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WEBINAR

CAN STATE-LEVEL CARBON PRICING HELP
ACHIEVE NATIONAL CLIMATE GOALS?

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P R O C E E D I N G S

MR. PATNAIK: Hello and welcome to this event of state-level carbon pricing. My name is Sanjay Patnaik. I'm the director of the Center on Regulation and Markets at Brookings. This event is joined with the Brookings' Urban Tax Policy Center, with my colleague, Thornton Matheson who will lead the panel discussion later on.

Carbon pricing is the most effective and most efficient way to achieve greenhouse gas emission reductions and it has been proliferating all over the world. However, in the United States we are still lacking a federal carbon price, but we have seen some movement at the state level especially in California and RGGI in the northeast.

And so, today's discussion we really focus on how state level carbon pricing can potentially help achieve national climate goals. And whether this is a viable way to achieve a carbon price that is high enough so that we can make a transition to a low carbon economy.

It is a real pleasure today to introduce multiple experts that will share their insights. Starting with our keynote address, Rajinder Sahota who is the deputy executive officer of the California Air Resources Board. And then the expert panel moderated by my colleague, Thornton Matheson with Barry Rabe, Ian Parry and Jennifer Winter. Thornton will talk in more detail about their backgrounds.

So without further ado, I would like to hand it over the Rajinder. Thank you so much for sharing your insights today, for being here. Please take it away.

MS. SAHOTA: Thank you so much for the invitation to join you today. I'm very excited to be able to talk about California's experience with carbon pricing and then maybe share a few thoughts on how it can fit into a federal effort to reduce GHG.

I do have a few slides that I'm going to share to help with the conversation. But yeah, very excited to be here and also looking for the discussion with the panelists afterwards. I'm hoping that everyone can see my slides. Unless I hear otherwise, I will keep going.

MR. PATNAIK: Yeah, you're fine.

MS. SAHOTA: So great. Thank you. So carbon pricing can take many forms. And we have had this question in California multiple times. And twice our legislature has chosen a carbon market over a straight carbon tax.

And so, I think it's important to remember that there's many ways to introduce carbon pricing into the economy. Different points at which you can introduce it, but then there are also some key differences when we think about our market versus a carbon tax.

One of the issues that we grappled with was where do you set a carbon tax? What's the value? And in an ETS program, in an emission trading system, you let the market find the lowest cost reductions and price it. And then let the market function to find the lowest reductions thereafter. The government isn't involved in setting that tax value.

There's also concerns about linkage. No matter what that carbon price is there needs to be a consideration of will it now or some entity or some regulated companies to move their production on part of the state where, sure, it looks like you've reduced emissions in the state, but you've just shifted them off of your books elsewhere. Or maybe increased them to the atmosphere because of different production requirements.

Another question that we had when we were looking at this issue was how do you stay harmonized for linkage if you have carbon tax or federal legislation. Once something is in legislation, it becomes a political discussion and less of a technical or market driven discussion. And so, there were concerns in California really about how do you maintain some of the linkages that we have? Like we had at that time with Ontario and with Quebec? We still have the one with Quebec. Ontario went their own way.

But these are the kinds of questions that we grappled with back in 2006, 2007 when we began the program. And then we grappled with them all over again in 2016, and 2017 when we thought about what does carbon pricing look like for this decade, 2021 through 2030?

The debate will continue. I've never seen anyone conform resolution on this. What I know is that here in California, the debate has happened twice under multiple governors, different bodies of the legislature and both times they settled on a carbon market for that carbon pricing.

So I think it's important for me to share what we have seen in California. Our targets were set for 2020, which was to return to 1990 levels. We did that in 2016. And so, there's been a good track record of being able to reduce emissions while the population and GDP for the state has grown. And we're very proud of the fact that we hit the emission's target for 2020 in 2016.

Our next set of targets is a 40 percent reduction by 2030. And we have a plan that lays out how to get there including carbon pricing that was adopted by our board in 2017.

In terms of a coverage, this pie chart shows all of the sources that are in our GHG inventory. It's the energy industrial sectors that we have. And 80 percent of these emissions are covered by the cap-and-trade program in California. I know that there are there are programs that cover some sectors and not others. But we felt strongly that if any sector was not included, it was getting a pass in terms of facing the same externality of carbon pricing that the covered sectors would have.

So we felt it was very important for us to include transportation, which is the largest sector of GHGs and harmful air pollution in California. And our industrial sources, not just the electricity sector, which we know have been the case in other programs, but we went for all of it. We did phase in transportation but from the very beginning we were clear transportation had to be part of the program and had to face the same carbon liability as the other sectors.

So carbon markets, the carbon pricing is not the only way that we get a reduction. We have multiple programs. You can see that we have everything from energy efficiency, deployment and standards for clean vehicles. Goods movement for freight.

Renewable electricity procurement requirements. A short climate, pollutant requirements for landfills and diary. And then also, our low carbon fuel standard program which is a market-based program in a sense that there's trading that happens with a credit there.

And then the cap-and-trade program, which is all of these sectors except for fugitives because the other important thing about carbon pricing for us was that we had the ability to effortless quantify with a certain amount of reasonable uncertainty those emissions before we put a price on those emissions. And so, to the extent that we could quantify with reasonable assurance and we wanted to have them in the market, we included them.

We did not leave any sector out because again we wanted to make sure that as many emissions as possible face that carbon cost so that incentive would be there on all points across the economy to reduce those emissions.

The program faced some challenges at the beginning. We had an early lawsuit from the program about how the options weren't a legal tax. We do some allowances at four quarterly options. We had other lawsuits filed the day before the first auction. And then we also had concerns on the offset component of the program which is a very small part of the program, offsets the count for four percent of the overall program.

But a variety of stakeholders both on the left and right sued us. We weathered those lawsuits successfully. There was a lot of consternation by the regulated entities and it even -- remember that the legislature that AAA carbon price would cause disruptions. But none of that came to bear with the experiences that we had in California. And I think that's one of the ways that state level carbon pricing is helpful is that it's a testing ground. It can be a testing ground for any federal design of program should we get to that point.

So that was in 2010. Now, in 2017, we have a different story. Our legislature passed a target of at least 40 percent for the 1990 levels by 2030. We had year after year, wildfires. We were exiting a period of draught. It looks like we're entering another period of draught or in the middle of another one. And climate change was on the

minds of elected officials and the public.

We had some of the most devastating wildfire and loss of life that was in the history of the state around the same time period. We did a scoping plan that showed the trade-offs of using a carbon pipe through a cap-and-trade program versus a carbon tax, prescriptive regulations. And industry recognized this time that the state was far in commitment. The political commitment to keep pushing on reducing greenhouse gases in the state.

And so, based on the analyses that we did, this time instead of suing us, they rallied behind the cap-and-trade program for all of the benefits that they saw. We have had the program money for about five years at this point. We had almost 100 percent compliance. There were no devastating impacts to the energy supply or other disruptions that could be attributed to the program.

And in the face of direct regulations or have a higher carbon tax, everybody rallied around the cap-and-trade program. And that resulted in a super majority vote, over two-thirds to make sure that there was a cap-and-trade program on a roll for it from 2021 to 2030.

So the political support is very key in all of this. It's not just about the regulated entities. There has to be sustained commitment to make sure that not only do regulated entities understand that there's an unwavering commitment but then they engage in a meaningful way to try and figure out what is the right path forward on carbon pricing?

I do want to touch on climate mitigation and racial equity. We completely agree that any of the actions that we take must protect public health and address opportunity gaps. We have many communities and residents that live in heavily burdened regions of the state due to policies like redlining. And we have ensured that they are the first to benefit from climate action.

Our legislature has passed a significant amount of statutory direction related to reinvesting money from the cap-and-trade program into these communities to help benefit

those communities and elevated some of those health concerns for air pollution and other opportunity gaps. And over 50 percent of the 19 billion to date is being reinvested to provide those benefits.

But the program has not been without its controversy even on this side. There were concerns that the cap-and-trade program would exacerbate or actually lead to harm in some of these communities. And a recent report by the Office of Health and Hazardous Substances found that that is not the case. While the air quality and air pollution gaps still exist in these communities. The gaps are getting smaller. So there is no evidence that the California cap-and-trade program is harming communities or is somehow exacerbating the existing disparities that exists.

And I think that's important because when it comes to carbon pricing, we know that the environmental advocates in California prefer a carbon tax. And in conversations with academics, what I've been to glean is that the inherent structure of markets is believed to be what has caused the existing disparities to exist. And so, markets are just seen as something that is to be distrusted.

But a tax is more accessible and straightforward and that is more trusted in terms of will there be a direct fee on a company? Will they have to manage it? But again, if a company can buy an allowance or pay for the emission, the behavior under either of these carbon pricings schemes is the same. You're not limited. You just have to be willing to acquire the allowances or offsets or be willing to pay for that per ton under a carbon tax.

But again, the whole construct of carbon pricing has been debated, continues to be debated. Still not fully accepted by our environmentalist advocates in the (inaudible) but there is no data that supports that we have actually harmed or exacerbated those disparities.

Cap-and-trade, we have allowance budgets that are issued each year. And I think it is important for me to hit a couple of points here. You can see that we take some allowances out each year for our price containment reserve. The yellow bar is what we give

to our industry to minimize for linkage.

So they get some amount of allowances to make sure that they are not -- they see competitive disruptions with production outside the state or internally to where they would need to leave the state or shut down operations in the state. And that, phases down to less than 50 percent over this decade. We do give some allowances to our utilities to help to mitigate the (inaudible) impacts for energy.

And everything in the blue is what is left over for the state. So we are last in the loading order here. And that what we auction as a state is what generates the revenues that we reinvest in low carbon transportation in our communities and other priorities of the legislature and the administration.

But minimizing linkage is something that's in our statutes. And the way that we have done it in the cap-and-trade program is due to the free allocation of allowances which is very similar to other market programs that we've seen out there.

Prices are important to consider. We do have a floor in the California program. At the auctions, it goes up by five percent plus inflation each year so there is an expectation that prices will continue to increase. We saw that we were around the floor for the most history of the program. What we see, this big dip here in February 2020 is really the shelter in place.

And what we saw was some of the uncertainty and disruption in the other commodities markets manifest itself in our cap-and-trade program and in our market. And so, you can see secondary market prices fall below the floor. And we have a self-reckoning mechanism that removes allowances if we don't have demand just as we have mechanism if prices get too high.

But in the recent 12 months or so, we've seen record high prices in the program. There is a recognition that the program doubles in stringency in the decade. There is a recognition that there is going to be continued pushing on greenhouse gas reductions in the state. There's been multiple pieces of legislation that have already been

introduced about post-2030 targets. And so, there is an opportunity for entities to hedge. The opportunity doesn't always present itself in something like a carbon tax, at least what we've seen.

But even with the hedging opportunity there are position limits so that nobody can exert market power or collectivity allowances to then not have to make reductions later when the prices get significantly higher in the program.

Federal interaction. So one of the questions that I wanted to talk about was how does a state level program get integrated into a federal policy? We saw a great example of that in a clean power plan. That plan allowed for states with carbon pricing to continue as long as they could demonstrate that their reductions for the electricity sector would be commensurate or exceed what was expected in the federal legislation.

And I think that acknowledgement and that integration of early action is really important. So that early actors like California or again Washington that all have kind of legislation and programs now taking off in that state. We've seen what happens at the federal level when you change administrations, you get inconsistent market signals.

We saw that with the waiver with the automakers and vehicle standards. But when you have states that have this longstanding commitment and aren't subject to the amount of volatility or swinging that you can see at a national level, it's really important to make sure that not only do those states get to move forward with their priorities, but that they are recognized for those in any federal action.

A very relevant example is the Canadian carbon tax. When the federal government in Canada came out with a tax there, they very much acknowledged the role that states like Quebec had taken to have a carbon market and allow for the inclusion of that recognition of those reductions into their program. And so, again they're all models that would continue to support early action by states.

And then that action could be leverage for meeting any national goals instead of this -- there's a mutual beneficial relationship in the federal government allowing

states to move forward. And then once they're ready to move on federal action being able to take advantage of those reductions, those experiences on programs. And some of that knowledge base and enacting any federal level policies that would come to fruition.

One of the questions that we have is if there were to be a federal tax or federal or carbon market of some kind, what would that mean to the revenues and priorities for the states? I talked earlier about how California has prioritized the reinvestment of our funds back into communities, low carbon transportation, some of our other programs.

If a federal program that comes into force and it supersedes or doesn't recognize the state program. Those revenues are no longer under our control. Those revenues are going to the federal government for appropriations to that process. And so, you know, of course we would want to have a conversation and think about how that impacts some of the priorities that we have already established in the state. What it means for some of those investments that we think are critical. Not just to meet our climate goals, but also to meet our air quality goals.

And then, you know, in the absence of federal action right now, there is no federal carbon pricing program. But there are other ways that the federal government is supporting the state and that we can support the federal government in its NDC target. The federal government has tax credits and incentives for clean energy, carbon dioxide removal. You know, things like the 45C credit and incentives through the infrastructure budget.

And those can be leveraged by companies that are working under regulation commissions in states like California. And to the extent that we're sending the signal, you have a carbon liability. And there's a federal signal. There's a tax break for acting on some of these. Those amplify each other and help that transition for the private sector into a more sustainable energy system or sustainable processing system more than either one of us could do directly with just tax credits or with a carbon market and a carbon pricing program.

So we could either be both complementary. Of course, there's always

details in how the interaction happens. I cited the funding issues that always comes up the most. But all of the action that happens at the states that get to move ahead early absolutely helps in any targets that are set up at the federal level. I think the one thing that we always caution is the action of the states should not be solely relied on and that the federal level action on carbon pricing in particular should consider how to get at some of the reductions that are very low hanging fruit in some of the states that have not been early to act.

And how do you design policies to recognize early actors versus states that are not early actors? Because at the end of the day as a state regulator, I'm already thinking about the low hanging fruit being gone in California, but recognizing there's a lot of low hanging fruit and cheap reduction of opportunities across the rest of the U.S.

And so, these are just a few of the things that I wanted to highlight in this discussion as part of my intervention here. But really excited to see the topic come up. Maybe it's coming up because there's rumors that something would happen at the federal level. I know that we've engaged on some of these discussions with our colleagues at the federal level last year and earlier this year.

But I think how you might end up, there is early action states that do have experience. And any federal action needs to be considered in the context of state priorities is always a good conversation to have. And with that I'm going to end my presentation and hand it back to Sanjay. Thank you.

MR. PATNAIK: Great. Thank you so much. It was super interesting and I really appreciate your insights. If you don't mind turning off the presentation, we can do a little Q&A here.

And I was surprised. It's actually really great that you brought so much support in the cap-and-trade. And I feel it is a good sign if both the left and the right sues you that means you're doing something right because both sides have (inaudible).

So a couple of questions I had. One is how does California handle

collaborations with other carbon markets around the world? Like do you exchange information, ideas, experiences, for instance, with the Europeans which have had a carbon market since 2005? Or do you provide assistance to other countries in terms of the expertise that you have built up?

MS. SAHOTA: Yeah. That's a great question because (inaudible) to our landmark legislation actually directs us to collaborate with other regions and governments. And that's really in recognition that greenhouse gases aren't a local pollutant, they're a global pollutant.

And if California is the only one reducing emissions, we'll still feel the impact of greenhouse gases and climate change if nobody else does it. And so, we have a long history of MOUs and bilateral agreements of other regions. With the EUETS folks, the commission, we've had a longstanding agreement with them for information sharing for several years. We also go to forums where the -- it's called the Florence Dialogue or the EU where they bring in other countries and other representatives. And we all share our experiences.

And what we realize is that as the programs mature, we all seem to see the same issues coming up, the same political concerns, the same technical design concerns. You know, one of the things I highlighted was the price going below the floor in early 2020 because of the pandemic.

Well, that happened to all of the markets. And when we regrouped that summer, we all came back together and said, yes, our prices are rebounding even though we don't have the exact same features in our program. All of the prices rebounded in similar ways. And so, it's interesting to know that it's more about the concepts sometimes that you're thinking about the concepts than the design of these programs.

And sometimes less about are you aligned on the specific regulatory tests or the specific mechanism. It's the outcomes that really matter. Not really the specific details of the program design.

Now, where they really matter for program design for California is on linkage such as with Quebec and with Ontario. And because we have full fundability of allowances and offsets, we needed to make sure we have the same market rules for all the participants across the program because action in one program had the ability to influence the efficiency or efficacy of the other program.

And so, the kinds of bilateral linkages that we have really do require a very closely coordinated type of interaction. But in terms of information sharing, we've been doing that for over a decade with many, many countries.

MR. PATNAIK: That's really interesting and great to hear.

And can you talk a little bit about how is the market dynamics on the carbon market in California? Like how much trading volume is there?

Are there liquid markets? Do companies really trade a lot? Or do they mostly get the permits at the auction and then be done with it?

MS. SAHOTA: That's quite a bit of liquidity. And I think one of the telling points is when we saw the secondary market start to emerge.

There is this point as a regulator on a carbon market. And I've had this experience in conversations with some of my colleagues in other programs. When you start your program, there's this anxiety whether or not it's going to be seen and taken seriously as a market program by the private sector or the people that will ultimately have to comply.

And we saw the creation of the secondary market products starting to emerge and then the secondary market becomes active. It was a relief in a sense that not only did we project the right political certainty, but the design of the program favored that these products should emerge and that these secondary market trades should be happening.

And there is significant liquidity in the program. We report out on that every year from our primary database, but also secondary entity. Our third parties report on it constantly that you can find out from those bulletins. I think the key measure for us is there's

been 100 percent compliance. We've not seen price gouging or market control in the program. And the prices that we've seen in the secondary market align with the prices that we've seen in the primary market at our auctions.

And so, those are the kinds of tests that we think about in terms of is the market functioning efficient, effectively, transparently for price discovery?

MR. PATNAIK: That's actually super interesting. Which bring me to my next question, which is the price, right?

As you mentioned, California has a price floor which the Europeans didn't have. And in Europe we saw big crash in around 2008 of prices. But the price in California still has been relatively low throughout most of the period or like about $10 to $12 per ton. And now, up to almost $28.

Has it actually been high enough to induce any changes at companies and emission reductions? Where do you see the prices going? And do you think that that prices are -- how to put it best? Like high enough to actually have an impact?

MS. SAHOTA: So I love this question because it lets me talk about how the carbon pricing program is not the only tool in our toolkit.

We have direct regulations on our fuel, technology, electricity sector. All the sectors under the cap-and-trade program. And what we did is we looked at a per ton analysis of those policies. They're sitting at $250 a ton in some of those programs or $200 a ton.

So the cap-and-trade price that we see is not the true price of carbon in the California economy. It has to be stacked on the other prices of the other programs in those sectors. And so, if we didn't have programs like the low carbon fuel standard, the renewable portfolio standard for electricity and we only relied on our cap-and-trade program, prices would need to be much higher in those programs, absolutely.

But because we have all of those other programs. They are, in fact, driving a lot of the reduction and we are picking up all the low-cost reductions, process efficiencies,

et cetera, underneath that. And that's been the case coming into 2021. Now, even before in 2021 as the prices get higher and the cap is much more steeper in its decline. We fully expect the program to perform much differently than it did in the last decade.

We know that carbon pricing has been integrated into dispatch models for our energy. So when we need electricity to serve our air conditioners in the afternoon, the company needs to be dispatched. It's going to be renewable power over gas power because gas power carries in the modeling a carbon price now.

And so, there are decisions that are being incorporated into models and into other policies from the cap-and-trade program. I think the past decade is not indicative of this decade just because there's been structural changes made to the program.

The only other point, I'd make is that, you know, the price in a carbon tax is hard to set because you don't know where to set it and there's always going to be argument. And the price in the cap-and-trade program is unique in that it lets the market find the lowest cost and lets the market set that price.

And we've seen instances where prices in other carbon taxes in other regions have been suspended or held constant and not allowed to increase because of political concerns. In the California cap-and-trade program because it's run through enabling legislation that doesn't have that detail. It's less likely that we would see legislative action or direction to suspend or do something with the program just because we've added features on a floor and a price ceiling. And so that range is now considered, you know, some ways it's an expected range for prices.

And in a carbon tax, it's one value and that one-point estimate can be subject to what's going on in the energy space or politically at that given moment.

MR. PATNAIK: That's really super interesting especially the complementary between your other measures. And that brings me to my last question.

What has the response of companies been? You mentioned that actually towards the end that most companies are supporting the cap-and-trade now. So what's kind

of like their stance been? And have you seen specific examples how companies have started reducing emissions in response to some of those policies?

MS. SAHOTA: Yes, absolutely. So we have carbon pricing that permeates through electricity and through natural gas prices for our industrial sector.

And so, we have seen some of our smaller industrial sector companies looking at alternative technologies to gas combustion for boilers on site. They are signing up for federal and state programs to look at solar thermal technology to put on site instead of using natural gas.

We've also seen some of the large companies developing their own carbon policies and carbon plans for how they're going to reduce. And some companies are even voluntarily retiring offset for their own corporate sustainability targets.

And so, there's been this awakening almost in some of the regulated entities in California that carbon pricing, climate change mitigation is here to stay. And so, they're being very creative in how they can do that.

I think one of the things that we really noticed in the last probably year, year and a half, is the interest in new and emerging technologies and a shift in the fossil industry to not just fighting us but also thinking about how do we think about the cap-and-trade program, carbon pricing and the signal it sends to actually make an argument within our own corporate structure that we need to think about divesting in renewable energy.

And so, we've heard those conversations. We've got analyses from companies that say, the signal that you're sending in terms of the carbon price, the signal you're sending in terms of the energy procurement for your utilities is a business opportunity for us now. And this is how we think we could do it. Or they come and say, if you make some slight tweak to your program, it would make it easier for us to produce this other energy for you.

So that has been really encouraging is that companies and financial officers are integrating the carbon price into where they want to go next. It's not just business as

usual. We'll keep producing fossil energy in the state.

MR. PATNAIK: I think that is super encouraging. That's actually how we predicted it from the theory side, right?

We want companies to have that certainty. And California is now being in place long enough so they have the certainty. They know it is here to stay. So they can start thinking about alternative ways to do business. This is actually great, wonderful. Well, thank you so much for your time.

It has been very enlightening. And I appreciate your time. I know you're super busy. And with that I will hand it over to Thornton. Thank you, Rajinder, for being here.

MS. SAHOTA: Thank you.

MS. MATHESON: Thank you, Sanjay. So hello and welcome to the panel discussion portion of today's event on state level carbon pricing. I'm Thornton Matheson, senior fellow at the Urban-Brookings Tax Policy Center and your moderator for today's panel.

So I'm very excited to introduce our expert panel on state-level carbon pricing systems who will discuss relevant experience not only in the U.S. but also Canada and the EU. So first off, Ian Parry is the Principal Environmental Fiscal Policy Expert in the Fiscal Affairs Department of the International Monetary Fund. Ian will be focusing on discussion of relevant aspects of the EU's carbon pricing system.

Barry Rabe is the J. Ira and Nicki Harris Family Professor of Public Policy at the University of Michigan. Barry focus on discussing state-level carbon pricing and political economy.

Jennifer Winter is an Associate Professor in the Department of Economics and School of Public Policy at the University of Calgary in Canada. She'll be focusing on relevant aspect of Canada's carbon pricing system.

So to begin each panelist has prepared some brief opening remarks on their

topics. So we'll start closest to home with Barry and then move onto Canada or Jennifer and the EU, Ian. So Barry?

MR. RABE: Thanks so much, Thornton. Good afternoon. When you consider questions of carbon pricing at the state level, particularly issues of political feasibility and durability. There really are two American stories. We just heard one of them, California.

The other is on the opposite coast, a cluster of states known as RGGI, the regional greenhouse gas initiative. Now, well into its second decade, RGGI has endured all kinds of political shifts and changes in each of its member states. It also has demonstrated some real limits.

It remains focused exclusively on the electricity sector. A near decade long effort to add a transportation component with some parallels to what was just described in California seemingly has not gone forward, seemingly has collapsed.

Unlike California, RGGI has not established formal linkages outside the United States. It's a multistate mechanism but those relationships are confined to the region as opposed to the kind of Quebec partnership that California has.

Its price has been fairly modest, often below $10 per ton. Although, that has climbed like other pricing systems, like other trading systems. And in its last quarterly auction just a short time ago, it went up for the first time to $13.50. There's also partisanship. And one of the things that we see in state carbon pricing policy, state climate policy over the last decade which was not sure in prior decades is how intensely partisan these divides are generally.

And when we look at the eleven states that now compromise RGGI, they are overwhelmingly democratic party leaning states. And they are also states that have little, if any, oil and gas production. And so, that creates a unique political market that may well be more receptive to carbon pricing and climate policy than other jurisdiction. So that's a unique case just like California is a unique case.

That said, more than 10 years after its launch, RGGI has done some things very, very well. There has been no collapse of membership or reversed diffusion where policies are started and then disappear.

In the Midwest, Michigan and a number of other states launched an effort more than a decade ago known as the Midwest greenhouse gas reduction initiative. It was trying to create a multistate carbon pricing mechanism and it collapsed within a few years.

Even in the case of California, while holding onto that partnership with Quebec, the original western climate initiative involves seven western states and four provinces. And there has been a kind of collapse in the ability to create that larger partnership, even though I know California has been trying to find more partners for quite some time.

By contrast, RGGI has really endured. It's done some interesting things. It pioneered auctioning, which was not part and parcel of a lot of the early thinking on emissions trading systems. It did it very effectively through relatively transparent quarterly auctions.

It has consistently returned revenue to states. Each state participating in this auction gets money that it put in and then each state can have a conversation about how they are going to use that revenue. Usually for energy related purposes. And it's kind of a model to combine the painful price that makes people uncomfortable with a very politically focused way to think about the benefits with that revenue transfer.

In fact, in many respects, RGGI is probably best known in its jurisdictions as the policy that brings money into the state as opposed to imposing that price. It's found a way to build and sustain a constituency.

It's contained offsets. Their volume and their location, avoiding a potential big Achille's heel that has been a challenge for many trading systems. It also pioneered an ongoing review mechanism to adjust the cap. To begin to consider environmental justice perspectives that are purely early stage.

And finally, I think RGGI shows a kind of ability to be complementary to other programs. Now, there once was a time that the climate policy thinking was that the carbon pricing tool was so powerful, it would just dominate the landscape and we would move to some kind of a global regime in a relatively short amount of time. That's not political reality in the United States or anywhere else.

And when we look at states that have adopted carbon prices, they're also the very states that have statistically most likely to adopt a lot of other policies, regulatory policies, fuel standards and the like. And that raises the question of how these policies fit together rather than a world where the price does everything.

RGGI region power sector emissions are down by more than 50 percent since the launch of RGGI. Is all of that attributable to the carbon pricing system? No. RGGI is a player. And fit has been taken very seriously individually in these jurisdictions, but also collectively.

Going forward where next? We have seen some interesting expansion of RGGI in just the last couple of years. And I think what Virginia was able to do in 2020, putting together a clean electricity standard alongside the addition of cap-and-trade in a former fossil fuel producing state is a very interesting one. In some cases, following the RGGI playbook, looking at the use of dedicated funds for things that were unique to Virginia.

And now opens up the very interesting question. When there's a shift in the opposite of the governorship. And a governor proposes to withdraw from RGGI. This would be Governor Youngkin. Is that a constitutionally acceptable move? And is that politically acceptable move to take hundreds of millions of dollars that would otherwise be going into in that case coastal flood protection and energy efficiency for low-income communities. How does that play out?

And just finally, we are beginning to see other states that are beginning to think along these lines. Looking at ways to possibly to join RGGI and the like. But the reality is that they are overwhelmingly democratic jurisdictions or they are jurisdictions where

a democratic governor is up against a Republican legislature and pushing to see how far he or she can go within the limits of their executive power. And that remains this defining divide that we have in so many areas of finer policy. Thanks very much.

MS. MATHESON: Thank you, Barry. And now, we'll hear from Jennifer about Canada's carbon pricing structure.

MS. WINTER: Thanks, Thornton. And I'm going to give you a world wind history of Canadian carbon pricing because I think it's an important context for the evolution of it and where we are today.

But first, I want to mention that Canada is a very decentralized federation. And like the U.S., the environment has an area of shared jurisdiction between the federal government and the provinces and territories. And this, of course, makes climate policy complicated particularly pricing policy.

So carbon pricing actually started in Canada in Alberta in 2007 with a performance standard for large industrial emitters. And then in 2008, BC implement an economy wide carbon tax. That was followed in 2013 by Quebec's cap-and-trade system. And then in 2015, Alberta announced it would expand its carbon price to economy wide plus the large emitter system with some tweaks to it to make more stringent.

And then 2016, the federal government moved forward with something called the Pan-Canadian Framework, which was a commitment to introduce economy wide carbon pricing starting at $10 a ton and increasing by $10 a year until $50 in 2022.

Now, the Pan-Canadian Framework was signed and agreed to by nine of the 10 provinces and three territories and then the federal government. So it was a bit of a watershed moment in moving forward with climate policy in Canada.

And then things sort of fell apart. We had government changes in multiple provinces. And as a result of that many or several provinces reneged on their commitment to the Pan-Canadian Framework. And so, what happened is we had a federal government in a position where it had created what was called a federal backstop and a federal

benchmark.

And so, it was basically an equivalency test between the provincial and territorial carbon pricing systems and what the federal government deemed as a minimum standard. So the minimum standard was coverage or pricing equivalent to BC's economy wide carbon tax. And that's a price on combustion of fossil fuels or equivalent coverage to Quebec's cap-and-trade system. And province has had the option of essentially choosing their own adventure and implement a policy as long as it met this benchmark.

If provinces did not create a policy that the federal government deemed as sufficiently meeting this benchmark then the federal backstop would be imposed. And the backstop is a large emitter system, which is facility performance standard combined with output subsidies and that's to address competitiveness concerns for emissions in terms of an in trade exposed industries. Roughly equivalent to the free allocation process in California's cap-and-trade system.

And then the other part of the federal backstop is an economy wide tax on fossil fuel combustion. And so, that's for households and large emitters.

So that's the basics of where we are right now. As a result of this, we actually have quite a hodgepodge of systems across Canada. We have some provinces like BC, like Quebec that have implemented their own systems. So we have both a tax and a cap-and-trade system. We have provinces like Alberta where there's a provincial large emitter system and then the government refuses to implement the tax on households. And so, the federal backstop is imposed for that sector of the economy.

And the end result is that each province and territory has a different system. And, you know, the benefit of this approach is that there is flexibility for provinces to implement systems that match their specific industrial composition. And the political issues, you know, within the province, and, you know, a province like Alberta, heavily weighted towards production of oil and gas. The competitiveness is a concern.

But at the same time, one of the downsides of this approach is that because

of the differences across provinces and territories, people are facing the same marginal costs of emissions and on Friday, that will go up to $50 Canadian per ton, roughly $40 U.S. But the average cost per ton is vastly different across provinces. And then on top of that there's also different coverage.

And so, all of these differences actually make it more costly on the Canadian economy to reduce emissions relative to a uniformed system that was the same across the country. So we're really trading off, you know, gaining some flexibility, but giving up or imposing some potentially unnecessary costs on ourselves. So with that I look forward to the discussion.

MS. MATHESON: Thank you very much, Jennifer. And now, we will move to Ian Parry who will tell us about the very broad and complex system developing in the EU.

MR. PARRY: Yes. Thank you, Thornton. So emissions from the power and industry sector in the EU are covered by the EU emissions trading system. These sectors account for huge bulk of the low-cost mitigation opportunities in the EU in the near term. The cap for this sector declines with an annual rate of about 2.2 percent a year in line with achieving the EU's pledge to cut emissions 55 percent below 1990 levels by 2030.

The emissions price is largely a market determined. Currently, it's equivalent to about $90 U.S. per ton so about three times the levels in California. Although, there is a market stability reserve which withdraws allowances from the system when there's a downward pressure on emission's prices.

A pure emissions trading system is not compatible with national level policies to reduce emissions in the power and industry sector in the sense that national policies will not reduce emissions as the EU level if they are fixed by the cap. Instead, they'll just reduce emission's prices. Effectively, they'll be 100 percent emissions linkage from those countries to other member state that are in the EU.

In contrast, if it was an EU carbon tax or there was a finding price flow under the EU ETS then national level policies for power and industry would be more compatible.

They would lead to emissions reductions at the EU level without affecting the emission's price.

But these instruments, particularly the carbon tax. It's less clear for the price flow. The carbon tax is very difficult in the EU because of unanimity requirements for tax measures as opposed to regulations.

A rebate approach is at one point is contained in the Build Back Better legislation in the United States for the power sector. It would also be compatible with some national policies. Rebates supply a sliding scale of fees on firms or generators with above average emissions intensity on a sliding scale of rebates to firms or generators with below average emissions intensity.

With regards to emissions from the building and transportation sectors in the EU. Here member states are responsible for cutting those emissions, their allocated targets which are stronger for higher income member states.

But the price responsiveness of emissions for these sectors is much lower than in the power and industry sector because there's no use of coal in these sectors and also capital turns over very gradually, less than two percent a year in the building sector. So for these sectors it is important to accommodate different policy approaches across countries given that there is differences in the acceptability of carbon pricing across prices.

Nonetheless, it's still the case that 14 EU countries have implemented some form of carbon pricing for the building and transport sector, 13 of them carbon taxes, trading system in Germany. And the emission's prices vary dramatically from below $5 per ton up to $140 per ton in Sweden. But this price variation is less of a concern than for industry because emissions from the building and transport sectors aren't really very mobile across our country borders as they are in the case of industrial emissions.

And to address competitiveness concerns for industry in the EU. To date, the EU has used up free allowance allocations to compensate for these energy intensive trade exposed industries. But this mechanism becomes less effective as the EU moves

towards deeper decarbonization of the industrial sector because the free allowances do not compensate firms for their abatement costs.

So now, the EU is transitioning towards a border carbon adjustment. It's going to apply for iron and steel, aluminum, cement, fertilizers and imported electricity. A border carbon adjustment is potentially a more robust instrument for preserving international competitiveness as jurisdiction move ahead aggressively with emission's pricing, but they are subject to some legal uncertainty because they haven't been challenged yet at the WTO.

One particular concern of border adjustments is that they might impose a disproportionate burden on developing countries, which tend to have a higher carbon embodied in their industrial sectors. At least initially that might be addressed by basing the border adjustment on EU emission factors for different industries rather than using country specific emission factors in gaging the border adjustment.

And then, you know, if the EU moves ahead with this system, on average it would be collecting about a billion dollars in revenue from U.S. exporters. Thank you. So I'll stop there.

MS. MATHESON: Thank you very much. So now, we'll move onto the audience Q&A. I had a lot of questions relating to the competitiveness effect of some national carbon or a multitiered carbon pricing system.

Carbon emissions, of course, generate a global externality. And a carbon pricing is source-based tax or price that can raise costs for local industries and shift production to areas with low or no carbon prices so called carbon leakage. While national governments can use a border carbon adjustment to address these issues. Subnational governments, at least in the U.S., don't have that option.

So given those constraints what are the risks to states who enact carbon pricing relative to neighboring states that don't? And how can they address that? Maybe Jennifer could open the response to this question and others when she's done other should feel free to chime in.

MS. WINTER: Yeah, that's a great question. So I mean there are different approaches to addressing competitiveness.

One of them is border carbon adjustments. And the other two approaches are like for cap-and-trade systems would be free allocations of emission's permits. And then in the case of a carbon tax like what Canada has done and several provinces and the federal government. There's performance standard emissions plus an output subsidy. So that's signaling the -- the output is valuable in that emissions are not valuable.

The interesting thing about the combined performance standard and the output subsidy is that it protects those -- the firms that receive it from import competitiveness so the relative costs of firms supplying to, say, Alberta. And it also protects them by lowering their cost for their own export competitiveness. So it's two-sided protection relative to border carbon adjustments which is only protecting the domestic market and making carbon pricing equivalent in the domestic market.

It doesn't -- unless it's combined with an equivalent decrease in the carbon tax for exporting. And then we're getting into like complicated design questions.

And so, it's, you know, the easiest way for subnational governments to address competitiveness is to, you know, in a bad design setting exempt some sectors because, you know, then they're not facing the carbon price. In a good design setting, it's providing those output subsidies so that lowers the average cost of emissions while preserving the marginal signal.

MS. MATHESON: Thank you. Barry or Ian? Anything to add to that?

MR. PARRY: Well, just throughout the competitiveness is mainly a concern for the power and industry sectors, not so much for the building and transport sectors. For power, California did introduce the first border carbon adjustment so there is a charge on imported electricity into the state according to the embodied carbon. So I don't see why other states couldn't follow that for the power sector.

And then as Jennifer was saying, for industry an option is the like these

changeable emission intensity standards of all equivalently a tax while you return the revenues and output-based rebates. Or equivalently, it's like a rebate scheme way. Have emissions -- you have a sliding scale of taxes on firms with above average emission rates. A sliding scale of substantive firms of below average emission rates.

So these schemes promote reductions in the emission's intensities of output, but they don't promote reductions in the level of output. But they do neutralize the first order burden on firms from carbon taxes and help with acceptability.

MS. MATHESON: All right.

MR. RABE: I do think in the American federalism case, we see a nation with states that have markedly different pricing but also are broadly climate policy strategies.

And I don't believe that there is solid evidence to suggest that there's significant industry migration in response to those policies. At least the way in which they are set.

That said, politically within state legislative debates, these kinds of arguments emerge all the time for any issue related to carbon or even if we move to something like methane where state legislatures routinely support some kind of tax, severance tax, on the production of oil and gas are relatively popular taxes because the costs seem to be exported to other jurisdictions where the product is concerned.

But every time a state legislature has considered a tax on methane, which is wasted gas and is exempt from the tax, you have an explosive response in places like Bismarck, North Dakota or Cheyenne, Wyoming. And the argument there is if there were to be some kind of a price or tax applied then capital would move and the drill rigs would shut -- I think even that is a bit of a stretch of an argument.

But when you get into state legislative sessions that argument does emerge quite a bit. And it has consistently come up in other places where carbon pricing has surfaced in some way.

MS. MATHESON: Great. Thank you. Thank you so much. On the other

hand, you know, there are other costs imposed by a local carbon price. But there may also be some local benefits from state or regional carbon price.

For example, reduced air pollution. And, Ian, maybe you could start us off by discussing those benefits and how they can offset? Are they potentially to the local costs of implementing a carbon price when perhaps neighboring or competing jurisdictions have a lower price?

MR. PARRY: Yeah, that's right. So these co-benefits and cutting back on the use of fossil fuels, particularly coal and diesel fuel which produce significant amounts of local air pollutants that define particulates.

So in those cases where a lot of CO2 reductions coming from reduced use of coal or diesel. You can get quite substantial domestic or local environmental air pollution benefits. And these are often skewed towards low-income neighborhoods. Wealthy people tend to move -- live in areas where there is relatively clean air.

So a first pass you would say, well, this is a nice benefit, an equitable benefit for low-income households. Though, it's a bit more complicated when you take into account that it may increase real estate prices in these regions and rents and if it is landlords who primarily own the properties rather than low-income households. It offsets some of the benefits to low-income households.

MS. MATHESON: Great. Thank you. Anyone else? I think the discussion of climate justice is which of course Rajinder raised as well is very important.

In the U.S., I think there's been significant opposition. Or certainly, the lack of support for pricing carbon in the climate justice community because there's a feeling that it does not specifically address the concerns of climate justice communities that have historically been exposed to higher level of pollution.

MS. WINTER: I could jump in here. And it's like with a slight tangent. And one of the things that is also important in policy design when we're thinking about carbon pricing is use of the revenue. And one of the interesting things about the Canada

experience is that because we have provinces and territories doing their own thing, there are different choices about the use of revenue.

So like, for example, the federal government for those backstop provinces, it uses lump sum rebates to offset affordability issues with carbon pricing and it does that through the tax system. British Columbia also provides a rebate through the tax system, but it's means tested. And New Brunswick has chosen to lower personal income tax rates.

And so, we also have these different approaches to trying to address affordability by using carbon tax revenues, but, you know, it really is perhaps not the best way to address the overall affordability issue. As an example, April 1 in Alberta, the federal carbon tax is going to go up $10 a ton and simultaneously the government developer has decided to lower its gas tax because of the high price of oil to give a brief gas tax holiday.

And so, that's great for drivers, but doesn't actually address the overall concern of affordability. And doesn't necessarily help people who don't drive cars but are facing affordability challenges. So I think this issue is going to continue to be really important, but it deserves attention separate from just discussions of carbon taxes and emission pricing policy design.

MR. RABE: Great. And I would only add, I do think that this is a really important issue to consider in the context of, say, Canada or the United States. Fairly decentralized federal systems where climate change, even the acceptance of using that term in political discourse may vary from one to another.

And yet, ways in which revenue might be used that would be politically popular could help build some degree of political appeal. In the RGGI case, Virginia deciding to focus on coastal adaptation, flooding and low-income energy efficiency assistance. That's different than all of the other 10 states and RGGI. But part of that challenge under that opportunity is to think about what those co-benefits might be that are unique and attractive to a particular jurisdiction as opposed to a more national strategy where the federal government is deciding how all the money is going to be spent.

MS. MATHESON: Wonderful. So just to follow up on the issue of economic constraints on subnational carbon pricing.

The two U.S. systems, carbon RGGI, have recent auction prices of around $29 a ton of CO2 equivalent, and $13 per ton, respectively. And although these prices -- so they're well below current estimates of the social cost of carbon which you usually see as somewhere between, you know, $60 and $75 a ton. You know, it keeps ratcheting up as global warming progresses.

Although, the local prices have risen substantially in the past couple of years. But given the previously discussed constraints on subnational carbon prices. I mean how far can states or regional conglomerations actually go in addressing carbon pricing?

Can we get at the subnational level? Can we get all the way to what we see as an efficient carbon price? Or, you know, are we constrained to stay at a much lower level? And how does this relate to the size of a state economy? And also, the coverage, the percentage coverage of their system? California, for example, you know, having a very large economy. It would seem that it would have a lot more capacity to implement such a system than a smaller state.

MR. RABE: Well, if I might take a shot at this? I do think that these early state examples are useful models, but they are likely to be real limitations and what the existing set of cap-and-trade states are able to do internally, certainly.

There has long been a hope in California and among RGGI states that they could be a model that other parts of the country would pick up on this. Perhaps nationally there would be some adoption.

And of course, even back in the 111 Congress, way back when in 2009 and 2010, when it looked as if Congress was on the verge of passing cap-and-trade, California and RGGI were there with ideas, examples and models and wanting to take advantage of what Rajinder was mentioning about as being sort of first mover possibilities.

We do have a lot of precedent in the U.S. in environmental policy. There is

a policy for early state adoption to drive the federal level. I think the most recent example that I've seen is the 2020 American Innovation and Manufacturing Act. One of the most significant climate bills Congress has ever passed. And in the last weeks of the Trump presidency. It passed with bipartisan support. And this is the bill that moves us into compliance with Kabali (phonetic) in terms of HFC transition for coolant.

A huge driver there was in 2019, 2020. We had state after state not just talking about HFC transition policy but adopting it and moving it. And that along with some other factors really created a kind of momentum. We've really not seen that yet in the carbon pricing space.

Were we to see states like New Mexico, Colorado, Illinois, Pennsylvania jump onboard that will create a different kind of mechanism possibly a sort of vertical diffusion, if you will, a tipping point to make this much more acceptable and then take the pressure off those states that now are concerned because they're acting unilaterally. But I'm not sure we're there yet.

MS. MATHESON: Thank you. Anyone else?

MR. PARRY: Well, I mean it's going to be incredibly difficult even with a federal policy to achieve these deep emission reductions that the U.S. is committed to. I think there's a 50 percent reduction by 2030 below 2005 levels.

These are very deep reductions. In the near term the bulk of the reductions would come from reduced use of coal rather than reduced use of a natural gas and oil. So it's important that states where a lot of coal generations are taking place are covered in this pricing system. So that would be difficult enough. I'm not sure of the exact carbon prices that would be needed, but well above $100 per ton by 2030.

But then if you take out some of the states, particularly those that are using a lot of coal and it becomes virtually impossible, I think for a piecemeal state level approach to achieve the nationwide target.

So what are the prospects of the nationwide level? Well, I think some

dynamic has to change. And most obvious is a change in the composition of bulk Congress with more the House and the Senate members in favor of carbon pricing. But another possible event might be if there was consensus that we needed to radically cut the deficit for financial or other reasons.

That on the table is, well, if you don't do a carbon tax that means you've got to have a bigger increase in corporate income taxes or a bigger increase in personal income taxes or a bigger cut in social security or a bigger cut in Medicare or Medicaid. None of those options are very acceptable. And it's not clear that, you know, a carbon tax is any more difficult than any of those options.

So that's one possible scenario, a nationwide carbon tax might be on the table as part of a package to deal with deficit reduction.

MS. MATHESON: Great. Thank you. So let's go on to talk a bit about how state level regimes, carbon pricing regimes can be instituted with a federal policy.

We had a question which I'm going to put to Barry first. Does a state-by-state approach to carbon pricing propel or set back prospects of national action?

MR. RABE: The short answer is yes to both. Both are possible. Both have precedent. My own thought, though, is that the states that have taken early action remain in a very interesting position to propel. To try to move things forward. They've experimented with this.

They've been relatively successful in doing it administratively. They do, indeed, create an almost historic parlance models or laboratories that the federal government might develop. Much as we saw, as I mentioned a moment ago, in the hydrofluorocarbons, the HFC policy case.

That really though does become a tough sell when you have deep partisan cleavages and even some of the challenges in the federal legislative branching that you were referring to just a moment ago that probably are not going away any time soon. But again, there's abundant precedent and opportunities for this sort of thing. I do tend to think

that along with the bigger pieces and challenges part of the dynamic here that could be really attractive is thinking what a revenue allocation or a revenue return scheme might be.

States like getting money. So do Canadian provinces. So does everyone. It doesn't mitigate the paying of a price, but it can potentially be done in fairly effective ways. And it might contribute to that propelling versus repelling framing that you were mentioning on.

MS. MATHESON: Great.

MS. WINTER: I'll say, I think the Canadian experience echoes a little bit. Obviously, we have it a little bit easier because there's 10 provinces and three territories rather than 50 states.

So the coordination problem is a little bit less, but what was, I think, interesting about carbon pricing development in Canada is we had in 2016, we had the four major provincial economies. So BC, Alberta, Quebec and Ontario moving forward with emissions pricing and a federal government that wanted to do it as well. And so, it was -- you know, it was really the stars were aligned, it worked well and then, you know, there were political changes. And so, carbon pricing has been like really a divisive political issue in Canada as well. In terms of federal provincial relations and even with differences in federal parties.

The other part of it is we have the Supreme Court say that yes, the federal government can do this. And so, it's sort of like, you know, end of story. You have to adjust. And so, these difficult provinces now they have lost control over part of the revenue because these backstop provinces that are not imposing their own carbon price, it's the federal government that chooses what to do with the revenue.

And so, that is really an incentive for provinces to figure out a system that is equivalent to the federal benchmark but that gives them control over revenue. And then the added benefit is that they can just blame the federal government for the carbon tax, right?

MS. MATHESON: Okay. So, Jennifer, we had a question that I'd like to

direct to you first.

How can states join existing carbon markets in other states or countries? And do the schemes have to be identical to join? We've seen some cross border partnering between Canada and California. And I'm not sure whether Washington state is considering entering that. I believe they're going to be setting up a system next year. I'm not sure if they're planning on tying themselves to the existing Canadian and California system.

MS. WINTER: Yeah, that's a great question. I think there are two fundamental concerns there. There's one is are states going to implement a tax or a cap-and-trade system?

And so, if it's a cap-and-trade system, you know, one easy option is just join with the California/Quebec system and it's already in place. The rules are set. Another option would be to try and link up with the EU ETS, slightly more complicated, but I think possible. What is going to be particularly interesting is if states decide they want to go the route of a carbon price so the tax itself. Then what price are they matching? Is it going to be like Canada's carbon price? Is it going to be the EU ETS price? Is it going to be the Quebec/California cap-and-trade system?

All of these systems have different prices. And when you're pinning your price rate to, say, a cap-and-trade system, but you're implementing a tax. That means you're losing the price certainty and you're also not gaining the flexibility of the permit trading system embedded in a cap-and-trade system. So it is, yeah, complicated for states to figure out where and how to match.

You know, in many ways the easiest thing to do is just decide that they're going to implement a tax, pick a price and, you know, keep an eye on what other jurisdictions are doing to think about any sort of increasing stringency of that price.

MS. MATHESON: Okay.

MR. RABE: I would totally agree. It is a super complicated issue. But one other piece that I also think is intriguing is this question of what a carbon border adjustment

process likely to be led and introduced by the European Union in coming months would mean for the American federal system or indeed the Canadian federal system.

I would assume with the rather robust carbon pricing regime in Canada, Canada would be certainly covered under a carbon border adjustment. But then when I think of Quebec, it has a carbon pricing partner known as California. Would carbon border adjustments be applied uniformly across the U.S.? Or would there be a California carve out? Would there be a RGGI carve out?

If carbon border adjustments really were to be applied and kicked in would suddenly there be an epiphany in a great many state capitols, let's get onboard? That's really, really hard to know. Here, I would only say if you look at discourse discussions in state capitols two or three years ago, the phrase carbon border adjustment was not known or was seen as some academic concept. Now, it's real.

Now there are all kinds of questions about this relationship between a kind of trade, tariff relationship and whether or not it would be good to get in line with a carbon pricing regime if for no other reason than to avoid possible tariffs from other jurisdictions. And that's new territory.

MS. MATHESON: All right. And in the U.S., we recently had a proposal. It was not enacted, but for a border carbon adjustment based on regulatory factors. But clearly, the U.S. has no coherent carbon price at the time. But this, I believe this proposal came up in response to the prospect of both Canada and the EU having a substantial carbon price under which U.S. exports would be disadvantaged.

MR. PARRY: Yeah. I think that makes much sense. I mean the point of the border adjustment is to charge for the taxes or allowance purchase requirements on the emissions that are remaining in your industries and are not subject to those charges.

To the extent the U.S. uses regulations instead. Well, those are reflected in the emissions, act as the emission's rate for U.S. industries. And so, if the EU was assessing a border adjustment that would be taken into access when it's looking at what's

the emission's intensity of U.S. industries. So I don't think there's any legal basis for exempting the U.S. using regulations.

On the one hand, you know, if the EU -- even China when they extend maturating system to the industry sector at some point in the next few years maybe they'll use the border adjustment as well. So on the one hand -- well, does that create a strong incentive for the U.S. to then price emissions?

Well, on the one hand, not really because only two percent of U.S. carbon emissions are embodied in tax box. And as we said, with the EU carbon border adjustment, they have been collecting a billion dollars in revenue from U.S. exporters. You know, a modest amount, but not a very big amount.

But on the other hand, maybe there's a lot of stigma attached. Maybe if Canada, China and the EU are all saying, we're not accepting industrial products from the U.S. without a border adjustment because you don't have carbon pricing. You know, maybe the stigma attached to that might galvanize the action. Who knows?

MS. MATHESON: Thank you. This next is for Barry first. So if federal level carbon pricing is not politically feasible, which it does not at present appear to be. Are there any administrative steps that the federal government can take to facilitate state-level carbon pricing? The spread of the current system?

MR. RABE: I think this is a difficult path. In part, because we have a history of using the Clean Air Act of 1990 and trying to reinterpret it for carbon.

You think of almost the entire Obama climate record after the collapse of legislative discussions in 2009. Its last six years were principally focused on interpretation of the existing statute. That ran into legal issues. It ran into a succeeding administration that was hostile to all these provisions including something called the clean powerplant, which had this unique effort to try to create a 50-state negotiation.

With the EPA giving them a number of options to try to reach power sector reduction targets, but in effect leaning towards a cap-and-trade system of some sort with lots

of incentives for states.

There was tremendous pushback to that. But to sort of reinvent that mechanism primarily saw the Clean Air Act as a challenging one. Legal issues, changes in the court and also uncertainty about the extent to which the current party in power will hold the presidency for multiple terms consecutively as opposed to the kind of pin pong game we see when there's changes in the executive branch.

So I wouldn't rule that out. But yet, we've seen -- and this is true in a great many states -- executive only made policy at the federal level and state level. And climate tends not to be very durable. It runs into lots and lots of issues.

And it's one of the reasons why I was reluctant to even mention states like Pennsylvania and North Carlina which are looking for ways to get into RGGI, but basically bypassing the legislative branch entirely. I have some real questions about how viable that actually is over time.

MS. MATHESON: All right. This other question is for Ian. Rajinder discussed California's choice between carbon tax and cap-and-trade. And of course, they went for cap-and-trade. And RGGI is also a cap-and-trade system.

Thinking about, you know, pricing carbon at the subnational level. What do you see is the major pros and cons of the two different systems?

MR. PARRY: Well, it's more of a degree because either instrument can incorporate design features that make it behave more like the other instrument. And so, I think, you know, as referred certain over emission's prices are very helpful for creating the right environment for upfront investments in clean technologies that have long run payoffs.

So that's a potential advantage of a tax that you can specify a trajectory of emission's prices over time. People know. And as in Canada, where there's a very clear trajectory of how the minimum price requirement will rise over time. But under a trading system as in California, you can have a price to go to provisions like a price floor. In principle, you could have a price ceiling as well.

I think that -- I'm not sure. But I think there is one in California, $65 a ton at the moment or something. But a lot of these price columns you can narrow the uncertainty. So that's not necessarily a huge drawback of trading systems.

Carbon taxes are very simple administratively. I mean all states have fuel taxes in place. All we're talking about is integrating carbon charges into those. Applying them to other fossil fuel supply, natural gas, other oil products and coal. So administratively it's very straightforward. Trading systems are a bit more complex because you need a new capacity to monitor emissions downstream. You need to monitor trading markets, but that's not a big deal for an advanced country like the U.S. It would be for a country with limited institutional capacity.

But I think, you know, ideally you want to exploit the fiscal opportunities. So maybe that's a little bit more likely under a carbon tax if the revenues are accruing to finance ministries that could be put to a more to cutting other taxes. Maybe it's a little bit more convoluted under a trading system if environmental agencies monitoring that and to have them use.

And the restrictions in California, I think on how the revenues can be used. It can't be used to cut other taxes so maybe that limits some of the fiscal opportunities a bit. But, you know, it's all a matter of degree. You can design a trading system to mimic a lot of the advantages of a carbon tax.

MS. WINTER: Okay. I have to jump in here. I think the biggest both pro and con of attacks is its transparency. In that people know that there is a tax and that is, you know, part of the political discussion in Canada and I imagine in the U.S.

It's like it's characterized as a charge on everything. You know, it doesn't work. Like all of these sort of absurd myths that people don't respond to incentives.

And then, on the other hand, systems like a cap-and-trade system, there's opacity and the charge is on generally large industrial emitters. And so, the politicians can conveniently ignore the issue of pass through and say, we're not hurting families and things

like that. So the transparency of a tax versus a cap-and-trade system is, you know, it lends itself to, I think more resistance.

MS. MATHESON: Great. So we're -- we have about five minutes left. And we've had quite a few audience questions on sort of the political economy and the outlook for state-level carbon pricing or federal carbon pricing in the U.S.

And most of the questions revolve around the current oil price spike and the effect that that has had with some states rescinding their gas tax temporarily. Even states that are pro-carbon pricing such as Maryland. And looking a bit further down the road to the 2022 elections. You know, how could those possibly effect the evolution of carbon pricing in the U.S.?

And then, you know, we do have other states coming into the equation such as Washington. So I guess just to finish up a tour to tablo (phonetic) of how people see the current situation and how they expect it to evolve over the coming months? Perhaps, Barry, we'll start with you.

MR. RABE: Thanks. I don't see much prospect that the 2022 elections are going to deliver a more climate friendly Congress or a more climate friendly set of governors and state legislatures with a few possible exceptions.

That said, there are really some interesting developments to weigh and think about. One of which is we are navigating that 117th Congress that was thought to be one of historic future achievement in climate by using noncarbon pricing tools. The clean electricity performance standard. The Build Back Better provisions. These have run into some huge political challenges and we might emerge after this two-year period with little, if any, substantial new engagement.

That opens again the question of how we do significant decarbonization maybe a path back to pricing. Particularly in those states that were expecting through the Build Back Better proposals to be receiving tens of billions or hundreds of billions of dollars over an extended period to support energy transition and other kinds of programs.

That money is going to have to come from somewhere and states may have to raise more of it on their own than they thought. So there's some possible ways to begin to think about that especially, and last point. If the carbon border adjustment kicks in. It's not the way one would like a nice thoughtful orderly conversation. And yet, I do think that if that moves forward in more and more states you may see a greater activity trying to head that off in some way. Protect state interests and move forward in that way. It's hard to forecast that one.

MS. MATHESON: You're referring to the Canadian and the EU border adjustments?

MR. RABE: Exactly. If that external pressure comes through a trade negotiation of some sort with the U.S., I think this point that I was raising earlier about carbon border adjustments meets federalism will become a very real, real issue with California asking why shouldn't we be treated differently than Texas and on.

MS. MATHESON: Briefly, Jennifer or Ian?

MS. WINTER: I think my only comment is, you know, globally, we're iterating slowly towards more and more countries introducing some form of carbon pricing. And that's going to have pressure on the U.S. and individual states.

You know, in particular border carbon adjustments weren't really a thing in Canada until the EU announced it. And so, there is definitely, you know, we shouldn't discount the role of external pressure and the decisions by other economies on decision making within North America.

MR. PARRY: Well, I think in principle this is an absolutely fantastic time to phase in and lock in carbon pricing with extensive coverage and deep carbon prices as international energy prices start to recede from that peak levels without an increase in energy prices relative to what we've got just recently experienced.

I don't know the numbers off the top of my head, but I think coal prices are maybe 300 percent higher than they have been 18 months ago. Gas prices are like 10

times as high. Oil prices, what are they? Two, three times as high?

So, you know, the sorts of carbon prices that would be needed to generate those enormous increases in energy prices are huge. So we could be phasing in, we could be locking in a $75 per ton carbon prices as prices recede. But without raising energy prices relative to recent levels. So that really is a golden opportunity to have it locked in. But I have my doubts whether that will actually occur in practice. And we'll squander this opportunity, I'm afraid.

MS. MATHESON: I absolutely agree with you. Of course, there's been, you know, the political reaction to these oil prices in particular has been shock and awe. And how can we bring them back down?

From my perspective, it's not a bug. It's a feature. You know, this does create a tremendous opportunity. We've been forced to transition to higher energy prices. We can coast on that by, you know, as the markets loosen up. Introduce some pricing to keep things more leveled.

But that is all the time that we have today. And I want to thank all of the panelists for a really great conversation. And Sanjay and Rajinder as well.

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