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Keynote Presentation:

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P R O C E E D I N G S

MR. PASCUAL: (In progress) ... issues that are not just far away or distant from us but are much more relevant to the problems that we have internationally today. And on the positive side that has really engendered an interest in trying to find solutions, and both of the presidential candidates have put themselves on the record as supporting some form of cap and trade system, for example, that would put a price on carbon, and by putting a price on carbon, then, would ideally have an impact on conservation of energy, on the development of new technology, greater incentives for the diffusion of existing technologies, and yet now we have another hit on the system which is the international financial crisis and the impact that that's going to have on our economy.

And whoever that next president is -- and we were just talking about this briefly -- they're going to come in and the big debate in the United States next year is: How do we handle this recession? What kind of stimulus do we need for our economy? And what are the groups that are being hurt, and what is necessary to provide them with transitional support?

And then, if we were putting on our ultimate, you know, policy wonk hats, and we're saying let's look at what's necessary to do about climate change, we've got to put a price on carbon, what impact does that

have with sectors of the economy does it affect? And might it restrain growth, or can it be characterized as that? And let's ask how many politicians are willing to stand up and say we're willing to consider talk-about measures now that could be characterized as restraining growth.

Boy, this is going to be like the absolute hardest year to do it, and at the same time we have in December of 2009 the conference of the parties in Copenhagen under the UN framework Convention and Climate Change where the expectations have become: this has been the place where you have to have a deal to get to a post-Kyoto world.

And so all of these things are coming together at the same time: recognition of the impact that climate change is having; that it's not just a future issue, that's it affecting us today; that we have to do something about it; that it's a time-sensitive issue. And yet there are economic and political factors that make the schedule so incredibly complicated.

And with that we have Ross Garnaut, who's going to explain all of this and help us understand how we're going to get to Copenhagen and how we're going to manage all of this -- I'm putting a lot on you here in your talk -- but he's someone who brings a tremendous background in helping us to be able to do this.

Ross is a distinguished professor at the Australian National University as well as a Professorial Fellow and a Vice Chancellor's Fellow at the University of Melbourne. He's been on the board and a chairman of

a huge number of organizations around the world, including The International Food Policy Research Institute, and a Director of the Lowy Institute and, in fact, it is a pleasure to in a sense be a cosponsor with both of those institutions/organizations in having this event.

It's also not irrelevant to think about the food policy issues in a discussion like this, as we've seen on questions of biofuels and what happens if you actually make mistakes in policies which could actually have an impact as well.

Ross was also an ambassador in China, which again is also of great relevance because there's no way to solve this problem without China playing, and indeed China and the United States together account for 50 percent of global emissions. And so if the two of us can't find a way to be part of an international system, then there's an international system that doesn't function.

So with all of those things in front of us, I am extremely pleased, and I'm very thankful to all of you who are here, to be able to welcome Ross Garnaut and give you the podium to walk us through The Garnaut Report, some of the principal findings, and give us some provocative thoughts about how we get to Copenhagen and beyond.

(Applause)

PROFESSOR GARNAUT: Thanks, Carlos. I picked up a cold in Beijing last weekend, so I'll be sipping water to try to keep the throat going

during the meeting, but I hope it doesn't make me hard to follow.

I'm not -- despite Carlos' introduction, I'm not an expert or specialist in climate change. I spent 15 months deeply immersed in it since I was asked in the middle of last year by all of the state premiers of Australia and the then leader of the opposition, who's now prime minister, to do a report on Australia's interest in a climate change issue. So I've been doing a lot of learning on this subject over the past 15 months. And the terms of reference said that I have to hand in a report on September the 30th this year, which I did. It went up on the Web, www.garnautreview.org.au, on the 30th, and The Cambridge University Press have brought it out as a book.

Just a couple of weeks later, we had a launch in London on Monday and Melbourne on May 16th, Jakarta the 17th, and Beijing a week ago, so a pdf. version available on the Web or through Cambridge.

The terms of reference were pretty broad ranging, and the Report is broad ranging. And it worked on the premise that this is a global problem. The policy problem in one country is how – it's an international problem, a whole lot of domestic dimensions of it. But in the end the issue is how does one country contribute to a global solution? And except for China and the United States, you can probably say that what any other country does does not have a material effect on climate outcomes.

At the moment, as Carlos mentioned, China and the United

States account for almost half of emissions, about half each. Under the projections that I developed for the Review, in 2030 they'll still account, under business as usual without mitigation, they'll still account for about or nearly half of global emissions. And China will be three-quarters of that half, so looking forward, that the China story is much bigger story than the United States which, historically, you know, the United States has been the big contributor to emissions.

The report I did was built around the question: What global mitigation effort with Australia playing its proportionate part would meet Australian interest best? And that is, simply stated, that it turns out to be an immensely complex question and EXTEND, with whom I've had quite a lot of contact as I've worked on this report and who was present at the Beijing launch last week, addressed the question of what level of global mitigation makes sense for the world as a whole given the global costs and the global benefits of mitigation of climate change.

That turns out to be a much simpler question than the question: How much mitigation makes sense for one country? Because when you're looking at the question for one country, you have to look at the question for the world as a whole, but then you have to address the question: What is that one country's proportionate part in that global effort? And you have to address the immensely difficult question of what could be a global agreement on allocation of responsibility for mitigation.

And I've tried to do all of that, and I had the support of a very good secretary, a very able, clever committed young people, and the Australian government and research agencies who work on these issues. I used the IPCC work as a starting point, and then sought to update that for relevant science and, in particular the Australian science relevant to a translation of the global science, the work coming out of the global science models set for impacts on Australia.

We commissioned a lot of detailed studies from the Kemal Scientific and Industrial Research organization in Australia, and state and federal government public agencies and universities on impacts of potential climate change, generally structuring it by looking at three cases: what would happen under business as usual, no mitigation; what would happen if the world were successful in putting in place constraints that held global concentrations of greenhouse gases to 550 parts per million of carbon dioxide equivalent; and what would happen if the world were successful in putting in place constraints that held -- that eventually got concentrations down to 450 parts per million.

That has to be an overshooting scenario because we're already over 450. The G-8 objective on holding temperature increases to a 50 percent chance of no more than two degrees really requires the 450 part per million concentration. We're already past that. We have to have a strategy of overshooting if running a missions below the natural

sequestration rate for awhile to get down to that.

I had to address in the report the skepticism about the science, and I made a point of talking to a small number of reputed skeptics who have real credentials in the climate science. I did that in the early stages, and the report is quite explicitly based on the fact that on a balance of probabilities, the mainstream science is reflected in the IPCC reports and in the established views of the Academies of Science in all the major countries of scientific achievement is right.

There are a small number of reputed people who hold different views, but I conclude in the early part of the report that it will be imprudent beyond the normal limits of human irrationality to seize upon the views of a very small number of reputed scientific skeptics against the overwhelming weight of mainstream scientific opinion. So I form that judgment on a balance of probabilities in the nature of things. When that's the basis of your judgment, it may turn out that perceptions change, but that's unlikely one would stand with Dr. Pangloss from Voltaire if one chose to be guided by the views of the small number of reputed skeptics.

But within the mainstream science, one has to come to grips a wide range of uncertainty about outcomes. The different climate models all pointing towards high risks of dangerous climate change are very different in details, in details of impacts, and each of the models comes up with a probability distribution of outcomes. And in the work that I did, I

based the analysis around middle-of-the-road median outcomes. I would have liked to have worked with the mean that the scientific community doesn't think of probability distributions in quite the same way as economists following Keynes and Frank in 1921 looked at probability distributions, and ended up having to work with the main -- with the median.

So the detailed modeling is based on those middle-of-the-road outcomes, but recognizing that there was a wide dispersion of possible outcomes around that coming from each of the models, including outcomes that were potentially very much more severe as well as some outcomes that were more benign.

Another basic issue I had to deal with right at the beginning was the base case of business-as-usual emissions if we didn't do anything about it. And I had not been working for long on these issues until I became very wary of the basic scenarios on emissions graphs that were used by the IPCC and which were embodied in Nick Stern's important work published at the end of 2006.

The IPCC scenario is based on a range of different assumptions about global economic growth, and the energy intensity of that growth and the emissions intensity of energy use, and you run a range of scenarios up to a scenario that's generally discussed in the IPCC literature as being an extreme scenario, A1FI, rapid global growth and highly fossil fuel intensive

growth.

Well, when I dug into some of those scenarios, it seemed to me that they did not give realistic portrayal of business-as-usual growth in the big developing countries, and so with my team I reworked in detail the stories for China, India, and Indonesia in endless detail for the developing road as a whole. And the outcome of that work, I think, is a set of much more realistic business as usual projections of emissions growth which I presented in Chapter 3 of the Report.

I really think the business as usual is somewhere above the A1FI scenario. So the IPCC reports are based on a very, very let's call it rosy view of growth and emissions in the absence of mitigation action. And the consequence of that is the middle of the range of the IPCC scenarios, which is used in a lot of the public presentations and which was used by Nick Stern in his modeling, would have a level of emissions in 2050 that my calculations say the world will get to in 2030.

This has two big implications. The points of dangerous climate change are going to come much more quickly than the earlier work suggested. The costs of climate change are substantially higher and earlier, but also the costs of mitigation, the costs of doing something about it are much higher because we're seeking to turn downward a stronger trend of emissions growth, so really big implications from that working of the scenarios.

What we did, we took what we thought were the realistic business-as-usual scenarios and then worked the implications of that through the climate models to give us the costs of the outcome from unmitigated climate change for looking at the outcomes from 550 parts a million or 450 parts per million concentrations. We could use the outcome of standard analysis because that assumes that you've dealt with the problem of fast business-as-usual case.

So a very important part of the analysis, I think, was the analysis of what might fit together as a global agreement. This is an issue that's not going to be solved without global agreement. It's a much harder international problem than, for example, trade policy, because with trade policy, we all know in economics even though no one believes it, that whatever the rest of the world's doing, you're better off getting rid of your own protection. And from time to time countries worked that out, and they go ahead and unilaterally liberalize their trade. And that's how the world moves forward.

Whenever we get into negotiating trade agreements, we start to pretend that it's a concession to another country to reduce our protection, and all progress in trade liberalization ends once we start negotiating it. But from to time countries take their own interests into account and reduce their protection.

Australia got, once in the early '80s, had the highest protection in

the world with New Zealand for the developed world. By the end of the '80s it had the lowest and did that entirely unilaterally. China went from being an autocratic economy to a very open economy in 15 years because the leaders of China worked out that the Chinese would be richer if they did that. Indonesia and the Philippines went from being highly protected economies to very open economies within a relatively short time because countries -- because they worked out it was in their own interest to do it.

Unfortunately, with climate change no country is going to work out to its own interest unilaterally to take a big step in mitigation because this is a potentially a true prisoner's dilemma in which each country is better off to do less, so long as the world as a whole does something. It's different from trade policy.

In trade policy, if the rest of the world liberalized trade and you keep your protection, you're poor because of it. In the case of climate change, if you do something and the rest of the world doesn't, then you are poorer than you otherwise would be. So you can only break that prisoner's dilemma with communication and agreement, side payments so that each participant in the process thinks it's getting a fair deal, and that's a complicated process.

So I put some effort into thinking through what would be the basis of an international agreement that was seen widely as being fair and being practical. I came to the view that in the end an international

allocation of emissions rights would have to be based on equal per capita rights; that nothing else would be seen as being fair.

As Nick Stern put it, meeting in China last week, if the world as a whole has to get down to something below 20 gigatons per annum of carbon dioxide equivalent within a few decades, and if the world's going to have nine billion people later in the century, on average we're going to have to get down below two tons per capita. Who's going to sign up to an agreement with substantially higher than two tons per capita -- to allow substantially lower to allow some countries to have higher.

The only stable equilibrium in the end is going to be equal per capita entitlements, and so having discussed those issues with people in a number of countries, including the major developing that would have to be partly to an agreement, I based my proposals for international allocations effort on an idea that, as figured in the international discussions since the early '90s and has been pushed considerably by India, of contraction and convergence where you take your current per capita emissions and head towards equal per capita entitlements sometime in the future. And in my modeling I based that time in the future at 2050.

Equal per capita entitlements is not the same as equal per capita emissions because you can have international trade in entitlements, and in a world of international trade, the cost of everyone meeting there, their constraints will be very much lower because the costs of mitigation are

going to be much lower in some countries than others.

Two of Australia's neighbors, for example, Indonesia, Papua, New Guinea have very high per capita emissions on a global basis because of deforestation. They could reduce that very -- at low cost if there were incentives to do that. It's not such. It will be much more costly for Australia to reduce its emissions, and so there are potentially gains from trade with countries in which the cost of reducing emissions are greater buying permits from countries in which the cost of reducing emissions are lower.

The one qualification I made to that principle was, it was clear looking at all the data that there would have to be some additional head room for fast-growing developing countries, and so I've got in there a provision for a conditional arrangement for faster rates of growth in emissions for a period from fast-growing developing countries.

A global deal would need to have other elements, or at least it can be more likely to be successful with other elements. We're going to have to invest a lot more in research, development, and commercialization and lower emissions technologies if we are going to achieve ambitious mitigation outcomes at reasonably low cost. We don't know from the economic literature that the market will underinvest in research, development, and commercialization of new technologies because the companies doing the investment cannot capture the whole benefits from it.

There needs to be public support for that. The International Energy Agency and the IPCC, together or separately, have put out numbers together suggest that something like $100 billion per annum needs to be spent by the public sector of the world for a considerable period to get the levels of research, development, and commercialization new technologies will need, and this is another area where you will not get an optimal outcome without international agreement because if one country puts a lot of public sector effort into development of new technologies, then others gain benefit from that. So this is another area that needs to be subject to international agreements.

I have suggested a lower emissions technology commitment from all high-income countries with each of them committing to their share of the $100 billion, and with each country being afraid to decide how to spend that money so long as it meets the criteria of innovation in the lower emissions space with a public goods element. And different countries would choose to do different things.

Barack Obama at the Convention, I noticed, committed $15 billion a year on investment in lower emissions technology with rather a high emphasis on lower emissions cars in Detroit. Well, that's all right for the U.S. to do that and for Japan to do it through more efficient appliances and investment in batteries for an electric car, and for France to put its money into nuclear, and Australia into dysequestration and

biosequestration techniques, and I think there will be lots of advantages in having that flexibility across country.

So I'm not suggesting there should be an international fund; I suggest there will be a commitment raise investment in research, development, and commercialization to certain levels.

Well, a little bit on how that allocation of entitlements to emissions would affect Australia and how that works into the calculation of the costs and benefits of mitigation to one country. I was working through, conceptually, the issue of how you deal with this in one country, so although it's focused on the Australian case, I think the analysis which is mostly new will be transferrable to other countries.

We had a lot of modeling capacity, initially, starting with the Queensland State Treasure, the Australian Bureau of Agricultural Resource Economics that came into it before the Kmof government formally came on board, and the modeling group at Monash University, and then once the Kmof government joined the process after the Rudd government was formed, the Kmof Treasury joined us, and so there's a lot of modeling fire power. And we sought systematically to model the costs of mitigation to Australia of meeting our proportionate part in either 450 or 550 mitigation effort and to balance that, compare that with the benefits from climate change avoided.

How did we calculate the benefits of climate change avoided?

Well, we calculated the costs of unmitigated climate change and then the costs with the 550 or the 450 parts per million. Remember, this was based on very detailed impact studies from applied science groups around Australia, then we fed that back into the general equilibrium model.

Conceptually, it's fairly difficult and partly because there's a sense in which in some parts of the calculation you're measuring the immeasurable, and Chapter 1 tries to set out, or does set out the methodology we applied to this, and introduces the idea that there are four types of costs of climate change and therefore four types of benefit from mitigation. Type 1 costs are those costs that are incurred through normal market processes, standard economic costs, and for which we've got the detailed data that give you confidence that you can just feed that through a general equilibrium model.

Type 2 costs of the market impacts that you can't -- that are standard economic effects, but we didn't have the detailed data that would allow us to feed it through a general equilibrium model.

Type 3 effects, remember, the model is based on the median of the probability distributions. The Type 3 effects are the costs of the possibility that the impacts will be much more severe than the median impact, a cost of a kind in which humans being generally risk-averse against shocks with large impacts and are prepared to pay insurance to avoid. And so the third category was the insurance value of avoiding high-

impact outcomes.

The fourth impact, Type 4, were the noneconomic effects -- obvious ones environmental amenity. The modeling shows, when we work it back through the climate models, that with 550 parts per million mitigation there's quite a high probability of Australia losing -- the world losing the Great Barrier Reef. Now, that is a major tourist attraction, so there is some Type 1 or Type 2 cost of that climate change, but there is a value of environmental amenity that most Australians would recognize independently of the value of the tourist industry. So that's part of the Type 4 cost.

Another example of the Type 4 cost at anything above 550 parts per million in the Australian context, there is a loss of quite a high proportion, a surprisingly high proportion of natural species, flora and fauna, and most Australians, when they're asked what value they would place on that, would think it would be considerable. So that's a Type 4 cost that doesn't come out through market processes.

Another one is through health effects. We did model the effects of health at a few degrees of temperature, and it was unmitigated climate change. You're not adding a few degrees, you're adding half a dozen degrees this century once you use the high business-as-usual emissions, and then it keeps on getting higher after that. So when you're talking about two or three or four degrees, that's with very successful mitigation,

very ambitious, successful global mitigation.

But certainly, with unmitigated climate change you get a big increase in mortality in the hotter areas of Australia. Already in Heat 5 in Australia, the rate of mortality rises a lot, and we had the medical research group at the Australian National University modeling the effects of increased temperature. You get big increases in mortality in the State of Queensland in Northern Australia.

We fed the effects of that through the effects on productivity on the labor force through the economic models, and we got rather a modest impact. But a whole lot of people are dying younger than they otherwise would, so that's the second part of the Type 4 effect doesn't show up in the economic models.

The modeling is the most detailed structural modeling, I think, of any national economy that's been done out as far as 100 years, but we thought we could only push it to 100 years because the further you get into the future the more speculative the technological assumptions around the models. So we thought 100 years was pushing it to the limits.

As you get into the second half of the century, you're pushing it to the limits anyway, so the costs and benefits of climate change that went through the model are the costs and benefits this century, and the benefits of mitigation are only Type 1 and Type 2 benefits. So what we ended up having was this partial view of the costs and benefits of mitigation at 450

and 550, and against that we have to compare the other types of benefits, Types 3, Types 4, and benefits accruing after the end of the century.

The profile of the modeled costs showed that through the first half of this century, costs continue to accumulate, but sometime in around in the sixth decade of this century the benefits of mitigation become larger than the costs of mitigation, and the difference grows and grows. And so by the end of this century, you have higher GNP per capita with mitigation than without. Then, of course, the gap would continue to rise, but we didn't model it precisely beyond that. But we've gone far enough to form a clear view that participation in the global regime of mitigation at 450 parts per million was in Australia's interest, but because effective mitigation had to be in a global context, if the world was only ready for 550, well, we should do our proportion of part of -- in a 550 deal which would be less stringent.

I was criticized quite a lot by the Australian scientific community and GO community for contemplating a lesser mitigation effort in the context of the world not agreeing on something very ambitious, but I think that conceptually I had the framework right. But that's been a somewhat controversial effort.

The 550 parts per million mitigation would have required Australia to reduce emissions from a 2,000 level by 10 percent by 2020 and by 80 percent by 2050. A global effort around a 450 parts per million

objective would have required Australia to reduce emissions by 25 percent from 2,000 levels by 2020 and by 90 percent by 2050.

Now, we modeled the cost of that, and it's those costs that enter into the assessment of the costs and benefits of various degrees of mitigation. The four chapters in the Report at 20, 21, 22, 23 that look in detail at the time path of adjustment through the Australian economy. What happens in different sectors, different technologies, that's all quite explicit there. It's not pie in the sky. We can actually do it; it's costly but it's not as costly in the end, nowhere near as costly as unmitigated climate change. And so that was the balance of views that I put to the Australian community.

Well, the recommendations were for Australia to say now that it is prepared to pay its full proportion of part in an ambitious global deal, the 450 parts per million, which is the reduction of 25 percent by -- on 2,000 levels -- by 2020 and 90 percent by 2050, but to do a lesser but full in proportional part if the world can only agree on something less ambitious. The government's considering all of that now, and the government in due course will announce its views.

Just a few more words on the international context since that's of considerable interest to a lot of people here. I think I've --

MR. PASCUAL: Someone ran out to work on the mike, because we obviously lost it for a second there, sir.

PROFESSOR GARNAUT: My voice isn't as good as it usually is, so I hope you can hear me at the back.

SPEAKER: (Inaudible)

PROFESSOR GARNAUT: Nothing I can do about that.

MR. PASCUAL: Someone -- I just saw them leave the room to go -- you can pretend you're on the Oprah Show and watching the audience.

SPEAKER: What are the prospects for a verbal agreement?

PROFESSOR GARNAUT: So what are the prospects for a -- What are the prospects for a global agreement to -- what are the prospects for a global agreement to hold emissions at 550 parts per million, or 450 with overshooting? Well, one thing, as a newcomer to this area what struck me was the degree of delusion that surrounds discussion of the issue. First, there's an awful lot of Panglossian delusion from so-called climate skeptics who just aren't prepared to look at the facts as they're defined by mainstream science.

Secondly, there's an awful lot of delusion by people who want strong mitigation thinking that you can get it by wishing it and announcing a very firm commitments to very ambitious goals, but not thinking through the elements of a global deal that might add up to that, nor thinking through the policy framework within each country that will actually deliver the necessary outcomes.

So what I've tried to do in my report is get away from delusion and only talk about things that add up, and the global proposal that I put forward does add up. It's not the only global proposal that would add up, and if we're going to get anywhere, we need concrete proposals like the one that I've developed to be put on the table and questioned and challenged, and others put on the table until we get something that can be the basis of an agreement.

But I think the principles that I've embodied are, in principle, acceptable to the major players if they are taking seriously the issue of global warming. Obviously, there is a big distraction now from the international financial crisis that -- I was very interested in China and I say in the report that China, there's no prospect of arithmetic that adds up unless China accepts a binding commitment in the international agreement that follows Kyoto. And the proposal I've got for China's participation is, in principle, acceptable in China -- capable of being accepted in China -- although, of course, the negotiation imperatives will mean that that will not be conceded until the later hour.

But everywhere this virulent financial crisis is capturing the minds of policymakers. For the time being they are very interested in China that the discussion of the response to the financial crisis, and for China the impact comes through real channels, reductions in export growth and then an associated reduction in investment in the export industries, and that's

going to be very severe.

China exports last year exported 69 millions of crude steel. The price of crude steel, because of the slump in the international market, has fallen to a level that the cost of the raw materials at the contract price exceeds the value of the product. There's a big crunch going on in a number of areas of Chinese exports. The Chinese response to that is going to be a big domestic fiscal expansion, and I was quite impressed how the choice of parts of domestic fiscal expansion in China encompasses the emissions implications of different parts. So this issue is being concretely discussed in the context of response to the financial crisis.

In Jakarta a few days before that, there were more signs of the political system being focused so strongly on the financial crisis, so there wasn't much room left for longer term structural issues. But whatever the distraction right at the moment, the financial crisis won't be here by the time of the Copenhagen meeting. In the nature of things, financial crises come and go, in a short period of time often leave economic devastation in their wake. So that's the context we'll be dealing with this issue in as we lead up to Copenhagen, a recessionary environment rather than continuing financial crisis.

The real economics of the situation will suggest that this is a good time for structural change, as you are introducing policies to grow

out of recession, and certainly the discussion in China and some of the discussion in my own country are focusing on that, and that is one of the options available to the United States to make fiscal expansion disproportionately linked to investment in our emission structures and technologies, and some of the things that one of the candidates has been saying suggests that might be promising.

Finally, a word on the design of the Australian emissions training scheme. I've tried to incorporate lessons from unhappy early experience in Europe and focus very strongly on the importance of auctioning all permits. I recognize the considerable threat to open trade from different countries having different arrangements for assisting trade-exposed emissions intensive industry, and I have suggested a formula and approach there that is analytically rigorous and that I hope will be influential in Australia and elsewhere.

I'm very much aware that in the discussion in the United States and in Europe a lot of prominence is being given to trade restrictions against countries which are not imposing similar carbon constraints, and I say in the Report that's going to require a World Trade Organization agreement that we need rules that place limits and constraints on what you can actually do in those circumstances; otherwise the biggest cost of mitigation isn't going to be the cost that I was analyzing but the cost of the breakdown of the global trading system.

MR. PASCUAL: Thank you very much.

(Applause)

MR. PASCUAL: I'm going to take the liberty of putting a question up first, and then I'll turn to the audience. But I want to come back to the issue that you raise about an international allocation system that would be based on equal per capita entitlements. And in many ways it's attractive, it sounds right.

And then when it starts to sort of work through the math -- and I don't remember now off the top of my head for China or India on a per capita basis how much lower their emissions are than that of the United States or the European average -- but if we see from the IPCC reports that we're in need somewhere that is probably closer, say, to an 80 percent reduction in annual emissions by 2050, and you indicated 90 percent, potentially, under some scenarios for Australia, the implication is that the developed world will have to take a huge hit in those reductions.

For China and India, the implication would be that they would still be able to increase their emissions quite significantly. Now, if you put that on a per capita basis for China coming onto the same level, or India coming onto the same level as the United States, I guess given the populations levels that are involved, it's hard to quite imagine how the math sort of works together. And I don't want to ask you to go into mathematical computations here, but I wonder if you can just give us a

general feel of how you make these pieces actually work.

PROFESSOR GARNAUT: Well, you don't have to imagine the math. It's in Chapters 8 to 10.

Global emissions are currently about a bit more than five tons per capita carbon dioxide equivalent, and with around five, given the growth of global population, we're going to have to get down to about two tons below the capita to stabilize it -- what, stabilize it at any level, because if you continue above that, you'll keep raising concentration, so the world in the end will have to get down to something a little below two.

China's, currently, per capita is slightly above the global average. India's are well below, so there's a sense the formulation I put forward is much easier for India than China, but there's also a sense in which it's appropriate that it be much easier for China.

Early in my work, I made a mistake of putting China and India in the same breath in conversations at a very high level in India, and I got a very strong lecture on how the cases could not be more different. And I have to acknowledge that there is something in that.

There are some developing countries -- on global level there are three developed countries with every high emissions per capita. Australia is the highest. The others are the United States and Canada. Then we're all between 25 and 30 tons per capita, five or six times the world average. Then you've got other developed countries -- Europe, Japan, New

Zealand, Korea -- which on average a bit less than halfway to that, but a bit more than twice the world average, and in developing countries you've got a very high dispersion. You've got some developing countries that are energy exporters with very high per capita emissions.

There's five countries with higher per capita emissions than Australia. They've all developing countries, and they're all oil-exporting countries that flare gas and use energy profligately because it's available, in some cases in the way they do it more or less freely. They're all high-income countries -- a couple in the Middle East, Brunei, Kazakhstan where it would not be unreasonable to place them under a constraint of falling emissions so they had to either change their energy use practices or pay for permits. And Australia, Canada, the United States will face that choice. And the cost of that, the implications of that were all set out in the Report.

For Australia, they're all embodied in the cost of mitigation, and the bottom line is that they're manageable costs, roughly, would carve .01 percent per annum of GNP in the first half of the century, and then added back over the second half of the century Australia per capita ends up being probably the largest purchaser of permits in the world.

United States, from the modeling, doesn't end up paying a big purchaser of emissions because it does have a lot of cost options for lower emissions energy than Australia, and also because the United

States has huge opportunities for reforestation and carbon sequestration on low productivity lands. So there are some options available to the United States that will make things much cheaper than for Australia or for Canada.

But Australia is a pretty extreme case in costs, and the conclusion for us is manageable where it would put back by about six months' time at which our current per capita income about $40,000, U.S. dollars. By the end of the century, we're up around $140,000 under per capita. Under either scenario, it would put back the point at which we reach $80,000 per capita from the current $40,000 by about six months.

MR. PASCUAL: Okay, thank you.

Hattie, please.

MS. BABBITT: My name's Hattie Babbitt. I'm the Vice Chair of World Resources Institute, and I wanted to ask a question related to Carlos' with regard to the equal per capita entitlements conclusion that you've set out initially. And I guess I'd also like a little more explanation.

I just recently participated in a war game in which the context was the UN Secretary General had called the four big emitters together in 2015 -- China, India, the United States, and the EU -- to tell us none of us were making our 2010 commitments and so get us seized with the urgency of doing so. It was interesting for a variety of reasons.

But on the per capita issue, it was for the reason you say, which

is India's insistence that per capita is the only way to go. But in that context, the EU had a stable or decreasing population. The United States had an essentially stable but for immigration population. China has a very aggressive population problem trying to keep its population stable. And India was saying the only thing we'll agree to is per capita and, by the way, in 2020 our population will be, you know, a gazillion plus-plus-plus, and in 2050 it will be a gazillion plus-plus-plus-plus-plus.

How does that work in an international negotiation in which everything is capped but population?

PROFESSOR GARNAUT: Well, that would be a real worry if population growth, if fertility was a function of how much you pay for permit. But I don't think it is. I think a more fundamental factor is affecting fertility. So sometimes an argument is made against a per capita based on the grounds that it encourages fertility. Well, I don't think it will. I think we have kids for other reasons.

MS. BABBITT: That wasn't my suggestion.

PROFESSOR GARNAUT: But it is often raised in this context about Indian population growth and so on.

Why I came down on gradual convergence in the long term toward equal per capital is that I don't see any other basis that's got a chance. And I think in the end we're going to have to have some principles that look as if they're broadly fair, and I think the per capita

income has got a chance.

Now, there will be a per capita allocations has got a chance. There will be some countries that seem to be relatively disadvantaged by that. Amongst the developed countries, yes, Japan and the European countries with declining populations when that issue has arisen in discussions I've had with Europeans, and they contrast the Australian case where we've got quite strong population growth entirely through immigration, our fertility is a bit higher than Europe, but the big difference is immigration. In the end is acceptance that if you are taking people from the rest of the world -- in Australia's case these days mostly the developing world -- their entitlements to emission should come with them; that it's a reasonable thing that if someone comes from India to Australia that they should be able to bring to the country in which they're living their right entitlements, yes.

Please continue. It's a really important question.

MS. BABBITT: I'm not certain I've asked the question very well, and I'm not certain -- it's a political question, really.

PROFESSOR GARNAUT: Yeah.

MS. BABBITT: And, of course, all of the issues around climate are as complicated as they are because they are all not just scientific questions but economic questions and political questions.

PROFESSOR GARNAUT: Yes.

MS. BABBITT: And so perhaps we've done the best we can here.

PROFESSOR GARNAUT: Yeah. Well, just to round it out, I think there are all sorts of difficulties in negotiation on this. I think there are even more on any other principles. I've played around with a lot, and in the end we're going to have to have something that's simple, and in the end the potential losers from this particular allocation have to think there's enough in the game for it to be worthwhile for them, and potential losers under this sort of formulation -- well, Australia's is potentially a big one despite population growth because we start from such high per capita emissions -- and for us the judgment in the end has to be that our interest in a global agreement makes it worthwhile to pay that .01 percent per annum of GNP growth to get the outcome which falls out of the arithmetic from the equal per capita basis.

I don't say it's easy. In fact, my basic judgment is that it's not very likely we will get a good global outcome, and I think if we don't get a good global outcome, we face bad, probably catastrophic outcomes for humanity. There's nothing predetermined about humanity solving this problem. The most likely outcome is disaster, and the question is what path gives us the chance of minimizing the risks, maximizing the path forward, and after looking at a lot of alternatives, I couldn't see anything better than the one I've proposed.

MR. PASCUAL: Let me take two more questions together. Let's start right over here. Yes, please?

MS. ARAFALK: Hi, my name is Lee Arafalk, and I'm a reporter with The Daily Environment Report.

MR. PASCUAL: Sorry, we can't hear you.

MS. ARAFALK: Oh. Yes, is this better? I'm a reporter with The Daily Environment Report, and I was wondering in the interim if there were any regional programs in the United States that you could see as functioning as an international partner like the Regional Greenhouse Gas Initiative or the Western Climate Initiative, that could function as a partner either of Australia or other interested parties in mitigating either an interim before Copenhagen or in the event that an agreement does not come out of Copenhagen.

MR. PASCUAL: Let me take one other question, and I'll let you combine the answers together.

In this side of the room, somebody? Over here, please.

MR. : Hello. I'm from Flinders University. My question is given on this particular (inaudible) Australia, given that it has relatively low population in terms of the countryside, a high dispersion of population, that its economy relies heavily on its exports of raw materials, do you think that Australia can be a real leader on the international scene in terms of reducing emissions because of these sort of economic disadvantages

which it's at?

PROFESSOR GARNAUT: It depends on what you mean by "leader." We've got no chance of being a leader in movement towards low emissions. Japan, 27 countries in Europe, New Zealand, and California are away ahead of us. We'll be doing very well to be where Europe, Japan, and New Zealand are on per capita emissions in 10 years. We'll be doing very well to be in 10 years' time where they are now. In fact, we won't do that well under any scenarios, so we can't be a leader in that sense.

I think we can be a leader in helping to develop the ideas in playing a role in the development of the international agreements. I think we can be a leader in showing that we're prepared to live by sets of principles that, if everyone adopted them, would add up to a solution. That's why it's important we start moving over the next couple of years on our own emissions training scheme, as I expect we will do.

But even in that we're not a leader. There's 27 countries in Europe that have already got active emissions training schemes. So I think we can contribute to the sum total of global leadership in idea and approaches, probably in technological development as well in the areas which are strong by a sequestration, GS-sequestration, GF-thermal energies. But we would have to start from somewhere else if we were going to be a leader in having low emissions.

MR. PASCUAL: And the regional arrangements?

PROFESSOR GARNAUT: Sorry, yeah. Why I think they are important developments in the United States, and early in my work I spent time in the Northeast talking to people who worked on that and also in Sacramento talking to people who worked on the West Coast scheme.

I think that if -- I think that historically they all will turn out to be preparatory along the way to the development of a national scheme. California and five West Coast West Region states matter. If they were a separate country, they'd be not insignificant country, so they matter, though what we really need is the United States to accept an emissions constraints. So what's being done in California, or in New York and Boston and up the coast on the Northeast will be helping America get its act together. But what we need is America getting its act together.

MR. PASCUAL: I'm going to take one last question. There's one person all the way at the back who was waiting patiently. Yes, there. Yes?

MR. KURELEK: Hi. Jonathan Kurelek from the Embassy of Australia, although I speak on behalf of no one else.

A quick question, I guess more politics than policy. I would take it that, Professor, you would agree that Copenhagen, the outcome would be a global agreement that would be the ideal scenario. But that's a long way to get from where we are today to there.

PROFESSOR GARNAUT: Um-hmm.

MR. KURELEK: What do we do in the interim? What are some of the unilateral steps that you're perhaps proposing to governments around the world -- America, Australia, others perhaps? And just in general, how do we get a global agreement, given all the issues that you have raised?

PROFESSOR GARNAUT: Yeah. Well, I think it's really important not to delude ourselves into thinking there can be a global solution in bits and pieces because of the prisoner's dilemma nature of the problem. We're going to have to all agree on this one, and that's not very easy. And that's why the human species might have an unhappier future than it's had in recent past.

But what can we do in the interim? Well, Copenhagen is not very far away. The most important thing is to prepare well for Copenhagen, and I think the most important thing to be done in preparing well for Copenhagen is for heads of government who are interested in a strong outcome to set working an expert group that can come up with alternatives sets of -- alternative draft agreements that add up to a solution, because on an issue as complex as this if you leave it to negotiations, then I will get to Copenhagen, and there will just not be time to work through all of the complexities. The arrangements really have to be tied down in some data well in advance to get a good outcome.

Now, one only has to say that and also to recognize that there's going to be no global outcome without a strong United States participation to recognize the problems of the timetable. So I'm afraid I think there's not very much chance of a good outcome at the end of next year unless a new U.S. president very early nominates someone to play a role from the U.S. perspective in contributing to a draft global set of numbers.

The awful reality is that we don't have very much time. The recession that we're going to have in a lot of the developed world and part of the developing world will give us a little bit more time, but only a year or two in terms of emissions growth and concentrations. And if you take seriously the mainstream science, then you really do have to have most of the big developing countries accepting constraints on emissions well before 2020, well in advance of the timetable that was contemplated at Bali.

So the realities are dreadful. The costs of not reaching an agreement are very high, but the problems of getting one are also very high. When I think through this, I'm not particularly optimistic about a good outcome. And because I've been persuaded after 15 months of immersion of the mainstream science has got something going for it, I think the conclusions of that are pretty awful.

But there is one saving grace, and that saving grace is that there is quite a lot of community support for taking action in a lot of countries.

And I think this issue is different from all of the big structural economic reform questions I've worked on in my lifetime. Just take removal of Australian protection which I had a big hand in, in the 1980s.

The opinion polls were 80 percent strongly against any reduction in protection before the whole government began its liberalization program. The whole government turned Australia from, with New Zealand, the world's most protectionist developed country to the most open over 10 years. At the end of the time, 80 percent of Australians still were strongly supportive of high protection and the rest weakly in support of trade liberalization.

Ten years later, Australia was enjoying exceptional prosperity because of the success of the trade liberalization, and 80 percent of Australians still supported high protection. And you got exactly the same polling on any of the big structural economic issues of my professional lifetime -- privatization of state and enterprises; tax reform efficiency; raising tax reform -- but on this issue involving much more difficult structural change in some ways than those other issues the community says that it wants to take actions, is prepared to pay for it, is prepared to pay for it even if other countries don't.

Now, Australia is a bit of a special case because we've been feeling the early effects of climate change more strongly than other developed countries. But in other countries there are analogs of this. So

there is a base for political leaders who want to do things to build on. I think that that will happen in Australia, it's happened in Europe. In Europe it's been used to resist the tendency to pull back through the financial crisis.

It might be existing in other places, but that's the one thing that you can point to, to make you think there might be a chance.

MR. PASCUAL: Michael, final word?

DR. FULLILOVE: Thank you, Carlos.

Michael Fullilove. I'm a Visiting Fellow here at Brookings and Program Director for Global Issues at the Lowy Institute in Australia. When we set the Lowy Institute up a few years ago, one of the things that Frank Lowy said was he wanted to bring more international exposure, Australian ideas, and Australian debates, and he complained that often when he traveled in the United States or Europe, he'd open the newspapers and the only references he'd find to Australia were references to shark attacks and tennis players.

And that very much is the spirit of this event and other Australian-themed events we've had here at Brookings recently with the Australian prime minister and the defense minister and others.

I want to thank Ross first of all for speaking to us and for launching your important review here. Ross is a public servant in Australia in the broadest sense of the term, a public intellectual with

enormously clear thinking and analytical rigor, and a public policymaker on many different issues.

Ross, you gave us a bracing report, but one that was blessed with your clear thinking, and you also gave us, I think, one possible key to get out of the prisoner's dilemma you described, and you finished -- I was pleased -- on the optimistic note that the saving grace of public opinion. So thank you very much for speaking.

Thank you, Carlos, and Brookings for generously hosting this event; to IFIC, our co-host today; finally to Chevron, who came aboard as partners for this event, and we're looking forward to working with Chevron on other Australian-themed events.

Finally, thank you, ladies and gentlemen, for coming to this event, and we hope to see you at future events. Bye-bye.

(Applause)

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