

Speech Topic: Garnaut Climate Change
Review Update

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Compere:

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ROSS GARNAUT;

The GREENHOUSE conference has established for itself a major place in a regular calendar of events on climate change, and I commend and thank all of those who have succeeded in making it such an important gathering. This time GREENHOUSE 2011 comes at a critical time in Australian discussion of climate change issues. We've had a national dialogue off and on for a couple of decades I suppose; over the last dozen years it's become more intense on a couple of occasions and receded. Well we're back at a decision-making time and probably the critical decision-making time. So it's especially important that we have a discussion that is grounded in agreement about premises, agreement about information that can be agreed and about the logic that we're using to draw conclusions from premises and information.

If we have that sort of a discussion we'll get somewhere. We'll end up with public policy that is designed in the national interest. But on an issue as complicated as this, as we all know it's not easy to have such a discussion. And the first set of propositions we've got to be clear on, including clear on the uncertainty, is about the propositions from the science. As I have emphasised in all my work it's crucial that we ground our discussion in the mainstream science. I am as aware as anyone, possibly more aware than anyone, of the range of views within the scientific community, but there's no doubt about the overwhelming weight of scientific opinion on the basis of propositions. And it would be a reckless country and a reckless species that turned its back on the weight of authority coming from mainstream science, and we know from that that the world is warming.

We know that without much science; we know that from observation and competent statistical analysis. There's an increase in temperature in recent decades that can't be explained statistically without the postulation of a warming trend, as work for both my original Review and the updates show. There's very little doubt that there's a human footprint on the warming and there's not much doubt that if there is not a major effort in mitigation, humanity faces large risks to its established patterns of life.

I don't think it puts too fine a point on things to say it poses risks to the civilisation of our species, has [inaudible] over this last ten thousand years especially over these last few hundred years. I began my work with no particular knowledge of the science but I have attempted to understand it as best I can. Especially at the beginning open to the whole range of views from credible science. One cannot trace down every incredible view and every non-scientific view of this matter. No human life, or human brain, is large enough for that, but I tried to work through that, through the scientific credentials and tried to make sure I understood where they were coming from.

One thing that comes out of the extensive scientific input into my *2008 Review* and the current update is that, and I thank the Australian scientific community for that, especially the CSIRO, the Bureau of Meteorology, several of our major universities. One thing that comes out is that there's a roundly broad agreement on what one may call the physics of both climate change and the evidence of the unfolding physics. There's a good deal of uncertainty which mainly affects how much and how damaging - there's uncertainty about three types of issues.

One is the rate of growth of emissions; that's largely an economic issue actually and it's one to which I was able to make a contribution in the first Review. A contribution that changed international discussion of that matter by focusing on the reality of sustained, rapid economic growth in the large developing countries in the absence of mitigation effort, the high energy intensity of that growth, and again in the absence of mitigation effort the high emissions intensity of the energy use. There is uncertainty

about emissions growth under business as usual; what would happen in the absence of mitigation. It's mainly an economic question.

There's of course a question of political analysis to the extent that political dimensions are important to patterns of economic growth. The science acknowledges uncertainty about the important variable of climate sensitivity and I have absorbed the weight of scientific opinion: the main expectation of sensitivity around three degrees; the doubling of greenhouse gases will be associated with roughly a doubling of temperature. But there's quite a wide range of views around that, both up and down. You get some quite low numbers, but I think they are a bit at the fringes of science, numbers that assume that there's no positive feedback from water vapour at all. We've had some discussion of this issue yesterday and the general acceptance that there is positive feedback. That immediately takes you off a base of around one back towards the three and there are views that climate sensitivity may be higher than that. But there's uncertainty around a fairly widely accepted mean range.

Then there's uncertainty about the impacts of climate change or the impacts of temperature increases. Again we had some of that discussion yesterday, even the uncertainty about some of the ways in which higher temperature will be manifested. Higher energy in the climate system will be manifested in extreme weather events. In most of the extreme weather events, a pretty considerable weight of analysis is that they will become more common, well intense ones will become more common.

More intense even with cyclones, which featured in this morning's press. The weight of opinion about the greater frequency of high intensity events alongside the reduction of cyclonic events overall. But that's the third area of uncertainty, related to the impacts that we can level at temperature change. This is the area I grappled with most difficulty with in my Review in 2007 and 2008. I was trying to pin the people that do the modelling of regional effects of precipitation change, or of peak temperature increase on precipitation change and ended up having to put in the Review statements, which were rather disconcerting, but reflected the reality, that the likelihood was a considerable drying in Southern Australia, including the most populous and productive end of the Murray-Darling system, but there was a ten per cent chance that the Murray-Darling would be wetter. That reflects the genuine uncertainty about impacts.

When you put these three layers of uncertainty on top of each other you end up getting quite a wide range of outcomes. Around the mean though it's pretty awful and there's a chance that it won't be as bad as that and a chance that it will be considerably worse than that mean.

Once we understand uncertainty in the statistical sense, as the dispersion of a probability distribution around a mean then the presence of uncertainty increases both the strength of the case and the urgency of the case for mitigation. It's commonly taken that the presence of uncertainty becomes a reason for not acting, well that's an un-analytic way of approaching things. Humans are prepared to buy insurance against outcomes that are bad enough to significantly affect their way of life.

Humans presented with - through choices would pay more to avoid climate change which includes amongst its moments the possibility of catastrophic outcomes than they would be prepared to pay for a certainty of the mean outcome. So I think we've made a little bit of progress on this important issue in recent months. I have made it a feature of my paper in updating the Review's presentations on the science - *Paper 5*, which I brought out in Hobart a few weeks ago, but there's a fair way to go. But I think hard analysis, analysis with the sort of rigour we apply as a society to predicting the price of grain or the price of copper would lead us clearly to the view that the presence of uncertainty around a broadly, a widely accepted mean increases both the strength and the urgency of the case for strong mitigation.

Once one looks at business as usual growth in emissions, one is daunted by the task. I had one paper in the update series, *Paper 3* that focused just on this. The good news is that we are a long way from business as usual; the world's actually doing quite a lot. The bad news is that although the big developing countries have moved much further and much faster than I anticipated in the *2008 Review*, the modified business as usual still points to very large growth in emissions. And I drew attention to another

daunting dimension of the reality in *Paper 3* and that is the downside to that very happy, historical development that the spread of modern economic development in the twenty-first century beyond the developed countries where it's been established for a long time – that's why we are developed – beyond the large Asian developing countries into much of the developing world. But the downside of course is that that will be accompanied by rapid growth in emissions from countries that are not particularly important in emissions now, unless a priority for mitigation is embedded in their policies.

But once one recognises how daunting the combination of modified business as usual emissions and what the mainstream science tells us about climate sensitivities and climate impacts, it's pretty easy to throw up one's hands. And one finds an element of that in a popular discussion we've seen creeping in, including in some of the commentaries on my work on my update, the view that "well it's so bad there's not much we can do about it, all we can do is adapt". But my reading of the literature on impacts is that there's no logic or stepping point where it makes sense in terms of our value systems as humans, to say "well at this point things are so bad we should give up".

Three degrees carries a lot more risks than two degrees, four than three, five than four – if anything, there is a compounding of risks. Somewhere along the way there may be triggers to catastrophic outcomes that make the viability of our civilisation unviable.

We don't know where they may be but no matter how far things have gone it will still be worth a major mitigation effort. It's an important issue but that's the conclusion that I've come to about that and it follows that however late we are in starting, however weak our start, things will be worse if the international community is weaker and later.

Some of the international discussion has suggested that the genuine progress that was confirmed at the UN meeting in Cancun last December following the Copenhagen meeting the previous December has moved the trajectory of emissions growth down to a path where we can look forward to something like 650 parts per million stabilisation. That requires lots of assumptions about what happens after 2020, which mainstream analysis says is associated with a range of temperature increases that covers a central point around four degrees.

Well that's a pretty difficult world as the Oxford conference a couple of years ago indicated. A conference at the University of Melbourne is going to focus specifically on that issue.

That will be a major achievement for humanity. Genuine business as usual might be heading for almost twice that concentration in the atmosphere but it's obviously an inadequate achievement given the risks and given the costs of doing something about them.

Australia, as shown in the analysis in the 2008 Review, has more to gain from effective global mitigation than any other developed country. If you look at it around the other way, we've got more to lose from the failure of mitigation. There are a number of reasons for that.

Agriculture is still a bit more important in our economy than in most developed countries and obviously agriculture is especially vulnerable. One of the important reasons we're especially vulnerable that is relevant to agriculture and more generally, is that we're already a country of climate extremes, already a hot and dry climate, so variation carries risks of larger damage in those circumstances than variations in climate from a more equitable status quo.

Australia too is vulnerable because it is located in a region of developing countries, and developing countries for a number of reasons analysed in the Review are especially vulnerable to climate change.

At the same time as we would be a developed country damaged most by unmitigated climate change, we've got quite a lot to gain from a successful global

mitigation effort. There's a lot of focus in our discussion on the energy question and on the fact that per capita we are better endowed with fossil fuels per person... I was going to say than any other country, I think we probably are – I would have to do some extra sums about Norway. We're certainly one of two best endowed countries in the developed world in fossil fuels.

We're almost certainly – well, I'm confident enough to say certainly, the best endowed with the basic resources for low emissions energy as well. As a transitional fuel natural gas will be very important. It's about 40 per cent of the emissions intensity of combustion of low quality Victorian brown coal and about 50 per cent of the emissions intensity of average quality black coal. And we are emerging as by far the largest per capita source of natural gas in the developed world, probably emerging as the largest exporter of natural gas per capita in the world.

That stands us in good stead to a transition away from fossil fuels. In terms of basic raw material and solar energy, insolation, we've got exceptional resources. Exceptional resources absolutely and per capita. When I was working on the original review one of the leaders of the German effort on solar energy – Germany of course does a great deal and we do little – remarked to me that he found Australia very disturbing.

He'd been all over the country and the worst place in Australia for insolation for solar energy was the west coast of Tasmania and that looked to him to be better than the best place in Germany. We've got rich wind resources, not all over the country but rather on the south coast as well as the west coast of Tasmania and that's a lot of country, especially a lot of country per capita.

The marine energy sources are in the relatively early stage of development globally but we have extraordinary resources of wave and tidal energy when the time comes. Despite the challenges in Japan, the tragedy in Japan, nuclear energy has an important part in the world's low emissions energy future and Australia is certainly amongst developed countries by far the main source per capita of high-grade uranium oxide and probably also other radioactive materials – as the development of nuclear technologies expands the range of the resources that are economically important.

We have exceptional opportunities for producing energy from biomass and biofuels from biomass from land that is not high quality agricultural land and so which does not compete with food production. We've got exceptional opportunities in both biosequestration and geosequestration.

If geosequestration is going to work anywhere in the world one of the places it is more likely to work commercially is the Latrobe Valley with its very low cost basic energy, so you can afford to use a lot of energy in the compression and sequestration process as it's located close to high quality and well known geological sites that have been shown to be suitable for geosequestration.

Not biosequestration as emphasised in paper number four on the land sector. In this large continent without many people, with much degraded woodland, we've got large opportunities for biosequestration in soils, pastures and especially in trees and that was discussed yesterday. And my reading of the papers is that what was said yesterday is broadly consistent with the approach that I was taking in paper number four. It's not surprising because I relied heavily on CSIRO sources.

We've got another special asset in this great transition to a low carbon economy that we are required to make and that's our professional and technical skills in the resource industries, the engineering, the sciences related to energy and also in the biological and earth sciences related to biosequestration.

We can make very large contributions in these particular areas because our skills are first rate and they show up in all of the measures of scholarly outlook – quality scholarly outlook in these two fields. They're reflected in our commercial strengths. We've built a strong agricultural economy in Australia in a most unlikely environment, because from very early days we've applied science and technology to the task. And on our geological and engineering sciences it's no accident that the world's largest

mining company has its headquarters in Lonsdale Street, Melbourne and not in St James Square, London or in the streets outside the Imperial Palace in Japan. That reflects the professional strengths that have been built up around our work in engineering, the earth sciences, geology over a lot of years.

It's very important that Australia makes its proportionate contribution to a global effort. This is an area in which we can easily get tangled by the claims and counter-claims of many people. It's a very easy way out for Australians to point to some other country that in some area and in some way is not doing as much as us and so therefore we should not do anything.

Well let's keep in mind when we play those games that we've got a bigger interest than any other developed country in successful global mitigation. Let's keep in mind that we can do very well in a world of strong global mitigation. Let's keep that in our mind as we use one liners to shoot down the reasons why we shouldn't play our part in a global effort.

In paper number two, that I put out in the middle of February, I look closely at the international situation and the awful reality is that Australia at this stage is not pulling its weight, it's not doing its proportionate part. It's pretty obvious that the half billion high income people in the 32 countries of Europe are doing a good deal more than us. That's half the people of the developed world, half our peer group if you like. But look at the other half of the developed world and we're not doing all that well there either.

So I'll have more to say in my final report at the end of May. I'm due to give that to the Prime Minister on the 31st of May and I'll have a bit more to say about what our proportionate effort is; it's pretty clear that we're not doing it now. But one issue that has become important lately is once we've identified our proportionate effort how should we get there and, although half a billion people in 32 countries in Europe are pricing carbon, the fact that two major countries and the biggest emitters of greenhouse gases in the world – China and the United States – do not have an economy wide price on carbon has become for some people a reason why we should not do so.

Well economic analysis tells us pretty clearly – and a lot of empirical observation tells us pretty clearly – that for this type of problem setting an economy-wide price on the external cost will give you the lowest cost solution.

It's not much comfort that the United States is not doing things that way. The United States administration, the clever people that work on this issue, informed people who spend their lives on analysis, are of a clear mind that the low cost way for the United States to do its proportionate part in a global effort is to introduce economy-wide pricing.

There's debate about whether it should be a carbon tax or an emissions trading scheme, but no doubt that the most important difference is between either of these ways of tackling the problem and ways that depend on a whole range of interventions. There are some very thoughtful people in the current American administration including the President himself who would prefer to go that way. But the current political constellation in the United States does not allow that. The President does not have majority support in the House of Representatives, and that's a binding constraint for the time being.

They haven't let that stop them. They made a commitment in Copenhagen and Cancun to reduce emissions by seventeen per cent by 2020 from 2005 levels. The arithmetic says that's roughly sixteen per cent in 2020 from 2000 levels. Having been blocked on the low-cost ways of doing that, they'll seek to achieve that goal in other ways. In a discussion I had with Steven Chu, the Secretary for Energy, once a Nobel Prize winner in physics, he explained to me how they had gone about setting a social price on carbon, which they are applying in decisions on regulation of cars - emissions from cars, regulations of appliances, regulations of emissions, regulations of what electricity generation will be allowed. It's an expensive way of doing it, but they're committed to reaching the goal they've put on the table at Copenhagen and Cancun.

Now, some people say, well, America doesn't have a carbon price, we shouldn't have one. Well, I think they are shooting themselves in the foot by adopting an expensive rather than a low-cost way of achieving their objectives. I don't think it's much of an argument for us to say, we'll shoot ourselves in the foot for as long as you keep shooting yourself. In China - there's a lot of discussion recently in China. Last Monday I had lunch with Xie Zhenhua, the deputy chairman of the National Development Reform Commission. He's the official who has authority on policy in the energy and climate change areas. He went through with me a range of recent developments that go beyond even what I reported in paper number two in February.

I'll be further updating that story in my final report, but the bottom line is China has moved emissions growth a long way from business as usual and that makes quite a big difference to the risks humanity faces. Even they have quite a long way to go. We've got even further to go. In the paper I brought out a couple of weeks ago on innovation, I made the point that we won't get as far as we want to get in mitigation simply from a carbon price - or at least we won't get there as cheaply as we could. We also need fiscal support for innovation; fiscal support for research, development and commercialisation of new technologies.

The reason for this, it's an economic reason. It's reasonably well-understood, universally-accepted in economics and fairly well accepted elsewhere that there are external benefits from successful innovation. The innovator carries a lot of costs in learning, that others will benefit from in a market if an individual or enterprise can't capture all the benefits of its investment itself. You won't get enough of that type of investment, so there needs to be fiscal support for research, development and commercialisation of new technology. I say a fair bit in the innovation paper about efficient ways of giving that support. It costs money. It can be funded from the carbon pricing mechanism. So long as we've got our eye on using that money to benefit the future rather than to smooth the pillows of dying economic activities.

The electricity issues that I discussed last week are very important. The amount of electricity we use per head and especially the high coal intensity, the high emissions intensity we need to generate electricity is the biggest single reason why Australia is the highest per capita emitter amongst developed countries, so we must deal with it. It is politically a particularly difficult issue at the moment because since 2005, since 2006, we've had extraordinary rates of increase in electricity prices.

It's got nothing to do with carbon. Much higher than earlier in our history, much higher than in any other developed country, much, much higher... I say some things about that, raise some questions, point to the need for review of that because that's making the carbon pricing issue more difficult, and if it's unnecessary then it's lead we need not carry in our saddles. There is naturally a resistance in the emissions-intensive energy sector to change. It's very easy to raise a scare about energy security. I've discussed that at length and explained why the relatively sound mechanisms of our electricity market can handle this issue and handle carbon pricing without a risk of energy insecurity. I suggest a couple of additional measures, cost-effective measures, that can remove residual risks.

In particular, I suggest that in response to all those arguments that emissions-intensive generators will have their loans pulled by the banks as soon as a carbon price is introduced, well, it doesn't always work like that. Banks will make their judgement on the basis of expected cash flows and not on accounting data about impairment. But if this is a problem, then a financial problem, a financial market problem relies on a financial market solution, or at least a financial market solution would be the most cost-effective, hence my proportion for limited loan guarantees through the transition period.

In conclusion, the science says we've got an issue here. The economics says it's worth doing something about the issue and that it won't be unmanageably expensive if we do it well. We can't solve the problem on our own in Australia, but we make a global solution much harder if we're not playing our proportionate part. If we're committed to playing our proportionate part, and we'd be stupid not to, we should do it in the lowest-cost way, and the lowest cost way has as its centrepiece putting a price on carbon. Thank you.

COMPERE; There will be time for some questions. Are there any questions for Professor Garnaut? We've got one up the back.

QUESTION; Good morning, my name's Brian [inaudible], a councillor in the City of Joondalup in Western Australia. I see myself here as an elected member within a sea of experts. When I look on these experts, they seem like the mother of a sick child, a sick baby. You all among yourselves agree that the baby is sick, but out in the real world where cures exist, there are people who don't believe you, there are people who are sceptical, there are people who even laugh at you. But in the real world, a real mum with a sick baby at some point is going to get desperate and is going to get mad and is going to scream looking for help. So when, Professor, will you and the Australian scientific community reach that point of desperation and start shouting and screaming to get something done?

ROSS GARNAUT; I'm not very good at shouting and screaming. I just read James Hansen's autobiographical piece, *Storms of my Grandchildren*, and he decided after first wading into public discussion as he gave the evidence to Congress, the US Congress, in 1988 that caused the US administration to want to put this issue onto the United Nations agenda and the IPCC but he copped such a bruising from that that he sat out of the discussion for 10 years and thought he should leave it to people who actually enjoy that sort of stuff. This is a really difficult public policy issue.

It's very understandable that lots of people don't want to face up to the realities. It's a daunting reality if you read the science as it's written and think about its implications for our way of life. It can be frightening. So I understand the preference of some people to wish the problem away. What can we do about it? Well, if too many of our fellow citizens were like that, there would be no chance of a solution. We would be one of the species that is unable to cope with the changing environment. But I don't think the evidence tells us we're in that place yet. In fact, I think we're a long way from that place.

Because despite the avalanche of misinformation through the popular media, there's still a majority of Australians who think climate change is real and humans are contributing to it. Despite the avalanche of misinformation, the majority of Australians, once they're told that the money doesn't just disappear from a carbon price and they're asked "do you support a carbon price if the money's given back to the people who are affected by it" – I've suggested in my paper on carbon pricing, paper number six, that the bulk of it should be given back in a productivity-increasing reform of tax and social security.

Once some context is given to this, the majority of Australians want to support effective action on mitigation. That's a pretty remarkable story, I think, about community support for action in this area, so a government that were steadfast in its ambition to be part of the global solution and not part of the global problem as we have been up to now, would have a basic community support to do that.

QUESTION; Thank you, Professor Garnaut. My name's John [inaudible] from the Torres Strait Regional Authority. I was just interested in your view as an economist on the area of subsidies. As I understand it, in Australia, taxpayers subsidise the fossil fuel sector to the tune of approximately nine to eleven billion dollars a year. Is that an area where there are opportunities for reform and to shift some of those subsidies to the cleaner energy sources?

ROSS GARNAUT; You have to be a bit careful about those numbers. I think economists don't put them as high as some of the other sources of analysis put them. Some of the things that are included as subsidies to the fossil fuel industry don't necessarily increase the consumption of fossil fuels in Australia. I think what you're really referring to is subsidies that will increase use of fossil fuels. But we do have some pretty awful fiscal arrangements that do encourage the use of fossil fuels.

I drew attention to one of those in the carbon pricing paper, number six, the way we tax fringe benefits in the form of access to a car where if you haven't driven – it happens quite a lot in Canberra; I'm sure it wouldn't happen in Cairns – but if you haven't driven enough miles as the end of the financial year approaches, you've got to make sure you drive to Brisbane to properly qualify for a higher rate of fringe

benefits tax. Getting rid of that in a gentle way could save a billion dollars. Do it more rigorously and you'd save a couple of billion. In my final report I'm going to have a 15 year budget on the interaction of my recommendations on revenues from carbon pricing and I'll have some more details on that then.

COMPERE; We have time for one more question. In the centre here.

QUESTION; Good morning, Andrew [inaudible], Australian Antarctic Division.

Professor Garnaut, you touched on the Japanese disaster. I'm just wondering if you could say something about what you see as the near and long term ramifications of nuclear issues and events on international efforts in carbon mitigation?

ROSS GARNAUT; Well, I discussed this at some length last week with Xie Zhenhua and all countries with nuclear programs are having a very close look at Japan. This is at once a serious safety issue and a highly sensitive safety issue. Even in countries with authoritarian governments there's high sensitivity to public opinion about such matters.

So, the immediate effect of - especially of Fukushima - is to cause all of the nuclear states that use nuclear energy to pause and to assess. We won't be able to say a lot more about the implications until Japan and the international agencies have done more work on what actually happened.

I'm not an authority on these things and I will myself await with interest the outcome of that work. I do note that there's been quite a lot of comment about the contribution of using older technologies and older plant and not having up to the mark safety systems well established. I don't know what's true in all of that and what's not.

I'll wait and see. But one thing that's clear is that the task of effective global mitigation is very much harder if nuclear doesn't play a big role in the energy future especially of the rapidly growing developing countries with very rapid growth in energy use, first of all China.

COMPERE; Thank you. I want to now thank Professor Garnaut [inaudible]

[Applause]

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