

**Senate Standing Committee on Finance and Public Administration**  
**ANSWER TO QUESTION ON NOTICE**  
**Prime Minister and Cabinet Portfolio**  
**Department of Climate Change**  
**Supplementary Budget Estimates Hearing—October 2008**



**Written question reference:** CC10

**Outcome/Output:** Response to climate change

**Topic:** Global Average Temperature

**Hansard Page:** F&PA 124

**Question: (Senator Abetz )**

It has been suggested by a number of people that there has been no increase in global average temperature since 1998. Does the department agree with that or not? What the answer to that is. On the best science available to the department, is that right or is that wrong ?

**Answer:**

Please refer to **Attachment A** and the Department's responses to questions taken on notice from the Joint Standing Committee on Treaties hearing on Monday 1 September 2008.

CCIO Attachment A



**Joint Standing Committee on Treaties**

Review into the

Kyoto Protocol to the United Nations Framework Convention on Climate Change

Hearing: Monday 1 September, 10am to midday

**Responses to Questions on Notice**

Provided by the Department of Climate Change

**Question 1: What is DCC’s response to a report by Professor Birrell (Centre for Population and Urban Research, Monash University) that population projections mean Australia’s ability to meet proposed climate change targets is difficult/impossible?**

**Asked by:** The Hon Kevin Andrews MP

**Transcript page:** TR22-23

The Government takes the issue of population size and growth seriously.

Attempting to make a direct link between Australia’s population and our level of greenhouse gas emissions is difficult and over-simplifies the issue of per capita emissions. Australia’s per capita emissions reflect the nature of our economy and the significance of our coal exports and other emissions intensive industries. It is misleading to assume or imply that additional population numbers will increase Australia’s total emissions proportionately.

Addressing climate change requires fundamental economic reform. Getting this reform right takes careful, methodical work. The work being done by Professor Garnaut and the Treasury in terms of modelling, as well as extensive consultations at every stage, will enable the Government to make equitable and responsible decisions in the interests of all Australians.

The Government has committed to meeting its Kyoto target, and to reducing Australia’s greenhouse gas emissions by 60 per cent by 2050. The central measure for achieving this is the Carbon Pollution Reduction Scheme.

Population growth means, by implication, that per capita emissions must fall over time to meet a national emissions cap. In addition, the Government is already implementing a range of measures to assist households to become more energy efficient and reduce per capita emissions.

**Question 2: Is drought a direct effect of climate change?**

**Asked by:** Senator Julian McGauran

**Transcript page:** TR24

Climate change is likely to have exacerbated recent drought in Australia.

In 2007 CSIRO and the Bureau of Meteorology found that in Australia direct relationships between drought and global warming can be inferred through the extreme nature of high temperatures and heatwaves accompanying recent droughts, ie droughts are becoming hotter with increasing potential evaporation and therefore more severe for the same rainfall deficiency.

**Question 3: Changes in temperature across the Australian continent – when have been Australia’s hottest years in Australian history?**

**Asked by: Senator Julian McGauran**

**Transcript page: TR25**

In Australia, eight out of the ten hottest years on record (since 1910) have occurred in the last 20 years. Australia’s hottest year on record is 2005. The other nine hottest years, in descending order, are 1998, 1980, 1988, 1991, 2007 (last two equal), 2002, 2003 (last two equal), 1996 and 1973.

**Question 3: Does DCC take the view that greater investment in public transport including rail would allow Australia to more easily meet its obligations under the Kyoto Protocol?**

**Asked by:** Belinda Neal MP

**Transcript page:** TR26

The most recent projections show that Australia is on track to meet its obligations under the Kyoto Protocol.

Transport emissions account for around 14 per cent of Australia's emissions. Road transport contributes almost 90 per cent of transport emissions. In its Green Paper, the Government has expressed a preference for inclusion of transport in the Carbon Pollution Reduction Scheme from commencement.

It is expected that the carbon price signal through fuel prices would be minor in the first few years compared to recent petrol price rises. However, as reported in the Green Paper, fuel users are more responsive to prices in the longer term. Hence, inclusion of transport in the Scheme will drive long term reductions in emissions.

The Government considers that all forms of transport have a role to play in moving people and freight, especially within our major cities. It is essential that an efficient road and rail network, supported by a robust public transport system, co-exist in a way that support each other to make our cities more sustainable and liveable.

Investment in public transport is a matter for the States and Territories. Nonetheless, the Government is committed to achieving greater use of all forms of public transport, thereby contributing to reductions in congestion in our major cities. The Government will work with the states and territories to develop and deliver solutions to public transport issues. These issues must also be considered in the context of each jurisdiction's circumstances, including the distances and population distributions that distinguish Australia from most other developed nations.

On 2 May 2008, the Australian Transport Council (ATC) gave in principle support to proposals that will move Australia towards a single national transport policy, through better planning and investment in infrastructure and greater uniformity in national regulatory structures. ATC also embraced the need to achieve environmental outcomes in the context of the climate change agenda.

**Question 1: Satellites that orbit the earth twice a day have not detected any increases in global temperatures since 2001. What does DCC say to that?**

**Asked by: Luke Simpkins MP**

*Provided out of session*

When analysed correctly, satellite data collected since 2001 indicates the continuation of a warming global trend. Climate scientists use an 11-year moving average to remove short term variability from the record so that long term trends can be observed. This process has led to the conclusion by the IPCC that warming of the climate system is unequivocal and that there is no global cooling trend.

**Question 2: I am informed that weather balloons have found no hot spot in the troposphere consistent with anthropogenic global warming. What does DCC say to that?**

**Asked by: Luke Simpkins MP**

*Provided out of session*

Current scientific conclusion from the IPCC would anticipate:

- warming at the surface and in the lower atmosphere (troposphere, where most greenhouse gases are found)
- larger warming at the surface in high latitudes and in the troposphere above the tropics at heights around 10 km
- cooling in the upper atmosphere (stratosphere, above the greenhouse gas ‘blanket’)

Some have argued that climate change is not happening because measurements taken from satellites and weather balloons in the early 1990s seemed to show virtually no warming in the troposphere. However, this has been found to be due to errors in the data and in its analysis. For example:

- Satellites were found to be slowing and dropping in orbit slightly, leading to inconsistencies in their measurements.
- Variations between the instruments onboard different satellites and weather balloons led to discrepancies.
- A mathematical error in one of the original analyses of satellite data meant that it showed less warming in the troposphere than was actually occurring.

Once adjustments are made to take into account these and other issues, the spatial pattern of warming observed is consistent with that expected from human-caused global warming.



**Question 3: Ice core samples at Vostok have shown since 2003 that global temperatures lead CO<sub>2</sub> rises by 800 years. What do you say to that and the theory that CO<sub>2</sub> is causing global warming right now?**

**Asked by: Luke Simpkins MP**

*Provided out of session*

It is true that the fluctuations in temperatures that caused the ice ages were initiated by changes in the earth's orbit around the sun that affected the amount of sunlight reaching the earth's surface. This, in turn, drove changes in the levels of carbon dioxide in the atmosphere. This is backed up by data from ice cores, which show that rises in temperature came first, and were then followed by rises in levels of carbon dioxide up to several hundred years later.

The reasons for this, although not fully understood, are partly because both the oceans and soils emit carbon dioxide as they warm up. These increased levels of greenhouse gases in the atmosphere then further enhanced warming, creating a 'positive feedback', which was responsible for about half of the magnitude of the climate changes.

In contrast to this natural process, we know that the recent steep increase in the level of carbon dioxide – more than 30 per cent in the last 100 years – is not the result of natural factors. This is because chemical analysis of the gas (for example its radioactivity) shows the majority of this carbon dioxide has come from the burning of fossil fuels.

The increase of 0.74°C in average global temperatures that we have seen over the last century is larger than can be accounted for by natural factors alone. There are multiple lines of evidence that carbon dioxide from human sources is responsible for most of the warming.

**Question 4: Over 30,000 persons with science degrees in the US signed a petition casting doubt on anthropogenic global warming. How can DCC dismiss their views?**

**Asked by: Luke Simpkins MP**

*Provided out of session*

The Fourth Assessment Report (AR4) by the Intergovernmental Panel on Climate Change (IPCC) provides the most comprehensive scientific, technical and socio-economic information relevant to the understanding of climate change. The AR4 states that global warming is ‘unequivocal’ and that ‘most of the observed increase in globally-averaged temperatures since the mid-20th century is very likely due to the observed increase in [human produced] greenhouse gas concentrations.’ Its conclusions are based on multiple lines of scientific evidence for climate change, including observed increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.

The AR4 is based on the work of 1250 expert authors from over 130 countries. It represents the international consensus on climate change science literature, which results from the synthesis of thousands of scientific papers that have been extensively peer-reviewed and published in credible scientific journals.

There are many factors that undermine the credibility of the US petition.

- The article accompanying the petition and forming the basis of its argument was not published in a journal publishing reputable climate science; instead it was published by the Journal of American Physicians and Surgeons.
- Although signatories on the petition are self-described as having a degree in science, it is not clear how rigorously this has been verified.
- It is not clear how many of the petitioners are practising scientists or how long ago they received their degrees.

Only 495 of the 31,072 petitioners - that is 1.6 per cent - describe themselves as having degrees in the fields of atmospheric science, climatology or meteorology, those most relevant to climate science.

**Question 5: Given the imprecision associated with the whole question of weather, how confident is DCC in the advice it is being provided in regard to climate change and its impact on Australia?**

**Asked by: John Forrest MP**

*Provided out of session*

There is clear evidence that our climate is changing and that greenhouse gases are having an adverse impact on the earth's climate system. The Fourth Assessment Report, produced by the Intergovernmental Panel on Climate Change (IPCC) in 2007, states that global warming is 'unequivocal' and that 'most of the observed increase in globally-averaged temperatures since the mid-20th century is very likely due to the observed increase in [human produced] greenhouse gas concentrations.' The Report represents the international consensus on climate change science literature that has been extensively peer-reviewed and published in scientific journals. It represents the work of 1250 expert contributors from over 130 countries. IPCC conclusions are based on multiple lines of scientific evidence for climate change including observed increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. In rigorously assessing the growing body of published material, each new Report represents a progressive strengthening of our understanding of climate change.

The Government will continue to be informed by the latest scientific research that is peer-reviewed and published in reputable scientific journals.

Climate is a measure of the average weather over decades and centuries, and is more predictable than hour-to-hour or day-to-day weather changes. Weather is highly variable due to the chaotic nature of the atmosphere over small time and space scales. Climate, on the other hand, is determined by physical processes that change more slowly.

Global climate models continue to improve in their ability to represent current global and regional patterns of temperature, precipitation and other variables. An important source of confidence in models comes from their ability to represent features of the current climate. Particularly important for Australia is how well climate models represent large-scale patterns of temperature, pressure and precipitation, as well as modes of variability such as the El Nino – Southern Oscillation (ENSO), the Southern Annular Mode and the Madden Julian Oscillation, all of which affect regional climate.

Confidence in model projections varies with spatial and temporal scale. Highest confidence is attached to results analysed at the coarsest spatial and temporal scales, such as global or hemispheric annual means, and decreases with finer scales, such as sub-continental or regional daily variability. This is partly because the magnitude of natural variability increases as scales decrease, so that regional climate change signals are more easily masked by climate variability. Furthermore, local influences on climate such as regional topography become more important at finer spatial scales.

**Question 6: Given the basis that emission measurements are based on the best scientific advice available and little more than estimates, how confident is DCC in the issue of target compliance can actually be delivered by signatory countries?**

**Asked by: John Forrest MP**

*Provided out of session*

The Kyoto Protocol and the Marrakesh Accords include a set of monitoring and compliance procedures to enforce the Protocol's rules and agreed emission targets.

National emission estimates are designed to be accurate, transparent, time-series consistent and comparable across parties. National inventories are prepared to be consistent with Intergovernmental Panel on Climate Change Guidelines on national inventory methodologies and parties are required to submit highly detailed descriptions of estimation systems and methods. Confidence in the estimates is built through compliance of Parties with Articles 5, 7 and 8, which address reporting and review of information by Annex I Parties (developed countries) under the Protocol, as well as national systems and methodologies for the preparation of greenhouse gas inventories.

- Article 5 commits Annex I Parties to having in place, no later than 2007, national systems for the estimation of greenhouse gas emissions by sources and removals by sinks (Article 5.1).
- Article 7 requires Annex I Parties to submit annual greenhouse gas inventories, as well as national communications, at regular intervals, both including supplementary information to demonstrate compliance with the Protocol.
- Article 8 establishes that expert review teams will review the inventories, and national communications submitted by Annex I Parties under Article 7 in accordance with the provisions of these guidelines.

The Kyoto Protocol's compliance procedures and mechanism were adopted under Article 18 of the Protocol in 2005. The objective of the Kyoto Protocol compliance mechanism is to facilitate, promote and enforce compliance with the commitments under the Protocol. The mechanism's Compliance Committee is made up of two branches. The Enforcement Branch is responsible for determining whether an Annex I Party is not in compliance with its emissions targets, the methodological and reporting requirements for greenhouse gas inventories, and the eligibility requirements under the mechanisms.

The mandate of the Facilitative Branch is to provide advice and facilitation to Parties in implementing the Protocol, and to promote compliance by Parties with their Kyoto commitments.

**Question 7: What is the arbitration and conciliatory measures to be adopted when there is a lack of agreement on measurements once compliance actions are initiated by the Protocols Compliance Committee?**

**Asked by: John Forrest MP**

*Provided out of session*

Dispute resolution associated with the Compliance Committee follows numerous opportunities for discussion between Parties regarding examining and refining emission accounting as reported in national inventories and national communications.

The Compliance Committee refers questions concerning an Annex I Party's (developed countries) compliance with its Kyoto Protocol emission target to its Enforcement Branch. The Party concerned is also notified and given details of the "question of implementation" submitted to the Committee.

That Branch conducts a preliminary examination, to determine whether there is a case to answer. The Party in question may make a written submission on the question, and request a hearing with the Branch to present its case. The Party may present expert testimony and opinion. The Branch may put questions to the Party, either at the hearing or at any time in writing. It may also seek expert advice. All information considered by the Branch must be made available to the Party, in order that it may submit its comments in writing.

Following the hearing, the Branch must either adopt a preliminary finding that the Party concerned is in non-compliance with the Protocol, or decide not to proceed further with the question of implementation. The Party may make a written submission to the Branch, which the Branch must consider prior to adopting its decision. Should the Branch adopt a final decision determining a Party in non-compliance with its Kyoto Protocol target the Enforcement Branch is entitled to:

- declare the Party in non-compliance; and
- request the development of a plan of action to return it to compliance.

Should the Party continue to fail to implement the plan of action after an appropriate period of time, the Enforcement Branch is entitled to require the Party to make up the difference between its actual emissions and its assigned amount during the second commitment period, plus an additional 30 per cent.

The Party may appeal against a decision of the Branch if the Party believes it has been denied due process.

**Question 8: What will Australia do to ensure compliance by other countries given that the global consequences may be more profound for what other countries do rather than just from Australia itself?**

**Asked by: John Forrest MP**

*Provided out of session*

Australia is playing an active and constructive role in helping to shape an effective global solution to climate change. Australia encourages and facilitates compliance with emissions targets through various bilateral and plurilateral technology and information initiatives with Annex I Parties (developed countries) on actions that contribute to the global response to climate change. Australia also seeks to engage constructively towards agreement on a long-term global goal for emission reduction.

- Australia's bilateral partnerships and projects are an avenue to deliver mutual benefit for Australia and partner countries and engage constructively on agreement for long-term global goal for emission reduction. Arrangements for bilateral cooperation are currently in place with Annex I Parties the United Kingdom, New Zealand, the European Union and Japan. Specific objectives for the Program include to:
  - Undertake actions that facilitate emission reductions;
  - Build support for an effective global response to climate change;
  - Facilitate market opportunities for greenhouse technologies, products and expertise from Australia and partner countries; and
  - Foster direct involvement by industry, business, scientists and communities in bilateral projects to broaden participation in climate change action.
- Plurilateral initiatives involving co-operation with other Annex I Parties include:
  - The Government is offering to host a Global Carbon Capture and Storage Institute (the Institute) in Australia to work with existing national and regional programmes as well as international organisations working on carbon capture and storage (CCS) around the world. The focus of the Institute will be to accelerate the development of CCS technology globally by facilitating demonstration projects, leveraging and sharing experiences, and identifying and supporting the necessary research. These projects would be spread across a range of technologies and emitters (such as power generation, industrial and natural gas stripping operations) and along the entire capture, transport and storage chain.
  - The Major Economies Meeting (MEM) process aims to build greater consensus on a long-term global goal for emissions reductions among the world's largest economies. The participating countries represent around 80 per cent of global greenhouse gas emissions and include Canada, the European Union, France, Germany, Italy, Japan and the United Kingdom, as well as the United Nations.
  - The Asia-Pacific Partnership (APP) focuses on developing practical technology projects with a high level of cooperation between government and industry to address climate change and promote clean development among the partners. The seven partners in the APP (Australia, China, India, Japan, Republic of Korea, the

United States of America, and Canada) represents around half the world's emissions, energy use, GDP and population.

- International Carbon Action Partnership (ICAP) was established by a coalition of European countries, U.S. states, Canadian provinces, New Zealand and Norway. Australia joined the partnership earlier this year, announced during the Prime Minister's visit to the UK. ICAP is an international forum in which governments and public authorities adopting mandatory greenhouse gas emissions cap and trade systems share experiences and best practices on the design of emissions trading schemes. This cooperation will ensure that the programs are more compatible and are able to work together as the foundation of a global carbon market.
- The Carbon Sequestration Leadership Forum (CSLF) is an international climate change initiative focused on cooperation to develop and apply technologies for the separation and capture of carbon dioxide for its transport and long-term safe storage. The purpose of the CSLF is to make these technologies broadly available internationally, and to identify and address wider issues relating to carbon capture and storage, including promoting appropriate technical, political, and regulatory environments for the development of such technology.
- The International Partnership for the Hydrogen Economy aims to serve as a mechanism to organise and implement effective, efficient, and focused international research, development, demonstration and commercial utilisation activities related to hydrogen and fuel cell technologies. It also provides a forum for advancing policies, and common codes and standards that can accelerate the cost-effective transition to a global hydrogen economy to enhance energy security and environmental protection.
- The Renewable Energy and Energy Efficiency Partnership is a coalition of governments, businesses and organisations committed to accelerating the development of renewable and energy efficiency systems. Partners commit to working with partners from governments, business, finance and civil society around the world to expand the global market and regulatory environments for clean energy.

Australia is also entitled to seek enforcement of compliance measures through the Kyoto Protocol's Compliance Committee. The Committee, through its branches, considers questions of implementation which can be raised by any Party with respect to another Party (supported by corroborating information). The branches are allocated questions of implementation by the Committee, based on the branches' respective mandates.

The Facilitative Branch is responsible for addressing questions of implementation with respect to Annex I Parties' commitments to implement climate change mitigation measures in a way that minimizes their adverse impacts on developing countries, and to use the market and project-based mechanisms of the Protocol (Clean Development Mechanism, Joint Implementation mechanism, international emissions trading scheme) as "supplemental" to domestic action to achieve their emission target.

The Enforcement Branch is responsible for addressing questions of implementation with respect to Annex I Parties' compliance with their commitments to meet emission targets, fulfil methodological and reporting requirements, and meet eligibility requirements for participation in the Protocol's market-based and project-based mechanisms.

**Question 9: The Insurance Council of Australia has expressed concern over a proposal to reduce the current fire sprinkler standards in the Building Code of Australia. It says buildings need to be more resilient to the range of natural hazards projected under climate change, and that the embedded energy involved in constructing new buildings means that we need sprinkler systems in place which save property and not just lives in the event of an event. Is there a carbon reduction incentive for keeping older buildings? Is DCC aware of the Australian Building Codes Proposal, and has it expressed a view about it?**

**Asked by: Kelvin Thompson MP, Chair**

*Provided out of session*

DCC recognises the importance of increasing the resilience of the built environment to cope with projected climate change impacts. The proposal relating to a reduction in the current fire sprinkler standards in the Building Code of Australia is not available for public comment until the end of October 2008 and has not been provided to DCC.

DCC has been advised by the Australian Building Codes Board that a 'Regulatory Impact Statement' (RIS) process is currently being undertaken. Until such time as the proposal is publicly released, the Department is unable to provide further comment.

The question regarding a carbon reduction incentive for keeping older buildings should be directed to the Department of Environment, Water, Heritage and the Arts.



**Question 10: The Western Australian Government has recently joined other States and Territories in proposing a solar feed-in tariff for residential properties. Shouldn't we now be looking at a national feed-in tariff to replace the various State and Territory schemes, provide uniformity, and give the solar PV industry a clear and certain future?**

**Asked by: Kelvin Thompson MP, Chair**

*Provided out of session*

The Australian Government recognises that adopting as consistent an approach as possible to feed-in tariffs across Australia can reduce the regulatory burden and costs imposed on electricity market participants as well as on consumers. The Government announced in 2007 its intention to work with state and territory governments through the Council of Australian Governments (COAG) to address this issue.

In March 2008 COAG agreed that it would consider options for a harmonised approach to renewable energy feed-in tariffs in late 2008.

**Question 11: Landcare Carbon Smart has expressed concern about forestry carbon credits (an idea they strongly endorse) being corrupted by forward loading ie people planting seedlings and then claiming a carbon credit based on the assumption that that seedling is going to grow into a mighty tree, absorbing carbon for many years. They point out that unless the outcomes is measured and monitored, seedlings can die, be destroyed by bushfires and that the whole process is open to double-counting and outright fraud. Do carbon credits in forestry and agriculture need to be year on year credits based on measured outcomes against established baselines?**

**Asked by: Kelvin Thompson MP, Chair**

*Provided out of session*

In relation to forestry it is the Government's preferred position for the Carbon Pollution Reduction Scheme (CPRS) that reforestation (as defined for the first commitment period of the Kyoto Protocol) would be included, on a voluntary basis, from scheme commencement in 2010, with design details to be determined.

- The CPRS permits will only be issued for reforestation after sequestration has actually occurred based on measured outcomes against established baselines.

In relation to agriculture the Government is disposed to include agriculture emissions in the scheme by 2015 and to make a final decision on this in 2013.

The Government will consider the scope for offsets from emissions sources that cannot be included in the scheme in 2013, following final decisions on coverage of agriculture emissions.

**Question 12a: What were our CO<sub>2</sub> equivalent emission levels in 2000?**

**Asked by: Kelvin Thompson MP, Chair**

*Provided out of session*

Australia's CO<sub>2</sub> equivalent<sup>1</sup> (CO<sub>2</sub>-e) emissions in 2000 were 553 Mt.

<sup>1</sup> CO<sub>2</sub> equivalent (CO<sub>2</sub>-e) is used to convert masses of each greenhouse gas (GHG) to a mass of CO<sub>2</sub> that would give the equivalent warming, which is being measured on a 100 year timeframe horizon for the first commitment period of the Kyoto Protocol. The GHGs counted under the Kyoto Protocol are carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. Over 100 years, per mass, methane is 21 times stronger as a greenhouse gas than CO<sub>2</sub>, nitrous oxide is 310 times stronger, and most hydrofluorocarbons are several thousands of times stronger. This is why the comparatively small releases of non-CO<sub>2</sub> gases become significant in warming terms.

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**Question 12b: To achieve a 60% reduction, what would CO<sub>2</sub> equivalent emission levels need to be in 2050?**

**Asked by: Kelvin Thompson MP, Chair**

*Provided out of session*

221 Mt CO<sub>2</sub>-e, namely 40 per cent of 553 Mt CO<sub>2</sub>-e (emissions in 2000, based on the most recent National Greenhouse Gas Inventory (2006)).

**Question 12c: What were our CO<sub>2</sub> equivalent emission levels in 2005? 2006? 2007?**

**Asked by: Kelvin Thompson MP, Chair**

*Provided out of session*

Australia's CO<sub>2</sub>-e emissions in the following years were:

2005: 582 Mt

2006: 576 Mt

2007: 585 Mt (preliminary estimate)

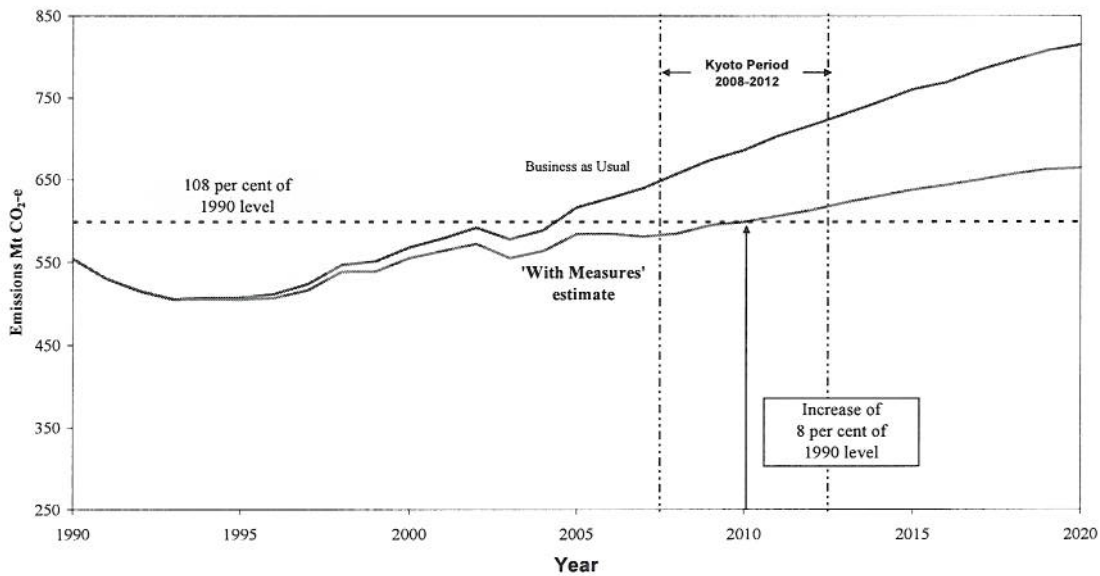
**Question 12d: What are the currently projected outcomes for 2008? 2009? 2010? 2020?**

**Asked by: Kelvin Thompson MP, Chair**

*Provided out of session*

The 2007 projections (*Tracking to the Kyoto Target, Australia's Greenhouse Emissions Trends*) published projected emissions for the Kyoto period (2008-12) of 599 Mt CO<sub>2</sub>-e (108% of 2000 levels) and for 2020 of 664 Mt CO<sub>2</sub>-e (120% of 2000 levels). Projections of emissions for other years are shown in the attached chart taken from *Tracking to the Kyoto Target*.

**Figure 1 'Business as Usual' and 'With Measures' emissions estimates**



**Question 12e: If we succeeded in cutting emissions in a consistent way every year between 2010 and 2050, ie not trying to make some years do more work than others, what emissions trajectory would this give rise to, eg where would emissions be in 2020 compared with 2000, and by what percentage would they be cut in 2030, 2040 and 2050 compared with 2000?**

**Asked by: Kelvin Thompson MP, Chair**

*Provided out of session*

To achieve a “consistent” reduction in emissions to a 60 per cent reduction (on 2000 emissions levels) by 2050, the same level of absolute emissions reduction in each year could be assumed. The table below provides percentage reductions in 2020, 2030, 2040 and 2050 for the trajectory implied by that approach. It should be noted that this represents only one of any number of trajectories that could be adopted to achieve the target of a 60 per cent reduction by 2050.

		<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>
Equal annual CO <sub>2</sub> -e reduction	Emissions trajectory (Mt CO <sub>2</sub> -e)	598	504	410	315	221
	Emissions reduction relative to 2000 (%)	+8	- 9	- 26	- 43	- 60

It also certainly does not represent a Government position. Government decisions on the medium-term national emissions target range and indicative national emissions trajectory up to 2012-13 will be provided by the end of 2008, along with the release of the White Paper.

**Question 12f: What percentage of global CO<sub>2</sub> emissions are presently generated by the United States, by China, by India, by Russia, by the EU, by Africa, by South America, by Asia (including China and India) and by Australia?**

**Asked by: Kelvin Thompson MP, Chair**

*Provided out of session*

The percentage of global CO<sub>2</sub>-e emissions generated by the countries and regions mentioned above in the year 2000 are:

- The United States of America – 14.87 per cent;
- China – 11.12 per cent;
- India – 3.60 per cent;
- Russia – 4.51 per cent;
- EU 27 – 11.28 per cent;
- Africa<sup>2</sup> – 8.08 per cent;
- South America<sup>3</sup> – 9.27 per cent;
- Asia<sup>4</sup> (including China and India) – 33.4 per cent; and
- Australia – 1.15 per cent.

The results above have been obtained from the World Resources Institute's 2008 Climate Analysis Indicators Tool (CAIT). The figures for the year 2000 are the most comprehensive single data set available for Annex 1 and non-Annex 1 Parties (the most recent data submitted to the UNFCCC from Non-Annex 1 nations is from 1994) which include coverage of all six gases counted under the Kyoto Protocol that produce greenhouse gas emissions. These figures also include emissions from land use change but exclude emissions from international maritime and aviation.

The Garnaut Climate Change Review (the Review) estimates that Australia contributed 1.5 per cent of global greenhouse gas emissions in 2005. The estimate is derived from the joint economic modelling exercise undertaken by the Review and the Australian Treasury. The modelling drew on a number of historical emission data sources, including national emission inventories and reports to the UNFCCC. Estimates of global emissions from land use change and forestry activities were obtained from the Lawrence Berkeley National Laboratory. Regional breakdowns of emission sources are constrained by the regional aggregation of the global models used in the Review-Treasury modelling exercise. Contributions are not available for all the nations and regions requested in the question.

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<sup>2</sup> **Africa** includes Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, the Democratic Republic of Congo, the Cote d'Ivoire (Ivory Coast), Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia and Zimbabwe.

<sup>3</sup> **South America** includes Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela.

<sup>4</sup> **Asia** includes Afghanistan, Bangladesh, Bhutan, Brunei, Cambodia, China, India, Indonesia, Japan, Korea (North), Korea (South), Laos, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, The Philippines, Singapore, Sri Lanka, Taiwan, Thailand and Vietnam.

**Question 12g: IPCC scientists talk about avoiding dangerous climate change by avoiding temperature increases of more than 2°C the level of carbon in the atmosphere has gone from 280 to 380 parts per million post industrialisation. At what level must it be stopped to prevent temperature increases of more than 2°C?**

**Asked by: Kelvin Thompson MP, Chair**

*Provided out of session*

The Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) notes that, “determining what constitutes ‘dangerous anthropogenic interference with the climate system’ in relation to Article 2 of the UNFCCC involves value judgements.” The AR4 notes further that “to stabilise the concentration of greenhouse gases in the atmosphere, emissions would need to peak and decline thereafter. The lower the stabilisation level, the more quickly this peak and decline would need to occur.”

The assessments of the IPCC, in particular the AR4, provide a basis for making informed decisions about the relative consequences of different stabilisation levels of greenhouse gases (GHGs) but do not propose a specific CO<sub>2</sub>-e concentration level or temperature increase at which we could avoid dangerous climate change. Science can provide no single reference point at which a rise in the average global temperature would cross a boundary between safe and dangerous anthropogenic interference with the climate system. The AR4 notes that “adaptation will be necessary to address impacts resulting from the warming which is already unavoidable due to past emissions.” These impacts alter in severity from region to region. Australia, which has the driest and most variable climate of the inhabited continents, is projected to be among the first regions to suffer from the severe impacts of climate change.

The AR4 suggests that stabilisation at 445-490ppm CO<sub>2</sub>-e (350-400ppm CO<sub>2</sub>) would result in temperature increases of between 2-2.4°C. The best estimate of current concentrations (2005) is 455ppm CO<sub>2</sub>-e.

**Question 12h: Given the information above about global emission changes, both actual and projected, what are the most realistic possible emissions scenarios for the regions I have referred to which would enable this level to be achieved?**

**Asked by: Kelvin Thompson MP, Chair**

*Provided out of session*

The Government is committed to international negotiations to bring about an effective global agreement to deliver deep cuts in greenhouse gas emissions. Australia considers that a post 2012 climate change agreement should prepare for economy-wide emission reduction targets for advanced economies and specific commitments for action by developing countries.