MR. ADLER: The last panel we heard was, domestic impacts of the Climate Change Treaty and in particular some of the proposals that are on the table. But obviously, any policy to reduce greenhouse gas emissions will necessarily effect other countries. Not only those countries that participate in the treaty, but as some of the speakers will discuss, even if some countries are no participating, the economic ramifications of an international treaty will be truly global.

To moderate our panel on this aspect of the issue is John Merline, who is Washington Bureau Chief of Investor's Business Daily. John asked me not to give any more of an introduction for him than that. So with no further ado I will turn this panel over to him.

MR. JOHN MERLINE: Thank you very much. I don't know if the planners of this conference were aware of it or not, but today happens to be the 20th anniversary, to the day, that president Jimmy Carter announced a blue ribbon commission to study the effects of global cooling.

(Laughter)

So the timing is fortuitous, although today obviously is a very hot day. A little story - it seems that we have an international panel here so I thought this would be appropriate. A congressional staffer, was escorting a member of a foreign delegation around Washington recently and this person was from a country that has many political parties. And he was explaining to him that in the United States we have only two major political parties: one he said is called the "Stupid party" and the is called the "Evil Party". He explained that every so often one party comes to dominate does something either stupid or evil. But occasionally, they get together and do something that is both stupid and evil and that is was we call bi-partisanship.

Unfortunately, that could very well be the outcome of the upcoming meeting in Japan and the effects of any treaty that is signed there. Unless, I think, the public is informed about the real world effects of attempts to limit greenhouse gases. With us this afternoon is a distinguished panel of experts who will talk about the global economic effects of any such efforts. What do developing countries need to grow? How will restrictions on the use of energy effect them as well as advanced countries. With all attention focused on the alleged risks from global warming, I think that these are questions that too often not only go unanswered, but unasked.

Our speakers include Dr. David Montgomery, vice president and head of environmental practice at Charles River Associates Incorporated; Dr. Brian Fisher, executive director of the Australian Bureau of Agriculture and Resource Economics; Mr. Deepak Lal, professor of International Development Studies and the University of California at Los Angeles. I will longer introductions before each speaker begins his presentation.

First, just a few ground rules, each speaker will make a 15 minute presentation and I will enforce that with an iron fist. After which we will open the floor to any questions.

Our first speaker is Dr. Davis Montgomery - as I said, vice president and head of environmental practice at Charles River Associates Incorporated, an economic consulting firm. Prior to joining Charles River, Dr. Montgomery directed economic impact studies for the U.S. Energy Information Administration and the Office of the Secretary of Defense. He was also an assistant director at the Congressional Budget Office where he studied the economic effects of environmental and energy policies. Dr. Montgomery has led studies of the national economic effects of climate change policy, most recently developing the International Impact Assessment model. To talk about the global economic effects of cutting greenhouse gases, please welcome, please welcome Dr. David Montgomery.

DR. DAVID MONTGOMERY: Thank you, it's a pleasure to be here today. I will join the slide turners and begin by putting up a title for my talk. The moderator and I were just having a discussion of whether

he could borrow my wristwatch or not in order to enforce with an iron hand. And I decided that since we're all in favor of volunteerism and free market approaches, I would enforce my time slot.

Well, how about if I just talk louder rather than spending any more time hooking me up. Can everybody hear me adequately? Okay.

Let me begin just with a brief review of where we stand, and key features of the negotiating process. The Conference of the Parties in Berlin set up the negotiating process that is currently going on, leading to the Kyoto and the objective of this process is to develop some kind of protocol or other legally binding instrument to be signed in Kyoto with some ground rules that were set up by the conference of parties. And there are three of them that are really important for determining the impacts on different countries. And so more for the purpose of bringing that point out than reviewing the whole process, that I wanted to begin this point.

There are three key parts of the ground rules. The first is that they are to focus on quantified emission limitation and reduction objectives. That's the new terminology for what we used to call targets. And dates of 2005, 2010, and 2015 are the timetables that keep coming up. And these dates are very close to the present for the kinds of severe cutbacks in emissions that are being proposed in some of these targets. And the third point is that under the ground rules, the developing countries are to be excluded from any additional commitments for reducing emissions. I will bring out some of the implications of the point in looking at the international impacts.

We've actually been looking at the economic impacts of climate change policies in the United States, and other countries, for quite a long time. And the key, consistent finding that the countries that undertake targets and timetables, that undertake to abide by targets for near term reductions in emissions, will face significant economic costs. And we, in many ways, concentrated on those countries in the last five or six years of our analysis.

So there has been increasing attention paid in the negotiating process to what potential impacts are on countries that do not undertake commitments to reduce their emissions. That's the subject that we began working on several years ago at Charles River Associates, to try to understand what are the actual economic implications of the negotiating process for the developing countries as well as for the advanced countries that are being asked to undertake limits on emissions. And Brian Fisher at ABARE has also been one of the leaders in addressing this set of questions.

Finally, a third point that has come out, I think, of all of the serious economic studies which has looked at this question which is that the realization that it is actually quite unnecessary for either the advanced world, the industrial world or the developing world to incur any of these kinds of costs in order to deal responsibly with climate change, no matter what one's opinion is about the climate science and the degree of protection which is ultimately appropriate for the world's climate and the world's environment. It's unnecessary to undertake, to undergo the kinds of costs that would come out of the Berlin mandate and the kind of proposals that are now being negotiated to achieve any of the benefits that someone would like to achieve. And I will try to finish up with that point.

Let me summarize the overall view of what the different proposals for reducing emissions might do to different groups of countries. I put on this chart three groups of countries. Being, OECD countries, and for today's purposes I'm excluding from emission limits any of the emerging economies of Eastern Europe, the former Soviet Union, and other Eastern European countries, technically, as far as the Berlin Mandate goes, they're part of Annex I countries and they're expected to be negotiating about emission limits. We're assuming that they will not adopt such emission limits, and are including them with the rest of the world.

The second group that we put here are the energy exporting countries, which include the oil producing countries of the Persian Gulf, but also include any countries that are -- have more fixed economies and are both energy exporters and producers of other goods.

And finally we have developing countries that are not major exporters of energy products. And we -- I put down here something that I'll continue to carry through this presentation, which is one proposal, which I've called a stabilization proposal. This would be a proposal to limit emissions from the industrial countries to equal 1990 emissions in the year 2010 and from then on out. So it's to bring emissions back to 1990 levels in 2010 and then stay there. The reduction proposal is one of reducing emissions to 10 percent below 1990 levels in 2010 and staying at that level thereafter.

These two proposals are probably somewhere between what the U.S. government has been looking at recently, as possible emissions that the U.S. would support, and the actual proposal of the European Union, which was for a 15 percent reduction in emissions below 1990 levels in 2010. So these are among the more modest proposals that are currently under discussion. So all the impacts that I'm talking about will be bigger if something worse ends up coming out of the negotiations.

Interesting point is that for the developing countries we see these two proposals as producing, on average, losses of 2 percent to 3 percent in their gross domestic product, by the year 2030. I pick 2030 because that's long enough for some of the consequences of this kind of an emission limit to show themselves, in the economies. And also for the growing demand for energy services after this fixed cap is put in place, to begin to show up in putting pressure on energy prices and costs.

The developing countries lost some 2 to 3 percent of GDP, below the level that is would otherwise reach at that time. For the U.S. that's somewhere in the order of $200 to $300 billion per year by the year 2030. For the energy exporting countries, the loss is every bit as big as they would be in the industrial world. And that's -- I will talk about the reasons, but that's not a surprise.

Interestingly, what we find and what has been found by most international trade models, and international trade analysts, who have looked at this question the way we have, is that for the bulk of the developing countries, they would also be harmed by the industrial countries undertaking limits on their carbon dioxide emissions. Even if the developing countries are not asked to do a thing to participate in those emission limitations.

I'd like to focus, and let’s talk just for a minute about why we see these patterns. The first point is, the OECD countries unambiguously face negative impacts. The OECD countries would be limiting carbon emissions, shifting to higher cost forms of energy, possibly imposing carbon taxes, basically reducing their ability to produce goods and services for their citizens, because of higher energy costs. In addition, the industrial countries would be facing a loss of their competitive advantage, relative to developing countries. Developing countries would not be incurring these costs, if they don't undertake carbon limits.

In the developing countries there are offsetting effects. I like to call it the income effect, and the substitution effect. That kind of goes back first year economics. The income effect comes from the fact that developing countries are connected to the industrial world through trade. Most of their exports go to the industrial countries. Most of their imports come from the industrial countries. If the industrial countries are worse off, they're going to demand fewer of the goods that are produced by developing countries and that's going to make the developing countries worse off, too. In addition, the industrial countries will be charging more for the goods they export to the developing countries, because it costs more to produce them in the industrial countries.

So that's the bad news for the developing countries. The possible good news is, what we might call the substitution effect. The developing countries will have lower costs, especially in producing energy intensive goods for the industrial countries. So maybe they'll gain a larger share of the export market. So the demand for exports will shrink, the demand for the kind of goods that these developing countries produce will shrink. But, they may be able to get a larger share of that shrinking market, because of their lower energy costs. And the issue for individual developing countries is which of these two offsetting effects are important.

Oil producing countries, clearly the effects are the most negative. They face a loss in oil sales and a loss in oil revenues, because oil is an important form of energy. Less oil will be used in the industrial countries if we impose carbon limits, which means any country that's an oil exporter is going to suffer from lower energy prices and lower demand for its exports.

That's true for Canada as much as it's true for Saudi Arabia. And also we include coal, it's clearly important for countries like Australia.

Now, there are actually significant differences in impact across each of these groups of countries. I'm going to start out talking about the industrial countries. You can see, even here, that their competitive imbalances, and uniform targets, as are being talked about now in the negotiating process, don't produce uniform impacts. The U.S., under these assumptions, would be one of the more severely impacted countries. Canada and Australia, because they're export oriented, highly energy intensive, exported energy goods, will be even more severely affected.

Germany and the United Kingdom, which have been pushing for tight targets, actually will have an easy time of it, because of reasons that have nothing to do with climate change. Their emissions are not expected to grow for the next ten years. In the case of Great Britain it's because of deregulation of electric power, a shift to natural gas, taking apart their coal industry. In the case of Germany it's because Germany -- West Germany, united with East Germany, and it shut down the East German economy which produces a big reduction in emissions in an economy that was very heavily coal intensive. So we see big differences across the industrial countries.

Let me turn now to developing countries. This is I think the striking feature of thinking about international impacts of climate change policies. The original intention of the framework of the Convention was basically to exempt the developing countries from having to do anything for a long time. But the global trading system makes this impossible, because all the countries are connected through international trade. Essentially what happens is that the cost of reducing emissions in the industrial countries is in part exported to the developing countries, in the form of lower prices that are paid for your goods and higher prices that are charged for the goods that are sent to them by the industrial countries.

But, there are differences across the developing countries. It depends in part on what happens to the world oil prices. The more world oil prices fall, the more likely it is that some of the oil importing developing countries would benefit from climate change policy. The demand for their exports from developing countries and the cost of their imports all play a part. Fortunately, we get right to, as I've been given my time warning, what these impacts are likely to look like.

This is not intended to be an eye test, though I'd urge all of you who can't see it to go visit your local optometrist. But, to give a picture of overall -- plot the effects, on the developing world, of the kind of emissions limits that are under negotiation, are likely to look like. At the bottom here, facing serious GDP losses are the oil exporting countries. I see Kuwait, the United Arab Emirates, and Saudi Arabia.

At the top we see the countries that may well be able to take advantage of their lower energy costs by increasing their exports and taking advantage of their competitive position to beat out the industries in the industrial world. And up there we see countries like Jamaica, South Korea, India. The reason that those countries are there is that they have the industrial base, that they are ready to expand production if they get a competitive advantage in world markets, and not being part of the climate change treaty will give them that advantage. Jamaica is at the top, because Jamaica is an oil importing country and it produces bauxite, an extremely energy intensive product which competes with the U.S. aluminum industry.

But, what we find for the most part is that the poorer countries of the world, the average developing countries are all going to face economic losses, because of the emission limits that are undertaken by the developing countries. So they're in an interesting position. They are likely to be irritated with the

industrial countries, because industries in the industrial world are likely to be shifting towards the developing countries. You can see that just by looking here. But, at the same time the developing countries are going to be worse off, because of, in the aggregate, losing demand for their products. And they are beginning to realize that in the international negotiations and part of the claims that are now coming up are requests by the developing countries for some form of compensation for the damage that they will be facing.

The other side of it, and let me just mention as a final note of pessimism, all the impacts I've been talking about on developing countries assume essentially that the free trade continues throughout the world. But, the most likely thing we would see, if this were a consequence of climate change policy, this appearance, the big reduction in output of not ferrous metals in industrial countries, increases in the developing world. This non-ferrous metals industry would put in claims for some form of protection that they were being unfairly competed with by developing countries. If that happens nobody gains, every country in the developing world would be a loser in the trading system that would come out of that. Once again, the point is that there are serious negative consequences for the developing countries coming out of these negotiations, that many of them are being realized in the process.

Thank you.

MR. MERLINE: Everybody is a loser, it sounds like the perfect outcome of an international treaty.

Our next speaker is Dr. Brian Fisher. He's the executive director of the Australian Bureau of Agricultural Resource Economics. The bureau gets 60 percent of its funding from the Australian government, 40 percent from private sources and it's an independent research group. Dr. Fisher also served on the United Nations intergovernmental panel on climate change and on Australia's National Committee for Climate and Global Change. In November 1995, Dr. Fisher became a fellow of the Academy of Social Sciences in Australia.

Here to talk also about the international economic effects of a global climate treaty, please welcome Dr. Brian Fisher.

MR. FISHER: Thanks very much, Mr. Chairman.

Without further ado, what I'll do this morning for you is to follow-up from David’s presentation and make quite a similar presentation. First of all let me just quickly describe the model we used.

The model we used is called MEGABARE. That’s a particularly Australian name, I guess. It's means big model in our case. This model is over a million equations. It’s a trade model. We basically think that this is a trade issue and, therefore, we built a trade model to describe it. It contains 30 regions and 41 sectors or industries. We've gone to particular trouble to model the energy sector and we used this, both forecasting and policy scenario analysis. Now, if you want to drag down the over a million equations from our webpage and check the things out, then please do so. The specification is there on the web for people to read. If you want to run the model then I suggest that you can type it in but clearly it’s more effective to just give me a call on the phone and we’ll run it for you at a competitive price. So if you would like to do some of that just call and we will be at your service.

In terms of the baseline emission projections from our model, our model basically has CO2 emissions from energy use doubling between 1990 and 2020, on a global basis. By 2016, non-Annex I countries, pass Annex I countries in terms of global emissions. So by about 2020 fifty-two percent of global emissions will be coming from countries that are currently, under the Berlin mandate, not called upon to make commitments at Kyoto. It's crucial in these negotiations, if we're going to do something for the environment, that over the long haul we have a framework that involves developing countries. I would submit to you that the current proposals for uniform emission reductions will not, will not solve that particular problem. No developing country is going to take on uniform emission reductions from their

already low base. But unfortunately, in terms of total global emissions the lion's share of emissions growth in the future will come from developing countries, just those countries that are currently not involved.

Now, in terms of analyzing the economic costs of emission reduction scenarios, we need not only to look at the domestic production costs, but also the trade costs. And in our model we divide these costs up into domestic adjustment effects, which is effectively driven by the magnitude of the emission reduction that you try to do and the unit cost of abatement, in other words how much it costs you to reduce or take out a ton of carbon out of the economy domestically. And the other side of the equation is the international costs.

They're divided it into the terms of trade effects, basically the price effects, the changes in the price of your exports, compared to the price you have to pay for your imports. And any international investment flow effects, the tendency for industries in industrial countries that are trying to do something about their emissions, to move off to developing countries, who have no commitments.

Now, most of the models that you've heard about produce macroeconomic effects that are pretty much the same in terms of the overall effects. There are differences in those models. But, generally speaking, the macroeconomic effects are comparable. What we try and do with our model, is to trace the impact on the gross national expenditure over time. And we use gross national expenditure as a measure, as a welfare measure in our model, because it takes account of the domestic production effects, the GDP as well as any terms of trade impacts.

You'll see from this next graph that for a country like Japan, for example, the impact at the very beginning if you impose a stabilization target and the type of target we're talking about here is stabilization at 1990 levels by 2010, and a 10 percent reduction on those levels by 2020. So it's effectively moving the commitment in the convention at the moment for stabilization from 2000 to 2010, and then doing some reduction. Now, if you do that, you impose that sort of policy, in a country like Japan, in the very beginning, Japan potentially benefits. The reason that we get that result is because Japan is a strong, very large net fossil fuel importer. To get fossil fuel content out of domestic economies, you'd have to impose some sort of tax or some other regulation. Effectively that means that the price of fossil fuels rises, domestically, the demand falls, therefore the world price of fossil fuels falls. Because Japan is net importer of fossil fuels, it has some trade gains in the very short term.

But, over the long term it has to do substantial reduction and in Japan the use of fossil fuel abatement is very high. And as a consequence of that, over the long term it starts to cost Japan more and more. So by about 2020 it is costing 3 percent, 3 percent of GNE per annum, in Japan to meet the stabilization target rising from basically nothing in the year 2000.

Compare that to the European Union, the most strident set of countries in this negotiation, it's costing them relatively very little to hit that sort of target for the sorts of reasons that David Montgomery has already discussed. It's a very, very large diverse set of economies and of course if you disaggregate the EU you get different results for the individual countries. But for the EU aggregate it is costing them not much. This negotiation is unfair in that sense. There are substantial differences in the cost potentially being forced on the individual players. And as a consequence to that, that's leading to substantial difficulty in this negotiation.

Now, one of the most important things to think about, in terms of the political economy of this negotiation is the impact on individual sectors within an economy. And just let me illustrate some of these by putting up a graph of Japan. Now remember, this is the policy that tries to stabilize emissions by 2010. Effectively, what we'd have to see in Japan to achieve that is around about an 18 percent reduction in the iron and steel industry in Japan. About a 100 million tons of iron that are still being produced at the moment in Japan. Based on our model a slight reduction in steel production out over time, and we're not

talking about -- around about an 18 billion ton reduction against that baseline. And a similar pattern is happening in other energy intensive industries in Japan.

Now, where do you think that production is going? Well our model says most of that production ends up in Korea. Korea, even though its an OECD country, is not an Annex I country. We've assumed that it will not be taking on commitments. Of course there is strong pressure on Korea to take on commitments in this negotiation. But, at the moment it is not an Annex I country. Under the Berlin mandate it is not called upon to take on commitments. If it doesn't take on commitments, then most of that iron and steel industry in Japan goes out towards Korea, new blast furnaces will be built, effectively replacing those that leave Japan, some go into China, but most go into Korea.

Now, we haven't budgied up this model. That's what the model results suggest. And that's intuitively appealing. It makes sense that that's the sort of result that you're going to have, when you've got the world divided into two halves, one set part of the world doing something about this in a policy sense, and the other -- the other part of the world not doing anything at all.

Now, the United States, basically when you look at the impact on sectoral or product level, country by country, the major impact of climate policy must be on the coal industry. Coal is the most carbon intensive of the fossil fuels, therefore it will take the lion's share of the adjustment. In the United States, we estimate that about a 45 percent reduction in coal output by 2010, against business as usual. Now, that's a substantial adjustment in the coal industry, and therefore, that will mean substantial regional impacts. There have to be substantial regional impacts. And given the changes in competitiveness in countries like South Korea, then you'd expect manufacturing also in the United States to come under some pressure, particularly manufacturing dependent on energy intensive inputs.

Now, as David has also said these effects flow -- because of the links through trade, out to other countries. This slide is illustrating the impact on Indonesia, for example. Again, in Indonesia there's a substantial impact on coal output, according to our estimates. Now, this is not happening because Indonesia is actually imposing policy itself, it's happening because industrial countries are reducing the demand for fossil fuels and that reduction in demand flows through to major exporting countries like Indonesia. You'll notice also, of course, that Indonesia increases its iron and steel industry. Now, that iron and steel industry would have been in Australia. It would now be in Indonesia. So effectively what this policy does, by dividing the world into two, is to encourage companies and investors to move their plants from one place in the world, to another place in the world, not necessarily having an impact on emissions that those plans expect.

Finally, given a very short time indeed, let me just say something about tradable quotas. I understand Americans are extremely fond of tradable quotas. I take my hat off to you, so am I. The reason I'm extremely fond of tradable quotas is because the quota instrument would -- or a marketplace instrument would substantially reduce the costs, compared with doing uniform reductions, effecting regulations to uniformly reduce emissions around the world, substantially reduce the cost of that policy our estimate is that it would cost you about $370 a ton of carbon for a carbon tax type solution -- $370, I think you can multiply 3.7 by .26 cents to get the impact on gasoline prices in the United States if you want to do that conversion -- to get you to stabilization at 2010. A tradable quota solution will cost you exactly half that. Of course, it still costs you the implicit carbon tax associated with tradable quota is a half of $370 U.S. dollars a ton. So there's no free lunches here. And, of course, for every tradable quota there's a permanent price , that means there's an equivalent carbon tax, so don't let people persuade you that there's no cost to a cap, to our policy, somebody has to pay for the quota.

Now, The nice thing about a quota, of course, is that it allows you to do this emission abatement in the most cost effective way. It allows countries that find it the cheapest to do the most abatement. Now, in our model, effectively what would happen is, that all of the quotas would be purchased from Eastern Europe and the former Soviet Union, to do this abatement. In the case of Australia, for example, we would have to do around about a 28 percent reduction by the 2010 base, without tradable quotas, to hit

stabilization, with tradable quotas we'd do a 5 percent reduction and we'd buy the quota and that's very nice, that's an excellent result.

The real problem with this is that there's going to be massive income transfers associated with that. And this graph effectively gives you some idea the extent of which income will be transferred from industrial OECD countries to the former Soviet Union and Eastern Europe. Around about 12 percent of the former Soviet Union or Eastern Europe's GNP will be coming from income transfers by 2010. Now, I ask you, is your Senate going to feel comfortable with that? I'll let you contemplate that.

Now, Mr. Chairman, I must be almost completely out of time.

MR. MERLINE: One minute.

MR. FISHER: I've just got one minute. Let met just do a tiny commercial.

All my results are contained in this book. I'm more than pleased to sell you a copy, for 36 Australian dollars. That's much less in U.S. dollars. Please leave me a business card and I'll have one directly to you almost instantaneously.

Thank you very much.

MR. MERLINE: All this talk about economic models and mega-models reminds me of a wire story I saw the other day. It seems that climatologists who are struggling to get their computer models to accurately forecast warming trends have decided to chuck the computer models and instead ask super models what they think. Elle McPherson and Cindy Crawford have signed up for that.

Our final speaker is Deepak Lal -- I hope I pronounced that correctly -- professor of international development studies at the University of California at Los Angeles. Mr. Lal is also a professor emeritus of political economy at University College London. In the early 1980s, Mr. Lal served as an economic advisor to the World Bank and he has advised several other international organizations, such as the OECD. He's the author of several books and articles on economic development and public policy.

To talk about the key role energy use plays in economic development, please welcome Mr. Deepak Lal.

MR. LAL: Thank you, Mr. Chairman.

At Kyoto, I think the Third World is not willing to face it's really first serious confrontation with ecological imperialism. Up to now you've successfully kept any commitments they might have to carbon emissions, greenhouse, et cetera, to a very rhetorical level and nothing seriously has been done. But, I notice that after President Clinton refused to go along with the Germans and the British, much to my chagrin, about -- you know, setting targets for U.S. emissions by 2010, and of course we've heard, by that date of course, half the emissions will be amounted for by the Third World. There's also this so- called "carbon leakage" problem, which people have been talking about.

Now, given all this, once they failed to endorse the European proposal for the reduction in greenhouse gases, he issued a statement on June the 26th, which I quote. He stated "the Kyoto Accord must include language that makes it clear that developing country obligations under the pact will increase over time and will include binding targets." And the U.S., of course, committed itself. He also says it will give foreign aid to developing countries to deal with these emissions, of $1 billion over five years, which of course, as I show, is a derisory sum.

Now, we've already heard about the indirect effects of emission control by so-called "Annex I" countries, that even these have deleterious effects on some developing countries, though there are a small number,

which are energy importers, which might benefit. But, these small effects are countered by, if you actually get what Clinton is proposing, binding emission targets of developing countries sign on to this in Kyoto, then there will be much more direct effects on their growth rates, which will result from any such Kyoto pact.

Now, it's interesting that the IPCC, in one of its volumes, its latest version, has actually produced some survey of various models which have tried to estimate what will the GDP losses in various regions of the world. It's got two scenarios, a reduction in the rate of growth in each region by 2 percent, per annum. And then a stabilization of emissions, by 1990 levels in each region. And they're enormous. You have to admit some of these changes are enormous. For instance, losses in GDP, particularly for China, range from 14 to 13 percent GDP in 2019, over the business as usual scenario.

Now, given that there have been all these models floating around, in fact, I mean, having sort of worked on planning models in my mistaken youth, I have very little confidence in any of these models, which includes, of course, many of these climate models which are floating around. And that's partly because most of these -- the assumptions of which are the best, are very, very shaky. But, if you want a sort of ballpark figure, I trust a figure which Tom Schelling produced, after surveying many of the economic models, about the cost of what the estimates would be to world growth rates, if you like, or GDP losses, which these models, you know, are coming up with.

If you delay the doubling of CO2 emissions by four decades, these -- the ballpark figure, that will roughly reduce world product in perpetuity, forever, by 2 percent per annum. Okay. Now, this might appear a trivial cost, if you're a rich country like the U.S., the numbers floating around here, you know, $367 per capita, or $500. Well, these are trivial sums, as far as U.S. living standards are concerned and I think many people here, if you just said, that's all it costs, might be willing to say, well, to save the plants or some cuddly bear or what have you, we're willing to incur this cost.

But, when you start thinking of this cost, in terms of what it means to developing countries, particularly the poor ones, where much of the emissions are going to come, India and China, this is by far from being trivial. Much, much more seriously, and I think this has not come out openly in this debate, is the fact that this attempt to limit carbon emissions, in fact, is really an indirect attempt at preventing the Third World to grow at all. And to understand that, one has to really go back through economic history, to see what has been the reason why of the so-called European miracle, or the industrial revolution or whatever you like to call it.

This has really been based on what you might call the substitution of organic material, mainly land-based, charcoal, if you like, various other forms of inputs into the economic process, which were all agricultural-based, in some sense, and hence, dependent upon supplies of land. This was replaced by organic minerals, essentially coal, fossil fuels. And it was this which finally broke the constraint which mankind has always lived under. Economists give it a name, a diminishing return.

You have a fixed supply of land, then over time, at some stage, you will hit the land frontier, return will decline and you can never get a sustained rise in living standards. People call it intensive growth. And it was the fact that you had, and could in fact, use what seemed this unbounded supply of energy, based on fossil fuels, which has made it possible for people in the West, a small crag of prosperity, to escape from man's eternal scourge, which has been poverty of various types.

And as many developing countries have shown, the Far Eastern, and now India and China are trying to do this, this is a route, this is the only route, in fact, in which they can eradicate their sort of long -- you know, their poverty, their historical poverty. Now, if you try and prevent this from happening, if you say that you have to now go back to nature, what you're really doing is condemning these countries to remaining old fashioned, organic economies. Now, even if these organic economies there is some -- you can still get intensive growth, sustained rises in the standard of living, and that's happened in history, through what Adam Smith described, the process of capitalism, exchanging free trade in goods. But, even

here, the greens are not happy with that. They want to introduce also their environmental and labor standards to make it even more difficult for the Third World to trade.

So I look upon the green agenda -- forget all the other rhetoric, is ultimately trying to stop growth in the Third World. And if you're saying you're going to stop growth in the Third World, you're really going to say that you're willing to condemn three-quarters of the world's population to continuing poverty. Now, apart from anything else, the amorality of that is something which I find absolutely staggering, coming from people who otherwise are constantly riding the high -- or trying to sort of claim the high moral ground.

Now there are many other sort of squiggles in this argument. I notice now that many economist, for instance, Bill Cline is one of the leaders of this, but many others have also starting claiming that, of course, it's in developing countries interest to stop global warming from happening. And, again, the IPCC survey is various studies which have tried to estimate the cost of different regions of the doubling of CO2. Now, again, as you'd expect, there are differential benefits. And most of these are concentrated in agriculture and sea levels.

The most gloomy prognostications are Clines, but I don't place any confidence in these. Partly because if you open up the most recent issue of -- the December '96 issue of the American Economic Review, he's tried to attack Bill Nordhaus estimates for what will happen to American agriculture, as a result of doubling CO2. And Nordhaus found, with one of his collaborators, that in fact nothing would happen, U.S. agriculture would benefit. And Cline claims not, and Nordhaus has a very effective reply to showing that Cline is just up the creek on this. So I don't believe his global figures either, actually.

In fact, all their studies which one can put any credence on show that certainly in aggregate there is no reason to believe the doubling of CO2 is going to harm agricultural output in the world, the whole. And there will be regional or distributional effects. But, these regional and distributional effects are rather like a gigantic land reform. Now, if you look through human history, land reforms of all sorts have been taking place either through nature or in man-made ways. And people haven't complained. They haven't said the apocalypse is here, the world has died. So I don't see any terrible thing happening from that.

As regards sea levels, which is the other great scare that, you know, people are always -- there are bleeding hearts about Bangladesh falling into the sea, the Maldive disappearing, Pacific atolls going. And of course, the Netherlands, though many people don't mention that, but of course in the Netherlands the Dutch have spent thousands of year -- well, not thousands, but at least hundreds of years putting fingers in dikes and preventing themselves from being swallowed up. And the costs of raising those dikes is not all that much. And if you're really worried about Bangladesh and various Pacific islands, there's a very simple abatement policy. These huge sums which are involved in reducing warmhouse -- which are for the world, this world as a whole, and in particular in industrial countries, just take that money and put it in an abatement fund, so-called "abatement fund" for these countries which are going to be extinguished.

And you know, if the worst comes to the worst, just the interest on that will be sufficient to lead to a fairly high standard of living for these citizens of these countries, sitting in Sydney, or some nice warm place in the Mediterranean or what have you. And to see that it is not completely foolish, there is a small island, a Pacific island called Nauru in the South Pacific, which consists just of -- well, the polite name is phosphate, but it is really bird droppings and it's being excavated, because it's very valuable. And essentially it's disappearing, because, you know, this is a natural resource which is quite valuable.

And the people of this island have done the sensible thing. They've taken the rents from this natural resource and what have they done? They bought up large parts of Sydney. And they've all the citizens now sitting there just exploiting the rent. In time, it's true, Naulu will disappear. It will still be a U.N. member, but it will -- but it will consist of some high-rises in Sydney. And if that happens to Bangladesh or the Maldives or something, that's not a fate which I think we should shed any tears about.

The final point I want to make, and again I -- this is all in the public domain. I'm sorry he signed this latest economist thing on carbon taxes, but Bill Nordhaus has been the most sensible economist, who has tried to, in my view, do a proper cost-benefit analysis, taking this apocalyptic fear of the green. Seriously, let's look at alternative policies dealing with this small probability of apocalypse and seeing what the alternatives are. And I'm not going to summarize the thing. But, essentially, the bottom line is that it turns out that the worst outcomes are the ones which were proposed in Rio. And that leads to huge losses which are completely unnecessary. The second best, actually, turns out to be doing nothing. The best is some form of geo-engineering, smart mirrors, you know, sitting in the ocean and all this sort of stuff. And -- sorry the second I got -- the second is -- I've got that wrong.

The second is an optimal policy, that means, again, this carbon -- tradable carbon permits. But, if you look at the benefits you get from that, all that happens is that if you do nothing by 2075, greenhouse emissions are 21.96 billion tons, carbon equivalent. If you do the optimum policy in this model they come down to 19.01 billion tons of carbon equivalent. That's a mere 13 percent reduction from laissez faire and what does that do to world income, if you do this absolutely ideal system, it increases on the discounted value by .06 annual increase in world annual consumption, trivial.

So are we going to go through all this, through all this diplomatic, you know, bloodletting and the grave danger, which I think is the one I really fear, of eco-imperialism, for this minuscule gain. Now, it's said, and the developing countries have been very quick on this, that of course this is a problem of the West. The West is very keen on saving plants rather than people. And if they have this strange eco-morality they should pay for it. So they've asked for monies to compensate them for what they consider to be the damage any form of emission control will manage. And here again that ballpark figure, 2 percent of world GDP is quite useful.

What this suggests is, that if you actually believe that the West is going to follow this, give this bribe, then what is the sum? This sum turns out to be roughly four times, from now until kingdom come, four times current foreign aid flows. Now, forget about the fact that foreign aid has not been successful, in fact, quite the converse. The fact that this means the democratic re-elected representatives of the people in most western countries will be willing to raise aid flows by four times the current levels, I fund absolutely unbelievable. I don’t think that will happen.

And in that case, how will they in fact fulfill their ecomorality? Now here I think there is a real -- danger, given the high moral ground, in which -- and the sort of moralistic basis in which much of this argument is couched, saving humanity and all this, that we have the real danger of an era of direct of indirect imperialism, this time discharging a green variant of the 19th Century white man's burden.

There is one little noticed aspect of the attitudes which underlie this green movement is that it's implicitly misanthropic and a close cousin of this sort of misanthropy is racism. Burgeoning Third World populations polluting the atmosphere and degrading its natural resources and habitats for plants and peoples -- plants and insects, not people, can easily be turned into the enemy of spaceship Earth.

So you heard it here. Don't be surprised if at some stage we do not have a U.N. sponsored brigade funded by the greens, trying to protect the Indians from greening, the Chinese from burning coal and all sorts of other devices, to save spaceship Earth. The best thing which could happen is that the Third World, in a united way, just walks out of Kyoto and says they'll have nothing more to do with Al Gore and Bill Clinton.

Thank you.

MR. MERLINE: So now it's a treaty that -- where no one wins and accomplishes next to nothing. I'm really starting to like this idea. We can open it up for questions now. We have, I think, about 10 minutes.

Q: MALCOLM ROSS: I'm interested in Europe's enthusiasm for this issue. I think Dr. Fisher and Dr. Montgomery have already alluded to the fact that Europe would not be greatly affected. Now is nuclear power their ace in the hole? France is largely nuclear power and their exporting it. Do the European nations figure that with nuclear power they can avoid a lot of these costs.

MR. FISHER: I think it's a little bit more complicated than that. If you have a look at the impacts on countries within the European Union, they're quite substantially different. For example, our estimates, and I think they would suggest that the impact on France would be much, much more severe than the impact on Germany, because -- principally because of the costs of -- much of the costs have already been born by the Germans in the unification process. So much of the -- they've made a lot of gains in terms of reducing emissions, by effectively getting rid of inefficient German industry.

Now, the Europeans have managed to do a deal for themselves, though. Basically what they have done, the 15 EU members, who are all individually parties to the convention, all signed onto this convention individually, have managed to negotiate for themselves an internal burden sharing arrangement. So they've basically differentiated their targets. They've allowed, for example, Portugal to take a plus 40 percent growth, compared to major reductions in Germany. So they're not doing effectively the same policy as the rest of us are being called on by the Europeans to do. It's one rule for them and another rule for us. And basically that's fairly -- that's a pretty unfair way to approach this negotiation.

DR. MONTGOMERY: I think the only thing I would add to -- I agree with the way the Brian has characterized the impacts on Europe, that clearly there are going to be big differences across the European countries. And those who have a relatively easy time of it, it's probably not because nuclear -- because of nuclear power. It's because of some other events that have made it -- are making their emissions tend to decline in the short run.

The only thing I would add is, it's not clear that overall there won't be serious economic consequences for Europe, as well as for the rest of the OECD. They're not likely to be as large as for countries like Canada and New Zealand. But, I think they're likely to be significant. And I think that we're seeing more recognition of that coming out of the European community, there was a recent communiqué by the energy director in the European Union that in the very polite terminology that the European Union, kind of, bureaucrats talked to each other and seemed to be saying, this is a really nutty idea. And it will take massive changes in our energy system in Europe in order to be able to accomplish these kinds of goals.

And I think that we may well see more attention being paid by economics and finance ministries in Europe, to what the kind of environmental and diplomatic community in Europe has largely been responsible for up until now. You know, I think most of the -- I think that a large part of the negotiating process has been in the hands of the environment ministries and has not been paid serious attention to by the economists in all the European countries. And I suspect that may change as we get closer to Kyoto.

Q: Yes, I was fascinated by Mr. Lal's concluding remarks, about the U.N. sending brigades to the Third World in order to force them to stop using coal, and so on. That may happen over time. But, in the interim, I think what is more likely is that a combination of trade sanctions and subsidies, foreign aid cut-offs or bribes, will be used to suborn the developing countries and bully them, because the object here has to be a truly global regime.

As Mr. Trisko pointed out earlier, if you just limit the reductions to Annex I countries, there can be no greenhouse gas stabilization. Now, this is not exactly a secret. And the greenhouse lobby certainly knows this. And I think that there is a danger here that we are looking at these proposals as if they are cast in stone. And as if what's on the table is the reality. Whereas, these are just moves in a game that's being played. And they started by proposing a treaty that was voluntary. And then, surprise, surprise, they found out that that wasn't reducing greenhouse emissions.

So now they want to propose a treaty that's mandatory, but only mandatory for some, because that way you can mollify the developing countries. But, when we discover, as we already know, that mandatory for some isn't going to be enough, then they will demand mandatory for all. And when the developed countries are locked in and paying big bucks, under this treaty, then the pressure on the developing world will be enormous. And I associate myself in particular with your remarks about the moral high ground. If we make the basis of our opposition to this treaty that it's not bankrupting the Third World fast enough, we're going to lose. And rather what we have to do is turn the rhetorical tables on the greenhouse lobby and say, no, really what you're trying to do is lure the Third World to its ruin, because that's the only way this treaty will be environmentally effective.

MR. MERLINE: We have time for one more question.

Q: For Dr. Fisher, your results showed, of course, a big hit on the U.S. coal industry. But also, somewhat surprisingly, you showed a fairly big hit on natural gas, which a lot of people would not assume or is not really shown in their models. Would you comment on that? And also, I think when you were here in May, you were talking about getting together with the folks at DOE, or maybe letting them run some of their data through your model and see if you came out the same on natural gas or discuss that issue?

MR. FISHER: Certainly, the results on gas and oil are very, very dependent here in North America on what happens to Canada and the United States, effectively in unison. Depending on how much hydroelectricity you can import from Quebec, and how competitive the Alberta gas industry is against the U.S. industry, you can have substantial increases in flows of gas above business as usual from Canada, in addition to imports of extra hydroelectricity.

Now, those sorts of flows are very critically dependent on exactly how competitive you think the U.S. gas industry is, compared with the Canadian gas industry. We are currently talking to both the officials in Canada and the United States to benchmark our model against some of the assumptions that are -- that the U.S. DOE and its Canadian equivalent use to see -- effectively to compare our results with theirs. Now, most of the -- most of the assumptions underlying the electricity industry estimates suggest that gas will become a more dominant fuel than we have in our baselines.

We are currently re-running the model with those baselines to check the exact impact. The preliminary estimates suggest that the macroeconomic effects are not much different. Effectively you get some swapping between gas and renewables in the final electricity mix and more hydro being imported from Quebec, if you can actually politically build the dams, which turns out to be -- that's, of course, another issue.

So there is -- yes we are talking to officials here and in Canada. And we will be making those results available in the next couple of months.

MR. MERLINE: Well, I see Fred Smith has a question.

MR. SMITH: Just one quick one.

Most of these models deal with the -- sort of how price changes affect market behavior, how different -- some win some lose. To what extent do those models now take in the effect of the non-market energy sources, because they mention the Third World, an increase in the price of marketed energy sources, coal, oil, gas, will lead to a shift to the non-marketed energy sources, dung, wood, and so forth. And we might actually deforest the world. So in effect the effects might not be massive energy increases in the Third World, but a total deforestation of the Third World. That's possibly more to India than the others. But, do the models actually take a case of the shift to the non- market side and the destruction of the world as the environmentalists fear?

MR. FISHER: I think the -- well, I can only talk about our model. We, at this stage, don't effectively model those types of issues. We are working on a segment of the model that will deal with forests and forest sinks and the impact on -- the sorts of impacts you're talking about, as best you can -- as best you can model those. Now, clearly, the main problem with doing that sort of work is just getting the data. The data is extremely difficult to get hold of. And I think you've got to be a little bit careful in building that sort of model that you don't make more errors than -- by trying to include those sorts of issues, than leaving them out, frankly.

MR. MERLINE: Thank you so much. I think everyone will agree this was a very illuminating panel. I'm told that there is a lunch next door. So I guess we can all retire for lunch.