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Compere:	Mike Stephens	**Speakers:**	Ross Garnaut
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Transcript:

COMPERE: I'm Mike Stephens. I'm a member of the MFS Board and I'm your chairman for the day.

I'd like us to agree at the beginning, if we can, on some ground rules. The first ground rule that I'd like is that when we get to question time, it's a time to ask questions, not to make statements. Can I have agreement on that, please? Put up your hands, okay? So if you want to make statements, you can go outside. If you want to ask questions that the speakers can answer, you stay in here and ask them.

The second thing I'd suggest that would be really helpful today is that we accept that there is a body of scientists called the International - the IPCC and that we're not actually here to argue about that science. What we're here to do is to talk about the various policies that are going to be - that have been talked about, not about science. And we're also here to talk about what we think might be some changes in climate in this neck of the woods that you might have to adapt to. Could I have agreement that that's what we're here to talk about?

AUDIENCE: Yes.

COMPERE: Thank you. Alright, so if people try and talk about something else we'll probably give them short shrift.

Today wouldn't be possible if it wasn't for the sponsorship of people who support the Monaro Farming Systems and if it wasn't for the generosity of Ross Garnaut and his office and Mick Keogh at Australian Farm Institute. But as well as those organisations, there's the Monaro Farming Systems' premium sponsor National Australia Bank, there's Jemalong Wool, Lambpro, Commonwealth Bank, Virbac and Farm Ready and, of course, as I've said Mick Keogh and Ross Garnaut. They're all supporting us today.

Ross Garnaut needs no introduction. What people normally do when they say that is to then go ahead with a long introduction. The simple introduction that I'll give is that Ross was asked to give a report for the State and Federal Governments on what was happening in this whole climate change area. That was about three years ago. Since then, he's been asked to update and provide further reports to the Federal Government and his final report was handed over to the Federal Government 31 May this year.

So in order to hear about climate change and carbon pricing, the impacts and the opportunities for the rural sector, please make welcome Professor Ross Garnaut.

[Applause]

ROSS GARNAUT: Thank you, Mike, and thank you for all your interest and coming along this morning on a crisp Monaro morning. My wife and I have been farming for over twenty years just the other side of Canberra on the southwest slopes where the mornings are not quite so chilly.

ROSS GARNAUT: We had friends up here and we used to get up here every now and again for a yarn about what was happening in farming. I remember a dinner at Ben Higgins' place at Nimmitabel with quite a number of his neighbours about twenty years ago and we were arguing about how important China might be for the wool industry, and Ben's neighbours still owe me a bottle of Black Label for a wager about whether China would be the main source of growth in demand for wool in the couple of decades ahead.

Anyway, it's always been a pleasure to interact with people on the Monaro, a tough country in lots of ways, you've got to do it right to have a win.

Anyway, it's good to be back on the Monaro where people have made a go of farming through doing it right and applying research to farming over lots of years.

We have to begin discussing this question by recognising that human induced climate change is part of the environment that we'll have to manage; we wouldn't be doing any of the things that we're talking about doing on carbon pricing and reduction of emissions if there were not an issue of climate change.

It's an issue that's more important, potentially more damaging for Australia than for any other developed country and is potentially more disruptive for Australian rural communities than for other parts of the Australian community. And not to do anything about it is not an option for serious people who are thinking about the future generations of people farming in Australia.

If you only think about what's happening in the rest of my lifetime then you might be able to put it aside. If you care at all about your children and grandchildren, future generations, then this is a big issue. You will want Australia to be part of the world effort to reduce the damage from climate change.

But even with perfect policy here and overseas from now on, we're going to be dealing with significant climate change. The average increase in temperature that's already occurred in the last half dozen decades is getting towards a degree. It's increased every decade since the 'forties - average temperatures - and all of the real science says that's going to continue and to intensify.

The momentum that's already in the system will take us up to more than double what's already occurred, even if we got right on top of things from now on. So, climate change is going to be an important part of the Australian and global farm economy even if we're very effective with mitigation. And when you're talking about the costs and benefits of doing something about climate change, you really do have to look at the reality of what the science says will be happening if we don't take rather strong action.

The science is telling us that the momentum that's already in the system for climate change is going to require very big adjustments on the farm, even without taking into account what we put in the atmosphere from now on. That's going to require changes in farming patterns, in optimal planting and harvesting times, animal types that will do well in each region.

There'll be a reduction in water runoff even if there's no general effect on rainfall. Rainfall effects will be highly variable, different in different regions and the reduced runoff will affect water availability from rivers and streams for irrigation.

We're going to have to be dealing with more extreme or more intense extreme weather events and that's especially a challenge for Australia.

Land use planning will need to identify the range of future climate change risks and to consider how best to take these into account. Increasingly, farmers will need to understand and actively manage these risks to ensure the success of their activities in a changing climate.

These effects are going to be especially severe in Australia. I was for a number of years the Chairman of the International Food Policy Research Institute based in Washington DC, which is the main global research body on rural activities, farming, food issues with very active research programs all over the developing world and the work of the International Food Policy Research Institute, IFPRI, identified climate change as a major factor affecting global food availability and food prices.

Now the news from that is not all bad for farmers. The effects of climate change will be one of the reasons to expect higher food prices and higher agricultural prices in the twenty-first century than what we've come to expect in the second half of the twentieth century. The question will be, what parts of the world will retain a capacity to make use of those better markets, those higher prices for rural products?

The change that's occurred in the trajectory of farm prices so far in the twenty-first century is historic. Through the second half of the last century we all got used to declining real prices for food, declining farmers' terms of trade. They were tough times so we needed very strong productivity growth on the farm just to catch up. And in periods of a high real exchange rate, there was huge pressure, additional pressure on the farm communities and we went backwards very quickly in the farm communities at such times.

Well, through the first decade of this century, the farmers' terms of trade have ceased to deteriorate and I think are holding up despite the biggest resources boom we've ever had and the highest real exchange rate that we've had since federation.

The factors driving that are several. One of them is the sustained strong growth in the big developing countries which is underpinning very rapid growth in demand for food and agricultural produce - back to my debates with friends in this region about Chinese wool demand growth from twenty years ago.

So that's underpinning the reversal of the fortunes of farm prices, but already we're starting to see the effects of disruption of supply in different places as a result of different patterns of extreme climatic events and that's part of the story of the big increase in food prices over the past year.

We saw the exemplification of the way in which that can work in the Russian drought and wildfires last year, which very severely damaged crop production. Russia responded by making things worse for the international community by restricting wheat export for a while which put additional upward pressure on markets. We're likely to see more of these sorts of developments in the future.

It's going to be part of the background that creates better price opportunities for Australian farming than we had through the second half of last century and the question is, are we going to be in a position to make use of it?

And in my final report, which is on the web and also available through Cambridge University Press, the one I gave to the Prime Minister at

the end of May, I include discussion from the International Food Policy Research Institute on the prospects for farm prices that take account of climate change.

The work of the International Food Policy Research Institute, which, again, when I was chairman and which is continuing, identifies Australia as one of the parts of the world that will be most severely affected in agricultural production by unmitigated climate change. So, our farm communities have got a very strong interest in the world getting its act together.

If we can hold global temperature to something like two degrees temperature increase, then that gives us a chance to be around, to be a part, to take advantage of the better market opportunities that are going to be there this century, very much better than we had to adjust to last century.

So, we've got a very strong interest in the world being effective in reducing greenhouse gas emissions, reducing the costs of future climate change. It's not realistic to think of the rest of the world carrying us, we've got to do our fair share. And if we're going to do our fair share in reducing emissions, we need to do it in the lowest cost way. There are lots of ways you can reduce emissions. There's lots of ways you can do anything in economic policy, but there are very expensive ways and cheap ways and economy-wide carbon pricing is clearly the cheap way.

The alternative, regulation or direct action, is much more expensive. We've seen that from a lot of experience in a lot of countries. Markets beat regulation, markets beat government intervention consistently. We've seen that through the response of the Australian economy to the market oriented reforms of the last couple of decades. We've seen it in the relative performance of centrally planned against market economies. We've seen it when big developing countries as well as Australia have opened up their economies to market experience.

And the basic reason is, if you put price incentives in place then millions of Australian businesses and households respond to those price incentives, that they find lots of ways of reducing their emissions in adjusting. Whereas, with regulation or direct action the things you do are the things that the minister and his advisers thought of, and they might be brighter than the rest of us, but they won't think of all of the ways of adjusting to a price incentive that millions of Australians going about their daily business will think of.

The other difference between carbon pricing and direct action or regulatory intervention to reduce emissions is that with carbon pricing the government ends up collecting quite a lot of revenue.

I've recommended that with a carbon price in the midpoint of the mid-twenty dollars - which would yield about eleven billion dollars per annum early in the years of the scheme, rising a bit over time - I've recommended that over half of that go back to households with tax cuts being the central mechanism, but supported by - for people who have missed out on tax cuts, social security adjustments.

I've recommended that we work up to around two-and-a-half billion dollars a year being spent on innovation in low emissions technologies. That would include innovation in the farm sector. I've recommended that there be substantial assistance for trade exposed industries and I've recommended that a substantial part of the carbon revenue be allocated to purchasing offsets from carbon sequestration in the farm sector.

I've suggested some limits on the farm sector sequestration, but those limits would allow, if fully utilised, the development of a carbon farming sector as valuable as the Australian wool industry was last year. It's not as valuable as it is this year because of the lift in wool prices in the last couple of months.

Farmers are naturally anxious about the costs that they will bear as a consequence of Australia doing our fair share in strong and effective global mitigation. I've recommended that farming not be covered for reasons I've set out in the report, not be a liable sector at this stage. And I've recommended the exclusion of - well, the balancing of the inclusion of fuel with reduction of excise at the time of introduction of the scheme, which has a substantial effect on initial costs.

With these adjustments, the average effect on consumer prices will be less than one per cent, if my recommendations are followed. And that will be fully compensated in tax cuts and in other household income payments for Australian households on low and middle incomes.

The rural community, like all Australians, will be intensely interested in the details of the allocation of increased costs and tax cuts associated with the introduction of carbon pricing. I will be interested myself in the final detail that comes out of the current policy deliberations.

I would just like to say a little bit more about the opportunities for carbon farming. This is all to do with the capture of carbon in soils, pastures, woodlands and forests, including plantations. There is currently before the Parliament a Carbon Farming Initiative, or legislation on a Carbon Farming Initiative which goes a step forward in measuring and crediting increased absorption of carbon on the farm.

I think that that will lack horsepower unless it's linked to a carbon pricing scheme. And I've recommended that that link take place and that even for those carbon credits, for example accretion of carbon in soils and in woodlands in growing trees, that even in those areas that are not currently covered by the international rules that the Australian pricing system should allow for full credit to that at the carbon price of twenty or thirty - or whatever it turns out to be - dollars per tonne. That will put horsepower behind farmers' work on sequestering carbon.

In some parts of Australia there's been quite a big effort in these areas anyway for productivity reasons. In my recommendations, I recommended dropping the requirement of what the first draft of legislation called financial additionality - a requirement you had to prove that you wouldn't have done what you were doing without the price incentive. I thought that was a bit of a metaphysical idea. And fortunately that has been dropped now that recommendation of mine has been taken into play.

So even if you were choosing to adopt low tillage or other approaches to farming that build up carbon in soils for financial reasons, you would still get the additional benefit from the carbon credit. We don't know how large the response to that will be. It obviously will vary a lot farm to farm, region to region. It will vary over time, but it is potentially as substantial as the work of the CSIRO and others shows.

So the story of the world of the twenty-first century, with Australia playing its part in an effective global mitigation effort and providing incentives for land-related sequestration at the general carbon price, should be a good world for Australian farming.

I know that it's possible to make negative points by focusing on parts of the problem, by ignoring the fact that we have a very strong interest, our farm community has a very strong interest in dealing with the problem of climate change because we've got a very risky future.

We'll be handing a very risky future to future generations of Australian farmers if the world doesn't deal with this problem.

Any assessment of the costs and benefits of an approach to reducing emissions that doesn't deal with those risks, that doesn't acknowledge the value for Australian farmers of being part of an effective international effort to reduce the dangers of climate change, I think is not being realistic.

You have to be careful too about partial equilibrium approaches to assessing the costs of a particular set of measures. We've got used to - Australia pioneered general equilibrium modelling and the Farmers' Federation in the eighties was very important in the Australian discussion, talking about how reform of protection for the manufacturing sector was crucial to the prosperity of Australian farmers.

And all of that good work, that good general equilibrium analysis showing that handouts to the manufacturing sector led to a higher real exchange rate and therefore to lower farm prices, lower export prices. It was influential in the discussions of the eighties that I was part of and it was very important in making the case for removal of protection that has done so much good for Australian farming. Be careful about any partial equilibrium assessment of the cost of these measures.

The coal industry is saying it will be hurt more than other tradeable sectors by what is being proposed by the Government and what was proposed by me. If that's true, that would lead through the general equilibrium mechanisms to a lower real exchange rate, higher farm prices.

One of the things you have to look for is how your sector is affected relative to other tradable goods sectors. That will be the most powerful influence on the exchange rate, on the general equilibrium effect. So make sure you ask those questions if you are presented with any evidence of the cost of the scheme that's based on partial equilibrium analysis.

But be careful too that any modelling that you see the results of is the modelling of what's actually being presented. For example, my proposal of the adjustment of excise on fuel at the same time as carbon pricing is applied to fuel, because unless you are modelling what is actually being proposed, you will distort the results.

Be careful that if you are being presented with data on the cost of a scheme that you are looking realistically at the alternative. Be very careful about analysis that looks at costs of a scheme that says the alternative is to do nothing. No-one says the alternative is to do nothing. We are not doing nothing now. We're not reducing emissions very much, but we're doing a lot of things that add to costs. The Productivity Commission report demonstrated that.

And the Opposition and the Government have the same unconditional target for reducing emissions. It's actually a pretty tough target, reducing emissions by five per cent from 2000 levels by 2020. I've already mentioned that under business as usual, we are heading towards a plus twenty-four per cent.

To get down to minus five will require a lot of action. If you don't do it through market mechanisms like economy-wide pricing, you've got to do it through regulatory mechanisms. They might hide the cost, but the cost will be greater so make sure that you compare those costs with the cost of carbon pricing.

Make sure that value is attributed to the opportunities in the farm sector for biosequestration. And make sure that account is taken when you're being told about the cost of a particular scheme, the fact that other countries are doing quite a lot and we are getting the benefit from that.

For example, the main competitor for Australia in many temperate products, including the products of the cattle industry and the sheep industry is New Zealand. And New Zealand now has an emissions trading scheme. It's actually due to include the farm sector from 2015 - that's subject to review. But on the cost side they are already paying a lot of those costs. So make sure you take account of the fact that other countries are not doing nothing.

So they're just a few cautions about looking at the results of partial studies of the costs of doing something about the problem.

On my website, on the Garnaut Review website, there is a longer paper on the land sector which is just summarised in the final report. And there you can get more details on my proposals for linking the Carbon Farming Initiative to the Carbon Pricing Scheme.

But it is that link that will make sure that farmers are not short changed for sequestration of carbon on the farm. Unless you have that link, if you are relying on voluntary mechanisms or other mechanisms, then you're not going to get full value for carbon credits. And it's particularly important that we have that full incentive in place.

There is one danger that I discuss in the paper on the website and in the final report of putting in place these fairly powerful incentives for accretion of carbon in the land. There is a risk of a reduction in biodiversity because sometimes, in some circumstances, it will be more profitable to grow a single species - to plant a single species rather than to restore a biodiverse woodland.

And I've said that it is very important that we maintain, through separate mechanisms, incentives for biodiversity. And through that mechanism we can get the balance right.

So in conclusion, the land sector is greatly affected by climate change and has a large part to play in its mitigation. This is true for the world as a whole. It is more powerfully true in Australia than in any other developed country.

The world has entered a challenging period of rising food prices in the twenty-first century after a long period of decline. This presents problems for global food security. These challenges can be met so long as the higher food prices are not compounded by the effects of weakly mitigated or unmitigated climate change.

In themselves, higher food prices represent opportunities for the Australian rural sector. And I've spoken mainly about food - that's, of course, the larger part of global agricultural production, Australian agricultural production, but many of the same factors operate on wool, hides and other farm products.

The Australian rural sector is set to do well in these new circumstances if the world is effective in mitigating climate change. The measures of reduced emissions in the rural sector will add considerably to rural incomes once they are rewarded within carbon pricing arrangements.

Some of the changes will confer substantial benefits for farm productivity and for adaptation of farm management to more intense drought and other extreme weather conditions that are associated with

climate change. So some of the things you would need to be doing anyway for adaptation to climate change may be given an additional boost by opportunities, by linking carbon farming to the Carbon Pricing Scheme.

In the absence of effective global mitigation in which Australia will have to do its fair share, the twenty-first century will be deeply problematic for global and even for Australian food security and for the income security of rural Australia.

The international rules developed within the Kyoto process overlook many potentially important areas of land sector mitigation. The emissions are especially important for Australia. That's because we dropped the ball for a while. We weren't a full part of the international discussion for a while.

Normally we are very influential in shaping the international rules. We opted out for a while and the Europeans set the rules and they're not rules that suit us very well. We've got to claw back what we lost then. But what I'm suggesting is that even before we change the international rules in ways that are better suited for countries like us, we should be given the full credits for accretion of carbon on the farm.

We've got a major role to play in developing alternative and economically and environmentally more efficient rules governing incentives for mitigation in the land sector. And if we demonstrate the suitability of these different rules in Australia, this will help the argument for having them adopted internationally.

The land sector has very considerable opportunities for biosequestration. We don't know how much of that potential will be realised - that will result from the decisions of a thousand of Australian farmers.

But realising a small proportion of the potential through providing incentives commensurate with the sector's mitigation contribution could transform the Australian mitigation effort and gradually expand the economic prospects of rural Australia.

So in time, as the world shifts towards a price on carbon in farming, the proposals that are made can be merged with the broader carbon price and the sector can play its full part in the Australian mitigation effort. I'm very happy to answer questions, thanks.

[Applause]

COMPERE: Thanks Ross. Now Nancy's got a microphone. There will be two - well I've got the microphone and Nancy's going to have. So if people wait till you get the nod from me to ask a question. I'll ask the first two questions, Ross, while other people are getting organised.

So the first question is, can you tell us the website again so people understand? And the second question, while you're all thinking about your questions is, I guess I don't trust governments to spend tax wisely. And after the last couple of years, I'm not sure that I trust the market to act wisely.

So as we're talking about either leaving it to the market or leaving it to the Government, can you give us the reasons for your recommendations?

ROSS GARNAUT: The website is www.garnautreview - all lowercase - .org.au. That's got the final report and it's got the ten papers, the update papers that are background papers to that. And there's many, many pages of working documents and other inputs into the work.

And on the question of, can you trust governments to get it right either way, trust governments to use the tax money wisely and can you trust the markets to set prices, well, they are the mechanisms we've got. We've got a severe problem here that we've got to deal with and governments one way or another are going to be addressing this.

The Opposition has stated its promise to make the same efforts the Government has to reduce emissions by five per cent in 2020 from 2000 levels. And without policy, we'll be heading for plus twenty-four per cent. Actually much higher than that, because there's been several new gas projects announced since the Department of Climate Change did those estimates.

And it's a question of what government policy you're going to use. It's not whether we can do nothing; whether doing nothing is better than doing something. We are going to be doing something. We're going to be doing quite a lot - or trying to do it. The question is, what mechanisms are most likely to be successful?

And I think we've got a lot of experience around the world and in this country that market-based mechanisms are just much more effective than regulatory mechanisms at achieving good economic outcomes.

And I think in Australia this is especially important. We had an awful history for the first eight decades of our federation of highly interventionist government policies, higher protection, everything regulated up to the gills including lots of things in the farm sector.

Always defended by the business interests that were being regulated because they thought they could capture and control the regulation process. But the outcome was awful. We had the worst productivity performance of the developed world in the first decades of our federation. We cleaned that up with the reforms of the eighties and nineties and in the nineties we had the best productivity performance of the developed world. The difference was as stark as that.

We've been drifting back a bit since the beginning of the twenty-first century for the last half-dozen years. Well, the last seven years - I first gave a speech on this in 2004. I've been talking about the great Australian complacency of the early twenty-first century where we're drifting back into the old regulatory ways of doing things.

If we introduce a vast new array of regulations rather than a market based approach to reduce emissions, then we would just encourage what unfortunately is already a bit of a tendency to go back to old Australian regulatory ways. We've shown in Australia that market based mechanisms are much more reliable.

COMPERE: Thanks Ross. Howard Charles and then Kerry Pfeiffer is next Nancy.

CHARLES: Thank you Mike. Ross, welcome back to Monaro, and the last time you and I met you were in the back of my utility as we took Ben Higgins' coffin around to where we buried him, your old friend and mentor.

ROSS GARNAUT: Yeah.

CHARLES: I have some doubts about climate change but - and certainly from a Monaro perspective, those of us that have been out in the early mornings lately, I think we'd actually welcome a little bit of global warming because it's been minus five, as you said. But that's been minus five in terms of temperature, not in terms of percentages.

And I do wonder - and that's not the real question - but I do wonder how long if we don't heat up because we're actually - the global

temperature has not really heated up in the last decade - how long if we don't heat up before the scientists start to think, hey, maybe we've got it wrong?

But my question to you is, as you've acknowledged, the world authorities don't want to accept sequestering carbon in terms of grasslands and we'll hear more today about how well we can do that here on Monaro, an after all, growing trees on a treeless plain is not much of an idea. How are you going to get the world to accept the fact that we can sequester a huge amount of carbon in our grasslands? Because I'm quite sure that if there is a problem, that farming's got to be part of the solution to it not part of the problem.

ROSS GARNAUT: Yeah. I recall poignantly that day out at Ben and Jean's place at Nimmitabel and lots of other occasions up here with Ben.

Well just on the last point first, I think there is very considerable opportunities for carbon sequestration in soils, pastures, woodlands, as well as plantations. Per person, per capita, those opportunities are bigger in Australia than elsewhere. They'll vary from region to region and farmers in each region will have to work out what works best.

The evidence is actually there of continued warming. I've got a chart in the final report and in the update paper on the science that shows average temperatures in Australia - and they're not contested, they're from the standard sources - decade by decade. This last decade is significantly warmer than the nineties, the nineties significantly than the eighties, the eighties significantly warmer than the seventies. The seventies - it goes back to the forties. That's when the consistent rises started. The chart is there.

If you don't believe temperature measurements, and there's no reason not to believe them, then you have to explain what's happening to glacial areas, the shrinkage all over the earth.

So the one uncontested fact from people who actually look at the data is that the warming trend is there. Of course, there's variations year to year, as has always been and will always be. But look at the decadal averages and there's no doubt about that.

On the important question of how can we get the rest of the world to accept soil and pasture carbon content, I'd add to that woodlands conservation through woodlands and restoration of carbon in woodlands.

I think that the existing rules were excessively influenced by Europe because two important countries, two countries in which farming is important - Australia and the United States - sat outside the international discussion for too long. We're back inside and it's not only us. The Americans are arguing many of the same cases.

And also these issues are very important in the big developing countries, including our neighbour Indonesia, including Brazil. And these countries are now much more important parts of the international discussion. So it's not just the Europeans having it all their own way now. There's a substantial countervailing force.

And I've recommended that full incentives be provided for these things to Australian farmers right now, paid for out of the carbon pricing scheme. That we shouldn't wait until they're accepted in the international rules. And if we can show that - the questions that are always asked about it - and you can actually measure the results consistently, if we can provide answers to all of those then it will help tip the balance in our favour.

I think things are moving towards us on those questions in the international discussions and we shouldn't wait for that. We should provide the incentives now. But the decisive change is not letting the Europeans have it all their own way and bringing Australia, the United States, Indonesia, Brazil and other countries with a strong interest in these things right into the centre of the international discussions.

COMPERE: Thanks Ross. Now look, we've got a lot of questions so can I ask for the questions to be snappier and maybe - thanks Ross - the answers too?

[Laughter]

COMPERE: And the other thing is, if you can say your name and where you're from. The next question's Kerry Pfeiffer.

KERRY PFEIFFER: I'm Kerry Pfeiffer, Southern Rivers Catchment Management Authority. Ross, you talk about human induced climate change and I think that the whole debate really misses some of the fundamentals. One of them is our capitalist system that relies on growth to prosper. And the other one is the population of the world which grows and grows and grows. And we talk about increased food prices into the future. Who's going to feed those people? Are they going to survive? How are we going to treat them? How are we going to look after them?

ROSS GARNAUT: The chairman asked me to be brief and you ask a question like that.

[Laughter]

ROSS GARNAUT: I think we've got to solve the climate change problem, the emissions problem, not by ending economic growth but by breaking the connection between growth and environmental impact between growth and emissions.

Now we can do that, we can do things in a low emissions way. And capturing carbon on the farm is one of the important ways, but there are technologies available that can substantially reduce the effects and we've got to put in place the incentives that will break that nexus between growth and emissions.

I don't think it's realistic to say we've got to give up on economic growth. I just don't think any of the political systems are ready to do that. But fortunately there is a way of breaking the nexus between growth and emissions.

On global population, it's a very important variable. If we had a billion people on earth we wouldn't be very worried about this problem. We're heading to seven billion soon. And there's only a couple of countries on earth that, as a matter of policy, have had a very significant effect on population.

China has had a one child policy. There are three-hundred-million less Chinese today than there would have been without the one child policy. It's tough, it's nasty. None of us would be comfortable living under it, but there are three-hundred-million less people in the world because of it.

India tried to get on top of population through policy. Indira Gandhi introduced some rather tough measures. There was a violent reaction against it. She suspended democracy and introduced martial law and still couldn't win. So policy only works in some places.

The good news is that there is - it's not a deliberate policy measure, but there is one mechanism that does reliably reduce population

growth - fertility and population growth - and that is economic development.

And in every country that's had sustained rises in living standards, improvement of education and health and the rising self-confidence of ordinary people, and especially of women that comes with better education and economic development, you'll find women choosing to have less children over time.

In India, when I first started working on the Indian economy in about 1970, the average woman during her childbearing life would have just over six kids. Well the number has fallen every decade as incomes have risen, education improved. Now it's about two-point-three, just over two per woman, almost down to zero population growth levels. It's still going down.

The countries that haven't brought their fertility down, that still have very high population growth, are the countries where economic development has been less successful - in Africa, the Middle East, Pakistan and some others.

So the message there is we've just got to spread the economic development and the education, together with information that helps empower women on these things, about mechanisms of population control.

Due to rising incomes there are reasonable prospects of world population peaking later this century. The current demographic trajectory has it peaking at about nine billion in about 2060; quite a challenge dealing with those extra couple of billion, but peaking and then going down. The only variable that will allow earlier peaking and stronger progress that has been shown to be applicable all over the world, not only in China, is rising living standards.

COMPERE: Thanks Ross. Over - yeah.

MALE: Henry Sellars, Mr Chairman. Professor Garnaut, would I be right when I say that the fossil fuel users, like the cars and the trucks et cetera, would be at this precise moment in time in Australia the bigger polluters than all coal fired power stations and power stations in Australia? And I'm aware that the Government is nibbling at the edge of this problem by upping the emissions controls on cars.

ROSS GARNAUT: The numbers are all there in my initial report, 2008 report. But from memory the total of emissions from electricity generation is about twice that from transport. The big growth one in Australia is emissions from production of - not from burning of coal and gas, but actually production of coal and gas. A lot of carbon and methane comes out with the mining of natural gas and coal and it's a very rapidly growing area.

In the end, one of the possible solutions to emissions in transport is going to be the electrification of transport, including development of better batteries. And so in the end, removal of emissions from electricity generation is going to play a part in reduction of emissions in transport.

COMPERE: Over here and really quick questions and really quick answers because we're over time already.

MALCOLM: Malcolm Rose, professional engineer. I've been up here nearly thirty years. You talked all the way through your talk about the need for government pursuing low emission technologies. At the end you said the need for global mitigation of carbon emissions. Where do you

stand, Professor Garnaut, on the contribution of nuclear energy to reducing emissions?

ROSS GARNAUT: I think that the emission reduction task will be much easier for the world as a whole if there's a major role for nuclear. And the good news there is that in the countries where energy use is growing most rapidly, like China and India, nuclear is a major focus of their work. Australia's got an important role in that as a supplier of high grade uranium oxide.

In China I had a lot of discussions with the people responsible for the Chinese energy program. And it's in China that they've been pleasantly surprised by the way the costs of nuclear energy have been coming down as they've moved towards large mass production.

There was a time when every nuclear plant was put in once-off and so you would in France or America bring together - Japan would bring together an engineering team. They'd build one plant, then disperse. But the Chinese are building so many of them that they're really putting production of major components on an assembly line and the same team of engineers puts in one plant then another, costs are coming down rapidly.

I was told in January that they hoped that within five years that nuclear would be fully competitive with imported Australian coal in coastal China, which would make a mess of values in the Australian coal industry. It would be very bad news for some parts of the Australian economy but very good news for long-term health of the Australian economy and for global mitigation.

All of that, of course, has been subject to review with the tragedy in Japan and I know that - well, China decided to keep going with all of the plants that were already approved, but to review all the new ones and the review will focus on the safety questions, the lessons from Fukushima. I don't know what the outcome of that would be but I would be surprised if the answer is a pulling back on nuclear. It's much more likely to be putting in place new safety standards, insisting on higher levels of technology.

The story…

COMPERE: Could we say you're in favour; is that fair?

[Laughter]

ROSS GARNAUT: I am in favour globally - there's one more point I - yes, I'm definitely in favour globally. But in Australia, on economic grounds it will not make sense here for quite a long time. We are an exporter of gas to Northeast Asia and uranium oxide to Northeast Asia. The costs of transport of gas are huge, so that if natural gas energy and nuclear energy are competitive in Japan and China, then gas will be much cheaper in Australia.

COMPERE: Thanks Ross. Over there?

JENNY BALDING: Jenny Goldie from Michelago.

JENNY BALDING: Professor Garnaut, I understand that the - if a carbon price is set at seventy dollars then wind energy will be competitive with coal. You, I understand, recommended a carbon price of about half that, of thirty-six dollars. Why - can you explain what your rationale was for recommending that level, if that's correct, and also what do you think the carbon price is going to be, that the Government will set?

ROSS GARNAUT: I don't know what the Government will set. I recommended it started between twenty and thirty with a fixed price for the first three years and market price linked to international prices after the first three years. A price at that level will begin a process of adjustment. The cost of the alternatives varies a lot with location and other factors. The price I recommended will begin the process of transition to a low carbon economy.

Over time, the carbon price will need to rise internationally. Ours will need to rise in line with the increase in international prices to do the job. How far the carbon price has to rise will depend on developments in technology. I don't think you can work it out by saying a certain technology has to work and therefore you set the carbon price for that. The modelling I've done suggests that the prices are - I suggested a starting price - will begin the process and the dynamics of the market will determine which other technologies would succeed later on.

COMPERE: Thanks Ross.

ED SCORE: Yeah, thanks Mr Chairman, Ed Storer's my name from Yass. Excuse me, you partly answered it with the nuclear issue. We constantly get told with the carbon price, we'll allow the markets to sort these things out. But through regulation, nuclear and hydro, in effect, aren't allowed to be considered which would be substantive ways of generating electricity, which is a significant portion of our emissions. Why should we have the market forced upon us? I mean, if we're not allowing the market to source the cheapest form of electricity generation or to look at nuclear or hydro?

ROSS GARNAUT: I've already talked about nuclear. For hydro to really reach potential for Australia is to tap the huge hydro resources in the island of New Guinea - where you've got huge falls of huge rivers and with modern, long, high voltage, direct current transmission - connecting that into the grid in North Queensland and supplying Eastern Australia is highly efficient. That's starting to be looked at by an Australian company. That could be very important like all the - I would like to see the merits of that tested in the marketplace and not through arbitrary intervention. I hope that will be the case.

COMPERE: Thanks Ross. There are - I'm sorry there isn't any time for any more questions, so can you please put your hands together and thank Ross Garnaut?

[Applause]

- ENDS -

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