Global Harmonized Carbon Pricing: Looking Beyond Paris

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Session Five:

The political economy of carbon pricing

Presentations and Discussion

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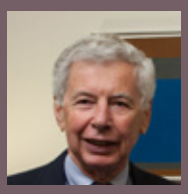




Session Five — The political economy of carbon pricing

This session is intended to discuss the political economy implications of carbon pricing. It will deal with both the domestic (in each of the key players) as well as the international political economy challenges for the adoption of carbon pricing.

Presentations

Ernesto Zedillo

I have asked Leonardo Martinez, in addition to being a good friend of mine, and of our center, and who nowadays works as Deputy Assistant Secretary for Environment and Energy at the Department of the Treasury, to do my job as the moderator for this session.

Leonardo Martinez Diaz

Thank you very much, and thank you, first, for the invitation here. For me, it's a special pleasure just to be here and to be able to think about the larger picture issues, but also to be here with two of my immediate predecessors in this position, Matthew Kotchen and Gilbert Metcalf, who was here yesterday. So, it's a bit of a family reunion, as well.

This is a really important session, because here is where the rubber hits the road. It's about how some of these policy ideas that we've been working on actually have to get implemented, and that means engaging policy and politics, and that, of course, is the province of political economy.

So, today we'll have six speakers who will help us think through some of these issues. I think, as

a political economist myself, these are the three standard elements in literature that I think we have to touch on. The first is the configuration of interest groups; who wants what, and how powerful are they relative to others in a system. Those, of course, can be firms, they can be different constituencies that are competing for an outcome.

The second is institutions; institutions and the rules of those institutions help structure how power is contested in a particular case, and I think we'll hear about that in both the domestic and the international arenas. Finally, what academics call ideational change, meaning that over time, there can be shifts in those interests, shifts in ideas, that give rise to the positions that different actors play in the system.

So, let's start with David Victor. We have 90 minutes for the presentations. So, I ask folks, if you could please keep it to 12 minutes. I'll give a two-minute warning just before, so you can wrap up. Thank you.

David Victor

Ernesto, thank you so much for the invitation. It's really a pleasure to be back at Yale. I'm just here for today, because we're in the very end of the teaching quarter at San Diego. I was feeling sorry for myself that I was on the red-eye last night coming in and then flying back home today. And then Leonardo said a moment ago that his job involves going to Congress to ask them for money for the Green Climate Fund. Any self-pity has evaporated immediately. Good luck with that, Leonardo.

I've been asked to talk a little bit about the political economy of carbon taxation, and I just want to make four remarks. Along the way I will draw on academic work that I have been doing on climate diplomacy, including some new work with Chuck Sabel at Columbia Law School and Bob Keohane at Princeton. I will also draw on work I am doing in tandem with a Council convened by the World Economic Forum, which is looking at how governance might be approved on a wide range of topics related to sustainable development.

First, I'm a political scientist. I study international relations in the three buckets that Leonardo spoke about. I focus a lot on the interaction between interests, and organized interests, and institutions, especially institutions at the international level. Discussions, like today's, on carbon taxation are happening in an environment where the international diplomatic scene has just radically transformed.

It's shifted from, if you like, the old Plan A through which countries get together, they negotiate targets and time tables, and they go back home and they implement those commitments. Plan A is a kind of top-down treaty framework with all countries as members of the treaty, and so on. For more than 20 years, many of us have been saying this was never going to work.

The good news in this transformation is that the diplomatic community has been shifting from Plan A to what might be called Plan B, or somewhere deeper in the alphabet. This new plan is based on a scheme where you have countries making individual pledges or nominations. In the world of climate change, these are called right now Intended Nationally Determined Contributions, INDCs. People will get upset with that term at some point and so the diplomats will change the term, but the basic idea was still the same: these are pledges that countries are making, and that somehow they're going to get connected together into a larger international agreement.

I think it's important to pick up on a point that Bill Nordhaus made in the last session: we actually have no idea whether this new scheme is going to work. What we know is, enthusiasm around the new scheme arises because the old scheme has patently failed, and so people are excited about the new scheme, because it's new. But they haven't actually paid hardly any attention to the institutions and the arrangements you would need in order to make this bottom-up scheme function properly.

This new plan for creating more effective international cooperation is quite familiar to trade diplomats — some of you are in the room. At least until the Doha round, this is how trade rounds were negotiated. Countries would put packages on the table, and then other packages would go on the table, and then the diplomats negotiate back and forth. It created a negotiation process that was slow but, unlike in climate for the last two decades, focused around actual commitments that actual governments could implement. Trade accession agreements followed a similar process, and in my academic writing I have seen a lot of promise in framing climate diplomacy along the same lines.

The trick in all this is figuring out how all these national pledges compare and then stitching them together into something that is greater than the sum of the parts — something that is not purely autarkic. This is one of the many areas where greater use of carbon taxation can be helpful. If countries use taxes, at the margin, to influence emitting behavior then that will make it much easier — not trivial, but easier — to connect these different pledges into something that's larger than, basically, an autarkic situation. The trade world went through this experience as the trade agenda shifted from just focusing on border tariffs to a wide array of "behind the border" measures whose trade effects have been harder to quantify. Climate has not yet begun to deal with the difficulties of stitching together national pledges; taxation can help.

The most likely outcome from Paris is autarky, where countries are going to pretend that they are doing something together. In reality, they are just going to set up an umbrella and then go off and do what they're doing individually. The after-Paris period that Ernesto's so focused on is where individual autarkic efforts might be assembled into something greater than the sum of the parts.

It's particularly interesting to be talking about the role of prices in affecting emissions right now because we've just seen a massive shock to energy pricing — in the form of the big decline in oil prices. The impact of that on emissions will be mixed because when oil prices decline so does the price of gas in most of the world, and that could be good news for emissions where gas competes with coal. But politically the effect of this big decline in oil prices is good news for reformers — especially reformers who want to tackle subsidies. We see that in Thailand, we see that in Indonesia, and a handful of other countries. If these reforms stick that means more rational energy markets — and probably more rational handling of externalities like emissions. Some countries that have long subsidized energy now actually have a kind of implicit carbon tax because regulated final prices are higher than production costs. That's the point Arvind Subramanian has made in a recent piece about energy pricing in India. Serious policy makers are using this window of opportunity with lower oil prices to put energy and emissions pricing on the right footing.

All of this is interesting and auspicious. But the big challenge, diplomatically, still remains. How will real diplomats working within real political pressures put together the individual pledges into something larger and more coherent after Paris? Here is an area where carbon taxation offers a massive advantage. In our jargon, if there is greater use of taxation it will radically lower the transaction costs necessary to figure out how national diplomats stitch together the individual pledges. It will also make it easier to figure out how to make these pledges contingent. That is, it is crucial that bargaining over climate mitigation not just be the U.S. doing its own thing and China doing its own thing and so on. Rather, what you want is that each country do things beyond what they would have done if they thought about this in an autarkic way.

The second of the four points I want to make is perhaps a point about marketing. Maybe it is a point about realism.

This is a room full of believers. Everyone in this room is a believer in carbon taxation--I guess people who love cap and trade, and only cap and trade, were not invited. People who want regulation and nothing else were also not invited. So we're believers and we are here in this room talking to other believers. But talk among the believers often falls on deaf ears outside rooms like this because people don't know what we're talking about.

One way to think about all this is that there are "strong" versions of carbon taxation and "weak" versions.

The strong version of coordinated carbon taxes, or unified carbon taxes, is that you have an agreement that tells everybody that they need to adopt the same carbon tax.

That might be our ultimate goal. The probability of that happening in Paris or any time in the foreseeable future is zero, for the same reasons that Plan A never worked. Adopting the strong version of carbon taxation is very demanding politically and administratively. It has a huge impact on what

countries do internally to comply with their international commitments. Strong versions of cap and trade had the same political and administrative problem — if countries adopted strict targets and timetables for emissions then each of them would need to set up strict cap and trade systems internally because that's the only way that they could be sure to comply. That was never realistic.

The same will be true if our messages about carbon taxation are adopted in the strong version. Maybe there are folks in this room who think that only the strong version of carbon taxation makes sense. But I don't see how that could happen politically and administratively in the real world. For Ernesto and his team — and I think of myself as a member of this team — it is crucial that we portray these ideas in their "weak" form. As these ideas are rolled out inside the diplomatic community it is important to portray the opportunities in carbon taxation as indicators of levels of effort. You're not expecting every country to do the same thing at the outset. And you are not expecting every country to adopt no policy instruments other than pure, clean carbon taxes.

Politically and administratively it is crucial that this proposal be seen as a way to make it easier to connect national efforts while not squashing the inevitable diversity in national choices. We know this diversity is a reality because we have seen it play out already. In Europe there is the ETS, which is a multinational cap and trade system. But the ETS is being implemented on top of many other policy instruments, such as renewable energy and efficiency mandates. Indeed, that is one of the reasons the ETS is having such trouble — because the residual demand for emission credits is so low after all these other policy instruments have done their work. (One of the many advantages of carbon taxes is that they still have a useful economic effect even when implemented in tandem with other policies such as direct regulation.)

The same is true in California, my home state, where we're thrilled with ourselves about our cap and trade system. Yet when you look at the data it is clear that perhaps only one-quarter of the actual leverage on emissions in California is coming from cap and trade. All the rest of it is direct regulation mandates, and things like that. What we see in Europe and in California and everywhere else is that politicians aren't stupid — they know that price instruments are the most efficient economically. Yet they explicitly opt for other policies as well — and then tend to choose market instruments that have low visible prices and regulatory instruments that have higher costs that are more hidden from view. This is basic political economy. Political leaders favor instruments that bury the costs and make it seem like a lot more is getting done for lower visible expense. We see this not only in the places that have adopted cap and trade but also in the countries where more tax-like instruments have been used—such as British Columbia, Sweden, and until recently in Australia.

So, I think it's very important that we not set ourselves up to fail by making people think that what we're arguing for — at least on day one — is a strong version of carbon taxation that requires identical carbon taxes across all economies. It's helpful from a modeling point of view, it's helpful as a kind of metaphor, if you like. Politically and administratively, however, it is not in the cards. If we argue for what is not feasible we will fail.

The third message I want to talk about is the problem of free riding. That was a central focus of the previous panel. Let me say, to start, that we should eliminate the term "free riding," to describe most of the defection and avoidance that we see in the real world. That's because, as Adele said, a large amount of what's happening isn't simple strategic avoidance of commitments. It is, in Robert Putnam's terms, kind of involuntary defection. It's because countries have difficult domestic constituencies. It's not just the US but it is every country in different ways. Every nation has an excuse for why they haven't done things. All those excuses are understandable yet they have a pernicious effect on cooperation.

Yet there is no doubt that the problem of misaligned incentives to avoid costly commitment exists. A huge part of the diplomatic machinery in any effective agreement will involve dealing with these perverse incentives — it will require stitching together incentive-compatible national pledges into true collective action. It will require developing politically viable systems for enforcing commitments that countries make to each other.

Dealing with all that is a huge topic; here let me say just two things. One is that if we want to make it easier for future diplomats to stitch together national pledges we need to do with greenhouse gases something akin to what tarrification has done in the trade world, and the right ideas about how well tariffication worked. Carbon taxation will help with that because it will make it easier for countries to observe what others are actually doing at the margin. It will also make it easier — administratively and legally, as well as politically — to apply border tariff adjustments.

The other thing I'd like to say about perverse incentives concerns border tariffs themselves. I can appreciate why trade and development economists are wary of border adjustments. They rightly fear that the great progress made through trade will be undone, at least in part, if trade gets used as an enforcement weapon. But those fears are overblown. There is no serious way to develop and enforce deep cooperation on climate change without border measures, especially if that cooperation emerges through sub-universal agreements within "clubs" and "coalitions of the willing." Members of these small groups will need incentives to act within the group and to attract others. Outsiders will need to feel some pain from not acting. That's not just crucial for success on climate change, which is an important development problem in its own right, but can also be done to some degree within the existing set of GATT rules under Article XX.

I listened to this debate we had in the last session about whether it is best to keep border adjustments within the Article XX framework or whether it would be better to seek some kind of amendment to the GATT/WTO rules to allow fuller use of trade sanctions and to close other gaps in the trade rules.

I love, as a moral case, the argument for doing an amendment. I think it's a great idea in some ideal world where we want to get the law perfectly aligned with aspirations. But, we have to remember that if we think gridlock in climate diplomacy is bad we should take a look at the situation for trade diplomacy, which is no better. The trade world has been talking for 14 years on the Doha round

agenda. It is like an aging rock band that goes from city to city, and never dies. This year in Davos I remember a session with leading trade experts where the central topic, as far as I could tell, was finding ways to get rid of the Doha round. It has been going on so long, with persistent failure to yield a final agreement, that it is probably making practical cooperation harder to achieve. So, that gives you some sense of the political difficulty in the trade world. Gridlock in trade is easy to understand—countries have highly varied preferences and the membership of the WTO has grown so large that consensus diplomacy has become intractable. Climate started this way back in Rio. Trade has evolved to this state. Either way, we have gridlock in these two global forums.

So, I think, politically, it's not viable for us to expect an amendment that operates by consensus rules in the trade world. What I think we should do is see how far we can get with Article XX and border adjustments of various types, and learn. And, if we need to do more, then we might need to do more and might even take on the politically demanding task of a WTO/GATT amendment. But let's first see what is feasible with existing law. Put differently, lets think about border adjustments and other trade measures in experimental terms. Let's try some different approaches that the trade lawyers already tell us are likely to work and see what actually works in practice. And then let's scale up the best approaches. Chuck Sabel and I are writing a book on climate governance that takes this kind of experimental approach to the whole problem, and while that is still a work in progress I think it is proving to be a fruitful way to think about practical problem-solving.

As we start working on the problem of free riding and border adjustments it is also important that we not get paralyzed by the level of cost coordination that will be needed. In the analyst community we have tended to focus too much on the need to equalize costs across economies. Some of that is an artifact of how our trade, investment and mitigation models are structured. In most of these models, which assume perfect information and ignore political adjustment costs, if countries don't have equalized costs of effort then all kinds of disadvantages follow immediately. Investment, jobs and economic growth leak from the countries that adopt costly policies and flow into the free riders. In the real world, however, people are willing to tolerate a significant — not an infinite, but a significant--amount of inequality. You witness this today in the difference of energy costs between Europe and the United States. You see this now even in China, this point that was made in the last session about co-benefits is really important. New policies in China are having a massive negative effect on a very powerful sector — coal. Yet the Chinese government is willing to do that, even if it has differential impacts on energy costs with big implications for trade and investment.

So let's not impose on political leaders a set of requirements that they, themselves, don't see as strictly necessary. We shouldn't hold ourselves to the standard of trying to get all of the costs equal across all the economies, but we do need to have a politically-defensible argument for why one country is not able to free ride, and for the incentive structure to create participation.

I'll say one last word on this, which is, I think the argument that was made in the last session about how participation is a key problem is right. But we need to really think, is the point that Leonardo is

making about the game theoretic context here, because we know that if we don't play the participation strategy correctly that we'll get in a trap. Let me take the argument further. That trap is the world that climate has lived in for the last 20 years, where the early thinking was that we would have broad, high participation followed by deeper commitments that would somehow mysteriously emerge within this broad framework. Politically, the world has demonstrated that it is very good at adopting broad frameworks that are a micron deep in terms of actual commitments. That's the problem — a participation trap that has been devilishly difficult to fix.

So, participation is very important, but we need to understand how the incentives inside a coalition or club of nations will create incentives for the members of the group to do more — to make deeper commitments. Doing that requires creating some semi-appropriable rents so countries inside the club have an incentive to do more. In the real world, leader countries have tolerated some inequalities and still been willing to create effective clubs. So let's not get overly paralyzed on equalizing incentives and focus a bit more on the glide path — the strategy by which early club members will act to create bigger and more effective clubs over time. That has been a missing ingredient in most of today's climate clubs, which helps to explain why most clubs so far haven't actually done much.

Fourth and last, I want to talk about what the additional protocol on carbon taxation might actually contain. That's the subject of the session this afternoon. I want to suggest, politically, a few ideas that might be part of this. We need to think, in the trade sense, about plurilateral commitments. We need to have some sense of what the minimum level of participation would need to be, what the incentive structures would be inside the club, as well as what entry and exit standards might look like. There's a lot of loose talk about clubs and coalitions these days but practically none of the academic literature has looked closely at minimum standards for clubs.

It is also important that the architects of the protocol think about the geometry and content of commitments. Should core members of the carbon taxation club — that is, members of the protocol — agree to a common level (or minimum level) of taxation? If so, should they also commit NOT to adopt other policies that might interfere with taxation, such as subsidies, or should the protocol just begin with taxes?

I also want to flag the issue of revenue recycling. Quite often, talk about carbon taxes leads quickly to lots of fast talking about the need to set aside some or all of the revenues for special purposes, like energy R&D or low carbon subsidies. I would counsel against setting standards for how the revenue is spent as part of the protocol. To some degree we don't strictly care how the money is spent, so long as marginal emitters see proper marginal prices. And politically, we care a lot about the ability of national governments to recycle revenues in ways that let them build and sustain political support for carbon taxes. If we don't do that then the government support for the carbon taxation protocol will be small. Maybe the protocol should set up a process so that after a period of time the use of revenues gets examined and standards developed — much as the OECD and IMF and other international institutions have, over time, helped its members adopt smarter tax and economic policies. The process for

looking at revenues, over time, probably needs to put a sharp spotlight on perverse uses of revenues — such as for corruption, for carbon-intensive subsidy, and the like.

I think this protocol needs to include some discussion about what the border tax adjustment issues are going to be, and the strategy for addressing those. I'm convinced, as someone who's not a lawyer, that success in applying border adjustments will require a large enough group of protocol club members so that the border adjustments are seen as legitimate. We know that will be crucial to ensuring that border measures are consistent, broadly, with the existing jurisprudence in this area. We know that unilateral action will not be legitimate. And we know that universal action is not feasible. But what we don't know is what the middle ground looks like. And, we don't have a sense of strategy of how many countries would need to be involved in order to have the norm be legitimate. It almost certainly is going to be an issue that's challenged, then, inside the trading regime. If the protocol had some standards and strategies for border measures that would probably help raise the odds that these measures are seen as valid when they are challenged through the WTO dispute resolution system — the WTO's Appellate Body needs some political cover for finding that border measures are valid and legitimate. The protocol can help that process.

I have some big reservations about the world "protocol." One reason we should be concerned about this is that it immediately creates the image of a UNFCCC protocol. That puts us into the world of consensus decision-making, and it guarantees the participation trap that the protocol is trying to avoid. Consensus rules will empower the countries that want to block the club and block action. That is not a hypothetical risk — it has been a constant problem over the history of the UNFCCC and in other consensus organizations such as the IPCC.

And so, I think what you want is a "friends-of" process, or something like that, as opposed to a protocol. You want some kind of fast start countries to do something in a framework that seems plausibly legitimate and can sit under the umbrella of Paris. But you don't want something married to the framework convention on climate change.

That's going to make a lot of people very upset, especially people who get excluded, small countries. This was, of course, part of the explanation for what failed in Copenhagen, is the small countries got really pissed off because they weren't in the room when the core deal was done.

It is probably also important that you consider whether the protocol should have some content beyond mitigation — so that it isn't just seen as a cabal of large emitters. The smaller emitters, which tend to be poorer countries, are increasingly concerned about the impacts of climate warming.

Analytically, an emitters club focused on carbon taxation may not have much to say, strictly, about how the poor and most vulnerable adapt. But for optics and politics it is important not to ignore that a huge part of the legitimacy of any collective effort on climate change requires that the most vulnerable see some tangible benefit from the scheme. Maybe this shouldn't be part of the carbon taxation

club, but there might be other clubs developed in tandem--including clubs working on the things that those countries, that the most vulnerable, care a lot about.

We must be careful in creating the mechanics and political momentum for a carbon taxation club not to lose sight of the larger problem at hand. It is about massive transformation of energy and land use practices. It is about dealing with the inevitable reality of lots of climate change — more, probably much more, than the widely discussed 2 degrees. Analytically those other aspects of the problem often get ignored when we focus narrowly on one aspect of this problem. But politically it is viable to have a strategy for all the main fronts. Thank you.

Eric Toder

First of all, I want to thank Ernesto, and Bill, and Haynie, and everyone else involved in organizing this conference and for inviting me here. It's been a great pleasure and I've learned a lot from the comments of people over the last couple of days.

I have to make a disclaimer, as well as the usual disclaimer, that I'm speaking for myself and not for any institutions that have ever employed me. I'm also not a political expert of any kind; I'm a trained economist, and usually when reporters ask me to comment on particular prospects of particular legislation, I say no. Ask me what it will do, not whether it will pass. So, I'm out of my comfort zone a little bit, but here goes.

First of all, I'm going to talk about the United States issues mainly because that's what I'm most familiar with and also because I think there's realistically no chance of any kind of harmonized carbon price agreement unless the United States is on board with the concept of taxing carbon. So, a prerequisite is to get the United States on board, and that's going to be very challenging. In the current situation, I can assert there's no chance that anything will happen before the next administration.

There has been a lot of discussion about tax reform, and so tax reform could be the vehicle for something, and there actually is some conceptual agreement between the Obama Administration and Republicans on the shape of what corporate tax reforms look like. But, the areas of agreement are at a very high level, they are not on the details. There are an awful lot of details to be worked out and the window for acting before the campaign season is upon us is closing fast. If nothing is done by September, nothing will be done, because everything will be caught in a political season.

A main obstacle to action is that Congressional Republicans have not yet come to terms with how to talk about climate change. Many in the House will not acknowledge it as a man-made phenomenon, and even in the Senate, I was told only five Republicans were willing to vote for an amendment that simply stated the scientific consensus. So, there's a huge, huge political divide on this. The political environment is so bad that we can't even pass an increase in the gas tax to pay for highway funding. That was something that was routinely done in past years, including under Ronald Reagan.

There have been some rather bizarre proposals for funding highways, one of which came from a Republican member who asked us for some distributional estimates. His proposal was to have a gas tax, but to accompany that with a cut in income taxes focusing on low-income people, which would leave the whole tax change revenue-neutral. Of course, that means that would be deficit financing the highways; you would just get the money going in the trust fund and then take it out of general revenues.

The other proposal has been spoken of favorably by the Obama Administration and that's to use the revenue from a one-time repatriation tax on corporate assets held overseas to fund infrastructure. Of course, that's not a permanent source of funding, that's something that can only be used once, and even then, it's problematic, because it would require an agreement on international tax reforms, which will be difficult to get.

So, having started on a negative tone, I'll say a few positive things about what's going on. There certainly is, among the think tank community, among the so-called "policy-wonk" community much more support for carbon tax than there's been in the past. The thinking on carbon pricing is moving away from cap and trade, and towards a carbon tax. There have even been some proposals; Representative Delaney of Maryland introduced a proposal for a carbon tax, a corporate tax trade-off. There is support from Republican and Democratic think tanks.

We participated in an exercise funded by the Peterson Foundation recently. Peterson's main interest is in the long-term budget problems. They asked five think tanks — two from the left, two from the right, and one from the center — to put forth their ideas for how to deal with long-term budget issues, and it's interesting that there was some support for a carbon tax and also gas tax increases from both sides of the political spectrum.

The American Action Forum, one of the Conservative groups, did not propose anything, but the American Enterprise Institute scholars proposed to increase the gas tax by 30 cents per gallon, and index it to changes in the Consumer Price Index (CPI). That increase would be to fund highways. They also proposed a modest carbon tax starting at $4.00 per metric ton in 2018, and increasing at inflation plus 2 percent per year afterwards.

In the center, the Bipartisan Policy Center proposed increasing the gas tax by 15 cents per gallon and then indexing it to the CPI. They did not have a carbon tax proposal.

On the liberal side, the Center for American Progress favored increasing the gas tax and replacing it ultimately with a tax on vehicle miles traveled. They would also impose a carbon tax, beginning in 2027.

The Economic Policy Institute also favored increasing the gas tax, and imposing a carbon tax at $30 per ton, with the additional stipulation that half the money would be used to pay for lump sum rebates to low-income households. So, there's a lot of people interested. We had a conference that Adele Morris was participating in, and Adele and Ian Parry, were co-sponsors, along with Rob Williams. They have finished editing a very interesting book on carbon taxes. The event at which this book was released was held at the American Enterprise Institute, and Adele and Aparna Mathur of AEI, both spoke in support of a carbon tax.

We also had Representative Delaney and a former Republican Congressman Bob Inglis from South Carolina, both of whom spoke favorably of a carbon tax, corporate tax trade-off. So, those ideas are in the air. I think the corporate tax trade-off is particularly attractive politically, leaving aside what its economic benefits may or may not be.

It certainly would be a way of getting on board groups that would generally not be sympathetic to a carbon tax, who would favor lower corporate tax rates. Another way of looking at it, of course, is you might think of the carbon tax as a way of paying for corporate tax rate cuts, which are quite challenging to pay for by reducing corporate tax preferences alone.

So, that's the good news. The bad news is that even after 2017, there are major obstacles to any change. Opposition from the Republican Congressional leadership, and the Tea Party wing of the party will continue, and the political campaign may very well solidify this opposition. We'll have a lot of competitive primaries, and in competitive primaries there's a tendency for politicians to appeal to the most extreme elements in their parties. So, I think if progress on a carbon tax is to happen there

will need to be a lot of back-pedaling by Republicans after the election; not something that politicians haven't been known to do, but it raises some challenges.

As far as the environmental groups, they're focused now on the President's new rules for CO2 emissions on power plants. Many of them prefer a regulatory regime to a carbon tax. They view regulation as a more certain way to reduce emissions and are less concerned about the economic efficiency aspects. They might, nonetheless, support a tax, but for many of them, only if it is not premised on elimination of the EPA regulatory authority. So, they would not necessarily favor a trade-off between a carbon tax and regulations. They would want the tax in addition to the regulations.

So, what could change things? I made up a list, which is incomplete, in an effort to show some optimism. First, we might see pressure from industry for a tax-based regime. Once the EPA rules are in place and industry finds these obnoxious and stringent, they will be more inclined to support carbon taxes as a less unpalatable alternative. Second, the political fights, the court fights and the disputes over regulations including possible Congressional actions to block them, will increase the coverage of climate issues and increase public awareness.

Recent polls show the public is becoming more interested in climate change issues, and more concerned about climate. Anything that focuses the public on this will probably be helpful in the debate. If public opinion changes, some Republicans might start to become wary of maintaining a 'just say no' position on climate, so there's a possibility that they could be shaken loose.

One thing that was suggested to a friend of mine who works for an environmental group was that if the regulations survive all the court challenges, which seems likely, then the issue of climate, as a policy, will disappear. That will be baked into the policy baseline because we already will have climate policies in place. Then, a carbon tax will start becoming more of an ordinary environmental issue, rather than this sort of quasi-theological issue about whether climate change is real or not. So, that might improve the possibility for action.

Finally, I would add two things from the work I've been doing. One is the pressure for corporate tax reform. There's a huge amount of that. The U.S. corporate tax is way out of line, in many ways, with international practice. But the big obstacle to reducing the corporate rate is simply, how do you pay for it? Some of the various base-broadening options that would be required might actually be harmful to investment, such as cutting back on accelerated depreciation. Others are just not politically feasible.

If you look at the Administration's plan for a "reserve" to pay for corporate reform that's in their budget document — it's interesting that if you add up all their base-broadening proposals the numbers don't come near close to paying for the corporate rate cuts they favor. So, you're going to need to find something else, and a carbon tax would seem to be an attractive candidate.

Finally, the fiscal pressures and the general desire for tax reform may ultimately lead to some kind of action, and in that case, a carbon tax could well be part of the mix. And then, I would encourage you

not to think of — what three items might be used to balance a carbon tax, which is the context we've been discussing here about a carbon tax trade-off with other revenues.

Instead, a carbon tax may be included in a much larger package in which a whole lot of things are being done. So, it's not a necessity to pick this tax offset or that which is associated with the carbon tax. It's all part of some general package. And, I would encourage you, if a tax reform bill comes up, to weigh in, because when the train is running, you can get on the train. Once the train has left the station, it might not run again for a number of years. So, tax reform might be a good opportunity that should not be missed.

So, my conclusions: nothing is going to happen in the short-run. There's a huge ideological opposition to taking action on climate change in the United States. It represents a special obstacle, because the opposition is almost quasi-theological and ideological. It's also based on interest groups. Interest groups are very important here as in other places, but this additional ideological element makes it much harder to negotiate change than if it was just a matter of buying off the interest groups. Thank you.

Robert Repetto

Thank you. I'd like to also add my thanks to Ernesto and Haynie, and others here, for mounting this very valuable conference. I also don't have a Power Point, but I do have with me a flash drive, so I could give a copy of the paper I'm going to discuss to anybody who might want it.

I know almost nothing about the political economy of other countries so I'm going to talk mostly about the USA. What I have learned today is that the USA is not like China or Sweden. For example, we are not tax lovers like the Swedes are, nor do we have a state-dominated economy like China's. But I suspect that in all countries, national decisions regarding climate policy will reflect various domestic and international interests and may not always resemble those of a rational actor in game theory.

As I stand up here, you notice a lot of gray hairs. When I was at the World Resources Institute at the beginning of the Clinton Administration, we and others were putting forward a proposal for a revenue-neutral tax shift, including a carbon tax. At that time the Administration was more favorable and Congress was in Democratic hands; but that tax shift proposal did not survive the first budget negotiation.

Today, the political alignment is more unfavorable. Obama has indicated he will not put forward such a tax proposal. Congress is in Republican hands. So, as Eric [Toder] has said, the short-term prospects are not good. My former colleague here at Yale, Tony Leiserowitz, also does public opinion polling, and what he consistently finds is that a substantial majority of Americans now think the climate problem is important and that the government should do something about it. But, at the same time, a significant majority say no when asked if they would be in favor of an energy tax or a carbon tax. Taxes are not a favored instrument and I think one of the reasons is that although salience and a focal point might be useful in international negotiations, as Marty [Weitzman] said, the last thing you want in domestic politics is for the cost of an environmental policy to be salient. You want the cost submerged, so it's as hard to figure out as possible, both in magnitude and incidence.

That's a fairly pessimistic viewpoint but on the more positive side, at this point we don't have a clean slate. We sometimes talk as if we had a clean slate, but we don't. We have cap and trade systems up and running on both coasts, with buy-in from some Canadian provinces. We have a history of successful cap and trade programs dealing with other air pollution problems. Other countries, notably the European Union and China, have adopted cap and trade programs to deal with carbon emissions.

Given that experience, here's what I think is more likely to come about than a carbon tax, at least in the short run. If the Clean Power Act survives judicial challenges, then immediately we will start hearing utilities talking about the need for "flexibility" because they know that with flexibility, which is a way of talking about permit trading, they can reduce their compliance costs by 30 or 40 percent. As a matter of fact, you can already hear this kind of talk from business leaders and the EPA is encouraging states to adopt trading systems. So, what might well happen is that we'll find more states either creating or joining trading systems. In the absence of a national system, we'll see cap and trade regimes expanding from the state level upward.

And then, of course, it's possible that the same companies that are multi-state utilities and are operating in several states will say, well, we don't want to have to deal with three different systems in three different states. This will create pressure for larger or even a national permit trading system. Business interests will support cap and trade as their best compliance option. This will change the politics.

So, that's what I think about the politics. Of course, if the Clean Power Act doesn't survive court challenges, we're back to square one and a quarter, and then the possibilities of a carbon tax along the lines described here become much more plausible. However, that's, sometime after the presidential campaign and election and a new Congress is in office in 2017, at the earliest.

So much for domestic politics. On the economics side, I'd just like to make a couple of points. First, although we all know it, because so far nobody has said it, it's still worth saying that in an upstream cap and trade system, if the permits are auctioned, then there's fiscal equivalence. Everything that we've heard from Dale [Jorgenson] about a double dividend and from Gilbert Metcalf about tax incidence carry over from a carbon tax to an upstream cap and trade regime. Also, administratively, the

two are equivalent because the permitting and taxing points are the same. You have the same number of permits as you have entities subject to the tax.

The other point I want to make has to do with the high degree of uncertainty that many people have mentioned today. If there's some idea of what the policy goals are, either in terms of a carbon budget or a concentration limit or a temperature limit, then there's great uncertainty about what kind of a tax trajectory would be needed to get there. There's a great deal of model uncertainty, which we've seen in the work of the IMF and the work behind the social cost of carbon and in Massimo's presentation.

There are also a lot of parameter uncertainties. Last year I joined the army of people doing Monte Carlo studies with Bill Nordhaus's DICE model. My colleague and I have varied stochastically a number of parameters describing the generation and mitigation emissions and also some parameters on the climate damage side. We've used probability distributions reflecting the range of estimates in the literature and drawn randomly to solve the model hundreds of times.

In these hundreds of "optimal" solutions based on randomly chosen parameters, the cumulative emissions in the solutions and the resulting temperature increase have a much smaller dispersion than the associated carbon price that would be needed to achieve those outcomes. Or, to put it another way, the coefficient of variation for the carbon price was about twice as big as that from cumulative emissions in the optimal solutions over hundreds of runs.

So, in my mind, it's a serious problem if we don't really know what carbon tax rate to apply. It's made worse by the fact that short-run energy price elasticities are about an order of magnitude less than the long-run elasticities. So, if a tax rate is adopted, it would a decade before we know what it accomplished, even aside from interim business fluctuations.

So, I conclude that a policy instrument that focuses directly on the emissions reduction needed to get to some agreed policy goal would provide greater certainty and equal efficiency. The appropriate policy choice would be an upstream cap and trade system.

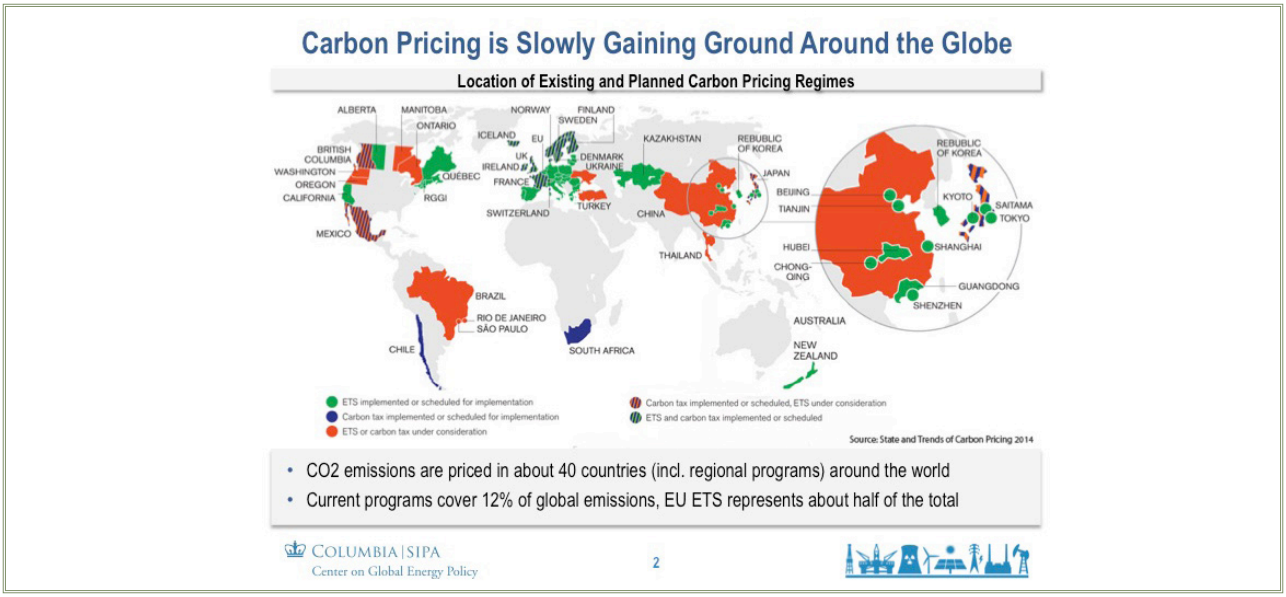
Nonetheless, what I have learned from this discussion is to think somewhat more positively about a hybrid system in which a carbon tax is either used to extend a cap and trade system to sectors that aren't covered by the cap, or to establish some sort of a price band, a minimum and maximum price, an approach that has been talked about over the years in the economics literature.

Thank you for your attention.

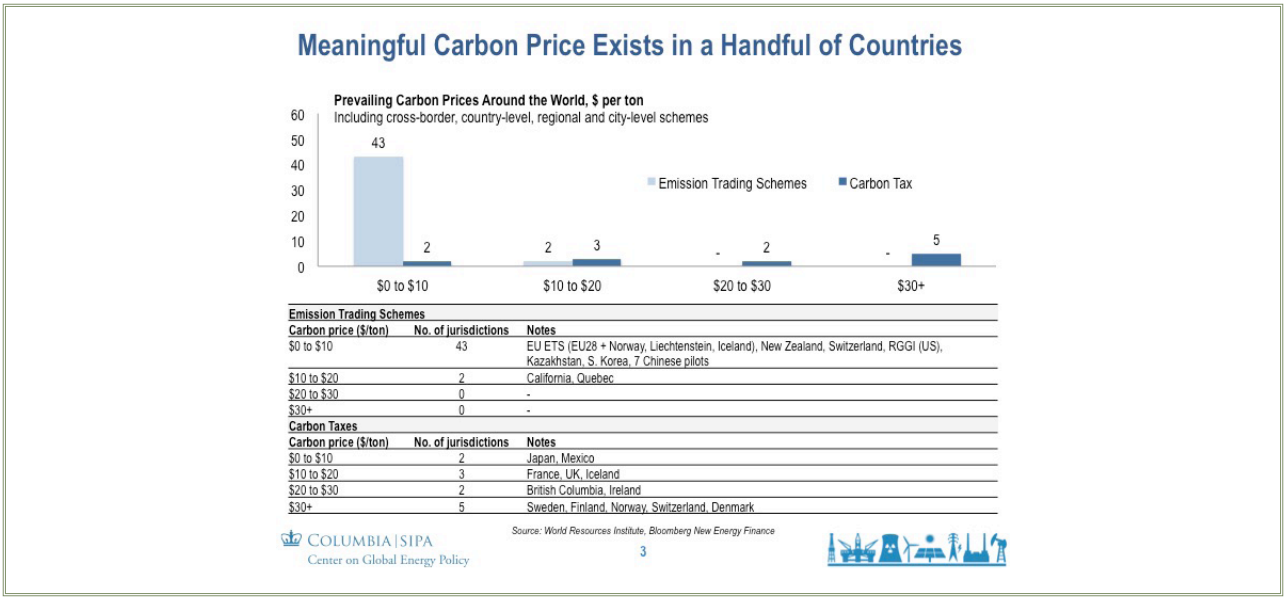
Jason Bordoff

I also want to thank Ernesto for hosting this, and for putting this extraordinary group of people together, and I appreciate the invitation very much. We have quite a large group here, so I'm going to go quickly.

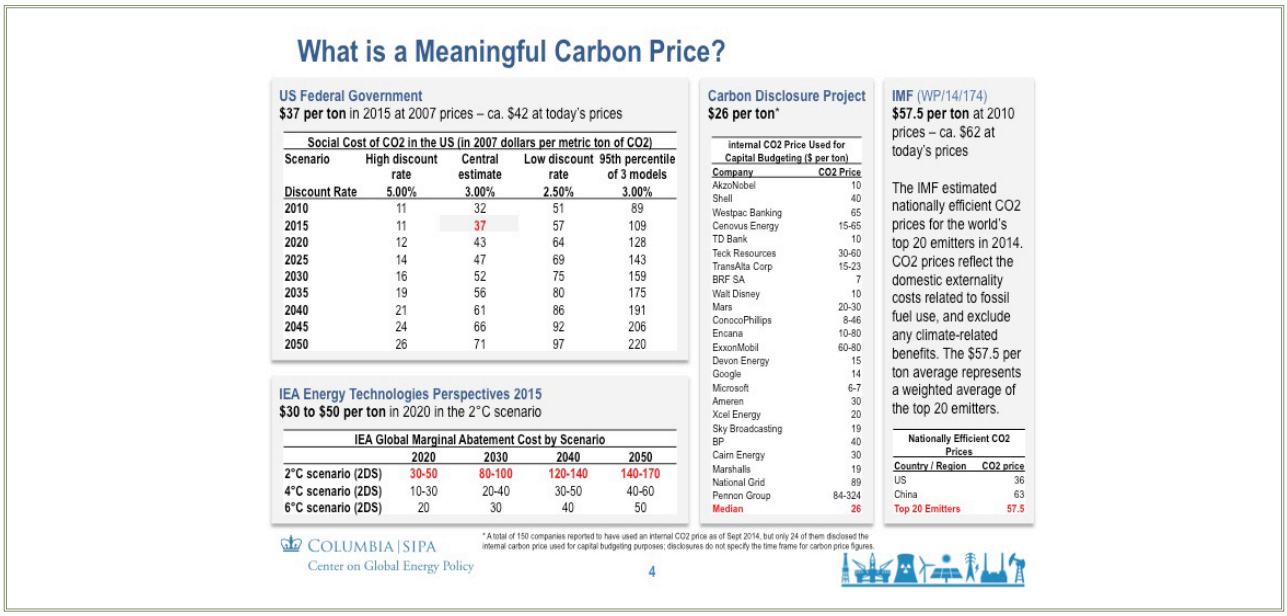
A lot of what I had planned to say has already been said. That's what happens when you go at the end of the second day, so I can move even more quickly, and make a couple of points on the political economy, of how we think about pricing carbon that I think are important to consider given the conversation, in particular, that we had yesterday. I'll talk mostly about what's happening here in the United States, but a lot of it can be applied outside the United States, as well.



So, we saw all this yesterday. We can move pretty quickly through this, in terms of where carbon pricing is happening, or is being considered around the world. Lots of places putting carbon prices in place, though lots of holes in how these are applied, in terms of how economy-wide they are, and also in terms of what the actual levels are. So, you can see that very few have what we heard yesterday in the form of Sweden.



Most carbon prices that exist are in the form of a trading system, not a tax, and most have a fairly low price. Very few have the kind of things we would expect or would want to see, in terms of what the social cost of carbon and other broad estimates would suggest. So, how high should the price on carbon be? There are lots of different ways to think about that.



You can take lots of different ways of looking at this, but in any scenario you look at, the kind of things we saw here are, for the most part, not anywhere close to where they should be.

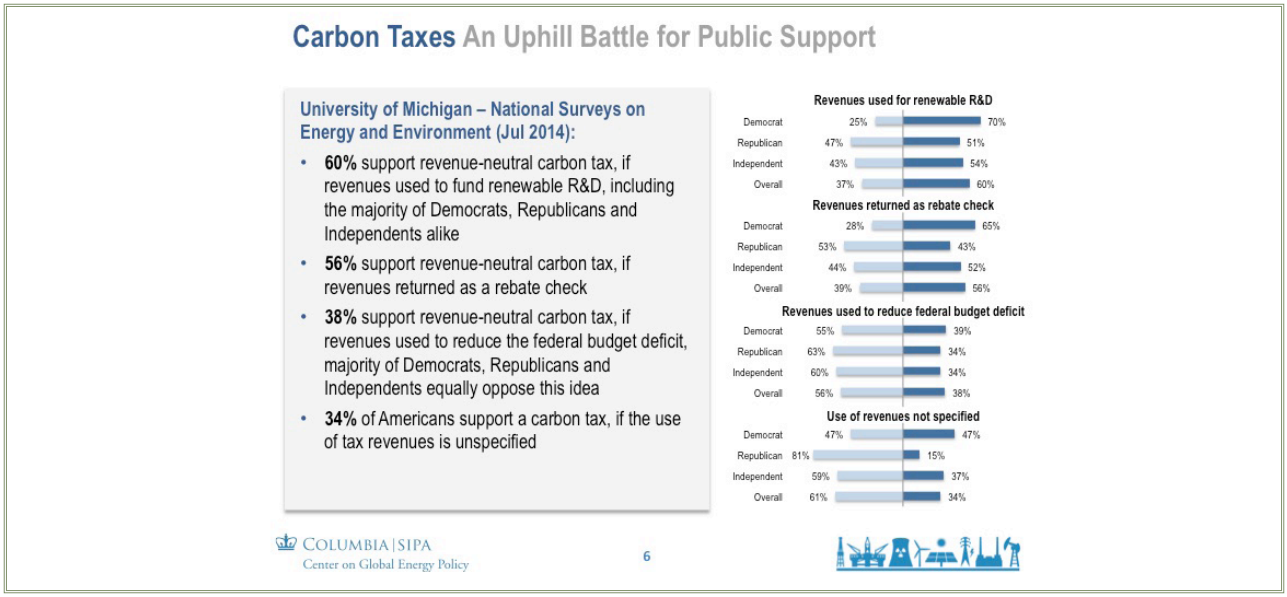
Exxon's gotten a lot of good press out of its supposed internal carbon price. My understanding is that this is a price that they impose internally as a hurdle rate for their projects, as they think about what they would need to pay for direct carbon emissions from new projects. If they think about global oil demand and where it's headed, if a price that high were actually to be put in place by nations, what that would do to oil demand. So, those are two quite different things.

So, what we've mostly seen are trading systems, and we've seen that those are quite difficult to implement. They have faced a host of problems that result in a low price, as we've seen in Europe and elsewhere, issues with who captures the rents, and free allowances. There is lots of overlap with other existing policies.

They create all sorts of inefficiencies in different places, and if you are a country, for example, that heavily subsidizes renewables, has a low price on carbon, doesn't like shale gas, doesn't like nuclear, it turns out you get more coal use, and we've obviously seen things like that start to play out in some European countries.

Carbon taxes are not hugely popular, either. There is some evidence to suggest that if you frame the question the right way, and depending on what you do with the revenue, you can start to see sup-

port for carbon pricing. So, this is what the University of Michigan did in one of their recent surveys where they asked people about carbon taxes.



People don't like carbon taxes. You start to see public support build, though, when you start to talk about what the revenue will be used for, which surprised me, actually. I hadn't expected to see that, given that politically, the idea that this is third rail, we can't possibly talk about taxes, is so prevalent.

So, as a general matter, I think it's still safe to say that the public is not supportive of broad-based carbon taxes, and certainly in Washington, DC, the perception that's true is so prevalent that people can't talk about it. Nevertheless, the fact is, as we just heard from Eric [Toder], many members of the Republican party won't even acknowledge the reality of climate change. But, you can frame the question and purpose it in ways that start to see an increase in public support for direct carbon pricing.

But, given that's where we are, what that means in Washington is that what we're left with are 2nd, 3rd, 4th, 10th-best regulatory approaches. I don't think they should be discounted, in terms of the potential impact that they can have. They're

clearly not optimal, in terms of what you would want to do, of getting rid of lots of these policies, and just pricing directly the externality that you're talking about.

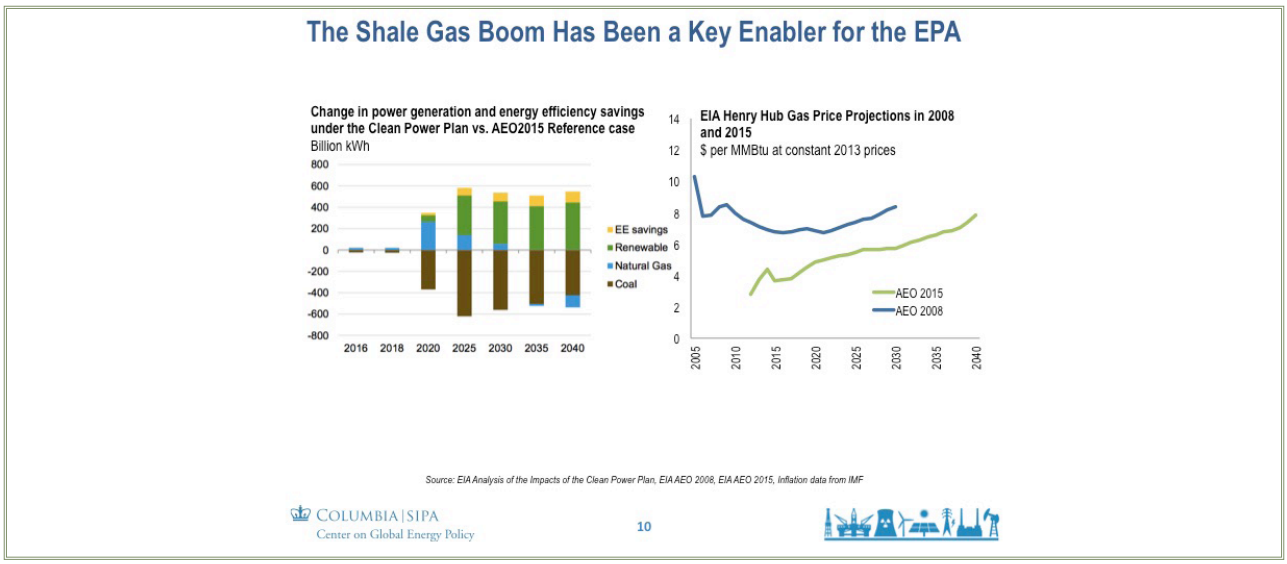
But, when you take fuel economy standards, and efficiency standards, and a host of other policies that impose costs, are duplicative, and you can have whole conversations about the renewable fuel standard, which the EPA will put out some numbers on probably in the next few days, and all sorts of unintended consequences, nevertheless, we're not sure what problem that policy is trying to solve.

But, when you put all these things together, given, as we heard from Adele [Morris] and others, that that's the reality of where our political process is, I don't think we should discount the impact that those can have in terms of achieving emissions reductions. And, why is that? I mean, there's broader public support when you talk about regulatory approaches, and we've heard the reason why, I think.

It's because from an efficiency standpoint, what you want is the most transparent price signal, and from a political reality standpoint, you want to mask the price signal, and that obviously has a cost associated with it, probably not as high as the cost of actual climate change impacts. But, it has a cost, and it's less efficient, so I think political feasibility sometimes means you need to mask the price signal.

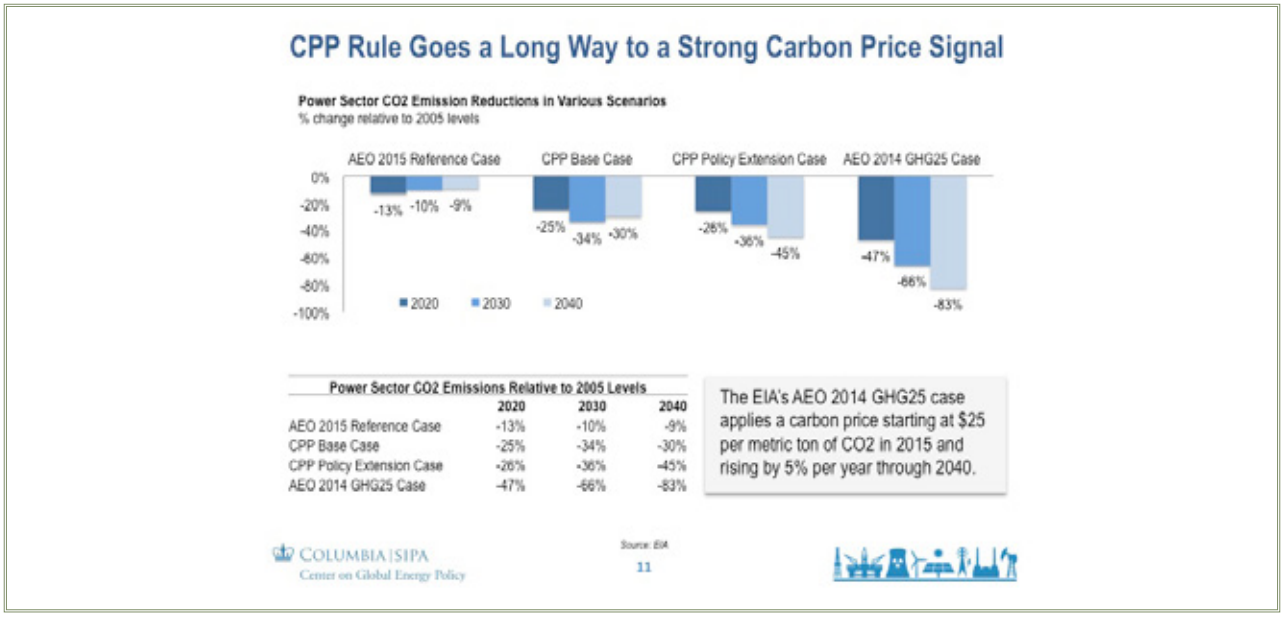
The public as a whole is broadly supportive of doing something about climate change, if you're not quite as specific about what that is. I think the Republican Party actually lags behind public opinion, and I hope this is the last Republican primary where candidates will debate whether they should actually say climate change exists and whether it's real. I think public opinion is moving somewhat quickly in that regard, so there's broad public support for taking action on climate change.

Though, obviously, it depends quite a bit on how you word the question, which is why I think there's support at a broad level, without getting into specifics, for what EPA is doing with the Clean Power Plan rule. I will note, as well, that I think the shale gas boom has significantly changed the political economy of the EPA's ability to move forward with aggressive rules in the power sector.



You can see on the left, there, the analysis that the Energy Information Administration put out a day or two ago, about what the impact would be of the Clean Power Plan, and what it does to natural demand over the reference case in the near term, and then what it does to renewables in the longer-term. You can see on the right the price projection for natural gas in the most recent annual energy outlook, versus what it looked like in 2008. I just picked 2008 because that was a peak year for gas prices; obviously significantly different.

So, the regulatory impact analysis, the cost benefit of the EPA's Clean Power Plan will look significantly different when you have very cheap natural gas in the U.S. I haven't checked the latest, but $2.60, or something like that, and reasonable in my view to think we're going to be at $3.00–$4.00 natural gas for many years to come, given the staggering production numbers we see coming out of the Marcellus, in particular.



So, where does that get you? You see here the reference case from the most recent Energy Information Administration outlook, and then the analysis they just put out about power sector. This is just power sector, obviously; emissions for the Clean Power Plant rule and the extension case assumes that those go beyond 2030, and then on the right, I took from the annual energy outlook their $25 a ton carbon scenario. Obviously, you get a bigger impact there. They also do a scenario of a $10 a ton carbon tax, and I didn't put that in there, but if I did, the numbers would be almost identical, very similar to what the power plant rule is achieving.

So, you can argue with exactly how the EIA has modeled all of this, but just as a ballpark estimate, when we see earlier on in the slide deck how few countries have imposed a carbon price above $10 a ton, and what regulatory approaches like this are able to get in the power sector, and then we can talk about what fuel economy standards are getting in the transportation sector, and other things.

These policies shouldn't be dismissed, in my view. So, I think where that leaves us is with the conversation yesterday such that we were talking about harmonization of standards, giving countries credit, trying to impose tariffs or border adjustments, depending on whether people are imposing the same standard. You heard Adele [Morris] say, I pity the Treasury official who has to sit there and figure out what the effective price of some regulatory approach is.

Therefore, the discussion yesterday suggested we need to keep it simple, we need to just focus directly on carbon prices, and not sort of give credit for many of those other regulatory approaches, and I think, from a political economy standpoint, that is not workable. It's not the reality of what many countries are doing with second-best alternatives to try to do something about climate change.

So, if we're going to have that conversation about how to bring people into the club, and figure out how to give credit for what people are doing, it has to figure out how to account for non-priced mechanisms, albeit inefficient ones, that countries are taking to reduce emissions. All these regulations, I would note as well, like the Clean Power Plant rule and other things, actually make it more likely that we may actually see public support and Congressional support build for carbon price in the longer term.

I think if we demonstrate effectiveness, that we can actually reduce emissions and not destroy the economy, and people see that we're doing these things whether they like or not, that people will recognize that if we're going to keep moving forward with reducing emissions, let's actually get behind the most cost-effective ways to do that. So, I think all these things are also consistent with, and don't undermine, the ability to put eventual carbon prices in place.

I do think there's hope for carbon price, still. We heard Eric [Toder] talk about the desperate need, that you hear many people on the Hill talking about, not to do something about climate change, but for revenue. Senators were talking about how to fund infrastructure, how to find revenue for the highway trust fund. I was talking to one Senator last week who — that was their motivation, and that led them to a whole series of other policies about sort of trades they could make, and where that revenue would come from.

The *Wall Street Journal* CEO Council did something recently, and they published the results in the journal, so there was a small group of about 15 CEOs focused on energy, and they asked me to sit down with them and moderate a session where they would put lots of energy proposals on the table, and they would vote on which ones were most important for the country to pursue, and explain why. I thought they'd come up with approving the Keystone Pipeline, or something that's utterly meaningless, but number one was to raise the gas tax to fund infrastructure.

So, I think when you're motivated by other things, like corporate tax reform, fiscal imperatives, and I do think this is probably going to need to be a Republican idea on the Hill, not a Democratic one, the idea that we want to tax carbon rather than labor or something else. Combined with the need for

corporate tax reform, it has the potential to build support over time. So, notwithstanding my general pessimism that we're going to do what needs to be done on climate change, it's still possible that we could see that happen.

I also don't think it needs to be a global deal from day one. We've heard a little bit in this day and half, too much maybe, being made of a free rider problem. I think the free rider problem is sometimes more an excuse than anything else. Although, Scott [Barrett], as you noted, if China and India showed much more aggressive and meaningful action taken on climate, I don't know if Congress would suddenly turn around. I think lots of people in coal states would find other reasons why they didn't think the United States should move.

So, I think the idea of moving on our own, with sensible policies that transition and escalate over time, working bi-laterally with other countries like China to set targets, and then see how close we can get to those targets, 17%, then 26% by 2028, and show that incrementally, we move a little bit, then you move a little bit and we'll keep going, and you keep going, this makes sense, and it's probably the most politically viable path forward. If in X number of years people in the U.S. discover that we're imposing costs on ourselves and no one is joining, and no one else is going along, I suspect political support for that will fade, and we'll walk those policies back, because we're in fact not solving the global problem, we're just incurring cost, and everyone else is free riding.

But, that probably feels more viable in how you build support than the idea that certainly not the entire UNFCCC, but at least even the major emitters will get together on day one, and agree on an approach that solves all concerns about the free rider problem. I look forward to the conversation. Thank you.

James Stock

Thank you very much. This has been a fascinating conference and I am grateful for the opportunity to make a few remarks.

I admit at the outset that I feel like a bit of a carpetbagger in this room, which is full of people who have spent their careers working on climate issues, while I have not. But I have been working on climate issues a great deal for the past several years. I spent a couple of years as a Member of the Council of Economic Advisors until last fall, and my portfolio included energy and environment issues. In particular, I led the CEA efforts (and was the senior White House economist) on the proposed Clean Power Plan, the Social Cost of Carbon (SCC), and a number of other climate and energy issues.

At a very high level, there are three roads that the U.S. might take on climate policy. One is the road that we were on for a long time, which includes clean energy subsidies, energy efficiency rules, regional and state renewable portfolio standards, and other such policies. While those policies are well-intended, overall they make only small contributions to emissions reductions, certainly contributions that are small relative to the enormous magnitude of the emissions reduction challenge. This

path is better than do-nothing, but it is far from enough

A second path is adopting a carbon tax. That path has a broad constituency among PhD economists. Indeed, if the climate problem were just left to the American Economics Association, we would have solved it a long time ago. But there isn't an AEA caucus in Congress, and the politics of a carbon tax are daunting at the moment to say the least.

Then, there's the third path, which is the path that the Administration has gone down. Under this third path, the Administration is aggressively using existing authorities, mainly under the Clean Air Act but also under other laws such as the Energy Independence and Security Act, while being careful to stay within the law. My goal in this talk is to lay out some details on path three and to make the case that path three might go a very long ways towards constituting a sufficient climate policy. I should be clear that, like almost all economists, my preference is for a single economy-wide price on carbon (path two), but absent that, there are reasons to believe that the regulatory approach could yield very significant emissions reductions and transform at least the power sector into a low or even zero-carbon sector.

Let me digress for a moment to add that part of path three is the Administration's emphasis on education surrounding climate change. In his first press conference after his 2012 reelection, the President was asked a question about climate change. He could have ducked the question, but instead he went on eloquently about how while we're not ready for a carbon tax at this point, there's a lot of education that needs to be done, and we need to move forward under existing authorities. So, the use of administrative authorities has been partnered with education from the beginning of the term. And there have been a lot of educational materials, one of the first of which was a chapter in the Economic Report of the President a few months later, in 2013, on the economics of climate change. Many government agencies, including National Oceanic and Atmospheric Administration (NOAA) and Department of Energy (DOE), have written and disseminated a large amount of excellent material going over the science of climate change for use by the general public.

Aspects of what I'll be calling path three, which is using existing authorities, has been discussed, and so I'm going to add some gloss, then address the question: if we are going down path three, does going

down path three make it more or less likely that we actually adopt a carbon tax? I will argue that it makes it more likely, but I might be wrong.

The fact that I might be wrong — and of course, we don't know — is really important and has two big implications. One big implication is that we had better do path three as well as we possibly can, in a way that will efficiently affect meaningful long-term change. I'm going to argue that is possible. The second big implication is that we need to bear in mind that the United States might remain on path three as we discuss the structure of international agreements.

The most important mitigation elements of path three (and the President's Climate Action Plan) are the Clean Power Plan and the Corporate Average Fuel Economy (CAFE) standards, which have been completed for light duty vehicles and which are gearing up for heavy duty vehicles. What I want to focus on is something that hasn't come up so far, which is that the proposed Clean Power Plan compliance deadline is 2030 in the EPA's Option 1, and that the plan is silent about what happens after the final compliance deadline. But the legal requirement to regulate under the Clean Air Act does not expire — that requirement was triggered by the EPA's previous CO2 endangerment finding, so the requirement to regulate continues even after the 2030 compliance deadline. What this means is that at some point in the early- or mid-2020's there will need to be a second round of rulemaking for post-2030 emissions. This fact has received very little discussion, but is extremely important for thinking about the efficacy of path three.

If we go back to Section 111(d) basics, the framework for thinking about what those standards might be is thinking about what the best system of emissions reduction (BSER) might be, standing in say 2023 when the proposed post-2030 rule could be circulated. People who are familiar with the proposed Clean Power Plan rule are familiar with the four building blocks which EPA has very carefully laid out. Those four building blocks are grounded in technological options that are currently available — in the language of the Clean Air Act, emissions reduction technologies that have been "adequately demonstrated." In the proposed rule, those adequately demonstrated technologies involve maintenance at fossil-fuel fired facilities, reprioritizing dispatching, extending nuclear plant lifetimes or building renewables, and so forth — a very detailed command-and-control approach to the best system of emissions reductions. But what's the BSER technology going to look like for reducing emissions in 2023?

Well, presumably, by 2023 there will be a fair number of regional cap and trade programs--in fact, there could be a large number of them if the final rule were to preference trading systems in terms of ease of administrative compliance and if the Federal Implementation Plan were to favor cap-and-trade methods over far less efficient command-and-control methods. Those regional cap and trade programs will have been put in place to reduce emissions in the electric utility generating sector. So I would argue that in 2023 the best (most efficient) system of emissions reductions that has been adequately demonstrated is one that many states will have chosen to implement. At that point, then, the BSER, becomes regional cap and trade programs.

If in 2023 the preferred emissions reduction technology is a regional trading system, then the main remaining technical question is how the emissions rates should be set. At that point, any economist can tell you that the emissions rates should be set so that the marginal benefit from emissions reductions equals the marginal cost of the reduction. Under that logic, the post-2030 Clean Power Plan would be regional (or possibly even national) cap and trade systems in which the emissions caps (mass or rate) would be set so that the shadow price of the permits would equal, say, the social cost of carbon.

The requirement to regulate under the Clean Air Act also extends beyond the power sector. This suggests that the next round of regulation would extend to non-power sector stationary sources such as refineries and manufacturing.

You can imagine a similar process working there, in which the first round of BSER is command-and-control heat rate reductions and so forth, but allowing compliance by regional trading; then the second round of BSER would be regional trading so that the shadow price on carbon can be set to the SCC. I don't know enough about the legal history of the Clean Air Act to know whether you could permit trading across a sector, for example a utility could build a solar farm and sell the credits to a manufacturer who would find it very costly to shut down a particular fossil-fuel fired facility. If that cross-sector trading is possible, then you could see a path for all major emitters to be in a national cap and trade system by the early 2030s, where emissions targets are set by back-solving from a permit price that equals the SCC. There would be efficiency losses if these markets had to be sector-by-sector, but perhaps those efficiency losses would be modest. So, you can imagine, through the Clean Air Act authorities, in the most optimistic scenario, actually moving in a direction that would be a workable second-best, nearly first-best, solution.

Let me digress for a moment and point out that this regulatory, path-three approach also works for non-CO2 GHGs, an issue we have not spent much time on at this conference. Indeed I am persuaded that in many circumstances a regulatory approach, as opposed to a tax, is the most efficacious way to deal with non-CO2 GHGs. For example, fugitive methane emissions from oil and gas operations are very difficult to measure (the sensor/continuous time monitoring requirements are prohibitive) so any price mechanism would not work well. But it is easy to mandate and spot-check operational procedures for say liquids unloading, or certain specs for valves and seals, and in such applications the regulatory approach seems to me to be preferred to a fee approach.

It is true that this long-term path three vision is not first best because it is not economy-wide, and in particular the tools available for the transportation sector, and its dispersed many-emitter nature, makes a cap-and-trade system for the transportation sector under the Clean Air Act seem like a stretch (although this is a great topic for economists and lawyers to join forces on to research). And although I'd prefer to see a path two, economy-wide solution, I think we have to be responsible by thinking about how we can make the path-three second-best solution as effective and efficient as possible. As I have tried to argue, on a longer horizon I can imagine path three being nearly first-best, with the main exception of not dealing very well with the transportation sector. I am willing to go

out on a limb and say that, once this is understood, the incentives for decarbonization will increase and, extrapolating from the large-model (NEMS and IPM) computer simulations I've seen, I think that there is a very good chance that this path will effectively decarbonize the power and major point source sectors by the middle of this century, possibly before.

Let me turn to the question of whether not going down path three makes a carbon tax more or less likely. A number of previous speakers have talked about the uphill fight of price regulation, as opposed to quantity regulation. I'm just going to add a small anecdote here. In the 2014 election, Massachusetts had a ballot referendum that proposed to repeal our current indexation of the gasoline tax to the CPI. Funds from the state gas tax are used for roads and bridges. What was at stake, in the first year, was an expenditure of $3.60 for the average Massachusetts driver, but that shortfall would grow and would deplete transportation repair funding over time. Well, despite the opposition of every Massachusetts Ph.D. economist I spoke with on the topic, the proposition passed, and our gas tax, like the Federal tax, is no longer indexed. Of course, this is just an anecdote. But this is a $3.60 issue, our roads are in serious disrepair, and this is Massachusetts! So, if we can't maintain gas tax indexation in Massachusetts, you know that's an uphill fight for a carbon tax. And, of course, the prospects for raising the federal gas tax (which has been frozen at 18.3 cents/gallon since 1993, are not good--even the current Administration has backed away from this very sensible way to solve the upcoming shortfall in the federal Highway Trust Fund.

The uphill fight for a carbon tax is exacerbated by its regressivity. I have no issues with Dale Jorgenson's economics and his detailed and thoughtful modeling. But, thinking about a simple, straight carbon tax designed to maximize the double dividend is not going to adequately address its regressivity, and without doing so any such proposal is, I think, a non-starter.

Let me make a few comments on the political economy of a possible transition from path three to path two. It is, of course, natural to expect opposition to a carbon tax from the fossil fuel extraction and distribution sector, and with some notable exceptions (e.g. BP) that is what we have seen. One can imagine scenarios, however, that there could be substantial movement in favor of a carbon tax among manufacturing. If a carbon tax were packaged with a winding down and eventual elimination of CO2 emissions under the Clean Air Act, I can imagine manufacturers preferring the simplicity of a carbon tax to invasive regulatory measures.

On the environmental left, there has been a significant willingness to embrace the SCC, which I will reinterpret as a very positive sign about willingness to adopt price mechanisms rather than command-and-control regulation. I'll just give you one example, in which Wild Earth Guardians and the Sierra Club sued the Department of Interior and the BLM over their authority to issue some permits for coal mining. The reason that they sued, and the reason they won their suit, was because the NEPA review that was associated with the lease this didn't use the social cost of carbon to value the climate impacts of the lease.

I should mention that path three has its own risks. First, a subsequent administration might decide to water down or slow-walk the Clean Power Plan rules, although that would be legally difficult for them to do. Second, the Clean Power Plan will be litigated, and there is legal risk involved. Is there more that could be done within existing legal authority? Adele [Morris] said that, basically, we're doing everything--I would actually argue that that's not completely true.

There's still at least one more major tool in our arsenal. It has appeal that's akin to Yale adopting a carbon tax. Even though we do not have a price on carbon, the federal government could still apply a carbon price to its own resources. In particular, 40% of the coal that we burn in the United States comes from Federal land, mainly (but not solely) out of the Powder River Basin.

For Federal coal, it turns out, under the Mineral Leasing Act of 1920, we have a lot of authority to set the royalty rate as long as it is done for a solid reason (non-capriciously). There's a nice analysis of this, actually, recently, by a Resources for the Future paper a couple of months ago by Alan Krupnick, Joel Darmstadter, Nathan Richardson, and Katrina McLaughlin. They point out that the Federal government has legal authority to add a carbon adder to the Federal coal royalty. Because Federal coal comprises 40% of domestic consumption, if coal royalty were pegged to some fraction of the SCC it would have significant aggregate effects on emissions. The effect would depend on the amount of the carbon adder and how that adder interacts with the Clean Power Plan (and we don't yet have the final CPP rule). I suspect that the effect of this action would be the same order of magnitude as the CPP, relative to the no-CPP baseline, and in that sense this proposal provides a backstop to the CPP if important elements of the CPP are thrown out by the courts. And, again depending on the interaction with the CPP, an increase in coal royalties could have some degree of economic efficiency because it is simply a price mechanism, although it covers only a portion of coal, which is only part of fossil fuels.

Let me just leave with four questions, or really action items, for this group and for economists in general.

First, as I mentioned above, we need to think about the optimal carbon tax with the side constraint not just of revenue neutrality but also subject to distributional neutrality (no regressivity). Even with this side constraint, there will still be considerable revenues for recycling. What is the best way, from the perspective of economic growth, to recycle the revenues and obtain a double dividend while maintaining distributional neutrality?

Second, if we had a carbon tax, what would it actually be? We all know that there is considerable uncertainty surrounding the social cost of carbon, and coming up with a single number is always hard for economists. But if you're going to have legislation, it needs a number. The numbers that are being used now, for example in Whitehouse-Schatz, are just using the USG SCC, but I bet if we started actually paying it, that'll be getting even closer scrutiny, and so additional research in that area's more than warranted.

Third question is, we know whatever we choose, that the social cost of carbon and our understanding of damage functions is going to be evolving. So, how do we make sure that whatever taxing regime we go into is going to be one that can take into account evolving understanding, and the evolving nature of the science. Is there a way to index the carbon tax or adjust it as the science evolves, which will prove politically acceptable?

I think a fourth question is what options do we have in path three. I've listed one, which is the Federal coal, and maybe there are others. I don't know if there are any others that provide meaningful emissions reductions, but that's a question.

Let me close by turning to the basic issue of the conference, which is an international carbon tax arrangement, or at least an international carbon price arrangement. As a practical reality, given the problems we have domestically, I would argue that we need to think about an international regime that allows for much more heterogeneity in terms of ways that individual countries accomplish their goals. I firmly believe that the United States is taking leadership in this area now, and can continue to lead, while using existing authorities and pursuing the regulatory path three. It is important that an international regime can accept a country that makes meaningful progress and has ambitious goals, but accomplishes them by means other than the first-best carbon tax.

Matto Mildenberger

Thanks so much. As one of the handful of political science interlopers here, I appreciate the invitation to speak about the political economy of carbon pricing. I'll offer reflections on some political complications that we need to address to coordinate a globally harmonized carbon price.

Much of my recent work has involved detailed empirical examinations of the political histories of carbon pricing across advanced economies. These have included Norway, Australia, Germany, and the United States. Now, climate policymaking is a collective action problem, and I think that a number of the scholars here have already thoughtfully described the free rider aspect of the climate problem.

But climate policymaking is simultaneously a distributive conflict problem at the domestic level. So, even if we can solve the participation problem and create a carbon club in which there are net welfare benefits for different countries to join, this won't by itself guarantee that individual economic stakeholders within each country — stakeholders that may be politically connected or politically influential - will also enjoy net economic benefits. There will always be individual economic losers from climate policy who will contest national climate policymaking efforts.

So, we need to pay more attention to the distribution of resources and the distribution of influence amongst these economic stakeholders and carbon polluters at the domestic level. And we need to find ways to solve the domestic distributive conflict problem simultaneously with the global free rider collective action problem.

What I'll suggest today is a series of principles that we can use to supplement our economic evaluations of different climate policy instruments. I'll argue there is a lot of value in thinking about the political properties of different instruments to shed light on the political viability of different carbon pricing policy designs.

Let me make three points that cast, I think, some light on the trajectory of political conflict at the domestic level over carbon pricing. During our conversations, we've talked quite a bit about policy feasibility. Can we create a political coalition at the domestic level of economic winners that will enact national climate policies with net benefits for the entire country?

We've also talked a bit about some of the struggles to implement such an efficient carbon tax policy in the U.S. I know some scholars — David [Victor] has written about this in the past — have described how specific policy instruments can provide particular political benefits. For instance, emissions trading may provide benefits for politicians seeking to build a support coalition because emissions trading creates a new set of assets (e.g. allowances) that can be used to compensate producers and economic losers. Even better, these assets are somewhat submerged and non-transparent, so they make good pork.

More broadly, I think policy durability is a really important political dimension to bring into these debates. It's important that policies are not only enacted, but have some form of institutionally and politically durable support over time. And, I think, here, thinking about the Australian case is quite instructive.

Australia struggled for a very long time to implement an emissions trading scheme, and eventually managed to in 2011. However, there was a lot of political controversy over what the carbon pollution reduction target should be in that scheme. The strange political compromise that Australian legislators came to is to create an emissions trading system, but defer a decision on what the carbon pollution reduction target would be — that is, what the cap in that system would be — for four years.

But then, they needed some carbon price in that interim bridge period, and so they created a fixed price for that period. So, we talk about Australia having had a carbon tax — it was effectively that — but it was technically a temporary fixed price within an emissions trading framework. Now, at the same time, there was enormous political uncertainty about that policy. The opposition party at the time, the Liberals, promised to repeal the policy outright if they came into government.

As a result, many companies, rather than making long-term investments in the carbon intensity of their economic practices, they instead chose to treat the fixed price as a short-term levy, gambling on its potential repeal in the coming years. Subsequently, when the conservative Liberal party, did, in fact, win government in 2013, they pushed through a repeal. And, in part, that's because the fixed price carbon tax that had been around for the last three years had created a lot of economic losers, but hadn't created economic winners or stakeholders with a vested stake in the policy's continued existence.

In this way, I think that one property of emissions trading that we don't often think about, is whether there's a certain institutional durability built into the nature of a policy instrument. Allowances, as an asset class — particularly when there's some tradability with future banking, allowance banking, or borrowing from the future — creates a series of assets that are forward-looking, and are on company's balance sheets in the present. So, it brings a class of future benefits into current political debates.

I suspect that Australia would have had a very hard time repealing their carbon price if the system was already in its floating emissions trading scheme phase, because that would have involved the government destroying assets that were already in existence on corporate books.

We also ought to think about the durability of the link between the revenue source and the benefit source, that is between the costs and the benefits of a carbon pricing system. Imagine we get a grand bargain where a carbon tax is introduced as a trade off for cuts in corporate income taxes. Can we guarantee in 10 years that the linkage between these taxes will still be around? Isn't it just as possible that, in the context of a new financial crisis, or in some new political environment, politicians will find a new revenue source to fund the benefit side of the equation — or simply cut the carbon tax altogether because its to their political advantage to do so in the future. This means we need to think about mechanisms that can enhance the durability of any carbon tax bargains.

We also need to think about adaptability. There is so much uncertainty about what the appropriate carbon price, or carbon tax, should be. We should expect that as climate science improves, as economic models become more sophisticated and measurement improves, we'll need to calibrate and recalibrate the level of carbon taxation, or the cap in a system, over time. And, finding ways to think about how we can make that process of adjustment more politically viable in five years, or in 10 years matters a lot.

We might imagine that a cap is somewhat more adjustable in the future, simply because the cost of a cap adjustment on, for example, consumers will be more indirect and more difficult to mobilize politically against. By contrast, if we depend on a grand bargain to implement a carbon tax, can we depend on the existence of another grand bargain five or 10 years down the road to facilitate necessary changes to the tax level?

Now, I don't want to suggest that there is necessarily a rank order of the political viability of these different policy instruments. I think that probably the political economy of these different policy instruments is differentiated by the domestic political institutions that exist in different countries. But, I chose these examples — given the sort of conversation we have been having — to make a brief, defense of emissions trading when the political economy of carbon pricing is considered.

That is not to say that emissions trading is the way to go, but to say that we must at least consider the political properties of these different policy instruments, and the particular political economic benefits that each offers. For emissions trading, this includes the creation of the easily distributable assets, forward-looking assets protecting against repeal, and more submerged and non-transparent costs to facilitate future recalibration of the policy costs.

Let me make just two more points. I know we're running dangerously close to lunch right now. Climate policy making from a political perspective is not a one-shot game. It's going to involve not just an initial reform, but a series of reforms over multiple decades. So, from a political economy perspective, we would do well to think about the way in which the current actions we take now shape what is politically possible in the future. You know, which political actors will face costs in the short term, how will those costs reshape the distribution of power and influence during future rounds of policy-making conflict.

And, I think this raises a somewhat provocative idea that it's not clear, in the short-term, that the sequence of carbon pollution reductions is immaterial. The choice of who and where to impose the initial units of carbon pollution reduction can have quite significant implications if these choices reshape the distribution of future resources.

Take for example the Clean Power Plan. This is a quite inefficient policy. However, by imposing direct costs on the coal industry it might actually reshape the political economy of the carbon taxation debate in five, or six, or seven years. This will happen if the political influence of coal industry on the debate weakens as a result of costs imposed by the Clean Power Plan. In this way, short-term policy inefficiencies might distribute costs in politically relevant ways to help unlock future political capacity to implement long-term, more efficient policy outcomes.

Let me make one more point, and that's that even if we look across advanced economies, there's significant variation in climate policy design. Often these policies, from a global economy perspective, are designed to moderate perceived costs on producers or consumers. So, even if the consumers are ultimately paying in the long run, there are significant differences in how different constituencies perceive those costs, and these have a lot of implications for the electoral and legislative incentives associated with climate policy enactment.

Robert [Schmidt] touched briefly on the BTU tax, but I think it's worth at least putting that episode on the table, given that it was this very significant domestic debate we had in this country in 1993. In fact, there was some appetite within some parts of the Clinton transition team for a carbon tax at the time. Al Gore really wanted a carbon tax, and the office of tax policy at the time modeled a number of carbon taxes as part of its deficit reduction package policy design process.

Ultimately, because of the implicit veto power of the coal states and coal legislators, there was a decision to go with an energy tax, the BTU tax. But, I think the political history of how that tax changed in design is instructive. Initially it was proposed as a very upstream tax. A number of the impacted carbon incentive stakeholders then tried to bargain with the Administration to redesign the policy to change its liability points to be more downstream.

They had quite a bit of success in this. For example, they succeeded in forcing the Administration to allow utility companies to include the BTU tax as a line-item charge on residential electricity bills.

Having demanded those compromises as a condition of their tacit support for the package, they then pivoted immediately to use these new consumer-facing policy costs as a way of mobilizing political sentiment against the tax. Ultimately, this helped undermine legislative incentives for enactment — and the policy would stall in the Senate.

You can contrast that experience with the Norwegian or Scandinavian set of carbon taxes, which are extremely producer-facing. They have often been negotiated behind closed doors within corporatist institutions — involving political bargaining between labor interests and business stakeholders, and economic and finance ministries. The result of this different policymaking context is that these taxes have tended to impose a relative distributive burden on consumers, or at least a perceived distributive burden on consumers. But, because of the sort of institutional dynamics that have surrounded policy design in these countries, carbon taxes have never been mobilized into the political and electoral domain in the way that we've seen in the U.S.

Let me leave you not with the idea that there is not a necessarily better or worse policy instrument to enact a carbon price. Instead, as we think about the development of a carbon club, and as we think about ways to engineer a group of countries to come together to solve the climate policy participation problem, we should make sure climate policy design at the national level can be sufficiently flexible. That way, domestic actors can respond to differentiated institutional contexts and political economy concerns in a way that allows them to manage domestic distributive conflict. We should work towards a globally integrated carbon price — but not towards global homogeneity in climate policy instrument choice. Thanks so much.

Discussion

Leonardo Martinez Diaz

If I could invite the speakers to please join us up here. Well, thank you for those presentations. You gave us a lot to think about. I don't know if you caught this, but I heard three ideas here that were actually highly subversive to what has come before us in this conference, and that should make for some interesting exchanges.

The first subversive idea I heard is that what we need is an international regime that allows for more heterogeneity, as each country develops its own sets of politically acceptable solutions. Now, that of course clashes directly with the idea of a harmonized tax, so I'm curious to see how we can find some way forward on this.

The second subversive idea I heard was what I would call, or what others call, choice architecture. In other words, are you for a carbon tax? No. Are you for a carbon tax to pay for subsidies for clean energy? Maybe. Are you for a carbon tax that would pay for corporate tax rebates, or for individual income tax rebates? Sure, I'll vote for that. So the outcome largely depends on the choice and how you structured it. I'm wondering if there are, then, opportunities for political outcomes that we might not have visualized.

The third highly subversive idea I heard here is bring back the emissions trading system idea. That seems to have very powerful things going for it, from a political economy standpoint. One is that they may have greater political durability, because they're harder to reverse because of this creation of assets that then creates some stickiness in the system.

So, in this context, then, where does the carbon tax come in? Is there still room for that? Is there a way to complement the two? How do we think about that? So, three good ideas. Please, Adele, the first question.

Adele Morris

I have a couple of questions. One question for Jim about taxing Federal coal. So, we might have 40% of coal use from Federal lands now, but if we tax Federal coal, the question is, how long would that last, and would you just simply lose market share to net gains? I'm sure you've thought about that, and I'm curious what you've learned in looking at that question.

With regard to the assets created by an emissions trading system, I've thought about this, and I think there is an analogy for a carbon tax. In an emissions trading system you create an asset when you allocate the allowances, right? So, if you give them away, obviously you have a large body of assets, but if you just give them away you have foregone revenue, and all the foregone opportunity for efficient revenue recycling, so that's a challenge.

If you auction them, there might be some limit to how much forward procurement of these allowances firms might want to acquire. Therefore, you might have a limited amount of those assets on the books, depending on firms' demands for having this stock of assets. But, you could do the same thing with a tax. I mean, the Treasury Department could allow firms to procure tradable tax compliance credits for future years of tax obligations.

And, there would be the same demand for those as there would be for auctioned allowances for future compliance years. And, those tradable tax credits--and, there are precedences within other parts of tax law--those assets of tradable tax credits would carry exactly the same asset value dynamic in terms of the incentive to perpetuate the program, as prior auctioned allowances would, under an emissions trading system.

Leonardo Martinez Diaz

Do you want to address that?

James Stock

Let me just very quickly on the Federal coal issue. Yes, of course there's a question of whether it would get supplanted, would there just be substitution of non-federal for federal coal. The numerical answer to that is going to require, fundamentally, a pretty complicated calculation that could be done using NEMS or IPM.

But, you can do back-of-the-envelopes based on what supply curves might look like in, for example, Appalachian coal or Illinois basin coal, and then taking into account some institutional details about how private coal is interspersed with public coal of Federal lands in the west, and it looks as though there'd be much less than one-for-one substitution.

So, you could end up with, I suspect, meaningful reductions in emissions. It would drive overall coal prices higher, but the supply curves are pretty steep for a lot of the eastern coal, and as national coal prices rise more natural gas is used. So, the actual numerical work would require sitting down with one of those large models.

Jason Bordoff

Do you think it would be net revenue positive or negative if the government raises rates, but then Federal production declines?

James Stock
Oh, positive, for sure.

Leonardo Martinez Diaz
David Victor?

David Victor
I appreciate the argument that Matto has made about the stickiness in policies that's created by, in effect, creating an asset that then people are going to organize and protect. My own view is that this argument is second-order at best, and has been radically overstated. Because, people are looking at these assets, and they watch real carbon markets, where they watch the real tax policy, they're seeing governments change it all the time.

So, the assets in play to a much greater degree. I think that might play a role here. For me, the much bigger issue is the way that a carbon tax interacts with the other policies that are operating in the same space, because in a cap and trade system, as happens all the time, every single cap and trade system is like this: you have all these other policies that then affect the value of the asset, and basically drive the prices down. Whereas, the carbon tax still remains there at the margin, sending a cleaner signal. I think that's actually a more dominant affect.

Leonardo Martinez Diaz
Eric, do you have a view on Adele's point on issuing tradable tax credits. Would that work in real life?

Eric Toder
I'm not really sure how that works, but I do think there is a set of interests that the high prices produce that would be sustained. There will be industries that develop and expand — renewables, for example — and then will have a strong interest in seeing the credits maintained, so I think anything you're going to do will have some vested interest created in favor of continuing it.

Leonardo Martinez Diaz
Prof. Nordhaus?

William Nordhaus
There are very many interesting things that have been said this morning, and I just want to address one of them. The title of this conference is "Globally Harmonized Carbon Pricing," and I don't know whether Ernesto and I are completely on the same page, but actually, I think the key point is pricing rather than taxing. So, I didn't spend much time on it, but I was quite explicit when I wrote that what a club or treaty should do is agree on a minimum international carbon price.

How individual countries would reach that price would be up to individual countries, although it has to be with a mechanism that can be verified according to a set of rules. I personally think there are great advantages, at least in some countries, of taxes. We've seen the failures and the difficulties of

quantity regimes, and you'd have to worry about how you're going to institute a floor on those if you actually do have an international harmonized minimum carbon price.

But the point that's been made here, and I think it's a very powerful one, is the purpose of this is the price. It's not to get people to adopt a tax, it's to get a minimum price, so I think the idea that this was trying to be forced into a tax mold is just incorrect. Now, I would say, just to come back to the durability stickiness point, one advantage of the treaty is that it actually does give a certain impediment to repealing — whether it's a floor in a cap and trade system or a tax, because there actually are international implications. You're not just changing international domestic law, you're also running afoul of some international obligations. Whether to include regulations in this price regime I think is really troubling. The idea that the U.S. would be able to substitute its Clean Power Plant rule and its café standards and all that, and maybe it's ethanol subsidies, and so on — well, you didn't say that, but someone will say that.

If you go down the rule of regulations, then you're opening a door. I know tariffication exists, but I haven't looked into it. I think it's a very difficult problem, and I think it's going to be very, very difficult here. So, my first inclination is not to allow carbon price-ization of regulations, but more generally, the other ways of raising carbon price would be, at least in my view, quite consistent with an international protocol.

Leonardo Martinez Diaz

David?

David Victor

The price comment is a very helpful reminder. I think this is where the protocol comes in, because it could be that what you want to do in the protocol is set that the standards for being a core member of the protocol, or the club, is you really are using price instruments, and then you lay out a set of procedures to figure out which of the regulatory instruments can be tariffied, or can be turned into price-like instruments for purposes of comparison, and which of them are truly pernicious.

I agree with you, Bill, it would be great not to have to go down that road at all, but there's going to be a real trade-off here, because the real world — you said it was a subversive idea to allow more heterogeneity — I call it gravity. This is just what's happened. The real world has all of these different instruments in it, and I think we're trying to move in the direction of more price-based instruments, but we need to find some strategy.

The other thing the protocol could do here, much as was done in the Montreal Protocol, is set up expert committees that go off and work on these problems for the benefit of the members of the protocol. So, then you've got advice that leads to clear, strategic plans with numbers on them, and ratchets, so that once a country puts something into place, it's harder to back off from that. And, that's the most important lesson we learned from the Montreal Protocol experience in the ozone layer. We could bring that experience in here, directly.

Eric Toder

I just want to throw out something completely out of left field, and I don't know if it works or not, but a question was raised the other day about our tax agreements, and the World Trade Organization (WTO) was mentioned. Of course, we do have a series of tax treaties in the international tax area with about 70 different countries. They are bilateral rather than multi-lateral. And, they address mutual interests in avoiding double-taxation. If the United States were to have some kind of carbon pricing scheme, we might have an interest in reaching agreements with other countries to do similar things.

So, there might be things we could do on a bilateral rather than a multi-lateral basis, just following that model. I haven't thought through what they are, but I'm just raising that as one thing, because that then could address very specific issues about whether we want to accept another country's policies, or they want to accept ours. That might be a different variation to achieving carbon pricing.

Leonardo Martinez Diaz

Let me collect these three comments, and then go back to the panel. Let me start on the left side, here.

Carolyn Fischer

My comment is a bit of a follow-on to Bill. We're thinking about allowing more heterogeneity in the policies. In some sense, to me, it sounds like we're getting a little bit back to the framework that we're in, the pledge and review. The distinction here is we want to keep it to be a club, and so then we need to worry that there may be some tensions with our club enforcement mechanism, especially if we're thinking about using something like border carbon adjustments for that.

In the process we went through thinking about what can you adjust, it was very clear that you really only have a good case for border carbon adjustments if you're using a price, and you're pricing embodied carbon. That's what you're asking imports to pay, implicit tariff on the embodied carbon, and then it also has to be the case that you are asking your firms producing those products to be paying for their embodied carbon. And, only a price mechanism does that, and also, that price mechanism can't be undone with allocations.

So, if you have an allocation regime that gives free allocation to your energy-intensive industries, you're going to be limited in your ability to apply border carbon adjustments in a consistent manner, to the extent that you allow a lot of heterogeneity. So, I just want to bring back the price emphasis there, and the need for that for designing trade-compatible adjustment mechanisms.

Leonardo Martinez Diaz

Thanks, Carolyn. Grzegorz?

Grzegorz Peszko

I have a comment on the instrument choice. One part of the comment is about the overlapping effects of different instruments, and often the EU ETS is called an example of the failure, because other

instruments, especially renewables support policies have interacted with the pricing on the ETS, and reduced it, and we see some unfavorable substitution in the power sector between coal and gas as a kind of side effect of it.

But tax is more immune at the margin, when it comes to the pricing. The reality is that the governments and societies have multiple objectives, and there will always be a presence of multiple policies in place. If you look at the history of renewable support policies, it has not been introduced as a climate policy in Europe. It has been introduced mainly and designed as an industrial policy. It was quite successful as an industrial policy.

A lot of European companies have been quite successful in increasing their market shares globally. They reaped their primary mover margins, then they lost them to Chinese companies. But, nonetheless, it has been a very successful policy from the point of view of the designers of the policy. Yes, it interacted with another policy, which was a climate policy, so now there is a kind of learning process, and in Europe there is now discussion, and the revision of the renewable support systems, in order to reduce these impacts.

The same goes with the design of ETS. When I moved to the U.S., I kept hearing that the EU ETS is a failure. If you give me an example which design element of ETS failed, I would be surprised, because I don't think that any of the design elements have been a failure. We discovered that pricing now was not immune to the kind of cyclical business cycles. True. So, we learned it, and now there is a decision to rectify it. But, in a way, the two main objectives of the scheme proved to be completely immune to any changes.

We first objected to this environmental one; the quotas have not been exceeded, on the contrary. The ETS is delivering the emission reduction among the regulated entities, and the costs have been contained. The markets reacted perfectly well to the changes in the economic climate, with the economic crisis and output decline, certainly emission reduction achieved by the adjusted output, so the prices reacted perfectly corrected; it went down.

We are now concerned about the long-term investment signal, and this is what triggered the correction, and the new proposal which has passed the Parliament now. So, I think it speaks to being very open-minded and very flexible when it comes to the choice of instruments, and certainly what we see from the World Bank in many different countries, it is extremely important to allow countries to really experiment with different economic instruments, and certainly I think the preference for price-based instruments is important, so I was very relieved by what Professor Nordhaus said.

At the end of the day, it is the carbon pricing that is important, and not exactly how this carbon pricing is implemented. We shouldn't be religious about whether it's a tax or cap and trade system; what we should care about is to design whichever of these instruments in a way that is efficient, that is politically feasible, and design them in a way that there is a fair amount of compatibility between them.

And, as Adele said, you can design different elements of tax systems in a way that makes it compatible with this durability advantage of the cap and trade system. In the same way, you can design emissions trading in a way that makes it very much compatible as the tax. So, I'd like to just leave it with that reflection.

Leonardo Martinez Diaz

Thank you. Last comment.

Thomas Sterner

Thanks very much. I was saying that we tend to focus so much on optimal design of policy instruments, but we need to think a lot more about what is politically feasible, and I tend to believe that, particularly in this area, policies are really made by lobbies, to a much larger extent, in many countries, and that's something that should be recognized and taken front on in a session like this. I think we hear people speak more about regressivity, for instance, than about lobbies.

But, who is the more powerful here — the poor who might be possibly disadvantaged in some occasion, or the lobbyists who have massively influenced policy-making in many countries. I think that we need to understand lobbies better. Maybe the coal lobby will be somewhat weaker now, but I worry that the gas lobby will become extremely strong, and that gas is also, obviously, a big problem with methane emissions. The smaller carbon emissions can be completely an illusion, if you take that into account.

And so, one of the hopes for policy-making, and for treaties in the future, may actually be to strengthen the green lobbies. That is done by technology policy. For reasons that we don't always understand, and that might appear strange to us sometimes, a number of countries are very prone to supporting new technologies, for instance, renewable technologies. And, there are lots of problems with this related to picking the winners, and so on.

But, it seems that at least some of these technologies have very strong increases with scale, and learning by doing, and that of course makes the point that if you put money into that, you change the cost structure. You change the relative weight of the lobbies, and you change the preconditions for the next round of negotiations about policy. This applies both on the domestic level and the international level.

I think it would be interesting, in the games that were mentioned before, for instance, by Bill. What is the lobby of the oil and coal producers? What is that coalition going to do — that's something we need to think about more. There are many areas where we need to think more clearly about lobbies. Thank you.

Leonardo Martinez Diaz

I think if you look at the cost curves for solar and wind in this country and others, I think it's pretty clear that the game has shifted, to some extent, as a result of subsidy policies. Three points out here — any reactions you want to make?

Jason Bordoff
I'm going to jump in just to say thanks, because I need to leave. We're about 25 minutes over, but I appreciate the invitation, and I'll leave my closing comments to the other five people.

Leonardo Martinez Diaz
Thank you. Any other closing — Matto?

Matto Mildenberger
Well, I might just follow up on that point, because I think if you look, for instance, at the extremely successful German subsidies for renewable energy that brought down the cost curve, in many ways that was a policy implemented because there was a political interest in doing something on industrial policy, on energy policy, but there was a political inability or unwillingness to impose costs, for instance, on the domestic coal industry.

So, coal was exempted from the German eco-tax until forced by the European Union in 2006 to bring it into their energy tax system. So, they're taxing nuclear and not coal up until 2006. So, in some ways you might say the same with the Norwegian investment in CCS. These subsidy policies are often efforts to deliver some desired political goal, when the political economy of imposing costs is very difficult within these domestic institutional systems.

I think we should be careful not to abandon those subsidy policies without making sure that there's the domestic institutional conditions necessary to replace them with some other effective policy that really drives changes in the cost structure in the economy.

Leonardo Martinez Diaz
Other thoughts?

James Stock
Let me just say one. Thinking through all of the different lobbies seems really important, I'm just going to flag one that's of concern, which is the energy efficiency lobby. And, I know you normally don't think of them as necessarily bad guys, but I think it's a potential. There's an awful lot of wide support for increasing conservation and increasing energy efficiency, but whether that's actually really an effective strategy to combat any of these issues is questionable. There's a risk of getting trapped in the wrong space in that area, in particular.

Leonardo Martinez Diaz
David, you had a point?

David Victor
Since we're wrapping up, I just want to come back to this point about multiple goals in policies, because I think there's always going to be multiple goals in policies. You really do have a big trade-off

here, because if you lay this out as a clean, price-oriented system that we would love, I think you're going to get Sweden and British Columbia as members, and then the list tapers off pretty quickly.

We do know from other areas of policy that although it's really complicated, we know something about how you can start to chip away the equivalence issue, and figure out which regulatory incentives are maybe not price-like, but are closer to price-like mechanisms than others, and create maybe the equivalent of some green boxes, and some red boxes, and so on, to help create an incentive for the membership in this protocol, or the pricing club, to be as large as possible, and to move in the right direction over time.

I think that is almost guaranteed to lead you to a "friends-of" kind of process, as I said in my main remarks, or a side agreement, as opposed to something that's actually a protocol or a treaty, because if you just look at what's going on right now in negotiations, they can't even agree on how to set up a review mechanism to review the INDCs that the countries themselves have submitted, let alone submit the INDCs on time.

So, if they can't agree on that stuff, the idea that they would be able to formally agree to a protocol that would actually set up the kinds of equivalents processes that we've used in some areas of trade, so that we help put pressure on governments to move away from regulation and into pricing instruments, that just seems completely impossible to me.

Leonardo Martinez Diaz

Robert or Eric, do you want to close with anything?

Robert Repetto

Yes, I'd mention two points that I didn't have time to state. When thinking about international agreements, one should bear in mind the huge co-benefits, largely from reduced air pollution in developing countries, especially in large middle-income countries such as China and India. We've seen some estimates of co-benefits per ton of carbon reduction that are much higher than any carbon price that exists today. This implies that those countries have nationalistic incentives to reduce emissions, even unilaterally, to gain those co-benefits.

Secondly, one should think about the broad scope of win-win mitigation options in those countries. As detailed in my book *America's Climate Problem: The Way Forward*, India, for example, would strengthen its growth prospects by electricity sector reform, reduction in energy subsidies, better urban construction standards, watershed reforestation and many other measures. I know many of you don't believe that there are win-win options, but I will say this: when I was on the faculty here at Yale, my wife was showing houseguests around the campus, and on Hillhouse Avenue, outside the Economics building where Bill has his office, she found a $20 bill on the sidewalk. So, if you actually go look in developing countries, as I did, you'll see that the win-win options are huge. Somehow, that ought to figure into thinking about potential agreements.

Eric Toder

All right, so if there's one point I haven't made, I'll make it. It's part of the reason I like Bill's idea. There are two ways of looking at social change. One is the grand bargain. Everybody sits down and agrees and does it all at once, and that's the 1986 tax reform model, and it was mentioned by several people, including me, for the carbon tax. But, the other approach is to start small and get things done by stealth.

There have been huge changes, I know, in the income tax system, with Earned Income Credit or 401Ks, where things started really small and seemed very insignificant at the time they started, and yet they've become very important. So, thinking of ways both in terms of domestic carbon tax and Bill's idea of clubs, where you started at a small scale and built out, is a very important way to look at the problem.

Leonardo Martinez Diaz

Thank you very much.