of our economy and you cannot effect a change so great that consequences don't come with you, right? So I think that it's important to give credit for the steps that have been taken. I mean, economy of a price on carbon, a cap on emissions from Oil Sand, coal, those are huge steps and huge changes for the province but things that are pragmatic and doable. Then, from there, you can continue to grow. I think it's also important, our hope is that Alberta's plan will change, like I said make us the supplier of choice. If you look at with whom Alberta competes, because you produce heavy oil, most other countries that produce that type of oil do not have the same environmental controls or even commitment to human rights in the box seat as Alberta. So we're looking to change behaviors. We're all looking to learn carbon economy. However, the reality is that fossil fuels will remain important not only in North America but in the world in the foreseeable future. And we would like to see people buy those fossil fuels from jurisdictions like Alberta and have the appropriate measures in place to minimize the environmental impact of extracting and using that resource.

ASSOCIATE PROFESSOR PARRAN: Mr. Zeigler?

MR. ZEIGLER: Well, I will suggest that US and Canada are already leading the way in terms of energy production with reduction in emissions. API takes climate change seriously. We would suggest that it requires research for solution of effective policies that would allow us to meet our energy needs while protecting the environment.

In Ohio, we have sort of framed this discussion sort of like a wonderful story. Back in 2015, West Virginia came out with a report that showed we have up to 782 trillion feet of natural gas within the Utica resources. That's the whole [of the] Utica resources from Ohio, West Virginia, Pennsylvania, and New York. 782 trillion cubic feet is fairly substantial when you, as comparison in 2015 the U.S. used 27 trillion cubic [feet]. So in the Utica region alone, we have enough resources to meet our energy demands for decades. And actually, in comparison to other resources in the U.S., such as the Marcellus, and other resources across the country, again, we have a wonderful opportunity here, and I would suggest that energy development between the U.S. and Canada, North America, we would include Mexico in that. We have an opportunity, again, to produce our energy resources at the same time being mindful of the environmental impact, whereas that may not necessarily be a priority in other countries across the world.

MR. HULTS: I will just briefly add on that I think our state's perspective on addressing climate matter, and particularly with respect to what we need to do to stave off the most dangerous effects of climate change, is we want to be leaders. We are forward leaning, so we have set this goal of reducing greenhouse gas emissions to 1990 levels by 2020, by 40 percent below 1990 levels. By 2030 both of those goals are caught by statute.

We also have an executive order from the Governor to reduce greenhouse gas emissions 80 percent below the 1990 levels by the year 2050, and those

goals, while they might just be pithy and so easy to remember, were also developed in accordance with the science on what means to be replicated across other jurisdictions in order to achieve the carbon emitting profile necessary to again stave off the most dangerous aspects of climate change.

We're also founding members under two coalitions, so that consists of, I think, more than a hundred subnational jurisdictions around the globe that are committed to taking the steps necessary to preventing the climate from warming more than two degrees Celsius, and so we're both taking a leadership role in that respect.

PROFESSOR PURDON: So maybe we can open it up to the floor for some additional questions.

PROFESSOR TELFER: Yes, my name is Thomas Telfer. I'm a professor at the University of Western Ontario. And the three speakers all had something in common. Chris said his organization takes climate change seriously. Gitane said climate change is really caused by human activity. And David referred to championing the fight against climate change. This morning Governor Blanchard referred to the danger of false narratives, and that one of the false narratives that has emerged is that climate change is a hoax, and I ask any of the panel members whether you see this false narrative as a threat to environmental regulation and whether the change of administration generally is a threat to the protection of the environment. Thank you.

MR. HULTS: I will take a first stab at it. So within the State of California, there is a broad commitment, I think it's fair to say bipartisan, a broad, although we actually have a super majority of Democrats in both houses and a Democratic Governor, but we're a pretty loose state as these things go in the state of California. But there is a broad commitment among the citizens of California to fighting climate change and I think a broad understanding that climate change is caused in principal by human impact. There is always, you know, there is further education to be done, there is further understanding. So I think that there are other notions out there, and those are notions that we have to continue to fight against as part of our broader effort to combat climate change.

In terms of the new administration at the federal level, we are committed to staunchly defending our interests in fighting climate change and protecting air quality, and somehow at the end of this, I am hopeful that we will have continued cooperation with the U.S. federal government. I think in other contexts it might be more conflictual. We're currently in litigation to protect the clean heartland, which was the U.S. federal government's centrifuge in reducing greenhouse gas emissions. Again, this past week's executive order from the current administration indicated, directed the USEPA Administrator to reconsider the appropriateness of the Clean Power Plan. So we will see where that goes.

But I guess I will just note that under U.S. administrative law a regulation that has gone through the rule making process cannot be undone overnight. There's a substantial notice and comment period required for issuing a regulation in the first place, and under the U.S. Supreme Court case of [Motor Vehicle Manufacturers Association of the United States, Inc. v. State Farm Mutual Automobile Insurance Co., 463 U.S. 29 (1983)], there's a parallel process that is

needed to undo a regulation. So we'll see where the U.S. federal government goes with that effort.

California will be an important part of those discussions in defending our interests and ensuring, you know, both that we can continue to regulate climate change aggressively at the state level, and that we believe the federal government should be taking those steps as well.

PROFESSOR PURDON: Mr. Zeigler?

MR. ZEIGLER: I reiterate, I haven't seen the Governor's comments, but I will reiterate that the API believes that climate change is a serious change, and the oil and gas industry has invested heavily in that to the tune of \$90 billion dollars between 2000 and 2014 on zero and low emission technology.

One note that I made, I think from ["Energy Information Administration ("EIA")], from 2013 to 2014, the oil and natural gas industry directly reduced emissions by the equivalent of 55.5 million metric tons of CO₂ equal to the carbon sequestration sequestered by 5.72 billion trees over ten years. So I certainly don't—well, let me say this: Our members support a robust regulatory program that allows us to operate, that protects the environment, [and] that protects the communities that we're operating in. What we do want is certainty. We want to be able to develop our resources with the certainty that we're complying with the regulations, are able to comply with the regulations, but in doing so, we are able to take advantage of what we have here in the U.S.

MS. De SILVA: As a recovering diplomat, I will not comment on the U.S. Administration, but I will say this: Alberta and Canada are continuing to move forward. We remain committed right after the election of this Administration. Both the Prime Minister and us in Alberta have said we remain committed to our Climate Change Action Plan and will continue to move forward. We think it's the right thing to do and creates economic opportunity as well. So we'll keep going down that path.

MR. HENDERLY: Hi. My name's Chris Henderly from the State Department in Washington. My question is for David, who I am happy to note, previously worked in the office where I now work, and the question is, just with regard to California's cap-and-trade, and the agreements that you've talked about with Quebec and potentially Ontario, what other nations or subnational jurisdictions might be considered for future cooperative agreements for California?

MR. HULTS: So to date, Ontario is the only one that we have proposed. I think that we are interested in developing relationships with other jurisdictions, both through the cap-and-trade program and other regulatory programs and other approaches that we might have. We have a state law, which sets certain criteria before we can link with another jurisdiction formally as part of the cap-and-trade regulation. And that law requires that the governor of the State of California make certain findings with respect to the stringency of the greenhouse gas laws in the linked partner jurisdictions, so they need to be at least equal stringency. The governor also needs to make findings with respect to the linked partner jurisdiction's ability to enforce its own laws effectively and to ensure that the

State of California's ability to enforce laws would not be compromised. Then there is a last finding with respect to potential liability that the State of California might face with respect to linkage.

So that's the legal framework, the legal gloss through which we operate in considering linkage partners. And, you know, beyond that, then it's certain policy decisions that we make, but again, I think California recognizes that we cannot solve climate change on our own. We're positioning ourselves. We believe in the critical importance of this issue, and we want to be a leader in addressing it, but we also want to bring other jurisdictions along in that fight to the extent we can. So if you have ideas, we're open to talking.

MR. HERMAN: Why aren't there more American jurisdictions, U.S. jurisdictions, engaged with California? It strikes one as a little bit unusual that Quebec and Ontario are participating with California, but no other U.S. states are. Is there any possibility of more engagement on the part of U.S. states, and if not, why not?

MR. HULTS: So we'll see. You know, it is a little harder for me to speculate on what's happening in the political economies of other U.S. states. There's a regional greenhouse gas initiative that several northeastern states have been engaged in for a number of years. Now, that is less comprehensive so that, and that is a cap-and-trade program, but it's less comprehensive in scope than California's cap-and-trade program. Our cap-and-trade is 85, I believe 85 percent of our economy and [Regional Greenhouse Gas Initiative ("RGGI")], the greenhouse gas initiative in the northeastern United States, is limited to the electricity sector. So there [are] some differences in scope.

Washington State recently announced a clean air ruling, I think it was within the past year, which has some cap-and-trade like components, but it is more of a cap and reduce program that has, my understanding is, there are fewer trading components than exist under the cap-and-trade program where, if an entity has an allowance, again, they can obtain that allowance from an auction or from a secondary market. They can freely trade those allowances with one another, so there are some differences with respect to Washington State. So there are other things happening that would be my point, and I don't mean what's happening in other states, and Washington State as an exhaustive list. In part, you know, this is going back to the point I made earlier about cooperative federalism in the United States.

We're a laboratory of different approaches, and we need to all follow the same script. You know, over time perhaps there will emerge some greater uniformity of approaches, and if there are other U.S. states that have developed comparable programs and would be interested in linking, my sense is that California would be very interested in pursuing it.

MR. DELOITTE: Hi. Brian Deloitte. Question for Mr. Hults: You didn't mention hydropower, and California has a very large number of urban dams. It also has hydropower generation, and the tallest one in the United States is, of course, Lake Oroville. Do you think Lake Oroville is a couple rainstorms [away] from tearing apart and killing a couple hundred thousand people, and do you think some of the other urban dams will just tear themselves up? Are they a

couple rainstorms away from maybe wiping out all the government employees in Sacramento? Isn't that part of climate change? We're talking about gases and vapors and warming, but flooding and tearing apart half century to century old dams, that's part of what we're looking at, isn't it?

MR. HULTS: So my agency is not the lead on these matters. They fall more squarely into the water agency's authority. Sacramento is about an hour outside of Oroville, and it's about an hour downstream of Oroville. So, as just a personal matter, I have followed, and just for humanitarian reasons, I have followed all the developments in Oroville with interest. We had a rainy winter, a rainy and snowy winter, and has put stress on our existing infrastructure and hydro, hydropower is a complicated set of environmental issues. It's a cleaner source of energy. You know, there are issues with respect to habitat from the construction of those dams, but they exist, and they have been a valuable source of water supply and energy source for us, and my understanding is that the agencies responsible with looking after those dams have been shoring up with an awareness that climate change may present new challenges for our infrastructure, first with respect to dams and other things going forward.

PROFESSOR PURDON: We only have about five minutes left. Are there any more questions? Otherwise, I will respond, too. Maybe the first question on cap-and-trade and carbon tax but, we have a question?

MR. SANDS: This is a small question. I wonder if you could talk a little bit about, since we are in Ohio, the auto industry and the transportation component of contributing to climate and how your jurisdictions or organizations are thinking about the car people and what they could be doing, because I know you are not in control of that but wanting any change in it?

MR. ZEIGLER: I will go. The emissions, vehicle emissions have decreased because we're producing cleaner fuels. That certainly has been a focus to not only comply with Ohio law but also comply with California emissions. So it certainly had an impact on our area here as well.

MR. HULTS: Yeah. Again, I'm not sure I have much to add beyond what I said in my initial remarks, and California has this authority under the Clean Air Act to issue motor vehicle standards, and that's both with respect to criteria air pollutants outside of greenhouse gases and then greenhouse gases as well. With respect to light-duty vehicles of passenger cars, there is an existing framework that provides for a one national program so that the USEPA standards and the California standards are aligned through model year 2022.

In California, we recently completed a mid-term review of our standards to see whether our approach is appropriate looking out to 2025, and we believe that it is, and that we need to continue our approach in reducing greenhouse gas emissions from those vehicles. But the federal government may be considering another approach. They have, so the Obama Administration completed its own mid-term review just before Obama left office, and the Trump Administration has indicated that it may want to revisit that matter. So we will see where that goes.

MS. De SILVA: I would just add you haven't seen enough of the same number of electric vehicles be adopted, in part, because of the distances between our population centers but also, in part, because of the percentage of our electricity that comes from coal right now. So you wouldn't see the same environmental benefits from that shift, but other jurisdictions in Canada are making great strides, and Quebec is pushing very hard to electrify, they are working very hard to improve their transportation system. There's a company in Manitoba that's working to electrify buses, so that's definitely part of that conversation, part of the equation. And I think that we'll see where that goes in Alberta once we make these other steps, and then last the industry can resolve the issues around the distance those vehicles can travel.

PROFESSOR PURDON: I would say Quebec knows it has sort of a unique position to have the electricity already. It's just the infrastructure to get it into play, so that's something that needs to be worked on. I just sort of want to go through a concluding session to get at this issue of the policy instruments at play, and I think what's interesting is, we look across the jurisdictions here, we actually have a large mix of policy instruments at play. We have California has a hybrid regime, has a cap-and-trade system with price controls on it, but actually my read of the scope of the plan is the majority of the emission reductions are going to be achieved through some of these regulations or complementary policies, the low carbon fuel standard. In Alberta, really what's been developed over the past two years is not just a carbon price; there are regulations, there are other things going on, and then we have, well, the natural gas boom. Nobody saw that in government, not in the planning area, and that sort of is a test of what markets can do.

So I just thought maybe we could kind of bring it back to the question of the policy instruments, and maybe are we seeing that in reality what happens is, there is going to be a mix of stuff going on, and that's going to, we're not really sure how it is going to play out. I don't know if that resonates with how you're seeing things in your respective areas. Do you have any final words on that?

MR. HULTS: Yeah. So just very briefly, I think you're absolutely right, Mark, the cap-and-trade program certainly received a lot of attention, and with respect to the U.S.-Canada relationship, it is far from our only initiative. In California, it means our portfolio-based approach to addressing climate matters is appropriate. It gets at different aspects of the problem while still paying heed to issues of cost effectiveness and technological feasibility, and I think it allows, you know, there's the innovation among states, among different jurisdictions but even within states as well, so that's something we're trying very much to pursue.

MR. ZEIGLER: I will add that in terms of Ohio, we are just now in the beginning stages of developing our resources. So there have been a number of regulatory policies that have been put in place with regard to production, with the focus in terms of the impact on the environment. I would say that air quality in Ohio generally has improved to the point that next week, I believe, the USEPA is going to file in the Federal Register that there will be no RVP requirements, Reid Vapor Pressure, requirements in Cincinnati and the Dayton area. So that's as a result of improving air quality, which we believe is a benefit to us. But we'll

continue to work, again allowing us to develop our energy resources while at the same time protecting communities and the environment.

MS. De SILVA: I think it's absolutely going to be a partnership. Governments can set the policy framework, but we need to achieve targets and goals and partnership with industry. You'll see in some instances government set sort of a high watermark, and then it's up to industry to innovate, to achieve that, and other times the innovation comes out of industry, and the government is playing catch-up. You know, we in Alberta are always free to create, to achieve, so we like for the government to do certain things, but we also like for industry and our basic entrepreneurs to help us achieve our common goals as well. So I think it's going to be a partnership going forward.

PROFESSOR PURDON: Thank you very much. I don't know if we are out of time, or do we have another hour-and-a-half?

ASSOCIATE PROFESSOR PARRAN: I wish we had more time for all of our panels to last longer, but we're out of time. If we could take just a five-minute break, stretch your legs, use the facilities, and we will reconvene for our final panel of the day. You have all been very good to be here today, so thank you very much. (Applause.) (Recess had.)