

**InterAcademy Council Teleconference on the release of the report,
“Lighting the way: Toward a sustainable energy future “
HELD ON MONDAY OCTOBER 22, 2007
AT 10:00 A.M. U.S. EASTERN TIME**

OPERATOR: This is a recording of the Jillian Ward Teleconference with Resource Media on Monday October 22, 2007 at 10:00 a.m. eastern time. Excuse me everyone. We now have our speakers in conference. Please be aware that each of your lines is in a listen-only mode. At the conclusion of the presentation, we will open the floor for questions. At that time, instructions will be given if you would like to ask a question.

I would like to now turn the conference over to Bruce Alberts. Mr. Alberts, please begin.

BRUCE ALBERTS: Hello. Welcome. This is the InterAcademy Council Teleconference about our new report being released today in Beijing. The report is called Lighting the Way Towards a Sustainable Energy Future. As the operator said, I am Bruce Alberts in the United States. I'm the Co-Chair along with President Lou of the Science Academy of Sciences of the InterAcademy Council. I'm also the recent tax President of U.S. National Academy of Sciences.

InterAcademy Council represents over 150 national academies of science engineering in medicine and it includes all believing science academies of the world. This case has brought together an international panel of energy experts that produce a report and some of these experts are on the phone. You'll hear from them shortly. The InterAcademy Council was founded in the year 2000 and it was specifically designed to give voice to the fact that scientists everywhere share a common culture based on a respect for evidence and rationale analysis. This common culture allows us to communicate easily

across very different cultures to reach an agreement even when our governments cannot agree.

This is a fourth report from the InterAcademy Council and here, leading scientists and engineers from around the globe present their agreement on a very critical issue for our future, how to come to grips with the world's search for energy.

I want to emphasize that Lighting the Way is a truly international effort presenting these scientific consensus frameworks for developing energy resources that drive economic growth in both industrialized and developing countries, but also securing climate and environmental protection goals.

The full report is now available on line at the InterAcademy Council's website, which is www.interacademycouncil.net. A recording of this teleconference will also be posted on the website soon after we are finished. Certain panelists will also be available for follow-up questions afterwards.

I will now introduce the panel for very brief remarks followed by questions and answers. I'll just give you a list of all those who will be on the phone before we start. Steven Chu from the United States, Co-Chair. He's a noble lawyer and Director of Lawrence Berkeley National Laboratory. Also, he is a professor of Physics and professor of molecular and cell biology at the University of California, Berkeley.

The other study Co-Chair is Jose Goldenberg from Brazil. He's a professor at the Institute of Electrotechnics and Energy at the University of Sao Paulo and he's the former Secretary of State for the environment with the state of Sao Paulo Brazil.

Ged Davis from the United Kingdom is a study panelist. He's a Co-President Global Energy Assessment International Institute for Applied Systems Analysis.

Lou Yan Long from China, who's a Director General of the Bureau of International Cooperation's with the Chinese Academy of Sciences.

And, Sergio Rezende from Brazil who's Minister of Science and Technology for the Government of Brazil.

In addition, Dr. Pachauri who's a study panelist from India may join us later. He is the head of the IPCC that just won a Noble Peace Prize.

We'll begin with the study's co-chairs Steve Chu and Jose Goldenberg who will give their introductory remarks about the reports and recommendations and conclusion. Steve will go firsts.

STEVEN CHU: Thank you Bruce. (inaudible) and I believe it's the first comprehensive study of how one gets the sustainable energy that has an international flavor to that. As one example, I'll serve you on the panel. We've began to – we fully appreciate the fact that perhaps 2 to 3 billion people out of the 6.5 billion people in the world have access to only primitive forms of energy. That is to say they cook and heat with (inaudible) and twigs, (inaudible) of coal. That 1.6 billion people don't have access to electricity. So, the energy problem means different things to different people throughout the world.

The report...

MALE SPEAKER: E-mail.

STEVEN CHU: Pardon? The report looks at various structures. The first thing it says, really is that conservation and energy efficiency is and will remain through the next couple of decades the most important thing that the world can do in order to get on a sustainable path, and it's a long chapter looking at that. It also goes into dual forms of energy can potentially transform the energy landscape and the decisions all countries have to make in the future. And finally, it goes through a list...

MALE SPEAKER: (inaudible).

STEVEN CHU: It goes through a list of potential policy tools that countries can make adapting to their specific experience. So, I think I'll stop there and so, Jose?

BRUCE ALBERTS: Jose?

JOSE GOLDENBERG: Yes. The perspective of the developing countries, what we realized working on this project is that the developing countries don't have to follow the path, follow in the path by today's (inaudible) countries, which lathers into this nightmare of local pollution, environmental pollution of all kinds and global pollutions. The developing countries can introduce best practices, that is energy conservation and modern technology early in their process of development.

So, leapfrogging is basically the great opportunity for developing countries. They don't have to install studios (sp?), which are polluting as they were in the past, but they can jump right ahead in these modern technologies. And, it's up to the countries, the leadership of the countries to choose these technologies adequately and I think therefore a different part points out the many opportunities to do it right. Instead of doing it, copying it from bad examples which are followed in the past because of lack of understanding of real problems, now they can jump right ahead and use modern technology. Like the cellular telephone. Everybody uses cellular telephones today, and the energy area, the same thing can be done and there are many, many examples that are given in the report of adapting these technologies. So, a combination of energy efficiency, as Steve pointed out and leapfrogging is probably the – has the most striking metrics of the report.

BRUCE ALBERTS: Thanks Jose. Ged, do you want to go next?

GED DAVID: Yes. I'd like to say a few things about the settlement growth in the industry and then touch on Europe at the end. I think the coal element of this report is that it talks about moving the global economy onto a track that embraces to options for sustainable energy use of production.

Let's remind ourselves what this means. In a global economy that's probably running at about \$60 trillion a year that invests about a fifth of that, we're talking a \$12 trillion a year investment, about a trillion dollars a month, and this goes into infrastructure, roads, railways, airports, business building, cars, truck, planes, factories and so on. All of these use energy use and a core presumption is that we want to shift the focus and need to shift the focus of attention to sustainable energy options in each of those areas. And of course, in support of that is the application of human ingenuity through science and the development of new technologies. And, whether this is going to be a significant cost or not to the global economy, that it depend on how quickly we feel we need to replace the existing capital stocks, do we really need to disturb those capital life cycles, and fundamentally, how smart we are in finding the new technologies and options and applying them. The quicker we learn, the cheaper it will be.

I think secondly, when we come to industry, what's abundantly clear in a world that's globalizing is that opportunities are not country centric but they're worldwide. And, in particular, when we look at where the energy use will be, the new frontiers of energy are much more likely to be in China or India, on comparable places than in the OACD (sp?). This is where the application of science and technology development for energy is most needed and can eventually be most applied. It's not just leapfrogging existing technologies

but its super leapfrogging. It's going to be the development of many new technologies in place and in these areas.

The challenge for business is to find the right business models to invest profitably from low carbon options, and this is a challenge. My colleagues have already indicated the landscape advance. It's the full range of energy used in efficiency, renewables, energy storage, electricity transmission, and it's going to be done not just as a pure application of science and technology, we're dealing with complex human beings and social assistance. And, to take these technologies out pervasively is going to need a lot of clever thinking.

Let me just conclude with one region of the world that's taken many of these challenges to heart. Certainly, Europe has taken a leadership role, both on climate change and equity issues, and it still faces significant challenges on energy security. We have the recent political targets to reach greenhouse gas emissions by 20% by 2020. This is from the 1990 level, and for renewables to triple their share to 20% by 2020.

We have targets. I think the fundamental question is how do we do this? And, I think this is where this report has an extremely important set of messages. We need a consistent price for carbon. If one looks at it in terms of CO₂ equivalent, the report talks of 27 to \$41 per ton, CO₂. That's 20 to 30 euros per ton CO₂. We need to boost science research and technology development and energy incentivized (inaudible) industry, and to begin to work on all the leaders, including in particular, in a very urbanized part of the world, to adjust urban planning and public transport.

And finally, it's going to come back to individuals, to us, to you and government needs to put in place even stronger public education programs and better incentives for each of us. I think I'll stop there Bruce.

BRUCE ALBERTS: Thank you. That was very clear. Is Dr. Lou on the line yet?

LOU YAN LONG: Yeah.

BRUCE ALBERTS: Oh good. This is Dr. Lou Yan Long from China. Please give us some brief remarks.

LOU YAN LONG: (Inaudible), should I give you general remarks on the IOC part (sp?)?

BRUCE ALBERTS: Sure, yes please. Yes.

LOU YAN LONG: (Unintelligible) I am not ready to (Unintelligible), I would like to let you know their response from their experts, officials and (inaudible) for their forum for sustainable energy. We heard it this afternoon. And, generally speaking, the report is a good scientific report. From a scientific point of view, it is taken (inaudible) that should be forward-looking and (inaudible). It does present us with a profile for the development of energy system, systematic or sustainable ways.

And, global community needs to be fully aware of the importance of creating the challenge for developing a sustainable energy system, but both developed countries and developing countries should work together to obtain a challenge. The developed countries should help the developing countries by (inaudible) the technology transfer, while taking the energy challenge, but also, the developing countries share the responsibilities in terms of their own capacity.

And also, we have some suggestions, taking the challenge is an example. At the present time, energy saving or energy conservation would be a first priority through the transportation, and lifestyle and also building energy savings. And, we also need to

optimize the energy structure, especially to diversify the energy in China. And also, the reusable energy could be an alternate way for other (inaudible) for solar energy or wind energy, whatever. You know? So, we need to develop new auto (inaudible) energy. For example, on the (inaudible), whatever, we also recommend the (inaudible) innovation programs could be undertaken by both developed countries and developing countries together to capture issues in energy and the environment. These are general remarks.

BRUCE ALBERTS: Okay, thank you. Thank you Dr. Lou. I think our last presenter this morning, then we go to questions-and-answers is the minister from Brazil. Dr. Rezende?

SERGIO REZENDE: Hello. Good afternoon everyone. Very nice to be – to have a chance to participate in this teleconference call. First, on behalf of the Brazilian government, I'd like to congratulate and to thank the panel, especially Dr. Steve Chu and Dr. Jose Goldenberg who led the panel. From the work that you have done, I think this is very important at this time that a report of this quality is presented to society. The way that the report was produced by first having papers presented in workshops and having people with very high caliber discussing the proposals and so on, it was a very clever way to do it.

And, of course the study applies and recommends measures from governments and societies in developing in developed countries. This point, I'd like to agree with Dr. Goldenberg that the developing countries should learn from what they should not do from the developed country return. They showed a leapfrog attitude about what various things that had to be done. Like, with certain development innovation instead of the measure that should be taken.

Regarding the report, it was very, very well written. Very well balance. It covers many aspects. In particular, there are four conclusions (inaudible), which are of – the

Brazilian government really supports. Of course, we support all nine but some of them are very important to us. For instance, number one, which measures should be taken, that the energy is provided to all mankind. It's a shame that almost 2 billion people have no electricity at the moment. Conclusion two, that a lot of efforts will be done in having more efficient machines, and devices, and appliances and conservation attitude should be taken by the (inaudible) government.

Regarding conclusion five, we are very interested to do this, because Brazil has only two nuclear power plants. And only recently, Brazil has decided to start (inaudible) nuclear power plants, because we have all of these resources for this and of course, nuclear energy was sort of banned for some time. It's very important that they become addition regarding the studies in nuclear energy (inaudible).

Lastly, conclusion number seven, as you all know, that we are very, very much involved in bio-fuels, use and research, and we think that a lot of research should be done so that growing fuel becomes more (inaudible) favorable, and of course, we considered to avoid warming, global warming.

Finally, let me mention that President Lula, the President of Brazil will write a letter to the United Nations Secretary General, supporting the recommendations that say that the UN should set up special (inaudible) and study for the (inaudible) of the report. I'll stop here now.

BRUCE ALBERTS: Thank you very much. We are now ready to go to the questions from the reporters.

OPERATOR: Thank you. At this time, we will open the floor for questions. If you would like to ask a question, please press the star key followed by the one key on your touchtone

phone now. Questions will be taken in the order in which they are received. If at any time, you would like to remove yourself from the question in queue, press star two.

And, our first question comes from Andrew Revkin with New York Times.

ANDREW REVKIN: Yeah. Thank you for doing the study and for holding this news conference. If you could characterize from an importance, the following things, that would be greatly helpful. How important is fueling or increasing money for basic research and development of energy technologies compared to the importance of getting a carbon cap in place for example? Some economists that I've talked to over the years say, to have a strong enough cap dispersed, our research is really – you'd have to have one that could never be politically feasible.

BRUCE ALBERTS: Who wants to answer that? Steve, do you want to have a first go?

STEVEN CHU: Okay. I disagree with the last thing. I think if you send a signal where you start fairly low but steadily rise, so really there are no loopholes, but to change behavior 10 years, 12 years out, so that you know 10 or 12 years from now the price on carbon would be enough to actually stimulate things. Historically, that's shown that it actually gets industry to start thinking about it immediately. But, it gives them fair warning. But, I think the crucial thing is a very sure signal, a very stable signal that this will happen and there will be no loopholes.

I think it requires both. I think it requires stimulation life, carbon (inaudible) but it also requires research. But, the (inaudible) then forces industries to make choices on what they have currently in their pocket in terms of technology or what could be easily developed within a short time. There are other things that where, it might need five, 10 years or even

beyond, that the industry would be unlikely to invest in until they are – they could see further down the road that those investments would pay off, and that's where government investments in this midterm research would be very important.

ANDREW REVKIN: Do you think people adequately understand how much governments around the world have disinvested in energy research since the 70's?

STEVEN CHU: No, I don't think they appreciate it.

ANDREW REVKIN: Can you tell – can you state something...

MALE SPEAKER: How (inaudible) has it been?

STEVEN CHU: Well, I think if you consider this energy problem, sustainable energy is the equivalent of the United States moonshine, and you look at the funding in the United States and what (inaudible) Kennedy there and followed by Lindy Johnson (sp?), what the United States invested in the Apollo program. Money of that magnitude would, I am confident reveal a lot of breakthroughs in energy technologies and efficiency technologies and in new forms of energy.

ANDREW REVKIN: Thank you.

BRUCE ALBERTS: Anybody else want to answer that question? Okay. Next question.

OPERATOR: Thank you. Our next question comes from Charles Hanley with Associated Press.

CHARLES HANLEY: Yes. I'd like to ask about carbon capture and storage and whether you all would characterize the prospects for early development of carbon capture and storage? And, whether also how you would characterize the amount of investment in that R&D at the moment, including the United States?

BRUCE ALBERTS: Ged, do you want to have a go at that?

GED DAVID: Yeah. I think the thought is there's a lot of discussion. We still are a long way away from any sense of commerciality. And, some of the conditions alluded to, perhaps the need for clear carbon pricing itself, there are some plans underway at the moment. I think we're not looking at significant commitments of this area unless we begin to shift significant new policies until perhaps the middle of the coming decade. So, I think many would argue that this is an absolutely cornerstone technology or set of technologies that's needed to address statistic climate change issue going forward, and certainly from my perspective, with currently inadequate investments and attention. Others may have other views.

STEVEN CHU: Let me add to this, this is Steve Chu, that in our report, we say that the technology for carbon capture and storage are – the research to develop those technologies is essential. The world has a lot of coal and it is unlikely to expect developing countries like China and India or the United States to turn their back on this energy resource. So, it is essential that we felt it.

But, I would agree completely with Ged. We are now doing a little bit but it's mostly at the level of enhanced oil recovery and at the level of several million tons per year worldwide, maybe five less than 10 year incomes per year, and if this is going to be a significant part of troling the carbon emissions, it would have to on from a scale of 1 to 10 billion tons a year. And so, the scale is an essential problem and we're not completely – it's not an in-hand technology ready to be deployed today.

JOSE GOLDENBERG: This is Jose. May I add something here?

BRUCE ALBERTS: Please.

JOSE GOLDENBERG: In the report, we have a graph, which is very interesting, which shows the efficiency of the use of coal for the production of electricity, and it turns out that some countries like Japan has an average efficiency of more than 40%. And, the number of other countries had efficiencies which are much lower. So, although carbon caption and storage will be important and it should be important in the future, one thing that could be done immediately, which will reduce carbon emissions would be to increase the efficiency of the use of coal in terminal power plants.

So, these things are not –one does not exclude the other. But certainly, the emissions from burning coal could be reduced efficiently just by adapting modern technology. They might be a little more expensive, which brings in the issue of, you know, transferring the modern technology from (inaudible) to developing countries, but I think there are mechanisms to do that, and rural bank to loans with preferred – with lower rates coupled with efficiency, I think could be one way of doing it.

STEVEN CHU: There's actually, even within a country, I just learned, for example in China, where you have very inefficient coal plants that have been put up or are kept running by local governments, and they would not have the capital in order to shut them down building more efficient plants, even though they know that more efficient plant over a period of years would pay for itself. But, what China has arranged internally is that a larger company can partner with these global companies, given the necessary infusion of capital that allows them to build much more modern plants.

Finally, the technology connection we've held, if we could develop better fuels or better hybrid ceramic fuels that could go to much higher temperatures, you can go to higher thermal dynamic efficiencies, so instead of being in the low 40%, you can actually get it over 50%. If you compare that with the ultimate efficient plants, we're now talking a fact of two less carbons for the amount of electricity you generate.

So, here is a little technology window that can help a lot. It can also help in capturing who does this (unintelligible), because you can burn in (inaudible) atmosphere, so you have (inaudible) dioxide, nitrogen oxides, the other (inaudible). But then, you also have a curostean (sp?) of carbon dioxide and no nitrogen separated out, and that would make it more economical. So, there's a (inaudible) technology issue in here as well.

GED DAVID: Just to add a final comment on that.

BRUCE ALBERTS: You know what, why don't you please identify yourself. That was Steve Chu just talking. This is Ged again. Go ahead.

GED DAVID: Just to put a final cap on that. I think the point here is that integrated gasification of coal would combine cycle plants as a lot of options, both sequestering carbon

and at the same time, leading to much higher efficiencies in use, particularly if we can increase significantly inlet temperatures through the use of ceramics and steels and so on and so forth. So, the two come together and clearly the experiments and their first projects in that area are also very important stepping stones to the future that we would like to see happen.

BRUCE ALBERTS: Dr. Lou, would you like to comment on this. I know this is a big issue for China.

LOU YAN LONG: Yeah, you're right. I agree too. I think it's (inaudible).

MALE SPEAKER: Right, yes.

LOU YAN LONG: It's both the technology issue (inaudible) management.

MALE SPEAKER: Right.

LOU YAN LONG: In China, we're, you know (unintelligible) smaller size to the companies, the co-mining companies and to make them a much bigger, I mean, birch (sp?), there are some companies into the big companies, to make them more efficient, increase their production and also in consumption. And, we also increased (inaudible) percentage out there too, to try to improve the efficiency in coal use.

MALE SPEAKER: Right.

LOU YAN LONG: I mean, we need both, both technology and management, and sometimes or in some cases, management is even more important to manage technology, at the present time I mean.

BRUCE ALBERTS: Okay. I think we gave enough answers to that question. Next question please.

OPERATOR: Thank you. Our next question comes from Jeff Johnson with Chemical and Engineering News.

JEFF JOHNSON: My question is somewhat on the same subject. I'm trying to be – if you guys could help us a bit with being as concrete as you can with what the developed world could actually do for the developing world in terms of encouraging, energy efficiency, whatever the case may be in terms of the various technologies you talk about.

One of the problems in the United States have been obviously that, time is reluctant to – there are lines again that they don't want to encourage too much aggressiveness on the part of the American companies, because their fear is that – and, you know, this argument better than I do, is that the developing world could continue to pollute. I'm trying to figure out, what kind of role to get around that argument and what kind of role developing, developed countries could play in improving that, the situation in the developing world.

BRUCE ALBERTS: Okay. We got this. Who wants to take that? Steve, do you want to start.

STEVEN CHU: Okay, it's Steve Chu. Let me go back to the example I already cited. That is, as China builds more parts to the city, it's expected in the next 20 years or so, there would be over 300 million people that will either be born or be moving into cities in China. That's the population of the United States. So, one has an opportunity to go to the city where you lived and the same place you worked. There's recreational areas. You recycle the water so you actually, the net use of water in the section of the city or in a new screen filled site city would be – just you add the water, a small amount of water rather than the way we'd normally consume it. You build in, into the city renewable energy sources like solar, like wind. You design the buildings so that you have very efficient power generation and coal generation of the excess waste now goes to heat up the city. Or, you can even use the cool.

So, if you'd start to design a city as a whole, where you use the people in that country to actually help develop the technologies, but the ideas are out there in the world, you actually, going back to this old theme of super leapfrogging, you actually can get developing countries to leapfrog (inaudible) what we did in the west. Especially in the United States where we have sprawling suburbia and terribly long commutes and inefficiencies.

I think China and India can easily see that this is in their best interest. That it's not – it's technology that exists today. It's an incorporation of those and it's the real key to this is to design it so it's cost effective. So, there's a financial incentive to do this and that's the key. And, once you get that financial incentive, so it look as inexpensive or even more inexpensive over let's say a 5 or a 10 year period, then it will take care of itself. And, this is something that the developing countries can do. We can talk with them and help design things, and we can actually then export it back to the United States or to the developed world, quite frankly.

JOSE GOLDENBERG: Bruce, can I interrupt. This is Jose. Look, I agree entirely with Steve. You know, I think the burden is not only on the industrialized sections but on the leadership of the developing countries, and when you have leadership with this clear sighted, they can choose the best technologists and they can encourage solutions that have not been used in the past. I think the ethanol problem from (inaudible) in Brazil, which is discussed in the report to some extent, I think it's a very interesting example of the new solution, you know? In Brazil, 40% of the government has been replaced by ethanol, which was renewable and has a lot of advantages over government.

And of course, then you have to be careful about not, you know, hurting the environment while you do it, but when we have recommendations to that extent, but it's an (inaudible) solution, so I think the burden is not only on the industrial incentives that should help, but on developing countries that should support science and technology. So, you know, new ideas will come up and could, you know, create solutions that could then be exploited to the United States and Europe.

BRUCE ALBERTS: (unintelligible).

GED DAVID: I think one of the realities is that these large companies view their markets as being global, and the perfect mechanism for addressing these issues is a clear minded, clear sighted developing country that knows what it wants in terms of improved technologies. Encouraging and bringing in those companies that have those technologies, not purely as we say in selling products, but in research and development locally to develop the new infrastructures needed and the new cars, the new planes and so on. And already,

there are companies that are looking to have their research and developing centers begin to place then in China and India for example.

So, I think in a world that's globalizing, there's a lot more opportunities and just to think of it very simply in terms of governments and the developed and the developing world that have to solve problems. Many more people are doing many more things, and I think positively.

BRUCE ALBERTS: Ged, can you give us an example of what exactly, you know, one such project that you know about?

GED DAVID: Well, I think the sort of area the interests me is actually the city area that's made reference to by Steve. I mean, if you take the Dong Tang (sp?) development outside Shanghai, which is being built part to the Shanghai expert, there's a good example where companies come in from the outside, it's been involved in the design, putting together the elements, but for that to happen, already other companies are beginning to say, we can supply there so we can supply that. And, in particular, many of the car companies are looking towards China as a place where they can develop a very efficient vehicle, and so it's in those areas that are in fact, which are particularly interesting.

STEVEN CHU: Let me – this is Steve Chu. Let me add to that. It's ironic that GM China is made with a big money making part of GM, whereas GM North America was not. But, in GM China, they make different cars. They make two, two and a half liter engine cars. Much more fuel efficient. Golly, maybe that can be exported to the United States.

BRUCE ALBERTS: Dr. Lou, do you want to comment on China?

LOU YAN LONG: Yeah. As far as the question how developing world could do for the working world, it's a funny thing, in my personal opinion is mutual understanding. The developed worlds should have led the developing countries to develop economy first. So, they can have the capacity to solve their own problems.

Now second, these are for the developing world to provide to them the early experience in developing economy and how to balance in the environment economy. Not only in clearance but also, very important (inaudible). Their (inaudible) the development per phase. The (unintelligible). I put the thing on the transfer (inaudible). But, it's also (inaudible), the first priority is to strengthen the mutual understanding between developed world and developing countries.

BRUCE ALBERTS: How do you think we are doing right now with mutual understanding? Are there problems?

LOU YAN LONG: I think there are serious problems. Developing (inaudible) that developed countries (inaudible). Still is a gap between the developed world and the developing countries.

BRUCE ALBERTS: Mr. Rezende, do you want comment on this issue?

SERGIO REZENDE: Yes. First I would like to agree with Jose Goldenberg that the experience of some developing countries should be looked in more detail by developed countries, in particular, in this question of using the ethanol, not only for cars that run purely on ethanol but also (inaudible) on gasoline. That's a very, that's a measure which has been

going on in Brazil for almost 30 years. And, in the recent years, with the development of the (inaudible) car, which in fact was started in Brazil, and so, the (inaudible) in developing countries which should be looked upon with more detail by developing countries.

When we say developing countries, it's a very common portable to return to India and China. Of course, they are very important countries. They have population in the billion, the billion number, which is a very, very large population, but Brazil has a population of almost 200 million people and as I said, in one nation, we have experience which should be looked upon in more detail and eventually some of the measures that are taken here should be – could be very well be used in other countries.

BRUCE ALBERTS: Okay good. Other questions?

OPERATOR: Once again, if you would like to ask a question, please press the star key followed by the one key on your touchtone phone now.

Our next question comes from Matthew Carr with Bloomberg News.

MATTHEW CARR: Hi gentlemen. I just wanted to bring a couple of things together. So, you're talking about \$41 U.S. for the price of carbon dioxide permits. Just looking at what you said Steve, to the – about the Chinese cities need to have 300 million more people, I think you said by 2020, is that right?

STEVEN CHU: I think in a couple of decades.

MATTHEW CARR: A couple of decades. So, will China be able to get, be able to sell emission credits for setting up its cities in a more low emitting way? And, how do you go about measuring how many credits it should be able to fill?

STEVEN CHU: Good question. I think (intelligible) would be important versus something that (unintelligible) versus your now carbon credits to go down. As the cities built up 110 projects what they might do it – what they might do, but that's current technology, what they could do and to give credit to China. That's a flow of capital that would certainly help China, India and other developing countries grow their infrastructure in a sustainable way. I think it is very important that the financing be done, that we have a global carbon cap and trait that would allow that to happen.

MATTHEW CARR: And so, is \$41 enough to get through two decades time? Or, will it need to be a lot higher by the end of two decades?

STEVEN CHU: Well, that's a – by taking, maybe the others in our report, we indicated a little bit higher price for carbon, but other people tell me that \$41 would be high enough, other people say 50 \$100. Let's find out what the others would say on that one. Ged, do you have any...

GED DAVID: 20 – the – I should just make sure we got the units right. We talked of 100, to \$150 per avoided metric ton of carbon equivalent, which equates to 27 to \$41 a ton carbon dioxide equivalent. Let's be clear where those sort of things come from. They give us a sense of what sort of price would be needed in particular to commercialize carbon capture and storage. So, that's where we've developed figures very much in that context.

I think the point Steve made really has to be (inaudible). This is going to be very much a dynamic situation for determining what credits should be or not and what our prices as we move forward is essentially hopefully going to be in the context of a very rich market with many buyers and sellers, which determines the price. And, I think what we've seen in the early days of carbon trading, a few problems, if I think of the European experience. So, nobody knows what these figures are. They're highly debatable but they're the sort of ballpark figures that we think is needed to really get the show on the road. In particular, capitalize the development of carbon capture and storage.

STEVEN CHU: This is Steve Chu again. Let me add to what Ged just said. If you go up to, let's say 100 or plus dollars of voided carbon and not carbon dioxide, if you did it suddenly, I think there would be some financial disruptions, but if you do it so that you get to that price 10 or 15 years from now, it's a very different story.

But first, even at just one third of that cost, it would tilt the balance between going – looking at the United States, going to coal or going to natural gas, although much more volatile, much more expensive, natural gas with cogen (sp?) is 80% efficient. And so, you can get much less carbon dioxide and now is actually too more efficient, including cogen, but there is in fact a 1.6 less carbon admitted per unit of what should be generated with – as part per unit of heat used in natural gas. So, that would be the first thing.

In the meantime, one would always be developing technologies to make the carbon capture in a coal plant less expensive. So, a tight signal even at half the cost could tilt the balance temporarily, meaning the next couple of decades while we hunt around for real solutions for coal that might come later or might come now, but as I said before, it's not ready off-the-shelf carbon capture storage in this current economic setting.

BRUCE ALBERTS: Anybody else want to comment on this?

LOU YAN LONG: I agree that, in the past (inaudible) to reducing emissions and to increase their energy efficiencies, but I don't think that we can (inaudible) the price now that cars should be set up by their market, by their buyers and users, and (unintelligible).

BRUCE ALBERTS: This is Dr. Lou speaking yes?

LOU YAN LONG: Yeah, you're right. But, it's a good instrument that should be introduced or regulated in their market, the energy market.

MATTHEW CARR: So, this has to be done by governments or not?

LOU YAN LONG: You're right. Should be discussed in detail by the governments. But, in the leader of governments, according to their local specific conditions.

MATTHEW CARR: So, what would we say is the next step to getting some carbon pricing in the market expanded? What's the next step here?

LOU YAN LONG: What's there for what? For the carbon price?

MATTHEW CARR: What has to be done?

LOU YAN LONG: That could be – we should leave the room for the governments, for the governments to talk about.

MATTHEW CARR: Yes, yes right.

LOU YAN LONG: They've got to work together (unintelligible), or each country or each national government to consider the price for that, or internationally under the (inaudible) umbrella, you can discuss about their carbon price or whatever. That should be a market of mass interest.

MATTHEW CARR: What kind of role do we see for the United Nations in all this?

LOU YAN LONG: You may tend to – you can discuss that with the UN Secretary General about the possibility (inaudible). All the governments are going to sit together to discuss about the market, discuss about their (inaudible) or whatever. But, I don't think we can set a single price for carbon, for energy whatever as \$41 or whatever.

MATTHEW CARR: Right.

LOU YAN LONG: That should be set up by the market right? According to their individual country situations?

BRUCE ALBERTS: Well, just for the record, (inaudible) Lou at the academy and I are just right now sending a letter to the Secretary General of the United Nations suggesting that this report could form the basis for helping them move forward, and that the UN could play a larger role.

MALE SPEAKER: Yeah, yeah.

BRUCE ALBERTS: But, that's of course also in the (inaudible) by the co-chairs.

MALE SPEAKER: Mm hmm.

BRUCE ALBERTS: Okay. Are there any other questions from the reporters?

OPERATOR: Once again, if you would like to ask a question, please press the star key followed by the one key on your touchtone phone.

The next question comes from Mark Fischetti with Scientific American Magazine.

MARK FISCHETTI: Hi. Just a quick reaction to some of the questions and in fact, there's a lot discussion about coal, what to do with coal? Some discussion about nuclear. But, in the spirit of leapfrogging, are any of the developing countries seriously considering really (inaudible) going to massive solar power, massive wind power, that sort of thing?

GED DAVID: It's your use of the word massive, that's always the problem.

MARK FISCHETTI: Right.

GED DAVID: The energy system itself is, it's got a lot of (inaudible), and you know, there's a tendency for large scaled plants to live for long periods, and when you invest, you want it to live long periods, and so I think it's clear that the solar and wind options are being taken

seriously, but to be taken seriously, you've got to get the economics right and a lot of the experimentation that's taking place in the – in places like Europe and the U.S., not without applications elsewhere, you have of course, Jose can talk to the remarkable S&O (sp?) story in Brazil. I'm not aware of other examples comparable to the Brazilian story but others may want to comment on that.

JOSE GOLDENBERG: Yes Ged, I thought that...

BRUCE ALBERTS: It's Jose talking?

JOSE GOLDENBERG: Yes. I'm told that China is doing enormous progress in producing and using solar energy for water heating, and wind. So, maybe Professor Lou could comment on that?

LOU YAN LONG: Yeah right. Solar energy is going to be widely used, especially in the rural areas. Wind energy is also now putting (inaudible) applications in, for example, in western China, also in the remote areas. Solar energy not only for heating but also for bathing whatever. In many small cities, they also use solar energy for their cooking, heating and also for bathing or washing cars or whatever. And, especially, not mass solar power but mostly (inaudible) solar energies that's more available or more cost effective for households.

BRUCE ALBERTS: All right. Well, thank you.

SERGIO REZENDE: This is Sergio Rezende. I would like to make a comment on this.

BRUCE ALBERTS: Sure, please.

SERGIO REZENDE: I think this is one area where the United Nations could play an important role, because many of the developing countries, this is the case with Brazil and of course, many countries in Africa, they are very, very rich in solar energy and they are not using it as much for many reasons. The people in the rural areas, they don't know how to use it. The people in cities do not have enough incentives for using solar energy to heat water for instance. People use it exclusively to heat water. So, the recommendation from the UN to the (inaudible) and to other international banks and especially for governments, on what should be done to make special solar energy more widely used, I think this would be an important contribution in this area.

BRUCE ALBERTS: Thank you. That's very useful. Can we have the next question please?

OPERATOR: The next question comes from Andrew Revkin.

BRUCE ALBERTS: Hello?

OPERATOR: (unintelligible).

ANDREW REVKIN: Can you hear me?

BRUCE ALBERTS: Yes, now we can.

ANDREW REVKIN: All right. This report, you're kind of describing it as the first effort to do this, but there's been quite a few efforts I've seen recently by pretty high profiled panels. You know, from the IPCC to the National Academy and through other means to make this message. But, without some message from nature that's comprehensible, do you really see this as catching fire? We have these invisible high mortality rates from burning indoor fuels and everything else, things that we can cover in slow motion, what do you think it's going to take to actually get world leaders and companies to pick up your report and act on it?

BRUCE ALBERTS: Let me – this is Bruce. Let me just say one word about the unique feature of this report. Is that it's – the InterAcademy Council is a creature of the 150 academies and the immediate, you know, actors in this are the academies in every nation that now will organize the (inaudible) that carries this message and work with their own governments to, you know, work on this issue very intensively, and you know, there's a terrific organization called the InterAcademy Panel, which brings these organizations, the different academies together to help them be more effective with their own government.

So, one of the unique features of a report from the InterAcademy Council is that it has an immediate update with these prestigious groups in every nation, which of course have to work with their own societies and interpret, as we go forward, go under general guidelines, but interpret it in their own context. So, that's in my view, is a new force growing into this equation. That doesn't completely answer your question of course, but I think that's an important aspect of this report we're talking about today. Steve or Jose, do you want to deal with this also?

JOSE GOLDENBERG: Well, Steve, maybe – this is Jose. Steve, maybe you should mention that a very large company like (inaudible) Petroleum has been responding to this

challenge and kind of put a lot of money in solving these problems. I think that's an indication that our recommendations, you know, of looking at new scientific solutions are presently on the boards of these companies. Maybe you should...

STEVEN CHU: Yeah, I would say – but, I think the original question was a signs of nature, as in the natural world. Was that your original, when you said the signs of nature...

ANDREW REVKIN: Yeah. You know what I'm doing, is setting up the notion that we as a species respond to clear signals. That in a sense of real time, emergencies like World War II...

STEVEN CHU: Right.

ANDREW REVKIN: Better than we do to long-term multigenerational risks that unfold over time and space in ways that we can't -- so, you know, you can have report after report, but do you think that there needs to something beyond the report?

STEVEN CHU: Well, I think we are getting signs from nature. If you look back 5 to 10 years ago, 15 years ago, the speed at which the Northern Polar Cap is melting, it was not anticipated, it was melting that fast and it's a very positive feedback, the fact that as the ice goes in the Northern Pole, the ocean absorbs more energy and accelerates. So, Greenland is melting far faster than we thought, the Northern Poles are melting far faster than we thought. It was always predicted that the alpiners, some alpine forests in the mountains that provide a lot of the water shape capability, where it snows and rains in mountains without trees, you get floods and runoffs. But, with trees, it really helps retain the moisture in the

soil. It was always predicted that water shade areas, that tree lines would increase in altitude and go northward, but we now see all over the world that it's retreating much faster than we thought.

In certain areas like British Columbia, the parasites like the Pine Beetle are really ravaging the forest, and it's predicted, I think by 2012, 2013 that would be 78% gone in British Columbia. And, the current reports, at least somewhere out there, it's saying it's about half way there.

So, if you look at the 1990 IPCC report and its sea rise level and you look at what's happened today, we're at the highest end of the air bars of sea level rise. But, it's further accelerating. So, in the last three, four, five years, Holanews (sp?) has been very alarming. What we've learned is that the climate of the earth is much more extensive than we thought.

So, if those are the signs of nature that you meant, I think that's happening now.

ANDREW REVKIN: Thank you.

BRUCE ALBERTS: Okay, thank you. Any other questions?

OPERATOR: No sir. There is no more questions at this time.

BRUCE ALBERTS: Okay. Well, we're almost exactly on time, a little over. Let me thank everybody for joining this call, both the panelists and the reporters, and let me remind you again that on the InterAcademy Council website is going to be a recording of this conference. That'll be up shortly and then of course, the full report is available both as PDF and HTML. So, thank you very much.

MALE SPEAKER: Thank you.

BRUCE ALBERTS: Okay.

MALE SPEAKER: See you. Bye bye.

MALE SPEAKER: Thank you.

MALE SPEAKER: Bye.

MALE SPEAKER: Anne, are you still there?

ANNE RABKIN: Sure.

MALE SPEAKER: No.

ANNE RABKIN: You can call me on my cell phone (510) 316-7144.

MALE SPEAKER: Bye everybody.

ANNE RABKIN: Bye. Is anyone still on the phone with a question for me? Hello? Hello?

OPERATOR: Miss Rabkin.

ANNE RABKIN: Yes.

OPERATOR: Yes ma'am. We have – everybody has already dropped off.

ANNE RABKIN: Okay great, thanks. And so, you're sending the recording. Can I make sure it gets sent to my e-mail address as well as, I think it's probably going to Zach Warnow.

OPERATOR: One second, let me get the paperwork, okay?

ANNE RABKIN: Thank you.

OPERATOR: Miss Rabkin?

ANNE RABKIN: Yes.

OPERATOR: Okay. Yeah, I have Zach as the one it's suppose to be going to. It may come to you as well.

ANNE RABKIN: He put it down to get it sent to me as well.

OPERATOR: No, it's going to him. You want it to you as well?

ANNE RABKIN: Yeah, can you send it to both of us?

OPERATOR: Yes ma'am. What's your e-mail address?

ANNE RABKIN: anne@resource-media.org. That'll go to Zach and to Anne.

OPERATOR: Okay. And, do you want the (unintelligible), the participant list and sort of closing (inaudible) sent to you too?

ANNE RABKIN: The participant list yes and the recording, and we'll get that probably within a half an hour correct?

OPERATOR: Yes ma'am.

ANNE RABKIN: Okay, yeah. Thank you very much for your help.

OPERATOR: You're welcome.

ANNE RABKIN: Bye.

OPERATOR: Bye bye.

ANNE RABKIN: Oh, sorry.