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PART III: ECONOMICS OF CLIMATE CHANGE POLICY

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PART III: ECONOMICS OF CLIMATE CHANGE POLICY

MR. GAYER: -- about seven years ago. At the time I was working at the Council of Economic Advisors and it was a very productive day for me when my boss, Greg Mankiw was described in the New Republic as “a nerd.” In fact, it was the lead line of the article. It said, “Greg Mankiw is a nerd.”

Greg, being very gracious, would share the glory, frequently telling reporters that all the economists at CEA were also nerds. Believe it or not, probably not, the small community of D.C. economists has a unique and unspoken competition of who can be considered the nerdiest of all. It is with great affection and with great admiration that I crown Doug the winner. (Laughter)

This past year, Doug was described by the Huffington Post as not just a nerd, but an uber-nerd. And he was described by the Washington Examiner -- this one is my favorite -- “a geek with guts.” I think that was the title of the article.

So why do I view the nerd crown with such admiration? To me it highlights Doug’s intellectual curiosity on a wide range of economic issues, including budget policies, social security, Medicare, financial markets, and macro economics. It also highlights his intellectual honesty and his dedication to the use of unbiased analysis to assess policy issues. These skills make Doug an ideal CBO director where the key job is to report analyses as clearly as possible without regard to political consequences, a job Doug does exceptionally well.

Doug might also know that in my house he carries another title. Months ago, in a futile attempt to impress my three-year-old, which is always trouble, I showed him a picture of Doug in the newspaper. I was excited seeing somebody I know in the newspaper. I said, “Do you remember meeting this guy?”

And he quickly turned around and said, “Of course, he’s our rabbi.” (Laughter)

Now, it could be that my son thinks all men with beards are rabbis. Maybe. But I’d rather give him more credit and believe that my boy has a good eye for wise and patient people, two qualities required of both rabbis and of CBO directors. So please join me in welcoming not quite the family rabbi, but, in fact, CBO director, Doug Elmendorf. (Applause)

MR. ELMENDORF: Thank you, Ted, for that very gracious and interesting introduction. (Laughter)

As Ted mentioned, I spent a couple of years at Brookings before becoming CBO director. Those were absolutely crucial years in my life. If I had not had that opportunity, I don’t think I would be CBO director today, and I know I would not be as effective at being CBO director as I hope I am. So I’m very grateful to Brookings, not particularly to the current leadership of the Economic Studies Program, although I am very fond of that leadership, but to the predecessors of the current leadership who brought me into Brookings: Belle Sawhill and Bill Gale. And also I’m grateful, of course, to Bill Antholis and Strobe Talbott for helping to support me during my time at Brookings.

I’m honored to be here with all of you today. The Congressional Budget Office has done a great deal of work over the past decade on climate and energy policy. And I hope to distill a little of that work for you today. As you know, human activities around the world are producing increasing concentrations of greenhouse gases, particularly carbon dioxide resulting from the consumption of fossil fuels and deforestation. Researchers generally conclude that a continued increase in atmospheric concentrations of greenhouse gases would have serious and costly effects.

Now, as you know and have talked about I'm sure, a comprehensive response to that challenge would include a collection of strategies, research to better understand the scientific processes at work, and to develop technologies to address them, measures to help the economy and society adapt to the projected warming and other expected changes, and efforts to reduce emissions, averting at least some of the potential damage to the environment and the attending economic costs.

Today I'm going to focus just on a third of those strategies: efforts to reduce emissions. As you may know or should know, the Congressional Budget Office does not make policy recommendations. We are not for or against any particular climate or energy policy. We are not for or against any particular approach to reducing greenhouse gas emissions. But we have tried in the work that we've done to distill the lessons of research done by people at think tanks and universities and in the private sector and elsewhere in the government, to do our own analysis and modeling, and to pull that together in a way that can help members of Congress understand the economic and other consequences of policies they are considering. And as we have done that regarding policies to reduce greenhouse gas emissions, we have come across, we think, at least five key lessons of economic analysis. Let me try to summarize those for you today.

The first lesson is that to reduce greenhouse gas emissions at the lowest social cost, the government should put a price on emissions. The amount of greenhouse gas emissions depend on numerous decisions made by millions of firms and households throughout the economy. Decisions including what technologies to produce goods and services, how much people drive, where they live, and on and on. Just as central planning is not an effective way to organize the

decisions about the production and consumption of all of these goods, neither is central planning an effective way to organize the reduction of greenhouse gas emissions. Market-based approaches that create financial incentives for firms and households to reduce emission give all of the independent actors the latitude to decide what is the least costly way to reduce emissions.

Now, price can be established in a variety of ways through tax on carbon, through cap and trade systems, through various alternatives to cap and trade that are being discussed today. I won't go into those specifics. The crucial point is that putting a price on emissions creates incentives for conservation, for substitution and production, and for technological innovation, exactly the changes that are needed to reduce emissions over time. Either a tax or a cap and trade program would cause the prices of goods and services to reflect -- to rise in order to reflect the amount of emissions. Those higher prices will provide incentives for firms and households to conserve energy, to produce goods in a manner that lowers emissions, and to replace the existing capital stock with capital that results in fewer emissions.

However, as important as it is to establish a price, establishing a price is probably not sufficient. It is a part -- an essential part of an overall strategy to reduce emissions but it is not the only essential part. There are some complimentary parts that economic analysis points to. One reason that a price signal is probably not sufficient is that price signals don't always work in the real world the way they do in economic models. People don't have perfect information, they aren't fully rational, and contracts don't always reflect costs correctly.

For example, consider rental housing. Apartment owners may lack appropriate incentives to undertake efficiency improvements if renters are

responsible for heating and cooling bills and if apartment rents don't accurately reflect the energy efficiency, and thus the energy costs of appliances in the apartment. So in addition to establishing a price to raising the cost of energy, efficiency standards or the dissemination of additional information about energy efficiency would be two complimentary ways to address the social problem.

Another reason that reducing emissions efficiently requires more than just a price signal is that government has a key role to play in funding basic research and probably in support for adaptation and for changes in other policies related to energy. For example, nuclear power regulation.

In general, markets underinvest in research and development because the benefits of those activities are not captured entirely by the organization doing the research and development but spill over to others in the economy. With that in mind, federal funding could be provided for R&D of technologies to lower emissions, such as improvements in energy efficiency, advances in low or zero emission technologies, and development of sequestration technologies which capture and store carbon for long periods.

Federal support would probably be most cost-effective if it went towards basic research on technologies that are in the early stages of development. And such research is more likely to be underfunded in the absence of government support than is research closer to the production process because that basic research is more likely to create knowledge that is beneficial to other firms but does not generate profits for the firm conducting the research. So the first lesson, as I said, is that to reduce greenhouse gas emissions at the lowest social cost the government should put a price on emissions. But that price is not sufficient.

Now, lesson two moves on and says to reduce greenhouse gas

emissions at the lowest social cost, the price should rise gradually over time and should avoid unnecessary volatility. A gradual increase in price would lead to gradual reductions in greenhouse gas emissions relative to what would occur in the absence of the policy. Gradual reductions are important because the economy is a large ship that takes time to turn. It takes time for research to be conducted and technology to be designed, tested, refined, and disseminated widely. It takes time for patterns or production and consumption to change. And it takes time for business and household capital to wear out and be replaced with different sorts of capital.

For example, replacing gas guzzling cars with more efficient ones or coal fire generating facilities with facilities that rely on renewable energy sources is much cheaper and more efficient if we can wait for the normal replacement cycle, rather than having to scrap existing capital quickly. If one forces those processes to occur too rapidly, that could raise the cost of achieving the desired cap on cumulative emissions without yielding proportionately greater benefits because climate change really depends on the accumulation of emissions over multiple decades rather than the flow of new emissions in any given year.

By that same logic, if one intends to reduce greenhouse gas emissions over time, it is important to get started on the process now so that the adjustment process can be more gradual. To have a price rise over time one needs naturally a tax that increases the magnitude or caps on emissions that narrow -- that tighten progressively over time.

Now, in addition to wanting the price to rise slowly to achieve reduction to the lowest social cost, one would like the price of emissions to not be more volatile than is necessary. And the reasoning here is the same as the one I

just gave really which is that gradual adjustment is least costly. If the price of emissions jumps up and jumps down, then that would progressively force more reductions in emissions when it is costly to do so, and then allow for smaller reductions when it is less costly to do so. And that raises the overall cost.

The point here is the demand for emissions-producing activities can shift significantly over short periods of time in response, for example, to the weather and the consequent demand for energy. In contrast, the value of reducing emissions is nearly constant over time because the ultimate costs of climate change arise from the total stock of emissions in the atmosphere, a stock that dwarfs the annual flow of new emissions. As a consequence, if you force a fixed time path of the quantity of emission reductions, then one is creating a volatile price and varying pressure for reductions that makes the process less efficient.

In contrast, the tax that keeps the price relatively smooth or banking and borrowing provisions in a cap and trade system that help to dam excess volatility in the price can lower the cost of emissions reductions because firms would undertake more reductions at times when it is less costly to do so and less reductions at times when it is more costly to do so. So the second lesson of economic analysis for reducing greenhouse gas emissions in an efficient way is to have the price rise gradually over time and avoid unnecessary volatility.

The third lesson of economic analysis for reducing greenhouse gas emissions efficiently is that the scope of emissions that are priced should be as broad as possible. Remember, the pricing emission makes emissions reductions efficient because it lets producers and consumers decide on the cheapest way to achieve a certain amount of reductions. And that process is most effective if the largest number of producers and consumers are involved.

That does not mean that everyone needs to face exactly the same price or be under exactly the same system. As long as the prices faced by different producers and consumers are similar, then the outcome will be fairly efficient. But if the prices are widely in variance with each other then certain aspects -- certain sectors of the economy will be forced to make emissions reductions at lower costs -- at higher costs, rather, than other sectors of the economy that are making only lower cost emissions reductions.

The issue about the scope of the emissions reductions that are captured by whatever system one might establish arises in a number of different contexts in climate policy. One of them is in a cap and trade or similar system and thinking about whether there should be a single system that covers the entire economy or different systems established for different parts of the economy. Having everyone in the same system would be most efficient, but carving up different emissions sources into different systems can be nearly as efficient if the prices end up being nearly the same across the different pieces of the economy.

The second context in which this issue arises in climate policy is considering international coordination. Because a ton of greenhouse gas emissions from any point on the globe at a given time would have essentially the same effect on climate change, the most cost-effective global way to limit the damage from climate change is to reduce emissions wherever on the planet is cheapest. Achieving that goal perfectly would require a uniform incentive to reduce emissions in every corner of every country. But this, as in many other areas of economic policy, one should probably not let the perfect be the enemy of the good. Achieving efficient emissions across the globe approximately would just require similar incentives in every country, or at least in every country with significant

opportunities to reduce emissions.

And because U.S. emissions of carbon dioxide from fossil fuels are only about 20 percent of global emissions of that sort and net greenhouse gas emissions from the U.S. are an even smaller share of net global emissions, it is clearly necessary to include at least a significant subset of other emitting countries if we are to achieve global reductions in emissions at a low social cost.

The third context in which the question of the scope of emissions' reductions arises is in considering offsets, that is reductions in greenhouse gases from activities not subject to basic limits on emissions. And such reductions can arise from disposing of waste in different ways, from changing methods of farming, and from lessening deforestation. Broadening the scope of greenhouse gas pricing through the use of offsets allows less expensive reductions from activities not subject to emission limits to substitute for more expensive reductions from activities that are subject to the limits. However, it is challenging to verify that offsets represent real emissions reductions. In particular, that they are incremental reductions that would otherwise not have occurred; that they are permanent, not merely delaying the release of greenhouse gases; and they are correctly measured so the effect on greenhouse gas emissions that we think we are getting is what is actually happening. Not just in that sector, but in keeping -- taking account of offsetting changes elsewhere in the economy.

Therefore, full inclusion of offsets in an emission reduction system risks not achieving the ultimate goal of a certain amount of emissions reductions. As a result, there is a strong economic logic to include offsets that are fairly straightforward to verify. For example, the capture of methane from animal waste. And to proceed more slowly on offsets that are very challenging to identify and to

quality, such as reduced deforestation in developing countries.

The fourth lesson of economic analysis for this topic is that an efficient system for reducing greenhouse gas emissions would probably lower overall GDP, employment, and household purchasing power by a modest amount relative to what would occur otherwise. And I should say leaving aside the economic effects of slowing climate change itself. The reduction in GDP would occur because resources would be devoted to achieving something that is not included in measured GDP. For example, think about resources that could be used to improve fuel efficiency in cars or to create fancier upholstery. We count fancier upholstery in measuring the output of economy. We don't count effects on the content of the atmosphere. That is not to say that we shouldn't count them in a broader social sense but that one should not be surprised if a thing that one does measure a certain way but doesn't include certain benefits then ends up showing costs.

Now, the amount of loss in GDP is very uncertain because it depends on things the analysts don't know much about. Essentially, technological progress over very long time periods in areas we have not really explored and our behavioral responses to changes in prices beyond what we have seen historically. However, most experts project that the long-term loss from a policy like the American Clean Energy and Security Act of 2009 would be a few percent of GDP, roughly equal to normal growth in GDP over just a few years.

The reduction in employment would occur because shifts in product demand across industries would generate shifts in the demand for workers. And the supply of workers would not adjust immediately or costlessly. Specifically, production in employment would shift away from industries related to the production

of carbon-based energy and energy intensive goods and services, and toward the production of alternative and lower emission energy sources, toward goods that use energy more efficiently, and toward non-energy intensive goods and services.

Those shifts in employment would occur gradually over a long period, as long as the cap on emissions or the carbon tax -- whatever was establishing the price -- was rising gradually so the incentives and the constraints became progressively tighter. Workers would follow the shifts in demand but they wouldn't follow right away and they wouldn't follow without cost.

I think the key point here is that analysts who focus only on the green jobs created by a policy to reduce emissions or only on the old jobs lost because of a policy to reduce emissions, are each missing a very large part of the story. Both effects would be at work. And both the modeling that's been done and the history of the United States' experience suggest that the overall effect would be a small decline in employment. For example, during the past half-century the U.S. economy has adjusted to a sustained decline in demand for manufacturing workers, while maintaining an overall level of high employment apart from recessions.

The reduction in households' purchasing power that would occur would occur again because resources would be devoted to achieving a goal not measured in our traditional measures of income. The loss of purchasing power begins with the gross costs of complying with a policy. Firms would need to pay taxes or buy allowances, make changes in their production processes or buy offsets. And they're going to tend to pass those costs along to consumers in the form of higher prices for goods and services. Those price increases are essential to the success of the policy because they're the most important mechanism through

which businesses and households would be encouraged to make investments and make behavioral changes that reduce emissions. But those price changes would also reduce purchasing power.

The other side of this is that households could also, depending on the policy, receive compensation. And the compensation can be derived from the revenue received by the government in the course of having a carbon tax or selling allowances under a cap and trade system. So the net loss and purchasing power to households depends on the gross costs of complying with a program minus the compensation they receive.

Keeping track of all that is very complicated because households would bear costs and receive compensation in their roles as consumers, as workers, as business owners, as shareholders, as taxpayers, and so on. And the Congressional Budget Office has tried to keep track of those pieces in some work that we've done. We've estimated that the net loss in purchasing power from the primary cap and trade system in the American Clean Energy Act of last year would be a loss of a tenth of a percent of GDP in 2015, rising by 2050 to about eight-tenths of a percent of GDP. So a little under -- starting from next to nothing and rising to a little under one percent of GDP. Measured in terms of the 2010 economy, the average loss per household would be $90 in 2012, we estimate; about $900 in 2050.

The fifth lesson of economic analysis for reducing emissions of greenhouse gases is that the details of the policies used have significant effects on how workers in different industries and how households at different income levels or otherwise different circumstances would be affected by the policies. As I noted a minute ago, a policy that reduces greenhouse gas emissions would naturally tend

to help some industries and hurt others. Coal mining would probably see the largest percentage decline in employment because when it is burned, coal produces more greenhouse gases per unit of energy than do other fossil fuels.

A mitigating factor can be the development of technologies to capture and store emissions of coal fire powered plants, allowing them to continue in operation and thus continue to purchase coal. Employment would also decline in oil and gas extraction, refining, mining, construction, chemicals productions, transportation services, and other industries. However, employment would increase in the very large services sector and the industries that manufacture equipment for the production of energy using low cost technologies. It's just the point I made a moment ago about the shift in the demand for work. Those shifts have costs for workers, and policies can be designed to cushion those effects. For example, the government could allocate a portion of emission allowances in a cap and trade system free-of-charge to firms in particular industries, such as those likely to face a high level of international competition.

The government could also use a portion of the revenue from auction of the allowances to fund benefits for workers who lose their jobs because of legislation. Of course, that protection has costs because those resources cannot then be used to help other firms in other industries or other households. But that is a choice, and the choices that policymakers make are absolutely crucial to the distribution of the benefits and costs.

Another version of that same point is that policies that reduce emissions could affect households at different income levels differently depending on how the revenues collected under the policy are distributed to households. The amount of revenue involved is quite large. CBO estimated that the value of

allowances in the cap and trade system under the legislation passed by the House last year would total nearly $900 billion during the next decade. So where that $900 billion goes, not surprisingly, matters tremendously for the benefits and costs in the short run of that kind of policy, leaving aside the longer term issues about the transformation of the economy. It's a lot of money being moved around.

Now, the increases in prices that I've discussed would have the largest direct effect -- the largest -- impose the largest directed burden on low income households because they spend a larger share of their income. But there are ways of distributing the value of the allowances if policymakers chose to that could offset or more than offset the effects of the price changes. If all of the allowances were sold, for example, and the proceeds used to pay lump sum rebates -- equal lump sum rebates to every household in the United States -- lower income households would benefit from the policy overall because the rebate would exceed no loss in purchasing power from higher prices. Higher income households would lose from that policy because the lump sum rebate would be less than the loss of their purchasing power.

The other ways of distributing the allowance value would have very different effects. If all the allowances were given away, for example, to producers with no conditions attached, then the benefits of those allowances would accrue primarily to shareholders who are disproportionately very high income people. So the distributional benefits would be completely different, again, depending on what's done with the value of the allowances, even for the same underlying policy in reducing carbon emissions. And recent climate bills have tackled this issue in a variety of ways and have come to a variety of different approaches at the end.

So to conclude, in the work that we've done at CBO over a period of

many years, we think there are a number -- for all of the uncertainties -- and there are tremendous uncertainties on this issue -- we think there are some pretty clear points that have emerged from the economic research and analysis that we and others have done. If one chooses -- and again, it's not a recommendation from CBO, but if one chooses to reduce greenhouse gas emissions, then -- and one wants to do that at the lowest social cost, economic analysis points very clearly to establishing a price on emissions, to doing complimentary policies to establishing that price, to having that price rise gradually and to not be unnecessarily volatile over time.

Even still, reducing greenhouse gas emissions would probably lower overall GDP, employment, and households' purchasing power by a modest amount relative to what would occur otherwise, and leaving aside, again, the benefits of the climate change itself. But policy design would have a very significant effect on the distribution of those costs.

Thank you very much. (Applause)

MR. GAYER: Great. Thank you again, Doug. So, as moderator I was going to pitch a few questions and then open it up to the crowd.

MR. ELMENDORF: Okay.

MR. GAYER: So first, in some -- you know, your first point on the importance of prices, I think as often happens among economists -- economist preferences sometimes are inversed to political will. So if you took a poll, I think, of economists, you would find the preference -- for much the reason you said -- would be on how to reduce carbon emissions. Let's start with a carbon tax, maybe a close second, cap and trade. And a third would be efficiency measures and command and control regulations would fall after that.

However, it seems that if you hear all the kind of political heat -- for lack of a better phrase -- and on the bills, there seems to be this focus that taxes are off limits because they're politically unpopular, cap and trade, lo and behold, is pitched as bad because it's a tax. And so therefore is facing, at least to say it mildly, political opposition. My question is -- my premise is the reason why we find this is because taxes are in economic (inaudible) what we call salient. They're easy to score. They're easy to see. Cap and trade maybe a little less salient but yet still fairly easy. And my concern is we lead to a political outcome where the thing -- the costs that are hidden, which most economists would say are higher, are the costs -- are the measures that we use.

So I would ask, one, if -- to reflect on that. And two, since CBO is out to measure what is measurable in some sense, and you talk a lot about cap and trade and the costs of cap and trade, is there a role for CBO to -- and I don't know if it's possible to put greater salience on the regulative cost savings of one approach to the other even if it -- and I don't know how you put hard numbers on command and control and EPA regulations or whatnot. But how to in some sense adjust for this maybe innate bias I would say. It's a long question but let's see what you got.

MR. ELMENDORF: I guess a few thoughts. One is that I think it's very important for people to understand that command and control regulation would raise the prices. If it is effective regulation in terms of reducing greenhouse gas emissions, it would raise the price of goods and services that involve a lot of greenhouse gas emissions and their production. And I agree that effect is not quite as salient but it is there and it is larger than the effect of using a price mechanism. That's the result from economic analysis. And so I think it's crucial in a lot of economic policy and a lot of economics in general. What is most salient, what

appears most obvious, is not the full story. This is a very important illustration of that I think.

I think the second point to emphasize is that taxes have both incentive effects, raising the relative -- or cap and trade system. Any way in which we establish a price on carbon emissions. There are incentive effects in raising the price of some goods and services or some activities relative to others. There's a slightly separate question which is the burden. The crucial part of the price mechanism in reducing emissions in a cost-efficient way is the relative price. It's changing the choices that firms and households made. It is not particularly imposing a burden. The money that's collected from a tax for a cap and trade system can be given back to households. And if it is given back to households, then that offsets nearly all of the burden while preserving the change in relative prices necessary to motivate changes in behavior.

I don't think it offsets literally all of the burden because as I said, if you're using resources to accomplish goals that are not measured in GDP or measured in income, there will be some net loss. But a very large fraction of the gross costs, the direct costs, can go back to households. They do go back to households. It's a question of how they go back to households really. They can go back directly. They can go back in various indirect ways. So I think partly what people need to do, and CBO has written how to this effect, is to distinguish between the need for changes in relative prices to create incentives and the question of the burden.

Now, what CBO can do more generally to make these issues more salient, I don't really know. I mean, we -- I came here. (Laughter) We write things. We try to, you know, we try to make our views clear. And I think because people

understand we're not advocates for particular policies, we have no ax to grind ourselves, they understand that our views are reflecting the consensus of expert analysis in the area. I think that gives us some credibility but these effects are subtle and hidden and difficult to explain. And I don't have a magic solution to those problems.

MR. GAYER: Well, maybe as a follow-up -- I should know this better than I do -- maybe you can explain a little bit of the CBO process. And by that I mean, you know, how much discretion do you have to issue reports on whatever issue you want versus -- or in particular legislation? And which components of the legislation? In particular, this is a great example of climate, which you had mentioned a few times leaving aside benefits. So benefits are really hard to quantify in a climate bill but any policy ignoring the benefits is a bad policy if the benefits are zero. So it's obviously half the equation if not more. So how kind of -- how much discretion and empowerment do you have to kind of look broadly at these issues or to issue reports or whatnot on some of these, as I called it, insalient aspects or hidden costs?

MR. ELMENDORF: So the way CBO works is that we respond to requests from Congress. Our job is to do analysis that members of Congress and their staffs find useful in making policy decisions. Much of our written work, we do cost estimates of legislation. And it is written into law that CBO will provide or will do its best to provide estimates of the budgetary effects of legislation that is voted out of committees. We provide hundreds of formal written estimates in a year and thousands of informal estimates. That's a response to the legislative process at work.

Beyond that we write a lot of studies, issue briefs, letters. Almost all

of that is in response to particular questions from particular members, although usually it develops over a course of time as we get questions from lots of sources. So on the distributional effects of climate policies being considered in Congress, we've had requests from lots of members of Congress on both sides of the aisle and both sides of the Hill. In the end, the letter or something is usually written "Dear Senator So-and-So" or "Dear Chairman So-and-So," but usually in response to a wide set of requests.

We get a lot more requests than we can respond to, both in volume, but also in scope. So there are issues that we don't have the analytic capacity to address that we're asked about and we have to say we're sorry. And sometimes that's because we don't have the right staff or enough staff ourselves. Sometimes it's because the research community on which we depend hasn't done that research. So, and the work that we just released a few weeks ago about the effects of climate policies on employment, we note that these are the effects of the increases in prices under a cap and trade system or under a carbon tax and how that plays to the economy. We do not capture the effects of any change in the pace of climate change on employment, and we say we don't capture that because that is something that has been less well studied in the literature.

So, I think the place where we have great latitude -- complete latitude, essentially -- is in the answer we provide. So our answer is our best judgment based on the analytic work that's been done in the world to any given question. But the questions are really chosen by members of Congress, sometimes specifically for individual products but more often just in general in the course of a lot of interactions and testimonies and so on.

MR. GAYER: Let me ask one more question before I open it up.

You mentioned your labor market study or the effect of employment on climate. And for you maybe this is a nerdy question but on the labor markets I read the study and it seems -- and you were right in qualifying everything by saying there's a high degree of uncertainty here. I'm trying to link it back. The key, I think -- one of the keys for the uncertainty is how quickly labor markets adjust. And this is kind of a lesson coming out of the last two years which I think every economist has to reevaluate their models and kind of have a big dose of humility on the tools of economics. And I'm wondering what are the lessons from the last two years or even the last two recessions I should say and the ability of labor markets to adjust to any sort of changes, whether or not they're shocks or price on carbon or anything like that? Is this something that effects the tools that CBO is using in their analysis of changes in the labor market or responses in the labor market?

MR. ELMENDORF: So I don't think our views about the evolution of labor markets over the long run have been affected very greatly by the experience of the past few years. We've been certainly reminder the past few years that in response to large sudden shocks, a tremendous amount of pain can occur in the labor market.

The climate policies that most people are talking about, however, involve often gradual changes in policy, essentially, and then gradual changes in economic activity. That's why a number of places, including what I said today, look more at the evidence on how the U.S. has responded to the decline in demand for manufacturing workers which has occurred over a long period of time.

I think one important issue that's somewhat unresolved in our minds about the affects of climate policy is how much foresight firms and workers will have. So, the policy might be phased in gradually, but at least in principle if a law

like the one the House passed last year, if that bill became law, one could look ahead at many years and form some expectation of what would be happening to the price of carbon emissions and thus to other aspects of the economy. The more that firms and workers saw ahead to that and moved ahead of time, the more people who saw when they were young that while they could have a short career in some area, they would have a longer career somewhere else -- the more that foresight occurs, the less costly the disruptions will be. On the other hand, even if a system were adopted that in principle would last forever, people I think would understand that Congress can re-legislate, the actual path of the price of carbon allowance -- you know, allowances to emit carbon would be very uncertain. People don't always have great foresight in those decisions.

So, it's not clear, but I think that's an important area of uncertainty in how costly this sort of transition would be, is the extent to which every year a sort of change comes as a new surprise, versus the extent which people can look out and see what's coming.

SPEAKER: I don't want to hog all the questions, so if it's okay --

MR. GAYER: Turn it over, and I think we have people with mikes, so, if you have a question, please wait for the mike and introduce yourself. The mike is coming.

MS. KENNY: Stephanie Kenny . You spoke to the point of burden but I didn't hear price elasticity and I wonder how you calculate that, how you account for that because the larger consumers/emitters are those who probably have the greatest elasticity in what they can and are willing to pay.

MR. ELMENDORF: So, we account for -- so, when we do analyze climate policies, we form an estimate of the -- what we think the -- and it's a cap

and trade system -- what the allowance price will be over time, and then an estimate of the price of allowance is derived from estimates about the elasticities, about how responsive firms and households will be to changes in price because if ultimately there was a fixed quantity of allowances, and people are very responsive to small changes in price, then the price doesn't have to go up very much. If they're very unresponsive to changes in price, the price has to rise by a lot to get to the needed response.

So, the elasticities are absolutely crucial and I think very uncertain because as I mentioned we're looking at price changes outside of the range of our experience, and we're building in, essentially, technological responses that are not even gleams in scientists' eyes now. But we build on estimates of elasticities in the literature. We use, actually, a sort of composite elasticity based on things we have read. And if you want to read more about our model, we actually have a working paper that describes how we do this.

Whether it is true that larger emitters are more flexible or not, I think depends a lot on the nature of what they're doing. So, I think it's not so much a matter of size as what business you are in. Some things have closer substitutes than others, and some things will respond more than others, and that is, in fact, why establishing a price is a cost efficient way to reduce emissions because it naturally demands more response from the places where it is easier. It doesn't rely on people like me figuring out which company and which activity has more opportunities to reduce emissions. It lets the companies figure it out themselves.

MR. WARA: Hi. I'm Mike Wara, Stanford Law School. My question is about how you think about uncertainty. You spoke, I thought, very honestly about the difficulties in estimating small differences between large numbers that are

way out in the distant future. And I'm curious how you view your role in communicating uncertainty to policymakers, how that might impact, how you communicate results, just what your thinking is on that because I think it's very relevant in the climate change context in terms of our understanding of what will be in 2030 in the baseline case or the policy case.

MR. ELMENDORF: We wrestle with that question a lot, not only in climate policy. I think the most standard line I utter when I talk about any topic is the uncertainty which I think we are beset by at every turn, and we wrestle with ways to communicate the clearly. Partly we just say it, like I said it here. Sometimes we provide a range of estimates to reflect uncertainty. So, if you look at a study we released, an issue brief, last fall about the costs of policies to reduce greenhouse gas emissions, there was a picture of affects on GDP, and we have a -- we show ranges. So, that's a very visual, very salient way, I think, to show the uncertainty.

It has its risks though. We find when we provide ranges it's not uncommon for people to pick the end of the -- individual people to pick the end of the range they find most congenial to their way of thinking and to say things like CBO says the effect could be as large as, or it could be as small as, and that introduces a certain cacophony into the discourse in Congress and beyond, so we don't always do that and that's one of the reasons.

For budget estimates as well, there are budget processes that depend on numbers. There's a PAYGO law in Congress, there are PAYGO rules that the House and Senate each follow, that have to do with the cost of legislation and they're just written in a way that demands a point estimate, sometimes demands a point estimate down to the hundred millionths or millionths place, and I

shrug, but that's the process.

So, in some cases we have to do point estimates, some cases we give ranges, but we do that in only cases we can and with some recognition of the risk of that sowing more confusion.

MR. GAYER: I would just reinforce the point. This was the first lesson, I think, when I went into the policy world at CEA and I was obviously at a much lower level than where Doug is right now, was somebody requests, what's the effect of X and Y, it's an almost unanswerable question even within precision, and then, okay, so how do you do it? And you try and give wide bounds. And then they'll just pick the one in the middle and there's lots of discussions among economist types and whoever within -- is some number better -- I mean, you have to provide a number. But for us is some number better than no number? For the very reasons Doug said. It's a real challenge because the number is what's going to selectively be picked and carry the day.

Charlie?

DR. EBINGER: Charles Ebinger from Brookings. This may seem like a strange question, but do you ever, as we get anecdotal evidence about the damage that may be occurring from climate change like the pine beetles in the forest, do you ever get asked to make an assessment of what are the costs of not acting?

MR. ELMENDORF: We released a long study last summer, I think, about consequences of climate change and it was drawing -- we don't have natural scientists at CBO, we have economists, we have a doctor, but mostly economists and budget analysts, but we tried to again distill the lessons of a very large literature of the consequences of climate change, so it's a study of about ten pages

with about ten pages of footnotes. And so that's -- so we are certainly trying to inform the Congress about both the consequences of policies they're considering and the consequences of no policy at all. And we look to update that work over time.

I think the fact that it's not readily quantified is a very big deal. Things that you can add and subtract, you know, to get some net number have a salience, have a power that the words often do not, but I don't know how to solve that problem. I mean, I think the -- as best I understand -- the state of the literature in this area, the economic consequences of climate change, the sort of thing that one might in principle add or subtract to the effects on household purchasing power, or so on, are not as well quantified and are believed to be further out in time in their largest effects. So, we have a situation here where the actions we're taking in the world today and tomorrow and the next day, have a very long tail of effects out 40 or 50 years and beyond, but the benefits come later than the cost in some direct way, and I think that -- and people often have a high discount rate in their thinking. So, I think the lack of quantification and the fact that even if it were quantified it would be -- I think much of the benefit would be not just beyond the next election cycle, but beyond the lives of many people who are making those decisions today, is a problem that we can't solve, but we are trying to illuminate both sides of the issues to the extent that we can.

SPEAKER: I have a question about your comment about how research funding should be allocated, and you mentioned basic research, and I've read a couple articles about the NIH's experience with turning basic research into prototype products and they find that what they term as a valiant death basically between promising science and a promising prototype that then can be shown to,

say, an MBA and convinced that this is something with profit potential.

So, I'm kind of curious about where you came up with that stand on how research money should be allocated.

MR. ELMENDORF: Yes, well, let me try to clarify that. I'm aware of that work. On a spectrum, from the most basic research to the development which is closest to being used tomorrow to make something, I think the economic analysis points pretty clearly toward the government's role being more important at the earlier part of that process, but I don't -- so I was trying to divide, in a sense, into early and late. If one thinks about early and the middle and late, or yet finer gradations, I was not trying to be specific about that. I think that is less clear, at what point the government should essentially hand the baton over to other researchers, and I think also there probably isn't a single, simple answer to that that applies in all cases either.

What we have done in the health area in particular over the last decade is to sharply increase the amount of government funding at some points along that process and I think it's very useful for people to be thinking hard about whether we've done that all at the right place, and maybe we haven't. And we've done some work at CBO on this issue in the climate area also and other aspects of research and development.

So, I think your point's well taken. I was not trying to divide this up that precisely but just to emphasize, I think, the correct general point that when things are closer to being of direct practical relevance, that is often generally the point at which the originators of some work reap the largest share of the benefits and in the earlier stages where there is less of that. But whether the government has gotten that dialed just right at every point along that spectrum, I think, is an

open question. I was not trying to speak to that.

MR. TALBOTT: Doug, among the admirable things you did was you very succinctly and sophisticatedly summarized the science at the very beginning, including the risk and the uncertainty. In your responsiveness to members of Congress, how often do you have to deal with skepticism about the scientific premise, which is to say skepticism about whether the risks are there? Does that impact on any way on the way you pose the questions to yourself and the way you answer them?

MR. ELMENDORF: Well, so, there are members of Congress who are skeptical of the science, skeptical of what is the mainstream of climate science. In the report that we wrote about the consequences of climate change, we tried to describe the mainstream of climate science and also to note that this was not a -- these views were not universally held, and we tried in that report to note the things that were more widely -- the views that were more widely held than others.

So, we try to be straightforward about that. I think most members of Congress don't look to CBO as their source of scientific knowledge, they have other places to go for that and they should go there. As I said, this study was unusual for us. It seemed worth our doing for the reasons, I think, that were raised, which are that there are costs and benefits of changes and we felt the need to show both, and there were a lot of members of Congress who wanted us to say -- to try to distil the science in a way that would be understandable by, I think, other members, who were more skeptical.

How our report was read, I'm not really sure. I think that different members' views about the risks undoubtedly affects their decisions about what policies to support or not support. But I don't get very brought into that myself, and

CBO doesn't get very brought into that. I think it was very important for us to respond to requests for this particular report, but it's not something that we bring a lot of expertise on as a general rule.

MR. GAYER: This will be the last question.

MS. JOHNSON: Hi. I'm Laura Johnson, Natural Resources Defense Council, and I have two comments that are thinly disguised as questions.

The first is, I'm not sure why -- I read your report, your employment report, and it was very thorough, but one thing that is true of all of these climate models that look at costs for consumers is that income is going up. So, when you report purchasing power going down, that's relative to a baseline. So, I'm just wondering why you're not more careful to day that, or at least the other studies, I think they come up with that.

The second thing is I like net numbers, too, even though what I just talked about was not a net number, but I looked at your numbers in your report, and I looked at you have a graph in the report that has basically bars of the number of jobs lost, and it's across three different studies. And so I basically looked at, you know, what are the average losses in each of the sectors that you looked at. And one of the sectors, the one which you mentioned, which is a service sector, which is expected to grow, if you take out the losses from the CRA study, which is the industry sponsored study, and you just take out those service sector jobs that are lost in that model, you end up with about 0 percent change in employment. And then you can sort of say, well, if you take out a few more of the other sectors, then maybe there's going to be growth in glass and steel because all of these things have to actually run the economy, right? So the new products are going to be made of all these things. Then it becomes slightly positive and that's pretty much

the historical evidence. If you look at environmental regulation in the past, it's basically zero, slightly positive, that's the consensus in the literature.

So, I'm not sure whether you could answer --

MR. ELMENDORF: So, on the first question, I tried -- we try at CBO to be clear about the baseline to which certain effects are being compared. I did say in my comments here, reduction in GDP relative to what would otherwise occur, and I put that in the context of worth a couple years of regular GDP growth. So, we try hard to do that. Certainly when we talk about the affects of the costs to households 40 years from now, we try to express that relative to the income they will have then, that's why the real dollar cost rises much more than the cost expressed as a share of GDP.

So, we probably don't do it in every sentence because it gets a little cumbersome to write and to read, but we try very hard to do that, so I completely agree about the importance of that.

On the second issue, we evaluated those three studies as best we could. We expressed a certain particular concern about one aspect of the CRA study, not related to its genesis, as you were commenting, but a particular aspect of the economic modeling that we said we were more skeptical of than the way that was handled in the other two studies. It had to do with basically the response -- the way in which labor markets respond. How readily they respond to shocks of this sort. But our reading of the evidence and the logic of achieving a very profound shift in the nature of production, and thus the nature of demand for work in the economy, is that that will lead to dislocations, which is a nice way of saying there will be people who will be without jobs. And it just isn't the case that one can take a coal miner and have them turn up as a solar panel maker, instantly, and without

cost.

So, I think we've been clear. And again, I think I was clear here, that the U.S. economy has shown remarkable flexibility over time and we expect that would continue, but that that doesn't mean that all this just happens overnight. And I think our summary of those studies and our -- the points as we made in past testimonies and reports, is quite consistent with research in this area.

MR. GAYER: Great. Before thanking Doug, I just want to remind everybody we are going to start at 2:45, a session over there, so get yourself some coffee, charge up, and we'll be continuing the discussion over there. But now let's thank Doug. Thank you so much. (Applause)

MR. ELMENDORF: Thank you very much.

(Lunch Recess)

MR. GAYER: Welcome back, everybody. I hope you enjoyed that lunch with Doug Elmendorf, I know I did.

We are essentially going to expand on Doug's talk, I think, in this session. We've got three distinguished economists and a lawyer, I should say -- I shouldn't insult him by assuming he's an economist -- here to talk on many of the issues that Doug talked about a little bit more in depth. We're going to essentially expand on the economics of policy design with respect to climate. We're going to drill down a little bit on the issues of offsets. Doug talked on the cost savings and also the validity issues surrounding offsets. And we're also going to discuss the regulatory approach to addressing climate change, which Doug also alluded to, some of the pros and cons along those lines.

So, the format I propose is we're going to have each one of our

panelists talk for about 10 to 12 minutes at the podium and then we will open it up for moderated Q&A. I'll ask some questions and then I'll welcome all the questions from everybody out there, from all of you.

So, to start off, I'd like to introduce Adele Morris. Adele is a fellow and policy director for Climate and Energy Economics at the Brookings Institution. Before joining Brookings she was a senior economist at the Joint Economic Committee and before that she spent nine years at the Treasury Department as its chief natural resource economist. Adele's departure from Treasury was of particular note to me. It occurred, I think it was about a week before I arrived at Treasury. I was very excited to be working alongside Adele since we had known each other from years before, and, lo and behold, she bolted. I didn't take it personally or I tried not to.

I started at Brookings eight months ago and she's still here, so that's a good empirical test, I hope. Anyway, Adele, please start it off and then I'll introduce our other speakers in between each of the talks. So, take it away, please.

MS. MORRIS: Thank you, Ted, and I appreciate the introduction and I want you to know not to take it personally, just like I won't take it personally that as soon as I got to Brookings, Doug Elmendorf left for CBO.

And I'd like to thank very much the folks at Brookings who worked so hard to put this conference together and to those of you in the audience who stuck around to listen to more economics.

Perhaps the best thanks go to Doug for such a great setup. This agenda is working really well for me because I can summarize the first part of my talk in three words, 'what Doug said', and then the rest of my talk is probably best

summarized by what Doug didn't say. By that I mean, I'm going to take a look at specific legislation and tell you how it stacks up against the principles that Doug outlined, probably in a way that a director of a nonpartisan objective federal agency wouldn't be comfortable doing.

So, Doug was right, is the summary of his talk. He was right that the objective of climate policy at its essence is to reduce the risk to the environment at the lowest possible social cost. And he's right that the key to that is a steady growing price on carbon in addition to the ancillary policies that he mentioned, and that that price should be applied as broadly as possible, across greenhouse gases and their sources, and that that is the underlying policy necessary, if not sufficient, for cost effective abatement of the risk of climate change.

He's also right that it's not a free lunch. Contrary to how this policy is often marketed, our research, which CBO also considered, is that we shouldn't expect climate policy to solve other problems. We shouldn't expect it necessarily to create jobs, to boost economic growth, or to rejuvenate the U.S. manufacturing sector, and we shouldn't necessarily expect it to drive us in the short run towards energy independence. If you look at the actual effect of -- projected effects of climate policy on U.S. petroleum consumption you'll find that those effects are projected to be quite modest.

But the point again is that we're reducing emissions because we're worried about the threat they pose to the earth's climate and done properly, the submissions abatement, the environmental benefits of that will be justified -- will justify the modest costs involved.

Doug's right that some folks will be burdened more than others in a way that depends critically on the details of the policy design. We don't need to use

climate policy as a vehicle for redistribution, but we do want to be mindful of the effects of higher energy prices on the poor and we want to do what we can to ensure that they're not worse off than they were before our environmental objectives are pursued.

So, there we leave off with the principles that Doug gave us, very wise, if not rabbinic . And let's see how the draft legislation stacks up. And I'm going to, perhaps timely, perhaps just picky, I'm going to start with the Kerry-Lieberman legislation that was just released.

Now, I welcome this bill, I want to make that clear, I welcome the bill because I know how much hard work has gone into it, I know it's a sincere effort on the part of the sponsors and others, and I welcome the bill because, as Dallas will tell you shortly, we need new legislation to help us avoid the potentially costly application of the Clean Air Act as it stands now, to greenhouse gases.

Now, before I start talking about the Kerry-Lieberman bill, I want to qualify what I'm going to say by saying that like most analysts, I'm truly -- really still trying to understand it. At 1,000 pages it takes a little while to digest it. I printed it out. You know, normally when people talk about a bill being a heavy lift, they mean, it's difficult to pass, but this one is literally a heavy lift and so I'm still working through it.

But, I'd like to go over the features of it that I think are consistent with the principles that Doug talked about and some things I think where we're not yet there.

So, the Kerry-Lieberman bill, it establishes a price on carbon, it's kind of a combination of a cap and trade program for the electricity sector along with some other industrial sectors expanding over time, plus an allowance purchase

requirement on the transportation sector. And the prices in the different sectors are equilibrated, at least in theory, because the price of the allowances sold to the transportation sector are set by prices of the allowances in the straight ahead cap and trade sector.

So, we do have what Doug was suggesting, a price broadly set on carbon in the economy. We are endeavoring to equalize the marginal abatement costs across sectors, that's a cost minimizing role. And we are seeing that as the cap ratchets down over time we're going to reduce emissions. So, we should see the environmental performance of this bill being successful.

Now, in terms of the volatility of prices, we're not quite sure -- there are some provisions in there that can help. There's banking and a limited amount of borrowing. That can help smooth prices over time although it's not clear exactly the full ability of the provisions in there to really reduce the kind of volatility Doug was talking about to a really modest level.

So, so far, so good. Now, let me get to the parts where I think it's not as consistent with Doug's principles as it could be. And I kind of look at this bill in the context of the history of bills we've had over time and we had the House pass a bill last year, and I guess it's in the eye of the beholder whether we've made adequate yearly progress between the bill last year and the bill this year, but I think there are some aspects that could use even more progress.

I'm going to provide three critiques, and succinctly they are about the cost containment, about the potential for cost minimization, and the fiscal responsibility aspect of the legislation.

So, let's talk about cost containment. There are two provisions in the bill that are meant to reduce the overall cost of attaining the environmental goal.

One of them is offsets -- Michael is going to talk about offsets here in just a minute; I'll leave the offset discussion to him -- the other is something called a cost containment reserve, and that's what I'm going to focus my remarks on.

Basically the way this works is, there's an annual set of caps that gradually ratchets down, and a slice of that is skimmed off the top of each of those caps and it goes into a pool at the beginning of the program. And in addition to the pool that's created, there's a price path. It starts at $25 a ton and it goes up at 5 percent over inflation. Now, these pool of allowances are available at the price each year, according to the price path from the government. Now this is marketed as a hard price collar. It's hard in the sense that the price the government charges for allowances out of this pool is fixed, but it's not a collar in terms of its ability to contain the costs of the program to the U.S. economy. Now, let me explain why that is. So, each year there's a limit on how many allowances can come out of the reserve pool, so the price is set, but there's a quantity limitation.

Now, if it's the case that for whatever reason the price of allowances has reached this limit and surpassed it, and these reserve pool allowances come into this system, the government sells them, for example, at $25, but the equilibrium trading price in the secondary market for allowances, it could be much higher than $25. There's nothing constraining the price that matters to the U.S. economy, which is the price of allowances out there, because the quantity of these allowances is constrained.

So, I don't believe that you can properly characterize this as a hard price collar on the prices that actually matter to the effect of this policy on the U.S. economy, and I think the clear way forward is to convert this thing into an actual price collar and allow these allowances to come into the economy without limits to

their quantity.

Now, that's an unlimited supply, but of course there's going to be limited demand because these things aren't cheap, but what it means is that it truncates the downside risk to the U.S. economy and our estimates suggest that the risk of very seriously over emitting relative to your cap are quite small, so for a relatively small expected effect on your emissions performance you can actually completely eliminate the downside risk to the U.S. economy. I think this is a bargain worth taking and part of the reason is not just economic, but the effects of the economic performance on the bill on the likelihood that it's going to endure.

Now, remember, to protect the climate we have to persist with this policy permanently. So, this policy has to survive through all the ups and downs and all our future republican congresses and I think it's important to keep that in mind.

So, now, while I'm talking about risks and unforeseen factors in the performance of the program I just want to make a shameless plug for a new paper that we're releasing today on the expected economics of the Copenhagen Accord. One of the things we've found in that study -- it's available out in the lobby -- is that an important factor in the performance of our commitments is what other countries are doing and those economic spillovers. We, of course, think the results are quite interesting in that regard.

Okay, so the final critique -- the next critique I'm going to make is about the cost minimization and the main point I want to make there is that the policy will tend to blunt the incentives to conserve energy to the extent that allowance value is passed along through energy bills, and I think that's an important consideration. If those tons aren't reduced in the electricity sector, they're going to

come from somewhere else that's more costly.

And that brings me to my third critique which is the fiscal responsibility. I think normally I'd say a cap and trade system need not raise revenue because the point of that price on carbon is not -- its economic purpose is to change the relative price of different fuels, according to their environmental damage. But given that we have this gaping maw of federal deficits, I think it's important to keep alive the conversation about using allowance value to reduce the deficit.

So, in conclusion, I mean, I think that there are good features to this bill, I think we have more work to do, I think it would be very useful for the conversation to include Senators Collins and Cantwell, and discussion around their legislation, and finally just a plea in the pursuit of climate policy to keep our objectives clean. As Doug said, reducing the risk to the environment at the least possible cost. When we lard up our objectives with all kinds of other stuff, whether it's, you know, protecting certain U.S. industries or driving abatement to specific technologies, or subsidizing folks who might be your opponents if you did it another way, I think all that runs the risk of hiding the tree with so many ornaments that it just collapses of its own weight and I think it would be a real shame for that to happen.

So, I applaud this new bill and I'd love to see where we go from here. Thanks. (Applause)

MR. GAYER: Thanks, Adele. Next up we have Michael Wara, who is an assistant professor of law at Stanford University. He actually has a science background as a geochemist and climate scientist, and after receiving his JD from Stanford, he was an associate in Holland & Knights Government Practice Group

where he focused on climate change, land use, and environmental law. He also currently is a research fellow at the program in energy and sustainable development in Stanford's Freeman Spogli Institute for International Studies, and he's going to be talking to us today about offsets.

MR. WARA: Well, first I'd like to say thanks to Ted for inviting me and to the Brookings Institute more generally. I was really excited to come and speak on a panel of economists, actually.

I'm going to talk about offsets in general and the role that they have come to play in the various proposals in Congress as well as more specifically the role that they play in the current bill.

In addition, I'm going to talk -- my area of research is really the international offsets market, the clean development mechanism, and various smaller offset markets, mostly voluntary, that exist around the world, then I'm going to talk about some of the relevant experience when it comes to actually implementing offset programs in practice on the ground and how that informs how we should think about the current legislative proposal and the different sets of risks and benefits that are likely to play out for it.

So, first off, it's important to emphasize that almost more than in any other location -- any other jurisdiction, offsets matter to federal climate policy. The level of offsetting that's permitted under the current Kerry-Lieberman proposal as well as all of the previous bills, far exceeds the level of offsetting that's been permitted under the EU Emissions Trading Scheme, or any of the state programs that have been implemented or are in the process of being implemented in the United States.

In effect, this is a cap, trade, and offset bill. EPA, in their best guess

about the sources of abatement out to 2020 and even to 2030 suggest that -- this is Waxman-Markey, obviously we don't have the analysis yet for Kerry-Lieberman -- but they suggest that more than half of the abatement will occur via offsets rather than via reductions by covered sources.

So, getting the offsets proportion of the bill right matters very much in terms of the overall environmental performance of the bill and arguably its cost effectiveness. If we are paying, say, $12 a ton, but we're only reducing one-third as many tons as we think we are because our offsets aren't of high quality, then our cost is really triple that and the cost effectiveness is obviously far lower. So, this is a real concern.

At the same time, the experience on the ground, in terms of implementing offset programs, is that they are incredibly challenging regulatory vehicles, that there are deep conceptual difficulties when it comes to understanding the baseline, the future emissions path of a particular industry or a particular project -- a particular offset project, and there is sufficient agency discretion and sufficient incentives to use that discretion in ways that doesn't necessarily benefit the environment, but may benefit offset project developers to skew programs in directions that are not net positive, and certainly do not meet the ideal standard that offsets should met of no net harm, i.e., a reduction doesn't occur under the cap, it occurs outside the cap, the total emissions to the atmosphere are the same. There's zero change.

So, we need to get both the domestic offset policy correct in whatever federal bill is ultimately passed, whether it's this one or in some later Congress, and we also need to get the international component right, and both are equally important and the particular proposal we have before us now contains different

risks in the domestic and international sections.

Just to give you a sense for why offsets are a concern I want to tell you a story about wind, in particular, wind farms in China. So, wind farms are eligible to generate Clean Development Mechanism offset credits. And a couple of years ago David Victor and I wrote a paper that basically demonstrated that every single wind farm in China was applying for credit under the Clean Development Mechanism, that is, all the projects, all the new wind farms being built were making a claim that they wouldn't have been built, but for CDM funding. That's the claim that needs to be proven in order to demonstrate that the reduction is real, that it's additional in the terms of offsetting.

That's a very difficult claim to support in the face of things like the 11th 5-year plan which sets targets for renewable energy added capacity in China, and in the face of numerous policy statements on the part of the Chinese government that it was their objective to grow a domestic turbine industry and to grow renewable power generation as a way to diversify fuel mix and reduce local air quality concerns.

So, some of those plants aren't additional, but we don't know which ones. Time passes, and so there's an environmental concern there, a profound environmental concern in the sense that credits are being generated at wind farms in China that are being used by coal-fired power plants in Germany in lieu of allowances.

So, the cap is higher in Europe because wind farms are getting what we sometimes refer to as "anyway credits," credits for what they would have done anyway, in China. That's a problem from an environmental perspective. But it turns out it's not just a problem from an environmental perspective if the offset

regulatory system isn't right.

Last December, right before COP-15 , the CDM executive board met and basically rejected 100 different Chinese wind projects -- nearly 100 -- that had expected to be approved at the executive board meeting, and the upset to the market was profound. The CDM market was, in essence, thrown into disarray because there was no investor certainty about why these projects had been rejected, what the rationale was. There was obviously some environmental concern but understanding what it was and how to fix it wasn't made clear by the regulator.

And so this just points to the need to create a process that both creates environmental credibility so that the projects that are getting approved are producing real reductions, and also to balance that against creating investor certainty that's going to lead to the kinds of private financial flows that are going to be necessary to make offset markets work to serve their purpose as a cost containment vehicle.

So, the basic story from the CDM right now is that no one is happy. Environmental groups view many of the projects with extreme suspicion, I think with some good reason, and the business community that has attempted to make money out of investment in these emission reduction products, to do well, by doing good, has ended up not doing well by doing good, ended up mostly going into receivership or Chapter 11 by trying to do good. And so the picture emerging out of this first attempt at a large offset program is not terribly positive. So to the extent that the U.S. system is going to depend on very large-scale offset programs, actually much larger than the current CDM, we need to look carefully at the lessons there and also implement responses to them that are responsive both to the

environmental concerns, so that we actually produce the outcome in terms of the atmosphere that we would want from the program and responsive to the concerns -- legitimate concerns -- of investors in these projects so that there is actually money flowing towards producing these emission reductions.

So, can the U.S. do better? Well, certainly the perspective of many of the staff that have worked on these bills is, we can. We can do better than the CDM executive board, than the international, than the U.N. system has done. The key challenges are going to be establishing very tough, conservative baselines, environmental baselines, that essentially derive who and what kinds of activities get credit and how much credit, at the same time as establishing standards and guidance for investors that are predictable and stable across relatively long time scales and those two demands are, in some sense, in tension with each other. New information arises that may cast -- may cause doubt regarding the (inaudible) of a particular project, actually changing the rules for that project upsets investor certainty and can be corrosive to the market.

So, I'm just going to talk for a few minutes about what the current bill looks like and how it strikes that balance.

On the one hand, the current bill does attempt to incorporate a number of -- incorporates a number of provisions that are probably superior to the current CDM executive board, the CDM regulatory system, in the sense that there is the ability of both the administrator of the EPA and the Secretary of Agriculture who jointly administer this program -- more about that in a second -- to review -- periodically review the program, make changes as necessary, shift course in the face of new information. That's a flexibility that, because of the design of the UN system, the regulatory body does not have to a large extent, at least not in a

reasoned, predictable manner.

At the same time, the bill extends on an approach that was first -- first appeared in the Kerry-Boxer bill where a positive list of project types is included and that positive list, the list of project types that -- for which offset methodologies shall be promulgated by either the secretary or the administrator, is much longer in Kerry-Lieberman than it was in previous iterations of this process. And that, I think, creates environmental risk for the program because ideally one would like the EPA administrator and the Secretary of Agriculture to be making those decisions based on the science, based on what we know about offset projects as Doug Elmendorf said, based on the idea that we should do the offsets that we understand the best, that are the simplest, first, and then work toward doing the more complex and less certain projects. That's not the approach that's being taken in this bill. This is very much a go-fast approach. That makes sense from a cost containment perspective because if we don't go fast, we aren't going to have the offsets available to reduce costs in the way that might be ideal from an economic modeling perspective for the economy. Unfortunately, the regulatory experience suggests that if we do go fast, we're going to get a lot of bad tons in the system and that's a concern from the environmental perspective and ultimately from a cost-effectiveness perspective as well.

So, the positive list and the requirement that EPA or USDA promulgate methodologies for offsets projects on a very short timeframe is probably not a strong environmental asset of the bill, but good from a cost containment perspective.

The other component of this bill -- well, there are two more things I want to talk about very quickly. One is the issue of who's capped and who's not,

and this tends to be missed, but -- or tends to be brushed under the rug in some contexts, but the reality is that the decision to allow a particular emission source to be an offset versus placing it under the cap, making it a covered source and forcing it under allowances, is, in essence, a decision about whether a particular firm or industry gets to have an asset on their books or a compliance liability. It's political and there are a number of covered sources -- or there were a number of sources that were covered in Waxman-Markey that are uncovered in Lieberman-Warner and so eligible to produce large quantities of offsets because they possess the ability to reduce their emissions at low cost. Whether that's a good thing or a bad thing is, of course, open to debate. But I would just note that if emission sources are in some sense easy to quantify, easy to measure, tend to look like a point source rather than a disbursed source of emissions, it may make sense to put them in the cap rather than to deal with the regulatory complexity of reducing their emissions via an offset system.

Finally, and I think in the current context around MMS this is a point that should be familiar, dual role agencies, agencies that have a job of promoting an industry and also regulating it, can be problematic. And that is what is being created in this bill as far as domestic, agriculture, and forestry is concerned. USDA, an agency charged with promoting the health of the agriculture industry and U.S. farmers, is also being charged with playing cop to those industries, playing the role of offset regulator and enforcer and ensuring the environmental quality of the offsets that are created by those industries, and that's a real concern, from an environmental perspective. It may also be very good, from a cost-containment perspective in terms of producing lots of offsets quickly. And in the defense of USDA, there's certainly an important role that has to be played there because if

there's one agency that knows the most about farming, farmers, and farming practices in practice, it is USDA. EPA has far less familiarity with that sector largely because they are exempt, at least from many of the major environmental laws, via statute.

So, with that, I'll conclude. Thanks very much. (Applause)

MR. GAYER: Thank you, Michael.

Next up we'll have Dallas Burtraw. Dallas is a senior fellow at the Resources for the Future. He's a leading expert in environmental economics having conducted research on the design of environmental regulations, the cost and benefits of environmental regulations, and the regulation and restructuring of the electricity industry. His recent work looks at carbon emission trading in the EU as well as cost effectiveness of trading programs for nitrogen oxides and sulfur dioxide here in the U.S. and he's going to talk to us about more recent work of his on the regulation of greenhouse gases under the Clean Air Act.

So, Dallas, take it away.

MR. BURTRAW: Thanks. Audio visual, maybe you can cut away from this for now so that people who can't see clearly and can look at the screen and we'll come back to slides towards the end. Thank you.

Thank you, Ted and Brookings, for inviting me today.

Well, what happens if Congress doesn't enact new legislation? My friends outside the country and many people in the U.S. have the general perception that there is no progress being made with respect to achieving greenhouse gas reductions in the U.S. And even this morning, Todd Stern we heard talk about the emergence of, I think, what is the new current global paradigm of domestically supportable actions swept up in the nomenclature of nationally

appropriate mitigation actions, NAMAs. Usually that notion is applied to the developing world, but it applies with force also to the developed world and I think it's very important for us to think about what's actually going on because the challenge that -- even an unexpressed challenge, in the eventuality that we don't have comprehensive climate policy in place for several years, is the signal to the rest of the world that the United States is doing nothing when in fact a lot is happening in the United States.

How do we evaluate that? How do we characterize it? This is a challenge that I think the administration leadership faces in the eventuality that all these other policies that we've seen put in place are what we have going forward for the next several years and we need to try to broker international cooperation in that environment.

So, what is knowable with respect to policy? What implements the course of greenhouse gas emissions in this country and internationally? And the federal Clean Air Act has inertia. Although its critics rightly claim that the authors of the Clean Air Act did not anticipate its use for controlling greenhouse gases, apparently it was designed to be able to accommodate unanticipated developments in science and it has been used to do so. So, with the 2007 Supreme Court decision in *Massachusetts v. The EPA*, which declared the greenhouse gases were, in fact, pollutants and eligible to be regulated under the Clean Air Act, the second stage, a domino theory if you will, in which then under the pressure of lawsuits that would have been pending against the EPA, where the EPA was forced to make a move towards the determination of whether or not greenhouse gases pose a danger to health and welfare.

And with that, findings which some characterize as the biggest "duh"

moment in recent regulatory findings, but still it was an important and comprehensive effort that the EPA put in place to retrieve that finding, then the EPA was compelled to regulate. We see mobile source regulation put in place now, and now with that in place it cascades into regulation affecting existing sources.

So, the main attention and controversy today is how we will regulate these stationary sources which constitute the area where the most emission reductions are expected to be achieved, at least under a cost effective approach to reducing greenhouse gases over the next couple decades of climate policy.

Well, we may be waiting for a while for the construction of this new high speed train that's going to take us somewhere on climate policy. The Clean Air Act is like a freight train. It's big, it's hard to stop, and it's already moving, and it's broadly popular with the American electorate, so it will take comprehensive economy-wide climate policy to substitute for the Clean Air Act, I would maintain, it's not going to go away by itself and in fact it has tremendous inertia already.

And while there's a lot of disagreement about the pace at which glaciers are melting, everybody here today has expressed agreement at one thing which seems to be about the glacial pace of climate policy, so hence we need to understand what is going under the Clean Air Act, which is really our plan A. To paraphrase John Lennon, history is what happens to you while you're busy making other plans.

Now, this causes a lot of consternation to me and to my economics sisters and brethren who have argued that the Clean Air Act is a second best approach, at least second best, compared to a cost-effective approach to achieving emission reductions, and cost effectiveness is so important because of what we may be asking our children and our grandchildren to do over the next few decades,

that the cost could be very significant as we think the effects of climate change could be very significant. We have a lot to learn still, so it's very important to put a cost effective institution in place.

And economists fret that regulation under the Clean Air Act will be unnecessarily expensive, so by analogy, let me draw you to our historic experiment with what Rob Stavins characterized as the grand experiment in applying economic ideas to environmental regulation which was the SO2 trading program. It has a cost that we've estimated to be about 1- to $2 billion pr year to reduce sulfur dioxide emissions by roughly 50 percent from what they otherwise would have been. And that is just one-quarter of what was anticipated at the time of passage of the 1990 Clean Air Act amendments.

If one accounts for changes that might have occurred anyway, and there's really no reason to exaggerate the cost savings under the Title IV SO2 trading program, it's still the case that cost savings are estimated to be about 60 percent of what they would have been with traditional regulation.

Would a comprehensive trading approach achieve similar cost savings for greenhouse gas regulation? The answer is, yes, especially in the long run. Greenhouse gases are ubiquitous in our economy and the opportunity for emission reductions will be widespread, disparate, unanticipated, sometimes simple, and sometimes exotic. The beauty of a market based approach is that it can identify those opportunities in ways that a regulator might not.

However, it is not clear to me that this result holds in the short run over the first decade or so of climate policy.

There are several parts of the Clean Air Act for regulating existing sources and in a recent paper with Art Frost and Nathan Richardson we identify

what we label as the knowable pathway as the one that would define the most predictable, likely, and practical way under the mechanism of the Clean Air Act to achieve emission reductions. This pathway is Section 111, new source performance standards, and despite the misleading name, Section 111D actually applies to existing sources that are not already regulated elsewhere under the act or are not subsequently regulated elsewhere under the act. This section allows EPA to determine the best system for emission reductions, for regulation of pollutant from new and existing sources and opens the door to possibilities well beyond prescriptive approaches.

MR. BURTRAW: So why would a comprehensive climate policy be better than regulation under the Clean Air Act? Conceptually, economists offer two strong reasons why incentive-based approaches such as emissions trading is likely to be more efficient: Number one, when costs are heterogeneous, and that is the cost of emission reductions differ across the economy; and secondly, when information about those costs is privately held and not visible to the regulator. Then the market can do a much better job of identifying opportunities for emission reductions then can the government.

But in the first decade of climate policy, it's not clear to me that either of these conditions strongly apply. That is, smart regulation under the Clean Air Act may not lead to substantially different outcomes in terms of the actions that are taken and costs that are incurred than would emerge under comprehensive emission trading over the next decade.

So, before you throw me out of here, let me try to defend myself. Many sources face similar opportunities to reduce emissions or energy use and the low hanging fruit is what's visible to the regulator. By analogy, consider another

very successful emissions trading program, the Northeast NOx Program in the ozone transport region.

In phase 1 of this program, coal-fired EGUs -- electric generating units -- were required to install low NOx burners. This was a fairly obvious measure, but under a trading program, not everyone would necessarily have installed low NOx burners as the most cost-effective thing to do. And some sources would have gone further and installed post-combustion controls. Nonetheless, low NOx burners are mandated as part of phase one as a prerequisite for trading, which began in phase 2.

And in phase 2, many sources did install post-combustion controls. But at that level of the cap in phase 2 for NOx, we can be sure that just about every source would have installed low NOx burners. In other words, the regulator could see what was an inevitable outcome across this whole fleet of units and mandated some of those measures perhaps out of order of cost effectiveness, but, nonetheless, not truly disrupting the course at which investments would have occurred for the industry. So, for this technology to be mandated didn't reduce some inefficiency, but it did also provide time and opportunity for learning about how trading program would take shape in phase 2.

When it comes to harvesting low-hanging fruit, regulators can pretty well see what needs to be done and there's little loss through prescriptive regulations. It's when it comes time to harvest fruit higher up in the tree that is very much harder for the regulator to see what needs to be done, and trading can yield important cost savings.

So, what are the sources that would be affected under Section 111-D ? One example is the opportunity for efficiency improvements at existing power

plants where apparently there is plenty of low-hanging fruit.

Two years ago or so, I didn't really think much about this, that there was an opportunity at existing -- in the operation of existing fossil fuel power plants to achieve emission reductions, just through the changes in the operations in these plants. But the EPA and the National Energy Technology Labs indicate that we could improve fleet-wide efficiency of 3 to 5 percent at coal EGUs. That's a 3 to 5 percent reduction in emissions from those facilities.

So now if we can go to the slides? Thank you. Do I have to pick this up? Next slide, please -- oh, there we go. That's good.

So, this picture gives an illustration of the heat rate, which is essentially the operating efficiency of coal electric generating units across the country. And that's organized along the horizontal axis with the less efficient units as you move to the right.

On the vertical axis is the heat input or fuel use at these plants, so vertically you can see where are the most important units and moving left to right, you see efficient moving to inefficient units currently. And that black line represents where 95 percent of the heat input occurs. So it's units to the right of that black line that are those that can be characterized as surprisingly inefficient, yet they continue to exist.

We've -- thank you. We've tried to look at how this can be explained. It isn't explained with technology or coal type, it's only weakly explained by vintage. The factors that do seem to explain it in our preliminary analysis are the ownership structure of these plants, and the fuel price that these plants see in those regions of the country.

Further, the EPA and NETL have suggested additional reductions

could e achieved by requiring 5 percent average biomass coal firing at existing plants. So, clearly neither of these goals could be achieved in a cost-effective way by requiring 5 percent efficiency improvements and 5 percent biomass coal firing at every plant, because the opportunities differ at any plant depending on where they're located geographically and where they are located in this graph.

To be reasonably cost-effective, regulation of the Clean Air Act would have to be clever. One reason to think this might occur is that today the agency is populated with hundreds of persons who have achieved a master's in public policy or its equivalent. And they've been trained well and prepared to argue that the Clean Air Act should be used in a cost-effective way.

The EPA might do well in achieving the opportunity for near-term emission reductions at a low cost through implementation of an efficiency performance standard, preferably a tradable performance standard, as was used under the Clean Air Act for the phase-out of lead in the 1980s. For example, it would appear quite feasible for the agency to allow tradable performance standard within a source category such as coal EGUs. And the EPA could determine this to be the best system for emission reduction -- for pollution reductions.

With a smart attitude, the EPA might venture even further into the realm of smart regulation under existing authority -- the process of implementing 111-D regulations for existing sources would involve delegation of enforcement to the states. And a process similar to the state implementation process under the National Ambient Air Quality Standards.

Under this approach, the EPA could develop a model rule and allow the states to opt into a cap to be -- if they deem that to be the best system for emission reductions. I remind you that the successful NOx budget program was

implemented under a different part of the Clean Air Act, but it is also -- it took shape in the same way where states were authorized to opt in to a cap and consequently the NOx trading program took shape underneath that cap.

Coal-fired EGUs are just 1 of 60 source categories and/or each of these offer some type of low-hanging fruit. For example, if you were to look at steam gas units, natural gas combined cycle units, or gas turbines, all those pictures have a similar shape to the pictures that I'm showing you here.

Based on what is expected to occur in the next decade, there would not be substantial difference in domestic compliance actions between programs under the Clean Air Act and actions taken under comprehensive approach like Waxman-Markey. And let me illustrate that with one more figure.

Okay. This figure actually summarizes also what the previous speakers on this panel have been saying. And so from the bottom working -- this represents the emission reductions that are expected to be achieved from 2005 levels by 2020. And the blue reflects domestic actions, the red reflects domestic offsets, the green reflects international offsets, and then the white reflects direct investments internationally in forestation and other matters. And Michael's point was that the green, international offsets, amount to as much or more as domestic emission reductions that would be achieved.

Now, if we were to look at what would happen -- did this work? Let me try again. Okay.

If we were to look at what would happen under Clean Air Act enforcement, just in a tradable performance standard requiring a 5 percent inefficiency improvement and 5 percent biomass coal firing would achieve that bottom brown line in terms of domestic emission reductions by 2020. I feel it could

achieve it by that level.

If you look across other source categories and use a fairly cautious approach with no trading of cross source categories, but just other sort of smart performance standard approaches across these source categories, EPA indicates that the Clean Air Act could achieve about 6 percent reduction in domestic emissions. So we're working our way up to that 10 percent that is achieved domestically under Waxman-Markey. But that 10 percent also includes the opportunity for banking. If you were to scale that amount down by the portion that's being banked for use after 2020, it actually comes in at the same level as what we indicate here under Clean Air Act enforcement. And if the EPA were to be so bold as to go forward and actually try to allow for trading across source categories and allow -- which would enable fuel switching between natural gas and coal, et cetera -- we could even achieve much greater emission reductions.

Well, let me just close by saying that the Clean Air Act is not my preferred way to go. One reason that trading would be preferable is that it would provide an obvious signal to the international community about our commitment to achieving emission reductions. And secondly, as we heard so much about this morning, provides an obvious way to achieve funding to meet our international financial pledge. Because offsets provide a major way that that is going to be achieved.

It constitutes a comprehensive policy framework, and it avoids the legal risks and delays that are implicit under the Clean Air Act. And finally, it takes us on the path towards the law of one price, which is an absolutely essential as we move out towards 2030 and on to 2050 to try to achieve CO2 reductions across the economy.

But in the short term, little is lost and something is gained from progress under the Clean Air Act. And so I think that it's important for us to recognize that it's not a lost ball game if we are stuck with the Clean Air Act for some years into the future.

Thank you. (Applause)

MR. GAYER: Thank you, Dallas.

I want to leave enough time for questions from the audience, so I'm just going to ask one question of our panel. And I'm going to ask actually for Michael, because offsets is an issue that I've often wrestled with.

I think you do have somewhat uniform views among economists on kind of the preferred approach. But with offsets there's an inherent tradeoff there, as you alluded to, which is they allow the flexibility to get lower cost reductions outside the cap. But they also have the potential of undermining the cap.

So first I have, one, a comment and, one, a question. One is on the comment, it ties to what Doug said, which is you talked about EPA's analysis. I don't know when EPA does an analysis of offsets. Certainly if you allow more offsets of any bill you drive down the costs, but you also raise the cap or you undermine the validity of the cap, potentially, given the validity of the offsets. And I don't know if that actually makes it into the EPA analysis.

So this gets back to what we said with Doug, which is when EPA does analysis the number kind of gets carried forth in the debate and the cost number is what's getting carried forth. So you could always lower the number -- the cost number -- by kind of ramping up the offsets from which -- is maybe why we see so many offsets in the bill. But anyway, that's my comment.

My question is just to help me grapple with this tradeoff. I wonder

whether or not if you put the necessary oversight for me to feel comfortable that you get credible offsets, are the transaction -- be -- the transaction costs of doing that be so high as to undermine the cost effectiveness?

I'm wondering -- I need -- the answer is, when you do that tradeoff is there anything in the intersection? Meaning, I know you -- you know, there's lots of things you can do, as you alluded to, to make sure these are valid. But that costs money. And so at the end of the day, I'm wondering how much flexibility you have there. Anyway.

MR. WARA: Well, the -- let's see. The biggest transaction cost that -- so, let me just respond to your first comment --

MR. GAYER: Sure.

MR. WARA: -- and say that the offset production schedules that are used in the EIA, EPA, and the CBO analysis of Waxman-Markey differ substantially. And the best way to understand them is that CBO and EIA are more conservative in their views about how many offsets will actually come to market given a certain carbon price than EPA. EPA is more aggressive so you get a lower carbon price from EPA. That's the main reason.

Leaving that aside, to your question. The biggest transaction cost right now is the cost of risk for these companies that are trying to do international offset projects. So, I think that the road not taken so far is one in which environmental standards are very high, but they're very predictable. You could have very tough predictable standards.

Right now, we have relatively lax, very unpredictable standards. And so -- and that creates a certain set of outcomes, both in terms of which projects are incentivized, i.e., the projects whose only costs are the transaction costs, right? So,

the business as usual projects that have to try to get lucky in the regulatory process are the ones that tend to come forward right now. That certainly could change, and it may be possible, given the development of a body of regulation and -- likely given the U.S. context in the Clean Air Act -- case law regarding different offset categories and final agency action on them. That there could emerge a set of clear guidelines with relatively low transaction costs.

That's not going to happen fast, though. And that's an important thing to emphasize. You know, there's -- the bill kind of has this go-fast approach because it is legitimately concerned with the politics of cost containment. But it's not clear that either the Clean Air Act into which these offset provisions will be incorporated will allow for that or whether that's possible, whether it's possible to combine the speed, the low transaction cost, and the environmental credibility. And that's -- I should have maybe added that third factor. But it's conceivable we could get to that system. And actually, to be fair, the CDM is moving in that direction in certain respects. Okay?

MR. GAYER: We have somebody in the back. And please wait in the green -- did somebody just raise their hand? No, sorry. Someone's -- go ahead up here in the front.

And please just state your name -- wait for the mic and state your name, please.

MR. CHENG: Yeah, no problem. Chow Cheng , freelance correspondent (inaudible).

To Adele, should we have a transparent and democratic process to get the price for the CO2? And this is in your term. I think in this way will be permanent and can be survived.

And to Michael and Dallas, should we have created a new agency to deal with the climate change? And if you want to use the Clean Air Act for dealing with this, it's very cumbersome and very awkward. And particularly, the (inaudible) EPA mission and function is not (inaudible).

So I think -- and also -- the reason I have this is, this is a very important. Michael talked about the problem in China in doing this way. We'll avoid the problems in China. So, it's the process to get coal and to have a new agency to deal with the climate change.

Thank you.

MS. MORRIS: Yeah, I'll address the process question. I see our Congress at work. You know, we have a democratic process and we're struggling with that to make sensible climate policy. And, you know, we've seen all sorts of climate bills emerging from the House and the Senate. What we haven't seen so far --

MR. CHENG: (inaudible)

MR. GAYER: Let's just -- we're running out of time, so (inaudible).

MS. MORRIS: What we haven't seen so far is the President weigh in with great specificity. And I think there our democratic process could be enhanced by clear guidance from the President about what he thinks would be the best approach for the environment and the economy. So I think we have the process, we're working through it, what emerges from all this remains to be seen.

MR. GAYER: Michael, do you have a quick thought? Either of you?

MR. WARA: You know, I don't think a new agency is really required. The EPA knows the sources the best, and they also have the most experience almost of -- perhaps with the exception of the European Commission, with

emissions trading of any agency in the world.

MR. BURTRAW: I just want to agree with that and add that I didn't hear anyone say that they want to use the Clean Air Act to regulate greenhouse gasses.

What I said was that you're not standing on the platform at the train station. You're sitting on the freight train. The freight train is already moving, so let's try to figure out how fast it's going and where it's going to take us, and let's hope that we can get a better train built soon.

MR. GAYER: Good point. Go ahead, right here.

MR. HOPKINS: Mark Hopkins, United Nations Foundation.

I was so glad Michael gave his talk because you were kind of the only one on the regulatory side in this whole thing.

And I just want to point out, the IEA estimates between now and 2030 over 50 percent of -- mitigation energy related mitigation -- is going to come from an improved energy efficiency. After 30 years of energy -- of deploying energy efficiency, it's now our largest single energy supply resource in the United States. Yet, we have -- as Mackenzie shows, we have about 35 percent -- we could reduce by about 35 percent in a highly cost-effective manner. Yet, at the same time, those reductions aren't being made with the current price.

Now say you put a price on carbon. Say it's 50 percent of the cost, electricity. In the state of Maryland, energy electricity prices rose 2 years ago by 70 percent. Last year the average Maryland household used the same amount of electricity they did prior to the 70 percent rise.

MR. GAYER: Can you get to the question, please? We're running out of time.

MR. HOPKINS: I think there is an enormous amount -- I think we are focusing an awful lot on price where it is extremely politically difficult where there is so much that can be done in termed in this early section -- or period -- in terms of the regulatory answers that, as you point out, that are obvious things that people would do if there was a price.

MR. GAYER: I don't know if there's -- do you want to respond, anybody? I don't know what the question is. More a statement than a question. Yeah.

Let's go -- we're out of time. So I want to get one more question over here.

MS. SHALI: Haia Shali from the World Resources Institute.

I was wondering if any of you could comment a little bit, both from the cost containment perspective as well as the environmental perspective on trade rebates and their role in either Kerry-Lieberman or the previous -- Waxman-Markey.

MR. GAYER: Anybody know?

MR. BURTRAW: Yeah. What you're -- I think the vocabulary, Adele, that I would use to characterize this is output-based updating allocation to energy intensive trade exposed industries.

MR. GAYER: It rolls off the tongue.

MS. MORRIS: Yeah, what he said.

MR. BURTRAW: That's --

MR. GAYER: That's not (inaudible) --

MR. BURTRAW: Go ahead, Adele. I'm sure you have something to say about that.

MS. MORRIS: No, no. Go right ahead. You did that so well.

MR. BURTRAW: Well, that I did -- rather than -- this is not our grandfather's approach, so to speak, of giving away free allowances to firms based on their historic performance, but rather giving them away based on their contemporary performance. So as long as a firm continues to keep value added onshore, then it would earn allowances for free if it qualified as an energy-intensive and trade exposed industry.

And the argument behind -- in support of this is that it's an approach that would protect jobs and reduce the leakage offshore and it would also tend to reduce the costs because essentially you're giving those allowances away for free to those industries and in this case, and at least in a competitive market, we would expect -- because that's essentially an output subsidy, we'd expect that allowance price not to be reflected in product prices.

So, it's a way of cost containment. It still has a real cost because it means that you're not going to achieve some level of emission reductions from those industries. The rest of the economy has to do more work. It's not a free lunch, but it is a band aid to get -- to hold us over until there was a global regime.

And finally, I'll just say -- this idea competes with the idea of a border tax adjustment, which probably most economists would prefer but our WTO lawyers give us trouble on that one, so.

MR. GAYER: Well, we're running over. So I want to thank all of you for staying to the very end. I appreciate it. And I thank our guests. And join me in thanking them for being here. Thanks. (Applause)

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