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THE ECONOMIC CONSEQUENCES OF DELAYS IN U.S. CLIMATE POLICY

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P R O C E E D I N G S

MR. GAYER: Good afternoon, everybody. Welcome. I am Ted Gayer, I'm the Vice President and Director of Economic Studies here at Brookings and I'm very pleased to be introducing today's event. It will feature the latest research from our Climate and Energy Economics team. The paper today will examine the implications of delaying climate policy and economic outcomes like consumption investment in labor markets. The paper also examines economic advantages of using carbon tax revenue to offset distortionary inefficient taxes like the corporate income tax. So as I'm sure you all know today is a very good day to be talking about the implications of delaying climate policy. Given the news yesterday and I think half the articles I've seen since were about how long will this be delayed through all the legal and political challenges. So I'm sure that -- I don't think they planned it this way but the timing of the paper worked out quite well given the policy context.

So the plan today is to start with a presentation with Warwick McKibbin and Pete Wilcoxen; they'll present the paper. Warwick and Pete are Nonresident Senior Fellows here at Brookings and they Co-Direct our Climate and Energy Economics Project. Warwick also has a Vice-Chancellor's Chair in Public Policy at the Australian National University. And Pete is an Associate Professor of Public Administration at Syracuse University's Maxwell School. And then following their presentation we're going to have a moderated panel discussion. Adele Morris will moderate that panel. I'm sure that will give more opportunity to also discuss yesterday's proposed power plant rule. Adele is a Fellow here in Economic Studies at Brookings and she is the Policy Director of the Climate and Energy Economics Project.

So with that brief introduction I think, Warwick, you're going to take it away from here. So welcome, everyone, and I'll leave it to Warwick and Pete. Thanks.

MR. MCKIBBIN: Thank you very much, Ted, and thank you to Brookings for making this my 25th year of commuting from Australia to be involved in the Climate and Energy Research Project here at Brookings with Adele Morris and Pete Wilcoxen.

Now this project looks at the issue of timing and delay, but it's actually part of a much broader collaborative project that's been going on at Brookings as I say for nearly 25 years. Some of the papers that we've recently released include looking at the scope of policy. So a paper that was recently published looking at Pricing Carbon in the United States: A Model-Based Analysis of Power Sector Only Approaches coincides reasonably well with what was released yesterday. So people who want to understand the specifics of electric utility focus policy that paper is the paper that's most relevant. This paper compared the power sector only carbon price with a more broadly based carbon price across the economy. We've also used it recently to look at what are the impacts of using revenue from carbon pricing or specifically a carbon tax to fund other sorts of our tax changes in the fiscal balance. And there's a paper that's currently being reviewed at the tax policy journal that looks at the various ways of recycling revenue and what does it mean for the aggregate U.S. economy and for individual sectors.

And today's presentation is very specifically focused on what are the consequences of delaying U.S. climate policy, what are the economic consequences. And the paper is available on the website. What this paper is not is it's not looking specifically at EPA's Clean Power Plan that was released yesterday. The key differences between what we're looking at here and the actual plan itself is that our approach targets economy wide carbon emissions rather than just stationary energy. We look at levying a carbon price across all energy, not only electric utilities. And we're not targeting anything specifically, and certainly we're not targeting the emission reductions in the clean power plant.

So why is it interesting to explore delay? Well, firstly if you're realistic you wouldn't think this policy would be implemented in the very near future. It's a very protracted process in place, delay is highly likely and almost inevitable. And there are -- there is a debate in the literature about the benefits of early action versus the benefits of delay. One of the benefits of delay some people argue is it gives you more time to plan, it leaves less stranded assets in the economy. On the other side of the argument is there is a cost of delay and that is given that the concentration target is the goal of climate policy the longer you leave it the more you have to do if you get to the same concentration target. So we're going to explore this, trying to get some magnitudes for some of these stories.

Why do we focus on the carbon price? Well, because it is the most efficient way to reduce CO2 emissions and it's much better than less efficient approaches such as the Clean Air Act which is a direct regulation approach, or other subsidies for clean energy or energy efficiency. And in addition to carbon price if it's implemented as a carbon tax it is possible to raise revenue either to cut the budget deficit or to reduce other taxes in the economy. And we'll touch on that issue towards the end.

So the three questions that we're answering or at least asking and hopefully answering in this paper, first question is does delay have a net economic cost? What do those costs look like, how big are they? And what matters more, the timing of the policy or the other issues around policy design? And so we'll be addressing all of those questions. Now we're looking at four carbon policy scenarios, the first three which are listed here, are directly aimed at deficit reduction. So we have three policies, first is a carbon tax that's implemented today and the revenue is used to reduce the fiscal deficit. We start this carbon tax at $15 per ton of CO2 and we have it increasing at 4 percent above the inflation rate. So this is a fairly standard hoteling type pricing rule. Then the

question is suppose to achieve the same degree of concentrations at some point in the future, suppose we start later and so therefore we start with a higher carbon price to achieve the same four percent growth rate and to achieve the same CO2 concentrations, or suppose we start at the same carbon price in the future but then we have to escalate that price more quickly to get to the same point of carbon concentration. So the common point we're tying down is the environmental outcome at a point in the future. Then we add a fourth scenario which is not focused on deficit reduction but looking at swapping the revenue from the carbon tax for reducing another distortionary tax in the economy and the tax we focus on in this paper is reducing the tax on capital, what difference does that make.

Now there are many very complex interactions going on in the real economy when you're analyzing this type of policy. There's the effect of the actual price change, there's the effect of the credibly expected future price change, there's the impacts on the fiscal position, there's the impacts on international trade, trade across the economy, and investment. And there's a lot of differential impacts across sectors that use energy in different ways. And so the complexity is quite rich and you really do need to have some form of economic model to be able to do this analysis. The model that we're using is a model that's been well established at Brookings since 1991 and that is called the G-Cubed model. I won't bore you with a long detailed exposition and many equations; I'll just point out the broad structure. It is a global model so it captures the entire global economy broken into particularly important countries like U.S., Japan, and Australia, and the rest of the world that you need to close the system. There are also 12 sectors of production in the model. So as well as capturing the linkages between countries we're also capturing the sectoral linkages within and across economies. We have a great deal of detail. The top six sectors are energy sectors and the second six

sectors are sectors that use energy.

The key features of this model is it's a hybrid of approaches currently used at Central Banks in the form of macro models but also a hybrid of the computable general equilibrium models which are widely used around the world for evaluating climate policy. It has a lot of inter-industry linkages, it looks at international capital flows, and importantly it looks at consumption and investment dynamics. So it's not a static framework, it's a very dynamic framework. And we have households and firms which not only care about what's happening today but they form expectations about what they think will happen in the future. And for the sorts of climate policies we're talking about where prices are escalating over time the belief about the future is very important for the way in which you restructure your production and consumption decisions today. And very uniquely I would argue this paper focuses on labor market dynamics. So you can't have unemployed resources in a particular sector or across an entire economy for a period of time.

Now I'll turn to my co-author to run through the results.

MR. WILCOXEN: Thanks, Warwick. Thanks, everyone, for being here. Am I loud enough? Okay. Okay. So where we're going to start is with our results for the carbon tax rate that's needed under each of these scenarios that Warwick just described.

So this graph, let me start by pointing out this green line that starts at $15 a ton, it rises at 4 percent a year and it ends up after 24 years at $37 a ton. That's our initial starting policy which we're going to refer to as the "Now Policy" or "S1 Now". That's the immediate tax. To achieve the same emissions reductions over these 24 years with the tax that is delayed by 8 years but then rises at 4 percent a year, our first finding is that the initial tax would have to be $26 a ton. It has to be substantially higher than $15 to achieve the same reduction over a shorter time horizon. And it also has to be

considerably higher than the $15 a ton tax would have grown to over that period. So it's a big step up to achieve the same emissions reduction over a shorter horizon. So that's the red line and that's going to be called "Scenario 2" or "S2 Step" because there is a step increase in the tax. The third scenario is the one that begins at $15 a ton, so this is just a pure procrastination scenario; we don't do anything until year 9, an 8 year delay, we put the same tax in initially but then the tax rate has to rise at a faster rate to become large enough to drive emissions down by the same amount. And when we do the calculation what we find is that the growth rate has to be as high as 10 percent a year, more than twice the rate of growth that we have in the baseline carbon tax trajectory. So the tax becomes quite high by the end of the scenario to achieve the same emissions reduction. Now in all of the diagrams that we're going to go through today there are going to be two vertical lines and I just want to point out what they are. The first one is in year one when the initial do it now policy takes effect, and then the second one is in year nine. That's when the two delayed policies take effect.

All of these policies are effective in reducing emissions and as Warwick mentioned they reduce emissions -- cumulative emissions over this period by exactly the same amount. This is the reduction in emissions under the immediately policy, the green line. There's an immediate drop when the carbon tax comes and then a further drop as it escalates over time in real terms. The other two scenarios have virtually no reduction in emissions initially. In the first eight years there's tiny changes. Some changes in the economy occur in anticipation of this event, but basically no effect until the tax comes into effect and then dramatic reductions after that. The total reductions, the cumulative reduction is the area above each of these curves and the simulations are constructed so that they are the same. That's 19 billion metric tons over this period.

The taxes also raise a lot of revenue. So again starting with simulation

1, in the first year of the policy the tax would raise $79 billion and that would grow over time to just over $200 billion. What's shown here is the tax rising by four percent overwhelms the fact that emissions are being reduced. So total tax collections go up over that period although at a rate lower than four percent per year. Putting the -- moving to S2, the second simulation where we don't do anything until year nine and then impose the larger tax, initial revenue is considerably higher although it's delayed and it rises to $234 billion. And then under the third simulation, initial revenue is somewhat higher than the $79 billion because carbon emissions have risen in the baseline before the tax takes effect and then it raises to the highest of all by the end of the simulation because of growth of the carbon tax itself. Now the graph mentions that this is gross annual carbon tax revenue, so this is just the revenue that is produced by the tax itself and I'll come back to that in a minute, but a key point I want to alert you to is that when this tax goes in to effect it slows down the economy in other areas and that reduces other tax collections. And we're going to come back to that in a minute. Using the revenue from the last graph to reduce the deficit, taking into account those other reductions in taxes, the immediate policy allows a reduction in the first year of $76 billion in the deficit and that grows over time. The other two policies produce larger initial reductions in the deficit but there's a delay of eight years which is going to as you'll see be a very important part of the story. So very substantial reductions in the deficit.

That accumulates over time into large reductions in the amount of outstanding government debt. So this is a graph that shows relative to baseline the reduction in government debt, total debt over this period. It's essentially the accumulation of those deficit reductions. So the green line here shows the drop in government debt again relative to the baseline and the total drop by the end of the simulation is almost $3 trillion. So there's very effective potential for debt reduction using

this policy. Delaying the policy until year nine, the eight year delay, produces cumulatively less deficit reduction. We have higher deficit reduction in the years when the policy is in effect but an eight year lag where nothing at all is being done, and so there's no debt reduction here and the total debt reduction is substantially less as a result. So one bottom line here is if the -- if one of the concerns of policy makers is reducing the deficit starting now is considerably better for the same climate outcome.

Okay. This is returning to the point I mentioned earlier about reductions in other tax revenue. This is sometimes known as "the haircut". So we raise a lot of revenue through the carbon tax, other economic activity slows a little bit and we calculate the amount of reduction in other taxes as a share of the revenue raised by the carbon tax and report that on this graph. So what you can see is this 10 percent indicates that other taxes fall by about 2 percent of the total revenue produced by the carbon tax. And over the full period of the analysis, the full 24 years, we find that about 10 or 11 percent of the total revenue raised by the carbon tax would be offset by a reduction in other taxes. So a little bit of a reduction but not a large amount.

Okay. I want to turn now and talk about some of the effects of the policy on the macro economy. So that's all just been about the financial characteristics of the policy. Putting the carbon tax into effect causes changes in all of the major components of gross national product. And I'm going to start with investment -- thank you. Is that a suggestion?

SPEAKER: No, it's (inaudible)

MR. WILCOXEN: Okay. So this is a graph of what happens to economy wide investment relative to baseline when these different policies come into effect. The green line again is the immediate carbon tax and what you can see is that the carbon tax comes into effect in year one and economy wide investment is reduced for a period of

time because the carbon tax raises input costs throughout the economy and it reduces the return on capital and so investment falls. There are also macroeconomic effects that we can talk about that reduce investment as well during because there's a sharp increase in prices or a modest but distinct increase in prices at the beginning of the policy. After the first couple of years investment under S1 begins to recover and is almost back to its baseline by about 10 years into the policy. The delayed scenarios have similar reductions in investment when they take effect, but one of the things that you can see in this analysis is that investment falls under those two policies even before the tax comes into effect. So there are anticipation effects going on here and anticipation of the higher carbon tax reduces investment. So another reason that you wouldn't want to delay a policy is that it causes adverse changes in the economy as people see this coming along. So you get hit by some of the costs even though you're not getting any of the climate benefit. And then the final thing that I want to mention about this graph is you can see this dotted line remains substantially below the zero line. The very rapid rise in the carbon tax under scenario three where it rises much faster than four percent which is roughly our real interest rate in this model, that makes a big long term effect on investments. So that's one reason of the two delayed policies that approach is less desirable.

All of these policies cause trade effects and in particular they cause changes in the exchange rate. These are deviations in the U.S. dollar exchange rate from baseline and it's hard to see but that's a .6. So these are like a half a percent depreciation of the U.S. dollar at the onset of the policy. So it's not a huge effect but it is a distinct effect. And because of anticipation in them all one of the things that you can see is that the exchange rate effect occurs at almost the same magnitude in all three of these simulations. So the effect on exchange rate is not delayed even though the

environmental benefits are. The reason that the dollar depreciates as it does is because of two things that we've already talked about. The first is that government borrowing has been reduced so there's less government borrowing from abroad, lower demand for dollars for that, and slightly less private investment so there's less demand by foreign asset holders for U.S. assets. That causes the dollar to depreciate slightly and then recover over time. So capital flows are playing an important part in this story. You can see the reflection of the exchange rate effects here. This is a graph showing net exports to it's the sum of U.S. exports minus U.S. imports in value terms. And the baseline -- these are measured in deviations from baseline GDP which makes the figures easy to compare with one another. What you can see here is that net exports improve under all of these policies and particularly under S1, they improve right away. So that's an effect that you might not expect if you weren't thinking about capital flows and your exchange rates because all -- this policy, the carbon tax raises the cost of U.S. producers. And other things equal you would think that that would make exports less competitive and imports more attractive. But the exchange rate effect that I just showed you a minute ago actually overcomes that and exports actually -- net exports actually improve. So the trade balance improves slightly in this case. It helps exports and reduces imports.

Consumption -- turning to it -- so I'm skipping government because as I think we might not have mentioned in all these simulations we hold government spending on good, services, and labor constant so that's the same in all these policies. And so just finally finishing off with consumption, consumption falls relative to baseline. It's difficult to see here but -- well, I'll start with S1. It falls in S1 by about .3 percent of GDP, .3 percent by year 8 and then begins to recover. In the two delayed scenarios consumption falls a little if you could -- if there were a horizontal line across here -- there is a very faint horizontal line but it's hard to see -- you'd see that consumption falls a little in anticipation

because of foresight on the part of households but for the most part the action on consumption happens once the tax kicks into effect. Okay.

And then the final thing that I want to point out here is that again the simulation three where there's a delay and then very fast escalation in the carbon tax is the least desirable. It has the largest long time effect on consumption. Overall putting together all these components we find that GDP falls relative to baseline in the -- particularly in the early years of the simulation. These are changes relative to baseline which is the way that we usually analyze this policy. But I'm going to emphasize now and then come back to this later that these are small changes relative to annual economic growth. So even though there's a dip here this is not a recession, right, this is not GDP going down it's just a slight slowing of GDP growth. So here's a slowing of growth from the initial policy and then the delayed policies, there some growth slowdown in the anticipation period and then somewhat more once the tax kicks into effect. And then again just to beat this horse, even though perhaps it's already dead, delaying and then having a rapidly escalating carbon price to catch up is a bad idea.

Okay. Now as Warwick mentioned, our model includes some macroeconomic features including sticky wages and money demand and supply equations, and that allows us to track what happens to employment. The model has full employment in the long run but it can have deviations from full employment in the short run. And so these are some results on employment. And so the first thing I want to do -- there's two graphs here -- I apologize because it's very cluttered but I want to be sure that there are no misunderstandings about what's going on. In this graph the inset we show total employment in the economy so the total labor force in the economy and this is just for the first four years of the S1 simulation, okay, right here. And so the green line is the baseline and if you were -- if you have really good eyesight or you're close to the front of

the room you'll be able to see that there's a little red line below that and that's the level of employment in the first four years under this S1 policy. And so what the policy does is it slows down employment growth. It does not cause a big -- it doesn't cause anything that looks like a giant drop in employment, okay, in levels. Now it does cause --relative to potential employment in the baseline it does cause in the short term a dip in employment and employment recovers to essentially its baseline level by about 13-14 years into the simulation. So if I continued this out these two graphs would touch after that period. And in this diagram there are -- we're going to look in detail at what happens at the sector level on year into each policy. So I'll talk about year two of each policy. For the initial start now policy that will year two and for the delayed policy that will be year 10. So I'll refer to that in a minute. And you can see here as well that delaying doesn't cause nothing to happen, right. Instead it causes this dip in employment over this period when there isn't even a tax in effect and there is no environmental benefit. And then there's worse outcomes, particularly under S3 after the tax goes into effect.

Okay. Now to get down into the details about what happens at the sector level, we're going to go through what happens to employment by sector in the second year of the policy. Okay. So for the immediate policy this is year, for the delayed policy this is year ten. So it's one year into each of these policies. And what we show across the horizontal axis are short codes representing each of the industries in the model and as Warwick mentioned the first six are the energy sectors and the last six are non energy sectors. And the graph shows what happens to employment by sector as a percentage of the U.S. labor force. So there's a common denominator on all these bars and you could sort of sum them by eye to see what's happening to total employment. So what you can see here is in the energy sector -- so this is electric power, this is the coal industry, this is natural gas extraction, you can see -- and I apologize to those of you who

are the back of the room -- you can see that there are little drops in employment. It is worse at the very beginning of the S2 policy because there's a very sharp upward jump in the carbon tax at that point. And you can see that in terms of total employment there are not big changes in the energy sector. And the reason for that of course is that the energy sector is not a big employer, right. The reason that we get the main effect on employment occurring during the durable good sector and the service sector is that that's where everyone works. So in percentage terms as percent of the industry's labor force most of the impact was on here. In percentage terms you wouldn't be able to see -- you wouldn't even be able to see the bars for the service industry. But in terms of total numbers of people there is action outside the energy sector due to these interactions and macroeconomic effects.

Now after a period of time as I mentioned for S1, by 14 years employment returns to full employment and the composition of labor force and the economy changes a bit. And so this shows the long term effects on employment by industry and basically what you can see is exactly what you'd expect, that employment in the energy sector goes down and employment in the rest of the economy goes up, particularly durables and nondurables and services. So people shift over a period of time and that is gas utilities. So if you're --sorry about the mnemonics there. The coal and electric utilities are CLS and ELE.

Okay. So to summarize -- it's difficult to concisely summarize all of the effects in these policies but one way that we have tried to do it is by computing net present values of the changes in gross national product. Gross national product is appealing here because it captures -- it does a good job capturing the economy's income including the changes in asset holdings abroad. And so what this graph shows is the change in -- is the net present value of the change in GNP under each of these three

policies. So there's a -- the green bar is the do it now policy, S1, the orange one is S2, the delayed step up policy, the blue bar is S3, where the policy is delayed and then escalates rapidly. And we've computed net present value using several different interest rates just to show how the results look. If you pick four percent which is the model's natural real interest rate and you compare these bars what we find that delaying and escalating the tax rapidly costs 14 percent more in present value terms than adopting the policy right away. And then -- so that's -- this is 14 percent larger than that. S2 lies somewhere in between. At lower interest rates the difference between the policies becomes more pronounced, right. At lower interests rates the high costs of the rapidly escalating or higher carbon taxes weigh heavily in the calculation. And so the difference becomes bigger. At a high enough interest rate, if you go to slightly higher interest rates then it would turn out of course that the delayed policies have a higher present value because they postpone all of the costs farthest into the future.

Now the last thing I want to -- well, I want to talk about is the fourth simulation that -- fourth scenario that Warwick mentioned which is what we see if we use the tax revenue to reduce distortionary taxes in the economy rather than reducing the federal deficit. So we hold the deficit the constant at baseline levels and reduce taxation on capital. And what you -- so just to orient you this is S1, the green line is GNP under S1, the original simulation. So it goes down a little. And what we find under S4 is a sign difference, right. GNP and GDP go up, okay. Reducing the taxes on capital causes a large boon in investment and raises GDP. So these are GDP and GNP, both of them are higher than baseline. And in the near term -- or in the midterm they're as much as one and a half percent above baseline. That policy also raises employment because the boon in investment requires a lot of additional workers to be drawn into building investment grids and installing them. So what we find under this tax swap case is that

there -- rather than -- so this -- so bear in mind this is the same carbon tax, right, so all the carbon tax effects that were reducing GNP and employment are still there but this boon due to the tax swap effect is enough to overwhelm that and produce an increase in employment. And then finally I want to emphasize something which is very important to keep in mind which is how these changes compare to the level of GDP in a growing economy like the U.S. And that is that they are pretty small compared to U.S. GDP, okay. So in this diagram there is a green line which reflects the baseline and so it goes up there and the three carbon tax policies, S1,2, and 3 produce lines which are slightly below it. But at this resolution they're impossible -- even if you're close to the front of the room to see the difference, it's impossible to see the difference. What you can see, the one that you can see if you're close to the front of the room is the effect on GDP of the capital tax cut. That actually raises GDP enough to be visible at this resolution.

So in case you haven't run into this before a good way to think about the long term impacts of policies like this is in terms of how much. So we're looking at policies that slightly change the growth rate of a rapidly growing economy. And so this diagram shows you that if you go all the way out to year 23 and you look at baseline GDP in year 23, that's what this horizontal line is, so if we go to year 23, the green line, that's how high GDP and the baseline would be in year 23. Under the worse of the carbon tax policies we don't reach that level of GDP right away. It's delayed until February, okay. It's delayed by two months, right. This is June of year 23. So it's a slight delay. So these changes in the -- as you know from the net present value in dollar terms they are large changes, but the economy is enormous and relative to that they are fairly modest. So there's maybe a one or two month delay here. If we flip it around and we do the policy that has the best macroeconomic outcome, reducing capital taxes, then instead of having to wait until the end of year 23 to get year 23's GDP we'd get it about four or five months

earlier, okay. So there's maybe about a seven month range here between these two prices -- or between these outcomes.

Okay, at that point I'm going to turn things over to Warwick to finish this off.

MR. MCKIBBIN: Thanks very much, Pete. There's been obviously a lot of information presented and I encourage you to look at the paper on the Brookings website. What I'll do is just draw out a couple of key features which I think are good takeaways.

The first is that delaying the carbon policy by eight years raises the required carbon price by seventy percent, that's if you're keeping the constant growth that we were using in the core policy. If you delay it by eight years and bring the carbon price in at the same price as in the core policy you have to raise the growth rate of the carbon price by 10 percent rather than 4 percent, and these are quite significant changes. Now obviously these are particular numbers, if you have a much bigger number the results will move around quite a bit more. So in conclusion overall we find that a carbon price reduces emissions at modest economic costs. The delay of a carbon policy or carbon price policy creates additional costs for the same environmental outcome. And by normalizing to the environmental outcome this enables us to get a proper comparison of costs and benefits. The key point at the end as Pete mentioned is that the timing although it matters, it matters far less than the actual design choices that are made in putting the carbon policy together. In particular it matters a great deal on how the revenue was used and I would refer you to our previous paper which looks at a whole range of revenue options and how they vary across a common price.

Now there's a lot of caveats in this modeling obviously. This is only a model and the world is very complex. And we also make a number of assumptions.

We're assuming here that policy is implemented here in the most effective way. And we know how political processes can complicate the analysis somewhat as we've seen in the Australian case. But nonetheless this is the best possible take on how that policy will perform. The second thing that's very important is that we're assuming here that the rest of the world is undertaking baseline carbon policy. So the fact that the U.S. reacts or responds with a significant policy does not change the behavior of other countries. You can make a very strong argument I believe that the timing of other countries' policy and the scale at which they will take action could very well be affected by the U.S. policy stance. And so that is not undertaken in this particular study although obviously that's a fertile area where we'll be extending the analysis. Another area where we will be extending is to look at the role of monetary policy in the short run adjustment. We do have a Fed sitting behind here manipulating interest rates and trying to offset the various impulses going through the macro economy. I think the role of the Fed in climate policy is ignored in the literature and that's an area where I think we can make an important contribution. The background material is at the Brookings Climate and Energy Economics Project at the website here.

And I'm completed. Thanks.

MS. MORRIS: Okay. We're going to take five. (Applause)

(Interruption)

MR. GAYER: Okay. So we're very happy to take questions and there's someone with a microphone who can come around and -- yeah -- there's --

MR. MCKIBBIN: Could I just take this moment to thank the Alex C. Walker Foundation for sponsoring this research. I'm not sure if we thanked at the beginning but we certainly are very thankful for their support.

MR. GAYER: Yeah.

MR. EBINGER: Charles Ebinger from Brookings. I wondered if you had any breakdown in your analysis about the impacts on different regions of the country of the carbon tax. And I'm thinking particularly if you have any insights to how say the energy producing regions of the country are more affected than those that are consumers?

MR. WILCOXEN: That's a very good question and it obviously colors the politics considerably. Our model has one region that represents the United States as a whole; it does not have sub-regions. We could speculate based on that and looking at the fuel mixes which EPA has now published basically on its website, how electricity prices and other transportation fuel prices would vary across the country, but it is actually not in our model as it stands.

MR. HUTCHINSON: Thank you, Thomas Hutchinson. I had two questions about some of the underlying assumptions. One was what's being assumed about sort of the progress of technology and particularly the carbon saving technology and how fast that's progressing? In other words how fast solar panels continue to increase in productivity and such things across other sectors? The other question was what are you assuming about tariff or border taxes on carbon content of imports and exports? Would there be any offsets in that?

MR. WILCOXEN: Well, so the answer to the first question about technology and productivity growth is that so as we talked about there are 12 industries in the model and we tune each industry's productivity growth to match what we've seen in the data for the last couple of decades. So productivity growth is tuned to that. In this model there is no -- there is not anything which is known in the literature as endogenous productivity growth that accelerates or decelerates when policy comes along. It's exogenous productivity growth.

MR. MCKIBBIN: So if I can just add to that there is a paper in the National Journal of Forecasting from a few years ago which explicitly looks at how you use such a complex system of equations to generate a forecast for the world. You're making many assumptions, not just about productivity growth by sector, by country, but a whole range of assumptions about policy rules of the fiscal authorities, the monetary authorities, the trading regime. So there are a lot of assumptions in there. And the beauty of a model is that you can bury those and look at the sensitivity.

On the second question if could -- and then people will probably follow up -- what we're doing here is levying the taxes as the mine mouth or the refinery. So anything that's imported in terms of primary energy will have a tax levied on it. Anything that's exported from the U.S. like coal for example won't have the tax levied on it because there will be an adjustment at the border. So there are no additional changes apart from it. So it's a consumption tax, not a production tax.

MR. WILCOXEN: And just to be clear we don't impose any border tax adjustments for other countries not adopting the policy and nor do we assume that they impose a border tax adjustment against the U.S. in the period where the U.S. doesn't have a policy. We have a paper on that from earlier in the project but not in the study.

MR. MCKIBBIN: Again if you are interested there is a paper published in a volume by Lael Brainard and Sorkin, 2009 Trade Policy, Foreign Volume which is available I think on the website, certainly at the Brookings book shop, which looks specifically at border tax adjustments.

MR. WILCOXEN: There's somebody at the back.

MR. KREUTZER: Thank you. David Kreutzer from The Heritage Foundation. Your data implies that any income tax hits the economy as broadly as your carbon tax coupled with an offsetting, you know, the swap of the tax on capital would give

the same positive impact. We have famously seen that Washington hasn't done that ever and you could tack that gimmick onto any policy to make it look better. Why would you expect it to be different this time?

MR. WILCOXEN: Well, so what we're doing is examining the consequences, not making a prediction. So I take your point that predicting there will be capital tax cuts would be bold and probably unprecedented. At the same time bear in mind that predicting carbon taxes would be bold and unprecedented. (Laughter) Some people have wryly mentioned to me that the two things that I work on are both third rails, right. One is taxes and the other is climate policy. So I take your point but this is not a prediction, it's just look at what the consequences would be.

MR. MCKIBBIN: And I think it is important to understand the differences in the recycling options that are available even if you don't believe they'll ever happen. My favorite recycling of course is transferring it to think tanks like The Heritage Foundation and Brookings. (Laughter) Totally different paper.

SPEAKER: I'd like to see the model for that one. (Laughter)

MR. JEMISON: Hey, Cory Jemison, ICF International. I was wondering, so you have three policies which both drive the same emissions reductions, correct?

MR. WILCOXEN: Yes.

MR. JEMISON: I was wondering, how did you decide on, you know, the different prices and different years and trajectories in order to drive those same emissions reductions?

MR. WILCOXEN: Well, do you want to?

MR. MCKIBBIN: You can do it.

MR. WILCOXEN: So --

MR. MCKIBBIN: They understand you much better than they

understand me.

MR. WILCOXEN: So the core policy, the simulation one which is the $15 a ton rising at 4 percent, we chose $15 a ton because that's in the realm of the social cost estimates for carbon. And we chose four percent because that's our model's natural rate, its internal long term interest rate, real interest rate. So under a perfectly operating economy that would be the cost minimizing rate to achieve a particular given set of emissions reductions. The other two policies we calculated internally in the analysis to match the emissions reductions from the first case. So the stepped up carbon tax is calculated internally so that we got the same reduction as in the first policy and the stepped up rate again was calculated as part of the study to get the same target.

MR. JEMISON: So you're still able to validate -- it would give you the same --

MR. WILCOXEN: They give -- that's right, they give you the same --

MR. JEMISON: (inaudible) is based on the same arguable (inaudible)?

Mr. WILCOXEN: Yeah, that's right. Now the capital tax policy because it causes the economy to grow does not achieve this much emissions reduction, about 3 billion metric tons less. But the first three are the same.

MR. TOUFECTIS: Hi, Kim Toufectis, NASA. I'm fascinated by the way you did this and very much appreciate it. I'd like to understand what made you choose a 23 year, 24 year period that the curves had very different implications for what would happen beyond that point. Did you think about that and if you did, you know, does it factor into your thinking about what this really means?

MR. MCKIBBIN: So we might have different answers here but I doubt it. The model itself would solve for over 100 years. Now coming back to the first question, after you get out 10 or 20 years into the simulation period you have to make very large

leaps of faith about technology and all sorts of things we don't know about. The data set used to calibrate and estimate the model is approximately 25 years in length. So it takes a very brave person to take 25 years in date and say anything about 100 years from now. So this model is specifically -- strength I think is in the short term and the macroeconomic dynamic story which does do a good job of tracking the data. Go out any longer than 24 years and you're in the realm of science fiction perhaps. And so that's why we don't even try and go there, although we can, we don't. Because I don't think -- I think it's misleading.

MS. SEYLLER: Emily Seyller with the U.S. Global Change Research Program. Did you factor in any of the economic consequences of climate change impacts in this at all in terms of extreme weather events?

MR. WILCOXEN: We did not. That's a very good question. To be clear this is not in any sense an integrated assessment study, it's purely an economic analysis of the economy without climate impacts changing.

MR. MCKIBBIN: Or another way to say that is that the baseline itself already has those sorts of issues in there so if you change the policy by the small amount that we changed it's unlikely to change the short term adjustment through the model fading back of the policy. So anything other than this we may need to take into account. But think in the time period we're looking and the scale and the fact that it's not global, it's just a small open economy -- well, okay, it's the U.S. but (laughter) it's 25 percent of the world economy and we don't think that will have the feedback effects.

SPEAKER: Two more.

MR. WILCOXEN: Two more? Okay. There's one. Someone over there.

MR. HURDLE: Yeah, John Hurdle, Market News International. Given

your projection for a slight slowdown in GDP growth would it be fair to assume that you're also looking at a lower inflation rate as one of the economic consequences of all of these scenarios?

MR. MCKIBBIN: The baseline itself has a very low inflation rate. The change in the policy will increase the inflation rate a little bit as the carbon tax feeds through the economy, but the Fed is responding explicitly in this scenario to the change in normal income growth. So the sense that CPI inflation may rise, real output goes down a little bit and the net effect is almost no change in Fed policy. Now as I mentioned in my conclusion we could change that totally and have the Fed respond to inflation only in which case they'd tighten policy, or we could have them respond to output growth only in which case they would loosen slightly. But it's an open question as to how the Central Bank may respond. But it does matter for the first few years, it doesn't matter for a decade out.

MR. WILCOXEN: It does because tightening slightly would be exactly the wrong thing to do, right. Just so -- because the policy is intended to cause an increase in certain relative prices and trying to clamp down on that would just unnecessarily put people out of work.

MR. MCKIBBIN: This is an interesting question because I was 10 years on the Board of the Australian Central Bank until recently and one of the questions that came up during the carbon tax debate while we were setting policy was do we respond to the carbon tax as it moves through the economy? Do you change interest rates in response to that? I can't tell you what the answer was because it -- I was around the table, but it's a serious issue for policy makers in economies that are taking serious action on climate change.

MR. WILCOXEN: I think we have time for one more question. Is there

somebody?

MR. HARRINGTON: Craig Harrington from Media Matters. Your model shows an immediate short term impact in positive job creation with the tax swap model, but after nine to thirteen years it dropped off and actually fell below the model for not swapping out taxes. What's the implication for that? Why did the model turn over at the time it did and would that affect the sort of policy applicability of something like this, of a tax swap being actually implemented?

MR. WILCOXEN: Well, so what you're seeing in those curves is essentially the play out of a lot of different lags moving through the economy. So in that policy we see a big upward kick in investment at the beginning and investment rises for a while, but then because they're lagged adjustments of prices, expectations, and income, there's a bit of overshooting which causes that ripple downward, but over the long term it evens out and we'd end up back at full employment.

MR. MCKIBBIN: So there is an assumption here in the very long term that if the labor market is tight -- if you hit full employment your wages will start to rise until you get back to full employment. So the other side of those results is that in the capital swap you'll have higher real wages in the long term and everyone full employed in comparison to the other scenarios.

MR. WILCOXEN: Okay. Well, thank you very much for coming.

(Applause)

MS. MORRIS: Hi, everyone, I'm Adele Morris. We're going to just take a couple of minutes and switch into our panel session mode here. I'd like to invite our guests to come on up. And you have like a couple of minutes if you want to grab a quick cup of coffee and we'll start in just a sec.

(Interruption)

MS. MORRIS: Well, we're going to get started here. Everybody, if you can take your seat. It has been a really big week for U.S. climate policy. I mean it's been hard to sleep actually just knowing how much stuff was going on, not least that we had to get our paper out for today. But, you know, so we had the EPA issue a new rule -- can everybody hear me? Let me just slide that up a little bit. EPA issued the -- perhaps the most important rule of my career as an environmental economist this week so really, really a huge deal. So we're very happy to welcome three keen observers of this process and I'm going to invite them to make some opening remarks and then we'll have a discussion and we'll welcome your W&A as part of that.

So first I'd like to turn to Philip Wallach. Philip is a Fellow in the Brookings Governance Studies program and his research involves the intersection of administrative law and politics and governance and he's been doing research on the EPA regulatory process and the greenhouse gas rules in particular. And I'd like to turn to you, Philip, first to give us a little back story. You know, we've seen these results about economy wide carbon pricing but that's not what's on the table this week, right? We were undertaking rule making under the Clean Air Act with a different very kind of policy model. How did we get here and what are your thoughts about the timing of this process and the prospects and implications of delaying it?

MR. WALLACH: All right. Well, thanks, Adele, for having me. Pardon my voice by the way, I'm suffering from a cold but I'm planning to say some very gloomy things anyway (laughter) so maybe it will contribute to the mood.

MS. MORRIS: Can you hear?

MR. WALLACH: Can everyone hear?

MS. MORRIS: No, okay.

MR. WALLACH: All right. Well, that's why you weren't --

MS. MORRIS: There we go.

MR. WALLACH: -- laughing at my joke. (Laughter) Okay. So our Congress has occasionally deliberated about whether to pass greenhouse gas specific policies. Not in 1970 when we passed the main major parts of the Clean Air Act, it really wasn't on the political agenda at that point. In 1990 when they passed big important bipartisan amendments they did discuss it and they decided to vote on it separately, and then they didn't do anything in 1990. It was contemplated but not included in those landmark amendments. And then you fast forward, we obviously had a big legislative discussion from 2009 to 2010 that included the House of Representatives passing the Waxman-Markey Cap and Trade Bill. But a counterpart never moved in the Senate. So we have this legislative vacuum on this topic that sort of begged to be filled, at least in many environmentalists' minds. And they did end up moving to fill it through litigation and took a big step in that direction with the 2007 Supreme Court Case, Massachusetts v. EPA, in which the Supreme Court more or less said the EPA must regulate greenhouse gases as a pollutant. And that put into motion a very long and complicated process of applying this Act which was designed to control local pollution problems, applying that legislative framework to this problem of global climate change. And that's where we find ourselves today. Now a lot of people thought, okay the Supreme Court pushing us in this direction will ultimately mean Congress will finally get around to doing something. And back in 2009 it looked like that might have been the right way of thinking about it but it didn't work out that way and so we are getting this EPA action coming out of the Clean Air Act in a few different ways. We've already had auto standards ramped up, but that wasn't too difficult because we had CAFE standards for fuel efficiency in place all along so we just made them stricter. That's gone through. Now we're seeing rules for new power plants to be constructed in the future. Those were proposed all the way back in

2012, re-proposed in 2013, still hanging in limbo today which people don't seem to talk about very often, but presumably those will be finalized soon. And now we move on to the more consequential question of existing power plants. How do we regulate the power plants that are already out there which are the largest single sectoral source of greenhouse gas emissions in the U.S. economy? So that's what the big rule announced yesterday is doing. And it is sort of cooperative federalism to the hilt. It says states are going to be figuring out how to hit reduction targets by 2030. They're going to be charged with reducing their carbon intensity by 30 percent relative to what it was in 2005. So the way that this is announced by the Obama administration, we're going to have the final rule --this was just the proposal -- it will get comments and be finalized by next summer and the summer after that we'll expect states to begin submitting their plans and get those plans locked into place in the years after that. So by 2017-2018 we'll have states having devised their plans to meet these -- by 2020 their preliminary targets they're supposed to be meeting. Now the question is, especially given the paper we've just heard about, is that -- when can we actually expect the effects of the carbon reductions from this compared to for instance putting a tax in place today? And are we going to have to revisit these policies if there's too much political and legal resistance such that say seven or eight years from now we might be saying this is too complicated, it's not working, we really just want to implement the carbon tax through clean legislation that's tailored for this problem.

So how likely is that? Well, for big consequential rule makings under the Clean Air Act it can take a really long time. And that's because the Act is built to allow legal challenges, to go into Court with very liberal standing rules, and there will be litigation about these rules. That is a 100 percent prediction, totally confident. I supposed we could get hit by a meteor. That would stop the litigation (laughter) perhaps.

But short of that really it's a certainty. And there's going to be litigation at different stages in the process. Once the rule is finalized it will be challenged as a whole. Once the states propose their own plans there will be big political fights at the state level about those plans and then once the states finalize their plans there will be more litigation at that stage contesting it. So it's hard to make a very accurate prediction about where that actually puts us, but it's really pretty easy to imagine a scenario where it's not until say the mid 2020s where this rule is really working as the EPA sort of touts it as being capable of doing. And of course as I'm sure Adele will talk about some more, it doesn't include in its current status any way for states to implement carbon taxes as one way of complying with the rule. So instead we're going to get a hodgepodge of efficiency measures, of attempts to shift our power generation techniques from coal to more natural gas and toward more renewables and perhaps nuclear and then demand side efficiency measures. And every state will be trying to work out its own mix. That flexibility is appealing in some ways but it's also perhaps troubling and a source for potential legal claims that the states have very different targets that they have to meet. So there's a lot that different interest groups can get excited about opposing in these rules and you can be very confident that will be opposing them. So it's going to be a very messy process in the years to come.

MS. MORRIS: Well, thank you, Philip. So we've heard now we're going to have state by state implementation of the EPA standards and potentially with 50 different state plans although we understand that some states are interested in collaborating on regional approaches. But remember that's just for power plants, right. So we need to promulgate new source standards for other stationary source categories, then we need to have rules that will cover existing sources for those additional source categories, right. So we're starting with the power plants which is the biggest source

category but we still have other sources to get to before we're anything like the kind of economy wide coverage that we discussed in the research paper earlier, right.

So I'm going to turn to Elis Lehrer, our next guest. Eli is the President of R Street. R Street is a conservative organization activist in conservative issues of all kinds, and this organization takes very seriously the risk of global climatic disruption. So I think this is a valuable perspective to see. so what do conservatives thing about all this, Eli, and how would you -- what are your thoughts about the EPA regulatory process and outlook and how it might compare to alternatives?

MR. LEHRER: All right. Can people hear me?

MS. MORRIS: Yes.

MR. LEHRER: Okay, right. So conservatives, a lot of them don't but of course a lot of the people of the country don't. The GallUp most important issues poll when asked what are the major issues facing the country climate last I looked was about two percent, well below any number of things. So saying the conservatives don't much think about it is true of liberals, is true of moderates, is presumably true of communists as well. It just isn't a high salience issue which is fine. As much as -- even when people are polled on environmental issues actually, clean water generally ends up as first. Clean air is sort of this issue but really isn't -- carbon is pollution but not particulate pollution. So it isn't a major issue for conservatives or for anybody else. The EPA rules -- let me think -- I hate them. (Laughter) The Clean Air Act is essentially not designed for this purpose. Trying to use the Clean Air Act to regulate CO2 as the last speaker just implied is essentially the equivalent of trying to use a jackhammer to fix a Swiss watch. It just isn't the right tool for doing this. The point of the Clean Air Act regulation and a commendable one is to reduce levels of these particulate pollutants that are harmful to humans at atmospheric concentrations inherently to zero or close to it. A zero level of CO2 would

obviously be exceptionally bad. This is just the wrong tool for doing something particularly when the effects of a ton of CO2 in Beijing and a ton of CO2 in Washington, D.C. are exactly the same in the global climate. What's most important here and what I think conservatives and I hope progressives and environmentalists can agree on is that we know how to solve climate change, we really on, and this is something that everybody can agree on, at least for the developed world, and it's pretty simple. Be really, really rich in the future. This is an enormous problem of uncertain dimensions. We can say that it's a problem we can say it affects the world. If you look at the IPCC estimates, sea level rise of two to six and a half feet. That's an enormous range for example and there are people who argue that that's not a very good range either and that it's even a broader range. So we don't know what the effects are. Do things that make you rich in the future. That's what's important, that's what matters. And that's why this paper is so important.

I started out here in town as a reporter and there was a lecture by Wesley Prudin, the then editor of *The Washington Times* who always told us get it first, get it right. And that was -- that's an important thing to think about, get it first, get it right. Now this paper shows that doing the right thing now is obviously important and better, but getting it right which is the most important thing a journalist can do and the most important thing we can do in public policy is a heck of a lot more important in climate change policy. The truth is as David's question implied earlier would I rather have just a capital gains tax cut? Yeah, I'd be happy with that. I mean look I'm a conservative who wants to cut taxes for the rich and all sorts of other stuff that other conservatives like so sure, I'll go for that. Just cut capital gains taxes, great. We need policies that give us the wherewithal economically to deal with a problem that's significant of very uncertain dimensions. The wrong policy -- and this paper as a good economic study makes a number of assumptions -- the wrong policy could end up being very expensive. Even

making some assumptions that are very favorable to the policy you still find trillion dollar costs over a period of years if you use the responsible policy. The best possible one has trillion dollar benefits over the period of years. Now in the context of the economy that's not enormous, but a trillion dollars is still a decent amount of cash.

And I think that the most important thing and the real finding that I take home from this paper, this very important paper, is that what we really have got to do is get it right and have policies that help us deal with the problem and help us deal with the problem by making us richer in the future, ideally really rich. Thanks.

MS. MORRIS: Okay. Thank you, Eli. So that's a perspective about long run economic growth. Maybe people are extremely focused on the environmental issue itself. And I want to bring in a voice that can speak to that, James Handley from the Carbon Tax Center. Now, James, I'd like to hear from you as a former EPA lawyer who's seen these kinds of processes from the inside, and also as a climate activist. What's your take on the EPA process, the prospects and implications of delay and how you see this policy playing out?

MR. HANDLEY: Thanks, Adele. Is my mic working?

SPEAKER: Yeah.

MR. HANDLEY: Well, yes, I think we sort of have to think about EPA as a round peg in a square hole or something like that. This is Obama's work around for Congress not being able to enact climate policy. And of course this paper is really pointing to what we consider to be the ideal policy which is a transparent economy wide carbon tax that gives everybody a clear price signal and gets investment going across the economy in the right direction. So this policy that we're seeing is limited -- you know, I have to emphasis this -- to the power sector and, you know, we're going to look at -- I mean I think the delays we're talking about could very well be in the range of eight years

that you modeled in your scenario. You've got rule making on the Federal level, rule making on the state level, litigation at each of those stages and they'll probably be some political activity as well. I thought it was interesting that the rule making starts with a one year comment period. When I was at EPA I don't remember ever seeing a rule that had that long of a comment period. Are they in a hurry about this? I'm sure that this is an attempt to minimize litigation risk. They want to get all the comments in and try to address them in the administrative process, but it does sort of raise questions about how quickly this process might go.

I want to kind of back up and look at this sort of from a bigger perspective because I think obviously what we're trying to do is avert the worst effects of global warming. And I -- my background is in engineering first and then economics and law. So I kind of come at this from a multi-disciplinary approach, and I've been reading the IPCC reports and my assessment is that they're actually conservative in the sense that they are grossly understating the magnitude and severity and rate of the climate problem. And one of the reason's they're doing this -- when you study engineering you study control systems, and I think of the carbon tax as actually a good control system for a runaway climate problem. The IPCC is leaving out a lot of the forward forcing feedback mechanisms that are driving climate change. So the estimates we're seeing out of the IPCC are low, they are systematically low. So one of the big risks of not moving quickly enough and starting our policy whatever it is soon enough is that we're going to miss the boat. And all the problems that you have politically with enacting a carbon tax or whatever your climate policy are get harder if you have to start with a higher rate or you have to increment faster. So we -- in addition to the economic costs of delay there are political resistance factors that increase by delaying. The ideal climate policy is probably a low carbon tax that rates up quickly so that there's time to adjust. If we get to a point

where we can't do that gradual upswing and we have to do something in a big step there are political as well as economic costs of imposing that suddenly. It's a shock to the system. That's not the best way to do this. So there are two kinds of costs there. There's the economic cost that you all have modeled but there's also well, you know, why is it so hard to climate policy? Nothing gets easier by letting if off. We've looked at the Carbon Tax Center some of the scenarios to meet things like the 80 percent reduction by 2050 and that's, you know, as some of the comments suggested that's a really hard thing to model going forward. But you can look forward about 10 years and get some kind of reasonable estimate. And we're expecting Representative McDermott to re-introduce his climate bill which is really a simple carbon pricing system. And it does what I was describing, it starts low at $12.50 a ton, that's a metric ton, and rises to 10 times that level in a decade. And we find with our model that it reduces emissions by one third in the United States in a decade. That's a serious trajectory that would get us on track to avert the worst effects of global warming. So that's the kind of measure that we think needs to be looked at. And that would be effective, you know, almost immediately. You don't have these lag effects that would be going to eight years of litigation with the EPA. The other thing that's interesting and important about the McDermott approach is it does induce international cooperation's by including border tax adjustments that tax imported coal, oil, or carbon intensive related good at the same rate as domestic goods. It creates an incentive for our trading partners to go ahead and do the same thing, impose carbon taxes. So we don't have to wait for the UN process to get going and respond to whatever the EPA's regulation does.

One of the things that disturbs me about the EPA regulation is somebody mentioned 50 state implementation plans, that's 50 different effective carbon prices. One of the basic things you think about in economics is the law of one price. What you really

want is to avoid distortions across markets, across geographies, across sectors. They're doing one sector in 50 different ways. This is almost the exact opposite of what I would think of as an economically efficient process. I would hope that if this does become the way we do it we at least find a way to unify the pricing across the United States because otherwise you're going to create arbitrage opportunities that won't make climate policy more effective but might enrich people who are trading across borders or whatever the ways that markets can take advantages of distortions across the state line between Delaware and New Jersey or whatever it comes out like. So I think the complexity of this is troubling, the time delays are troubling, and it really cries out for leadership from Congress and from the administration.

And one of the things I appreciate about your paper is tying it into tax reform or tax policy. You can think of the carbon tax not only as climate policy but it's also really important as tax policy. It is a good revenue sources, it offers the opportunity to shift against other distortionary taxes as you modeled the corporate income tax, but you could also pick any tax that you dislike. I think the wage taxes are among the most onerous and regressive. So you could swap out the carbon tax for a wage tax or you can do a mix of things as British Columbia has done. You can swap it out against several taxes and end up with a more efficient tax code, an effective climate policy, and a growing economy. Actually do what Eli is suggesting, is a climate policy that spurs economic growth. So we can have a win-win and it's frustrating that we're having to do this sort of back door approach to climate policy through EPA.

MS. MORRIS: Thank you. Thank you, James. Yeah, so in defense of the administration they're working with the tools they have, right?

MR. HANDLEY: Yes.

MS. MORRIS: So the Clean Air Act was enacted by Congress and

upheld by the Supreme Court and those are the tools the President has. Any of the kinds of policies that we've been talking about that would embed a carbon tax in broader fiscal reform, that includes pro growth tax shifts, that would require action by Congress and so maybe if anybody wishes to complain about the EPA process maybe they can offer an alternative that would make more economic sense.

So, Eli, let me turn to you. Now any kind of climate policy in the U.S. has been vilified as a job killing energy tax, right?

MR. LEHRER: Mm-hmm.

MS. MORRIS: And that phrase has gotten a lot of traction and I kind of watch the Google searches and the Google references to job killing energy tax spike after the passage of Waxman-Markey.

MR. LEHRER: Mm-hmm.

MS. MORRIS: You can see it in the data. What are we going to have to do to reframe the idea of a pro growth tax swap as something other than the epithet that's been used against these kinds of ideas in the past?

MR. LEHRER: It's a good question. The fact is that Waxman-Markey was to a large extent an effort by people on the political left and the political center who do a lot of things they want to do anyway to punish people they didn't like, help people they did like, and exert more control over the economy. I don't have much of a problem with that in that the things that I want to do, cutting taxes, reducing government control of the economy, I just use climate policy myself as a way to accomplish all of the things that I wanted to do anyway (laughter) as a right winger. So that's the entire thing. There is not -- the truth is this problem is exceptionally complex. We can't model the economy or the climate 100 years hence with any degree of accuracy except that the climate is almost certainly, 99 percent going to be a significant problem and a larger economy is a

good way to deal with it. So at the end of the day to stop that a bill that does it has to do things which are known and shown for the most part to create jobs. And of course I should mention that in the long term of course as all the economists in this room knows, the economy will eventually reach full employment anyway. You're really talking about wage levels. It's not really, really jobs in any case although there can be short term job impacts. I mean you'll get the full employment in the long run under any policy. But the most important thing basically is to give people like me what we want which is essentially, you know, essentially give people -- to come up with something that causes some pain for everybody. You know, certainly some of the traditionally right of center coal and oil regions are going to suffer under any tax like this. And equally served --

MS. MORRIS: Or the regulation too.

MR. LEHRER: Yeah, or the regulation, yeah; either way.

MS. MORRIS: The --

MR. LEHRER: The regulation is almost certainly worse for -- the regulation is almost certain to be worse for all of those regions than any tax. But any policy is going to hurt the traditional fossil fuel industries, there's no way around it. So figure out ways to help people ideally in my judgment by imposing less overall restrictions on the economy by trusting the market, by trusting individuals, by trusting free enterprise to solve the problem rather than thinking you can plan it, rather than thinking you can do these things, and frankly to put in some things that liberals really don't like so that it's a bitter pill to swallow. I mean I offered a bunch of environmentalists a deal that they could have whatever carbon tax policy they wanted if I could repeal Obamacare and ban abortion after 12 weeks. And actually some of them said yes which is a testament to them. I would never say yes to a similar, you now, single payer and free abortions for everybody whenever they want them. I never take that for the carbon tax policy I want,

don't get me wrong. But, you know, people have to have some degree of pain. And it isn't, you know, a modest tax. Is it going to kill jobs in a huge way? It obviously will just as almost any tax increase would in any sector of the economy is going to have some effects. But a good Pigovian tax that's in some way a tax swap does have an effect.

And of course, in response to what David was saying earlier there are plenty of examples of tax swaps that have worked. The British Columbia is one. But in the U.S. Ronald Reagan's 1986 tax reform was on balance an overall cut in personal income tax rates in return for a hike in corporate income tax rates. So we've done this a bunch of times and there are all sorts of examples of base broadening throughout history. So this is not a major thing. This is another Pigovian tax and Pigovian taxes generally are pretty good.

MS. MORRIS: So, Philip, now you've listened to these guys really stake out very different positions but with some common ground. What's your sense going forward about how, you know, people say a carbon tax is unthinkable politically, well we're seeing a lot of opposition to the rule making process too, so what do you see as politically how this goes forward?

MR. WALLACH: Right. So I think there -- you can try the scenario that's really not so farfetched in thinking about how some sort of grand bargain would come into play now. You know, you have these inefficient rules that are likely to be coming into effect slowly but surely under the legal status quo. That creates an incentive for industry to come to the table and support some kind of bargain. You have this potential for a tax swap and you have a need for revenue. You know, you could have a partial tax swap and partially use it for deficit reduction, you know. There's nothing preventing that. So, you know, as we think -- and no one wants to raise the income taxes, that's -- President Obama -- you know, maybe on the top one percent it's okay, but nobody wants to raise

income taxes on the vast majority of Americans. And so we have to start looking around for other revenue sources as we hit our sort of fiscal straight jacket in the years and decades to come. And so I think that will open political space for a potential compromise even if it's true that in the past that space has not been there.

MS. MORRIS: Thanks. Now, James, in our modeling analysis we assumed that what other countries do is not affected by the delay in the United States. Now we all know that -- well, having been a negotiator for the U.S. in the climate treaty talks all eyes are on the United States, what we bring to the table, the ambition that we express in the climate talks. What's your sense of the global implications of the delay in U.S. policy?

MR. HANDLEY: Interesting question. I guess at least, you know, the way they're spinning the EPA rule as a 30 percent reduction from 2005, which by the way is a little bit of fast and loose I'd say there. The 2005 -- reduction since 2005 have been about half of that already. So the rule as it's being sold is going to reduce emissions another 15 percent or so over a fairly long period of time. On the other hand it's better for the United States to go into the negotiations having something in process that is, you know -- before that we had the CAFE standards and that's all. So we have -- we're covering the two big sectors, the power plant sector and the transportation sector in some way. Both of those are arguably less than optimal. So there's some help to make the case that we're trying. I'd certainly feel the U.S. would be in a much better position if we had Congress thinking tax reform and getting busy on doing what Phil's talking about which is, you know, putting carbon tax into a broader tax reform proposal and even starting at, you know, a fairly modest level, but know that that's going to raise carbon prices, the price to pollute really, over time could really -- if we put ourselves on a trajectory to do that and announce it ahead of time and there's a lot of advantages in pre-

announcing what the price will be, getting the investment there, that would be certainly a much preferable place for us to be right now. So I guess my answer is sort of it's better than nothing but not really very much better than nothing. And it's - and the pricing are confusing. One of the problems with the 50 state approach is you've got 50 different prices. I don't know what you do for -- what's your equivalence when you go into the international negotiations, what do you say the U.S. carbon price is that you want to -- what's the measure of the international level of effort that's going to be required to meet the U.S. or whatever. It's a little hard to quantify that and to use that as a benchmark. So it's kind of a muddy signal, it's saying we're getting off the starting block but it's not really giving much of a clear picture about how fast we're going to move.

MS. MORRIS: Yeah, it's a little hard to explain the ambition of X pounds per kilowatt hour in this state and Y pounds is kilowatt hour in some other states. And all these different emissions rates and -- for other countries to know what that really means other than the broad emissions goal the president has calculated.

MR. HANDLEY: And the timing is completely uncertain. I mean will it, you know, will it be done by the end of the next administration? You know, because that would be a bet but I don't know whether I'd make it.

MR. LEHRER: You know, this does seem to be a feature of such system in a democracy, that there's going to be a degree of uncertainty. I mean the European emissions trading mechanism has collapsed twice, Australia had something that's currently under review. So this just seems to be something that's going to happen in any democratic country to a large extent and, you know, I just think it's something that has to be dealt with. You can't guarantee what the policy is going to be in the future so therefore be rich. (Laughter)

MR. HANDLEY: Well, I do think you can get some certainty. British

Columbia offers a pretty salient example. They implemented up $5 a ton for 4 or 5 years and it went up as predicted, as planned and one of the cool things about the way they did that is they used the revenue to reduce a whole range of other taxes and the public has bought in. Everybody is getting something out of the deal, both economically and in terms of climate policy. So I think if you got broad tax reform where, you know, if you're a worker you're getting a benefit, if you're an owner of capital you're getting a benefit, and other, you know, other pieces maybe you do a direct distribution of some of the revenue and some of it goes to deficit reductions. If everybody's got some benefit, direct economic benefit out of the revenue stream and we know we've got a climate policy that's demonstrably workable it seems to me maybe you can get predictability.

MR. LEHRER: It's possible but I think that in a sufficiently complex democratic system it's unlikely on a large scale. I mean British Columbia is a single province with a Westminster style parliament, essentially it isn't stated quite the same way in the U.S. but something close to parliamentary supremacy on the provincial level. You can have certainty from mandate. Obviously if you have a different government in there who knows. There are all sorts of things. You can't have long term certainty in any political system unless you're absolutely sure it's going to be run by the same authoritarians forever and maybe Singapore can offer that. And if you can offer that, if you can offer competent uncorrupt authoritarian role lots of things can work including cap and trade. (Laughter)

MS. MORRIS: Hey, let's turn to the idea --

MR. LEHRER: Anyway.

MS. MORRIS: -- of cap and trade because the EPA rule explicitly calls out the option for states to engage in a cap and trade program, either a mass based cap and trade or a rate based cap and trade. And there obviously are existing cap and trade

systems in the United States. So at least there's some potential within that rule for some Federal relatively efficient price harmonization across states and within states. One thing I would have liked to have seen in the Bill was a call out for the potential of state level carbon taxes.

MR. HANDLEY: Yes.

MS. MORRIS: -- to be a compliance option because we could see some of these pro growth tax swap effects within a state because we know some states have distortionary taxes that they could change out with the carbon tax or they have deficits that need patching. So it would have been nice to see a little bit of reference to that, although I don't think that's precluded in the rule, it's just not explicitly recognized. Do you have an opinion on that, Philip?

MR. WALLACH: Well, I think, you know, it's a little hard to know what that the EPA is encouraging is going to stick legally that they have proposed. And I think the carbon tax option would also perhaps be more legally uncertain and maybe that's why they've left it out. But really the logic of it isn't so difference than these kinds of cap and trade systems like the RGGI in the northeast states or that California has so it doesn't really seem very -- there's no really compelling reason that if you're going to have one why you shouldn't also have the other.

MS. MORRIS: Yeah, yeah. So any other comments from the floor? And I'll open it up to questions? Anyone want to respond to?

MR. LEHRER: Cap and trade is awful for CO2. The truth is, look, you structure cap and trade just right and it essentially puts a price on pollution wherever it's emitted and you've essentially accomplished having carbon tax except it's a heck of a lot more complicated and likely to be corrupt in any number of ways, particularly when it comes to the client politics that can be played with the government conjuring carbon

allowances out of thin air. So, you know, cap and trade, yeah, can work in theory. The practice has not been promising particularly the larger the scale you go and the more people and places that are involved. So I think yeah, it's probably preferable to a pure command control regulation for CO2 but probably not by a lot and there are probably more opportunities for it to be used for all sorts of silly mischief.

MR. WALLACH: I have to agree with all of that, yes. (Laughter)

MS. MORRIS: Okay. Wow. So there is some intersection there in views. Let's get some thoughts from the audience. Is that Charles?

MR. KOMANOFF: Thanks. Charles Komanoff with the Carbon Tax Center. And, Adele, like you James and I have been so busy responding to events in the past few days that we haven't shared our modeling results fully with each other. So I just want to embellish a remark that James made. We can actually get a sense of what the revealed price if you will in the clean energy or climate plan, the White House EPA Plan. Our modeling suggests that a national U.S. carbon tax in all sectors, not just electric power, starting at $1.25 per ton of CO2 and increasing by the same buck and a quarter every year would by 2030 produce the same tonnage reduction in U.S. emissions of carbon dioxide as the White House EPA Plan. And that's about a meager a carbon tax as one can imagine. It's even lower than the RGGI price, even lower than the EU price. And, Eli, we agree with you on the inadequacy of those prices and those systems. And so, you know, as much as we carbon tax advocates and climate concerned citizens would like to be applauding what has come out over the past few days we look at the numbers and regard it as far too weak to be able to celebrate. And so we're still pushing for that carbon tax at a far more robust level than the numbers I was just citing.

MS. MORRIS: Okay. Any other questions? Yes, sir?

MR. HUTCHINSON: Thank you. In the EPA --

MS. MORRIS: Could you identify yourself?

MR. HUTCHINSON: Thomas Hutchinson, self employed.

MS. MORRIS: Okay.

MR. HUTCHINSON: In the EPA regulations how does sequestration fit in to the regulations subject to the fact of course that the states haven't proposed their regulations, but in the meta sense how does sequestration fit in?

MS. MORRIS: Well, I think we're all still digesting the rule and its details but I did see language in the preamble that tried to acknowledge the interest of some states in their forestry and agriculture sectors. And I know -- my impression is that states could get credit or could effectively lower their emission for example if they use biomass to coat fire with coal in their fossil fueled fire power generating units. I think it remains to be seen what would happen in terms of getting credit for growing forests and that kind of thing. Do you guys have any thoughts on that?

MR. WALLACH: Well, there is this -- the main piece perhaps or the first component of the plan is efficiency standards applied to the plant level. So if you developed some sort of, you know, carbon capture and sequestration method that could economically put in place at coal plants that would certainly be one way that states mandating that could comply with the overall goals. Now it's a big variable of course just how economically feasible that really is in the coming years.

MS. MORRIS: All right. Yes, sir.

MR. LEHMANN: Evan Lehmann with ClimateWire at E&E. Eli, do you think that the regulations will help you pursue a carbon neutral carbon tax? Do you think it could convince some republicans to act in Congress? And on the state level carbon taxes, do they provide the same benefit in terms of offset income? So if you -- I think, yeah, I think you know what I'm talking about. Thanks.

MR. LEHRER: Sure. So we're going to see what I might call a derpfest from the republican party with people derp, derp, derp, you know, climate, Ombama, socialism, whatever, for about a year. So that's just what's going to happen and the general practice --

MR. HANDLEY: What's the word, dirt?

MR. LEHRER: Derp, derp. It's from South Park; derp, derp, derp. (Laughter) It's a wonderful word and everybody should use it to refer -- and both sides do it with equal amount. Just, you know, like, you know, tax cuts for the wealthy Coke brothers, that's left wing derp. Right wing derp is like Obama can get in socialist. So both sides are equally guilty of derping all the time.

So republicans -- all of our republican friends are going to go derp, derp, derp about it for about 12 months. At that point we'll have -- we'll be past the elections and people are going to have to do something. A state level carbon tax obviously is going to have no impact on global emissions or anything, but what it can do is give a republican governor a great opportunity to say I'm going to get rid of your income tax and kick the EPA out of our state. That to me is like a really fun and good thing to do. But cut taxes and stick it to EPA and Washington. So in the long term I can see a lot of political promise to state level carbon taxes. Are republicans going to embrace it? Maybe, maybe not. I mean for -- and this is the fault of both parties, climate policy today has largely been a way for people on the political left to come up with long lists of things they want to do anyway and attach them to climate change. I just want right wingers to start doing the same thing. And given that there is an enormous precedent of left wingers using it for what they want it's going to take a while to get people to realize gee, we can use this to do stuff we want anyway. So that's what eventually is going to happen, you're going to have a year-long derpfest before that at least.

MS. MORRIS: But states have to do a compliance plan --

MR. LEHRER: Yeah.

MS. MORRIS: -- under the 111(d) rule. So at some point states are going to have -- I mean maybe --

MR. LEHRER: Yeah.

MS. MORRIS: -- there's a little bit of delay as everyone comments on the proposed rule and waits to see what's in the final rule, but ultimately even the red --

MR. LEHRER: Right.

MS. MORRIS: -- states need a compliance plan with this rule.

MR. LEHRER: Well, I mean people said they have to -- you know, they'll have to set up health exchanges, all this stuff; who knows. I mean believe me you cannot underestimate the ability of many governors in both parties just to go derp, derp, derp about things they really don't want. So, yeah, I mean they'll have to but I don't know, maybe they'll like submit some plan on toilet paper or just say you do it, we're not doing it, who knows. But all of these things are possible. I mean not without reason, the whole issue of climate change has been turned into this enormous political hot potato because it's been strongly associated with bills that are longs lists of preexisting priorities of the democratic party, so why should conservatives care about it?

MS. MORRIS: James, do you want to respond to any of that?

(Laughter)

MR. HANDLEY: I hope we can get somewhere before a year passes on discussing tax reform. I think it probably will be a while before that happens. I would like to think that maybe the regulatory nudge will as Phil was suggesting create some opportunity and opening for a wider discussion about including pollution taxes in tax reform.

MR. LEHRER: After people have the opportunity to say, you know, (inaudible) a socialist for about a year. Yes, I agree.

MR. WALLACH: Yeah. And unfortunately it's an election year as we all know.

MR. LEHRER: Yeah.

MR. WALLACH: And the rhetoric coming out of the White House is really very grandiose about this. You know, just a few years ago everyone would admit working through the clean air act is really suboptimal. It's second or third best, you know.

MR. HANDLEY: Well, the administrator of the EPA testified to that in the hearings running up the Washington (inaudible)

MR. WALLACH: That's right. But the message coming out today is this is a great policy for America. And that's understandable politics, but I think it does set the stage for election season 2014 to have a lot of mudslinging from both sides about the likely effects of this rather than starting to move toward a constructive alternative.

MS. MORRIS: Okay. We have time for another question if there is one. Okay. Well, please join me in thanking my guests and thanking (inaudible) (Applause)

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