







# The Economics of Climate Change Impacts: A Case Study

Prepared for:









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March 16, 2009

## A CASE STUDY:





Were estimates of total damages from climate change developed and where they were used to or informed setting of GHG targets

-  □ 3 Case studies: UK, Australia, and California
-  □ Impacts studies have informed government level discussions on mitigation
  - Netherlands, Washington, Massachusetts
  - US Supreme Court: Mass v EPA
-  □ Policy makers have attempted to estimate benefits and costs, but as far as we can tell, they relied on the precautionary principle to set emission levels.
  - IPCC: where there are threats of serious or irreversible damage, the lack of full scientific certainty shouldn't be used as a reason for not mitigating emissions.
-  □ Understanding motivation is a difficult process, but governments could at least use these estimates as justification to pass climate legislation or announce emissions reduction targets.

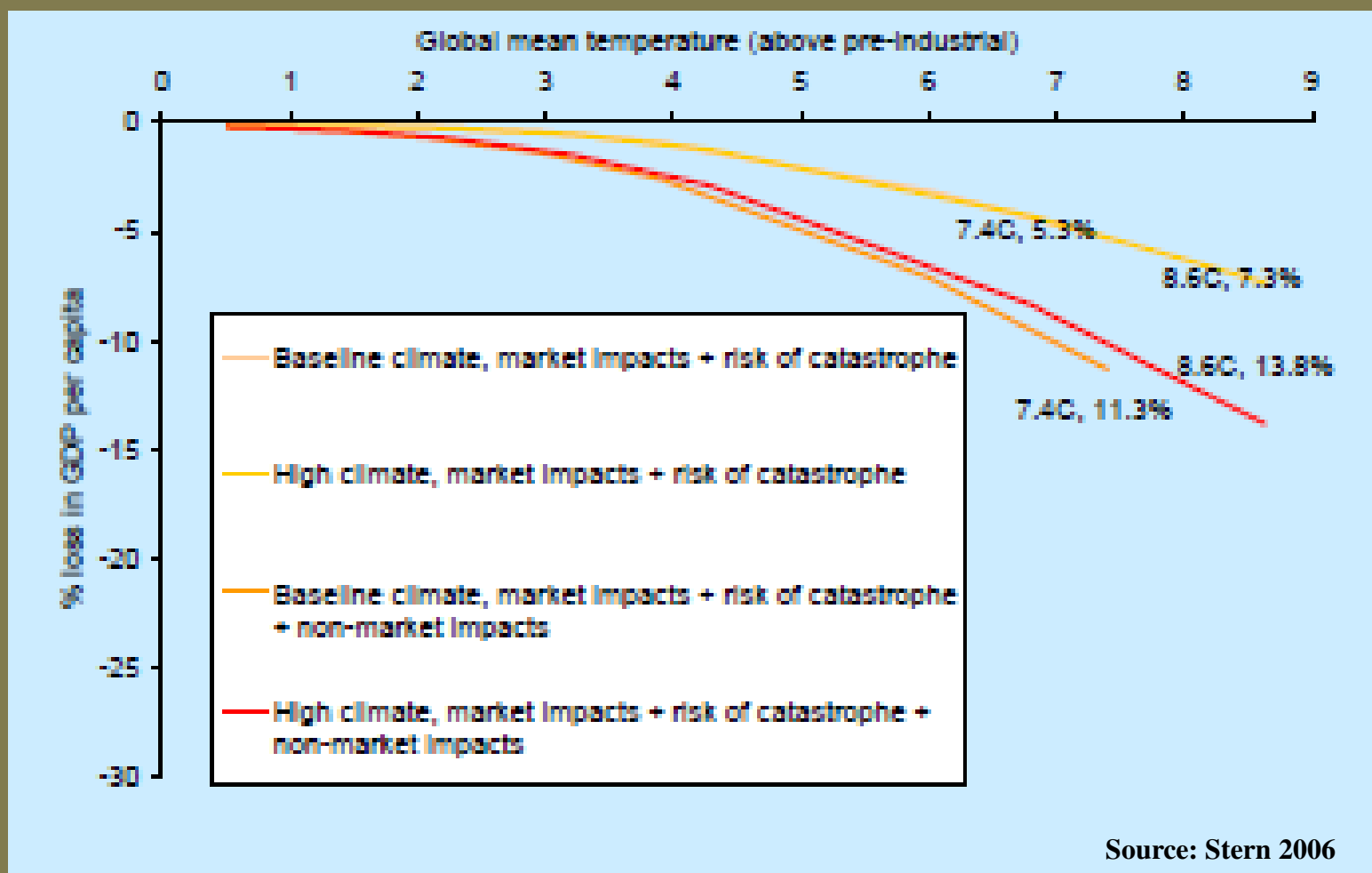
# Economic tools for climate change impacts

-  □ Impact assessments are detailed estimations of the consequences of future climate change. Potential impacts include:
  - increased droughts
  - sea level rise
  - increase in heat-related illness and disease
-  □
-  □
-  □
-  □ In addition to market impacts, a few assessments of climate change losses include estimates of “non-market impacts” such as loss of ecosystems and values of human life.
-  □ The social cost of carbon SCC: measure of the marginal damages from emission of an additional ton of carbon.
-  □ The SCC signals what society should be willing to pay now in order to avoid future damages caused by incremental CO<sub>2</sub>e emissions.
-  □

## United Kingdom

-  □ A global leader in developing an understanding of the costs and risks of climate change
-  □ Passed the Climate Change Act 2008, creating the first long-term, legally binding framework to reduce GHG emissions
  - at least a 26% reduction by 2020 and an 80% reduction by 2050.
-  □ A qualitative impact study has also been completed for each region, plus a number of quantitative and economic sector-specific studies
-  □ The Stern review is the one of the more comprehensive reviews on the economic costs of climate change.
  - Review predicts that the value of the damages from unmitigated climate change could be significantly more than the global cost of action to stabilize atmospheric concentrations of GHGs at 550 ppm CO<sub>2</sub>e.
  - It estimates BAU climate change will reduce welfare by an amount equivalent to a reduction in consumption of **between 5 and 20%**.
  - The review found that mitigation costs for stabilization at 500-550 ppm were centered on **1% of GDP** by 2050

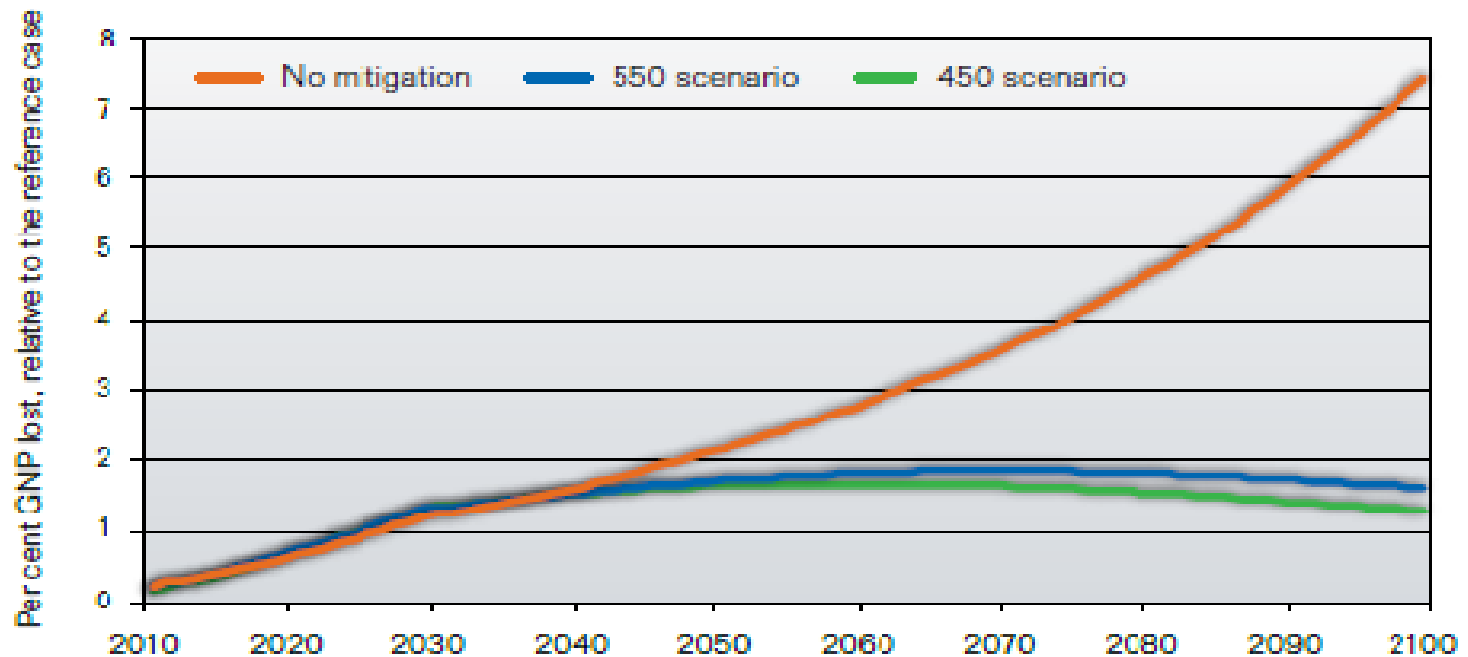
This slide represents the percentage losses in income relative to GDP from four scenarios of climate change and economic impacts, plotted against average increases in global mean temperature



# Australia

- Australia is one of the most vulnerable of all industrialized countries to the impacts of climate change according to the IPCC
- Australian government has endorsed a carbon emissions reduction target of 15% by 2020, following the introduction of a carbon trading scheme in 2010
- Several impact studies have been developed that identify sectors of the Australian economy particularly vulnerable to climate change, and estimates the costs of climate change for some of these sectors
- Garnaut Climate Change Review was an independent study commissioned by Australia's Commonwealth, and state and territory governments.
- The report estimated that the global income would fall by around **8% by 2100**, with losses in developing countries likely to be higher than the global average. Australian GNP would be reduced 9% and wages would fall 12%.
- Both Garnaut and the Treasury department followed with an analysis that under a mitigation scenario, GNP growth will be **one-tenth of 1% less** than a business-as-usual case





This slide shows a comparison of the modeled expected market costs for Australia of unmitigated and mitigated climate change up to 2100



Source: Garnaut 2008

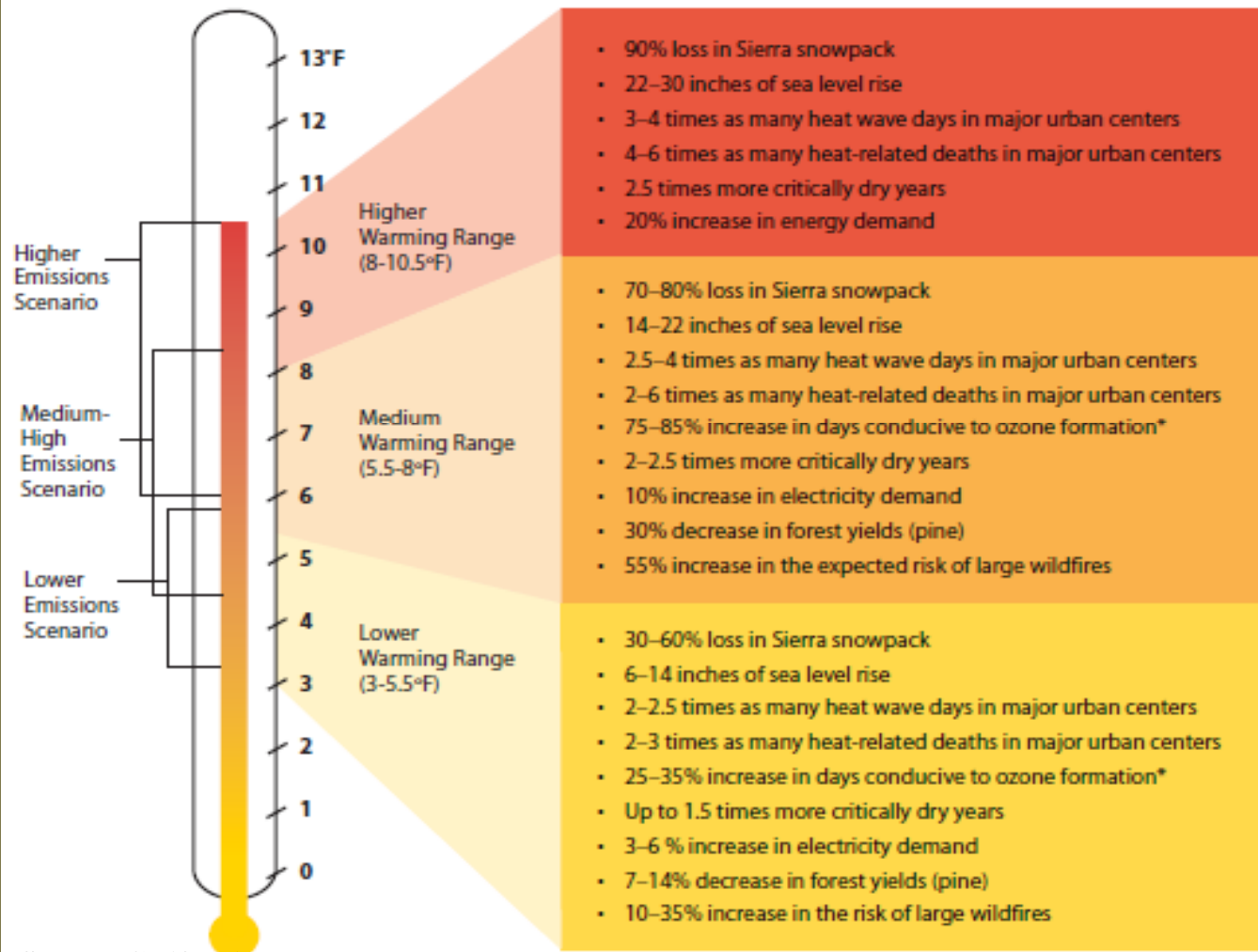
- Estimated climate change damages are less in the 450 scenario than in the 550 scenario, the small expected market gain from the 450 scenario was not in itself adequate to justify the additional mitigation costs.
- The report states that stronger mitigation is justified by insurance value and non-market value benefits, it is worth paying less than an additional 1% of GNP as a premium in order to achieve a 450 ppm result.

# California

-  □ AB32 establishes the first comprehensive program of regulatory and market mechanisms to achieve reductions in GHG emissions in the US.
-  □ One particular impact study, "Emissions Pathways, Climate Change, and Impacts on California" was considered to be very influential in the decision making process. It found:
  - Heatwaves in Los Angeles are estimated to be six to eight times more frequent, with heat-related excess mortality increasing five to seven times
  - Alpine and subalpine forests are projected to be reduced by 75-90%.
  - Snowpack declines 73-90%, with impacts on runoff and streamflow that disrupt California's water rights system
-  □ Impact studies have helped the state develop motivation to set emissions reduction goals that surpass any other state in the country.
  - 2006 & 2008 Impacts Assessments Reports
-  □ Secretary of the California EPA stated "It will cost significantly less to combat climate change than it will to maintain a business-as-usual approach."

# California 's 2006 Impacts Assessment Report was stated to be a primary motivating factor in the development of AB32










## Summary of Projected Global Warming Impact, 2070–2099 (as compared with 1961–1990)



Source: California 2006

\* For high ozone locations in Los Angeles (Riverside) and the San Joaquin Valley (Visalia)

# Conclusions

-  □ None of the governments undertook a formal benefit-cost analysis using the future benefits of avoided climate change to set its GHG reduction targets.
-  □ The estimation of the benefits of avoided impacts may have played a role in justifying climate policies, but it did not find an optimal emissions target.
-  □ It is possible that the levels of emissions reductions selected by each government would have been selected even if formal economic analysis of the benefits of such reductions had not been done.
-  □ The calculation of economic losses from climate change (or in the case of California description of projected impacts) may have informed the policy process.
-  □ The setting of targets was apparently based on a number of considerations, such as cost-effectiveness and competitiveness, not just avoided economic impacts.
-  □
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