# Meeting the Challenge of Climate Change

A Business Perspective, March 2007

Tony Wood

# Overview of Origin Energy

**Exploration & Production**

**2,436 2P reserves**

**Market focussed portfolio in Australia & New Zealand**

**Generation***

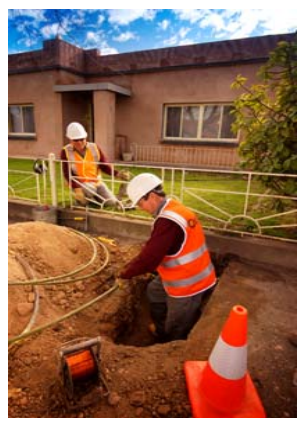
Total capacity 3659 MW
Gas capable – 2663 MW
Hydro – 752 MW
Geothermal – 244 MW

**Origin Energy owns, develops and procures energy and related products and services to provide customers with better choices to meet their energy needs.**


**Retail***

3.6 m customers in Australia,
New Zealand & Pacific

Electricity – 2.3 million
Natural Gas – 958,000
LPG – 357,000



**Networks**

Asset Management services
Envestra investment – 18% interest
SEA Gas pipeline – one third interest

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***Includes Contact Energy**

# Origin Energy's Supply Chain Emissions (Mt $CO_2e$)*

## Total supply Chain Emissions = 32.8Mt#; Origin's Equity Emissions = 3.6Mt

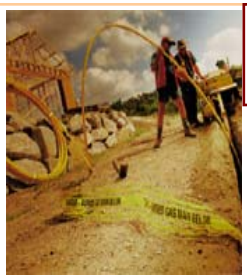
### Production & Purchase

Natural gas, LPG and other products

**Origin production**
**1.3 Mt**

**Purchases**
**1.5 Mt**

### Transportation



**1.9 Mt**

### Customer consumption

Natural Gas and LPG

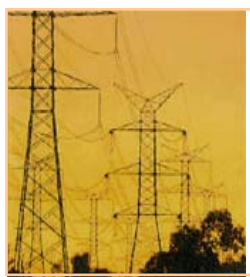
**10.3 Mt**

Electricity

Gas purchased for Origin generation

**Origin electricity & steam generated**
**1.2 Mt**

**Electricity purchased**
**16.5 Mt**



**0 Mt**

**Emissions accounted for at generation**

*** Origin's Australian Operations 2004/05**

**# Represents 12% of Australia's stationary energy emissions**

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# Introduction

- The climate change challenge – global
- The climate change challenge - Australia
- What could be done with technology?
- What is the role of Government?
- What will be the impact on business?
- How far to go and when?

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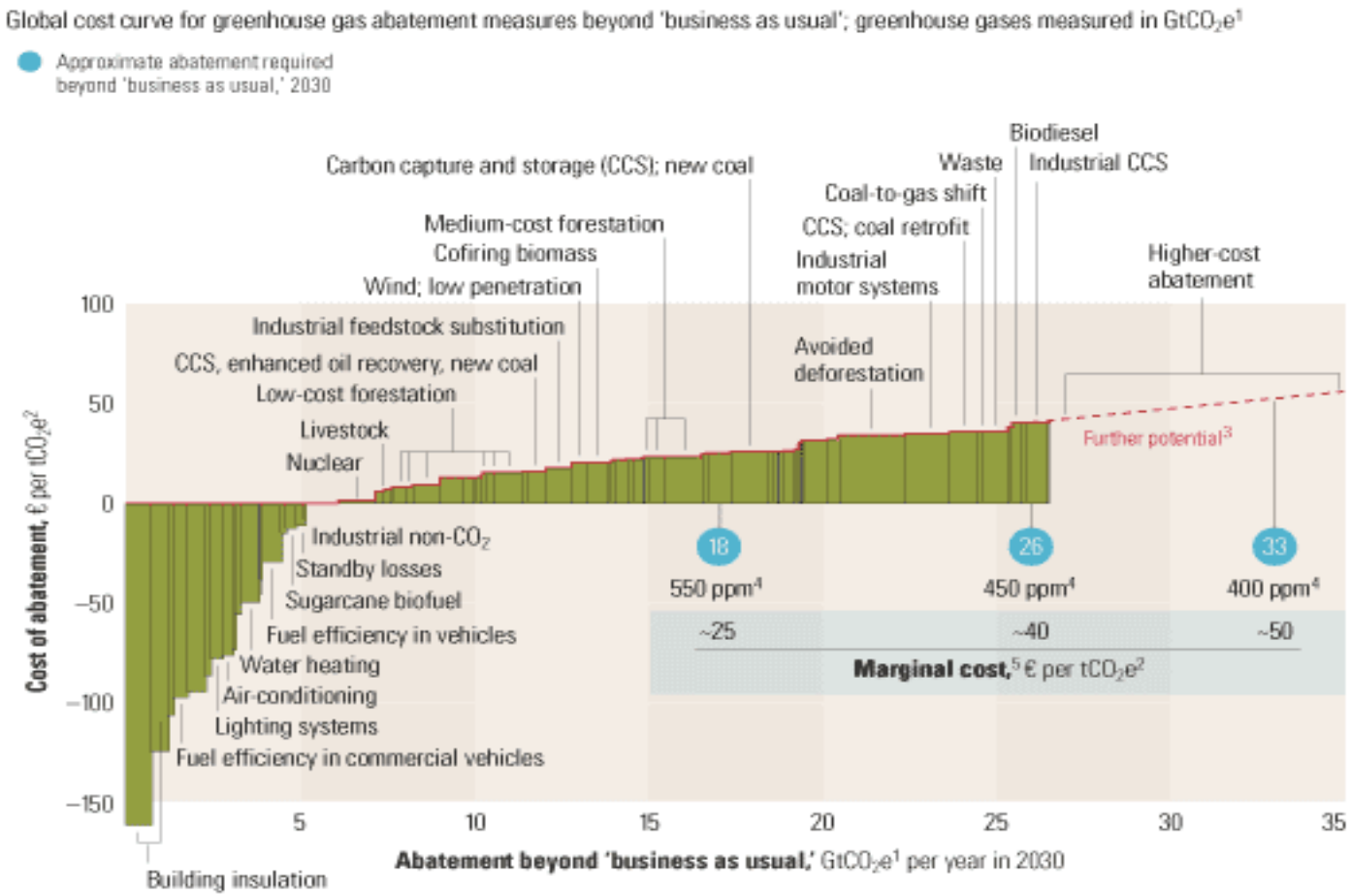
# A Global Cost Curve for Abatement




[1] $GtCO_2e$ = gigaton of carbon dioxide equivalent; "business as usual" based on emissions growth driven mainly by increasing demand for energy and transport around the world and by tropical deforestation.
[2] $tCO_2e$ = ton of carbon dioxide equivalent.
[3] Measures costing more than €40 a ton were not the focus of this study.
[4] Atmospheric concentration of all greenhouse gases recalculated into $CO_2$ equivalents; ppm = parts per million.
[5] Marginal cost of avoiding emissions of 1 ton of $CO_2$ equivalents in each abatement demand scenario.

**Source: McKinsey Quarterly, Jan 2007**

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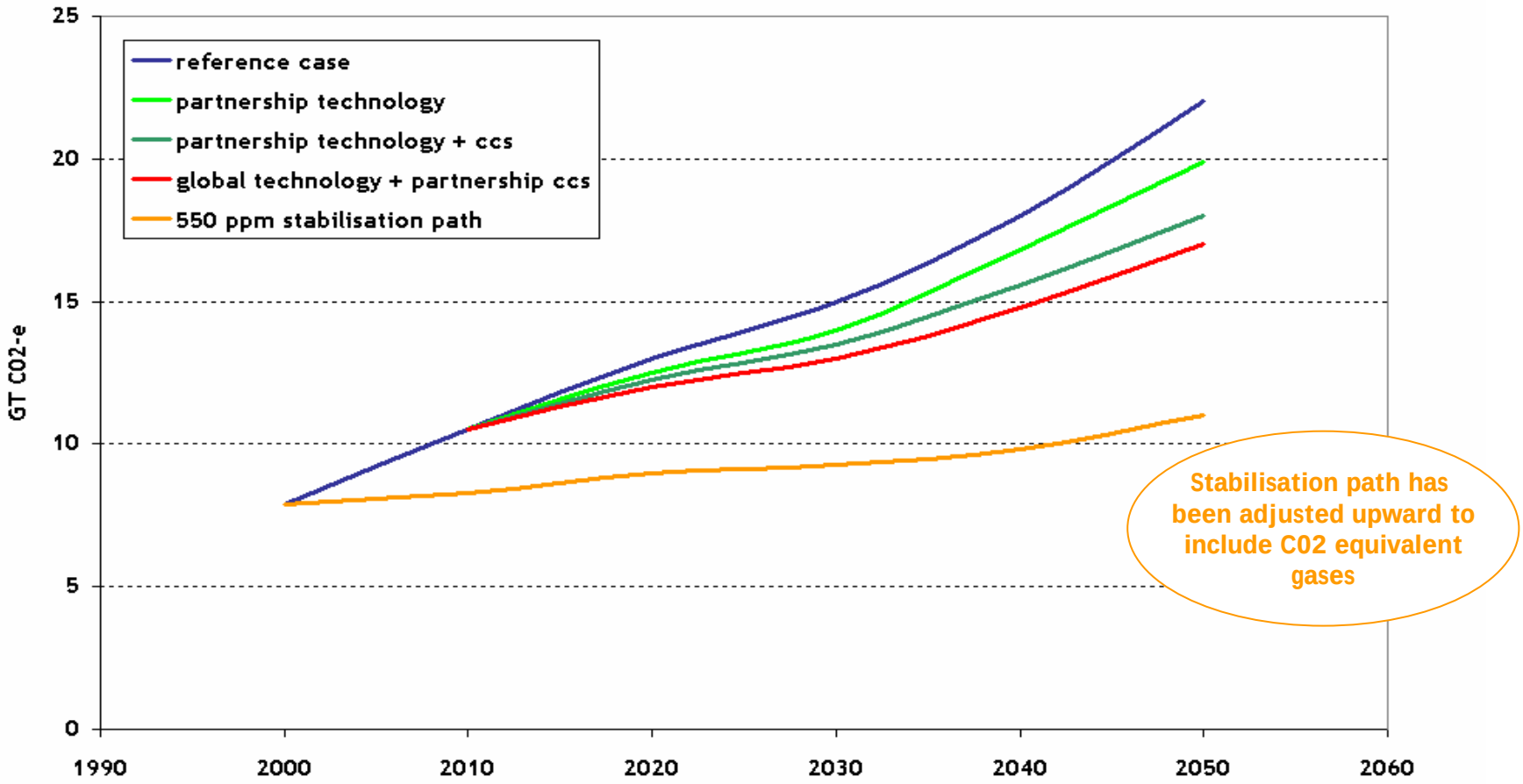
# The technology challenge - initiatives based solely on new technology development are insufficient.




Source: ABARE, Asia Pacific Partnership on Clean Development and Climate – technological development and economic growth (2006)

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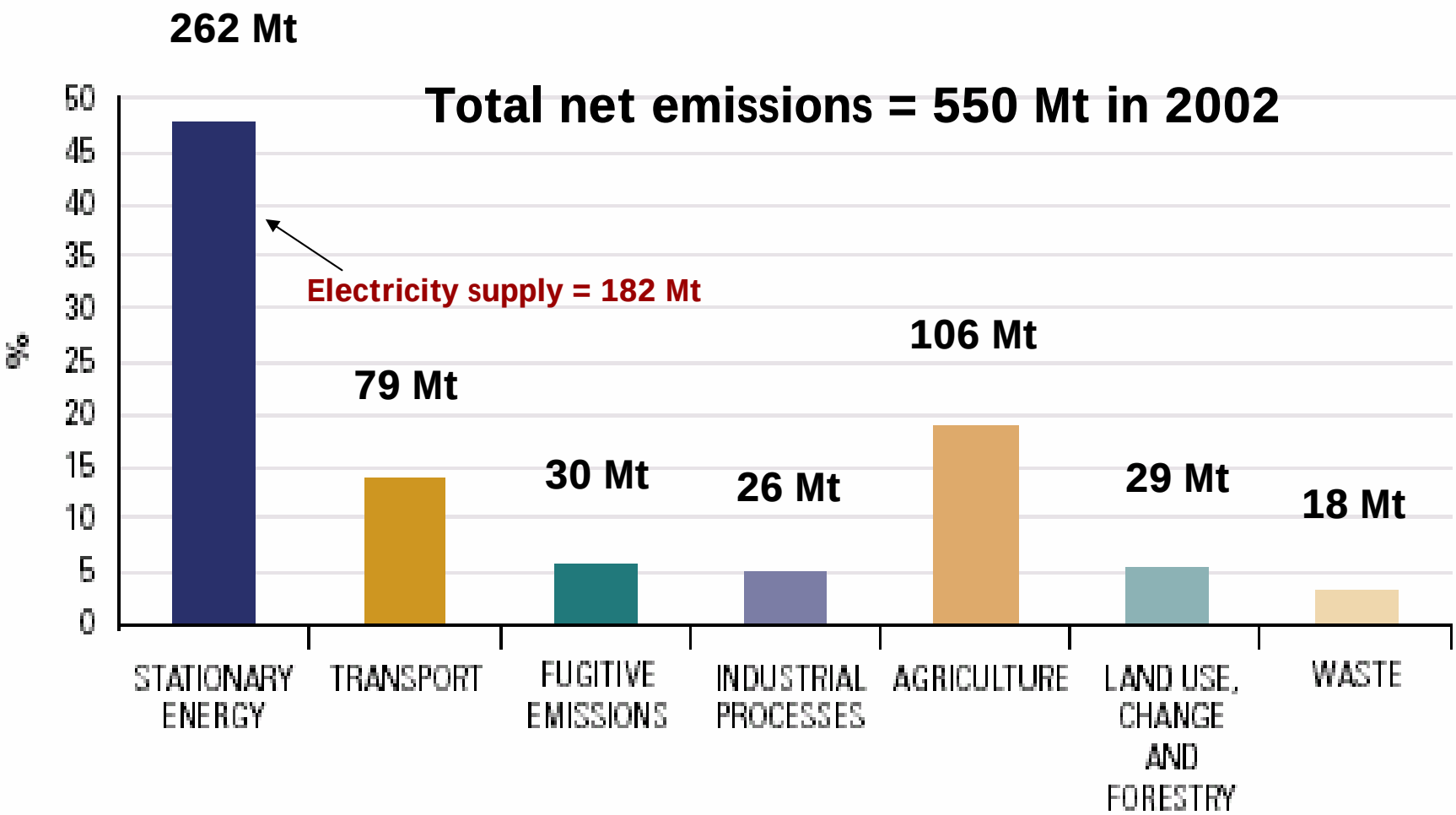
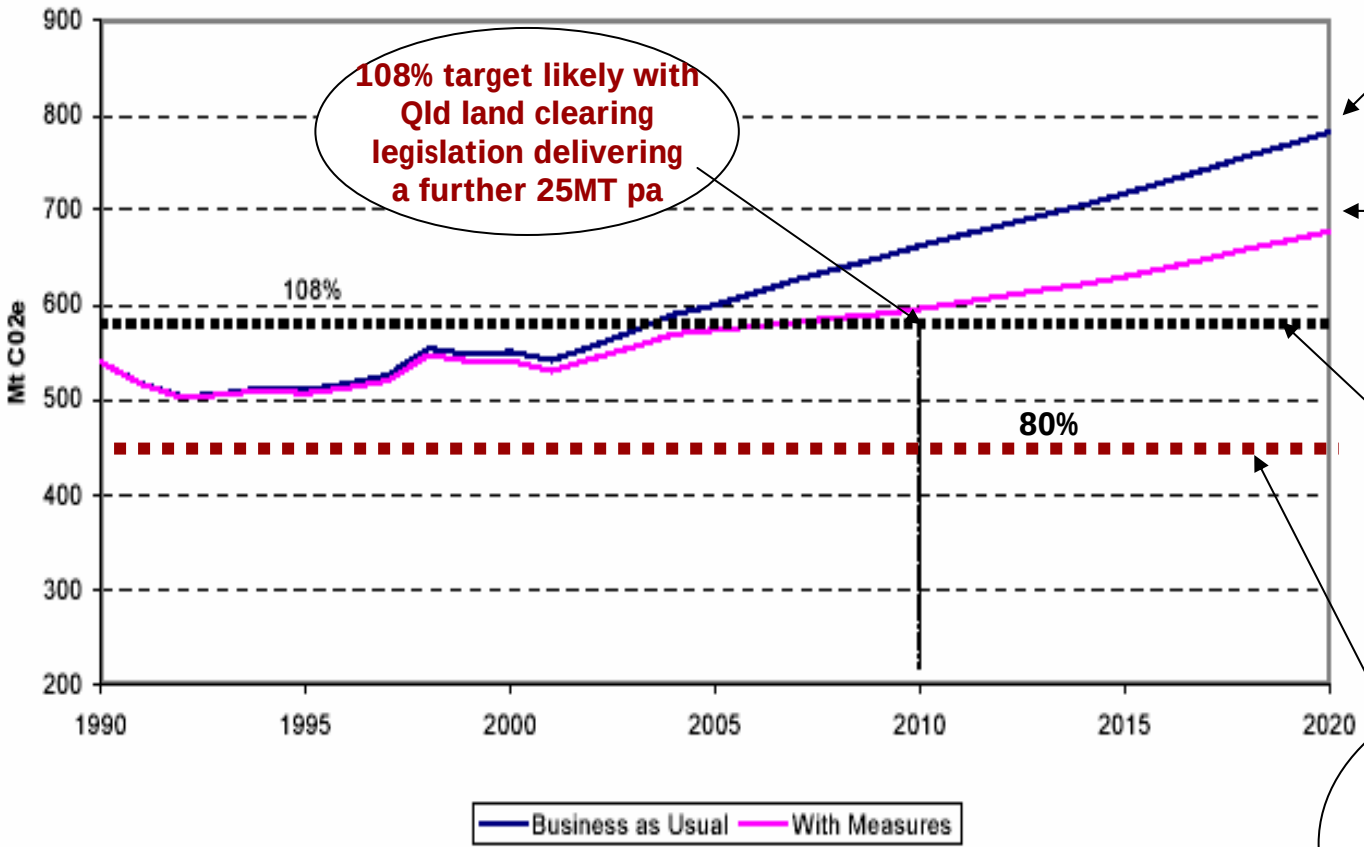
# Stationary Energy the major contributor to Australia's GHG emissions



# Australia's 2020 greenhouse emission forecast shows significant growth - of which 90% comes from the stationary energy sector.

**Australian emission projections (**AGO, Sept 2003)




"Business As Usual (BAU)"

108% target likely with Qld land clearing legislation delivering a further 25MT pa

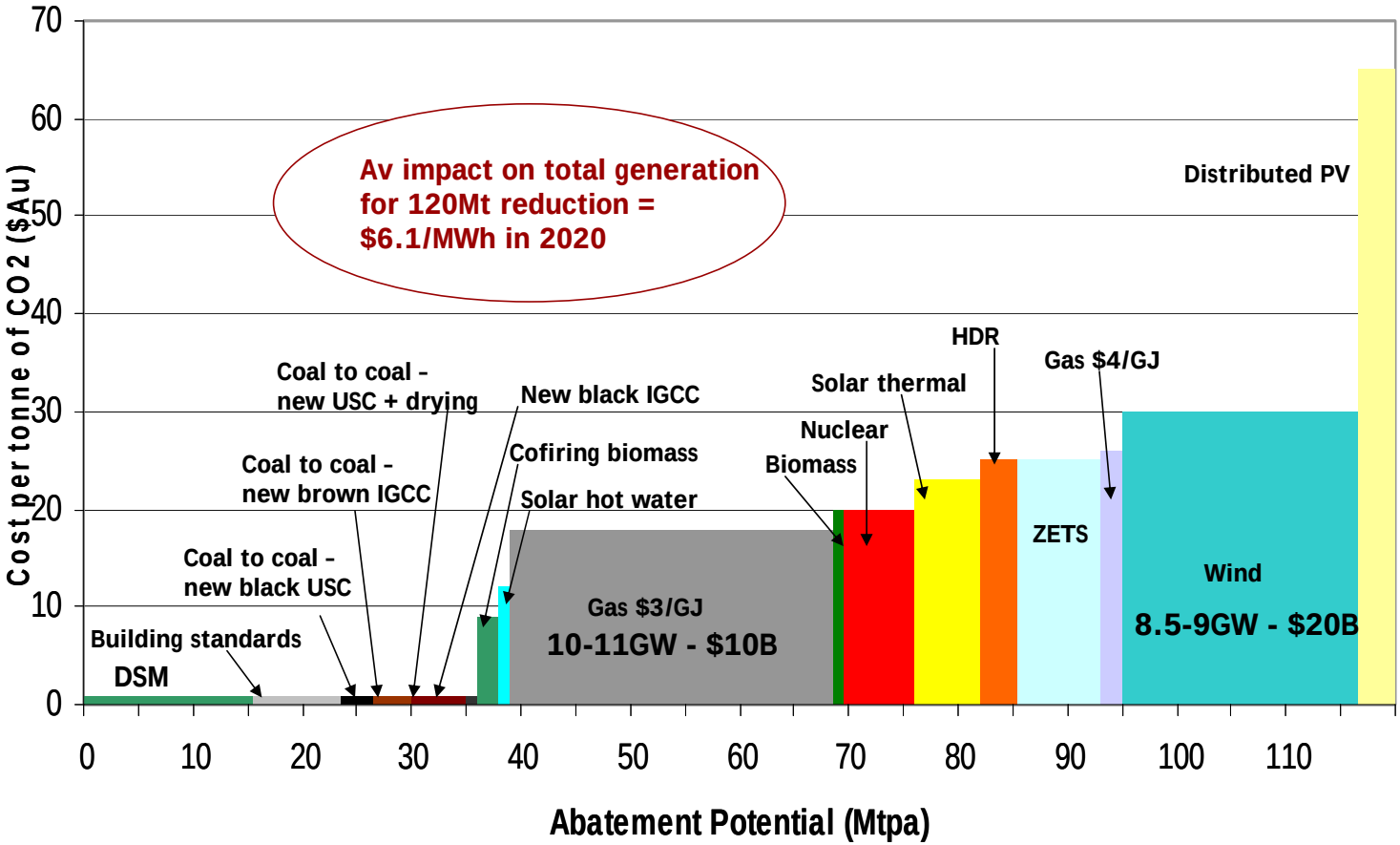
"With Measures" reduces emissions by 105 $MtCO_2e$ beyond BAU

To maintain a 108% target a 200 $MtCO_2e$ reduction from BAU is needed

To achieve an 80% target an additional 150Mt is required from 108% target - a total of 355Mt from BAU in 2020

"Current Measures" will deliver a reduction of~105 $MtCO_{2e}$ beyond BAU by 2020, but a further 100$MtCO_{2e}$ required to meet 108% target

# Current estimates of the abatement costs for existing technology show the magnitude of the task




**Early retirement of existing capital stock may be required to deliver deep cuts**

**Gas provides an interim solution, but zero emission technologies and renewables are required … and the problem is still not solved**

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# What causes change?

- **Fear**
- **Better value (Green Power)**
- **Opportunity (more revenue, lower cost)**
- **Corporate positioning, marketing advantage, corporate reputation with stakeholders**
- **Government Intervention (market failure, political will)**
  - Regulation
  - Tax
  - Market-based framework
- **(Because it's a good thing to do)**

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# A Core Climate Change Policy package

- **A national long-term aspirational target in line with desired global action**
  - Interim firm targets and reviews
- **No carbon holiday for new generation investment**
- **A market-based carbon pricing scheme**
  - Cap and trade emissions trading
  - Introduced from 2010
  - Permits to be auctioned with exceptions for allocation for restructuring/compensation and trade exposed sectors in the absence of an international scheme
- **Funding for low and zero emission technology research, development and demonstration, eg LETDF, AP6**
- **Industry development support for renewable energy, eg MRET**

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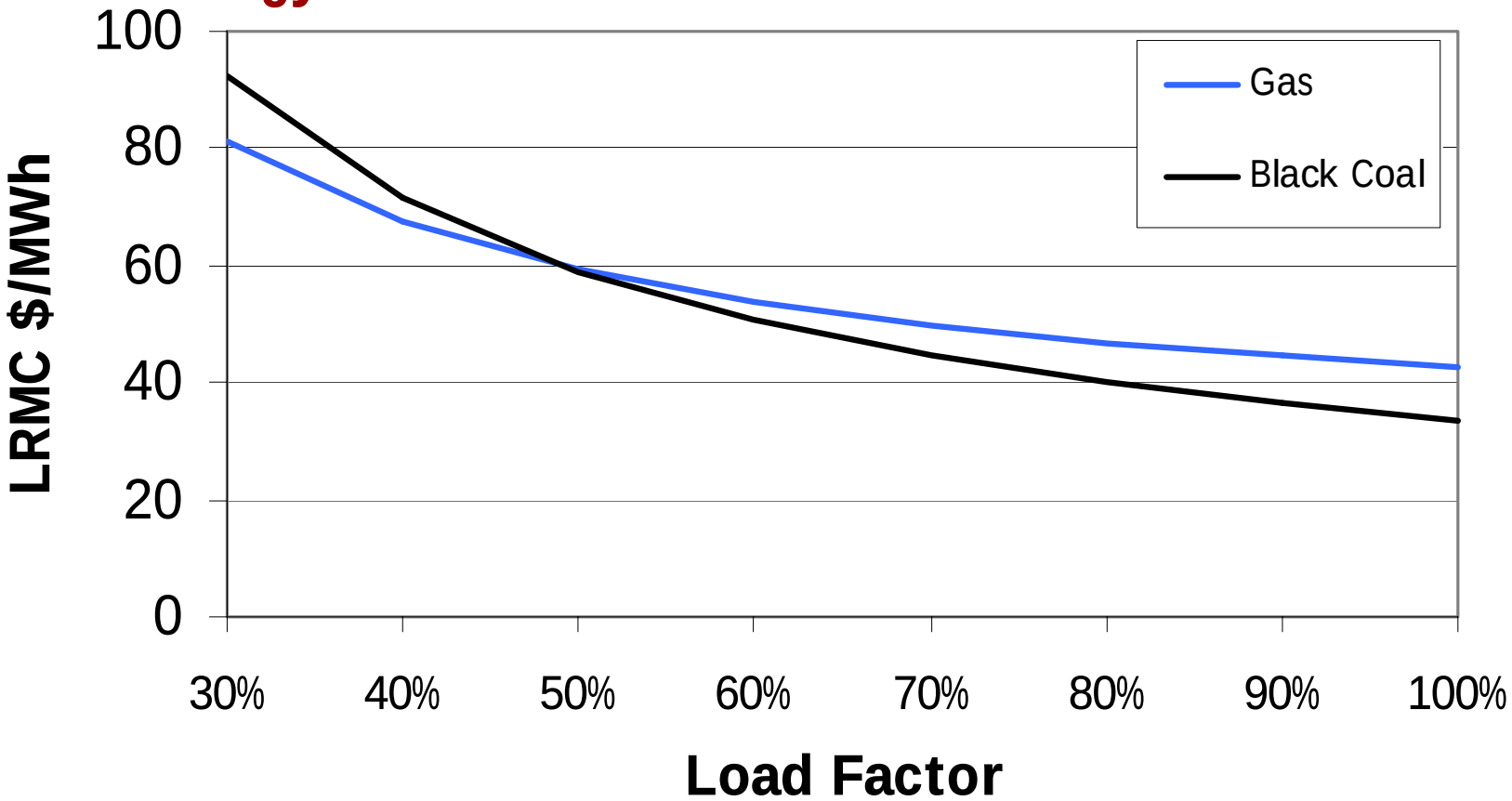
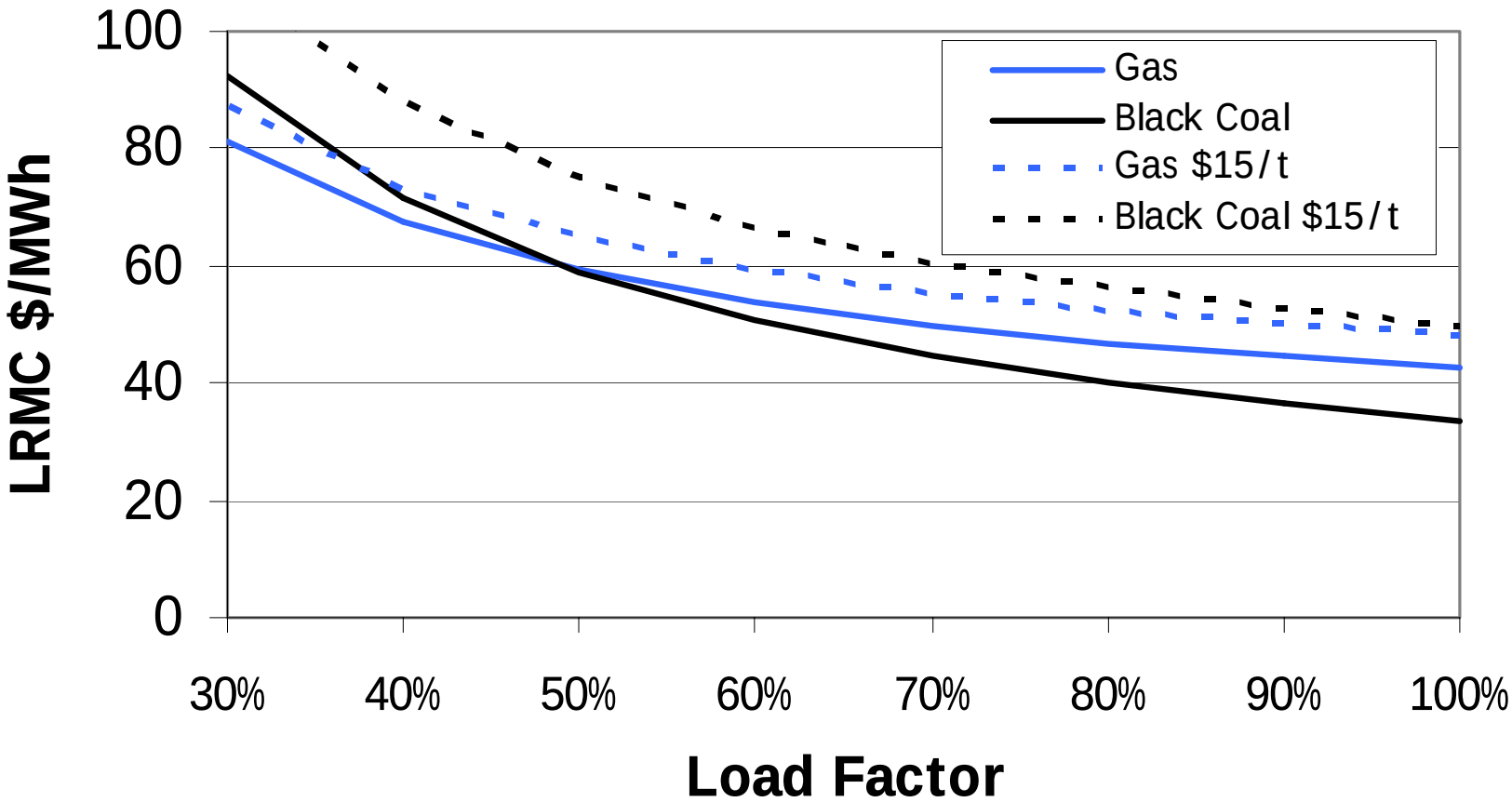
# In absence of government policy (eg. no new coal) the market will deliver at least cost … existing coal technology




**PEAK** **INTERMEDIATE** **BASELOAD**

# A gas baseload project is not economic without policy intervention. A $15/t carbon value favours gas.




**In the absence of emissions trading, gas-fired investment is reliant on other encouragement such as the GEC scheme …**

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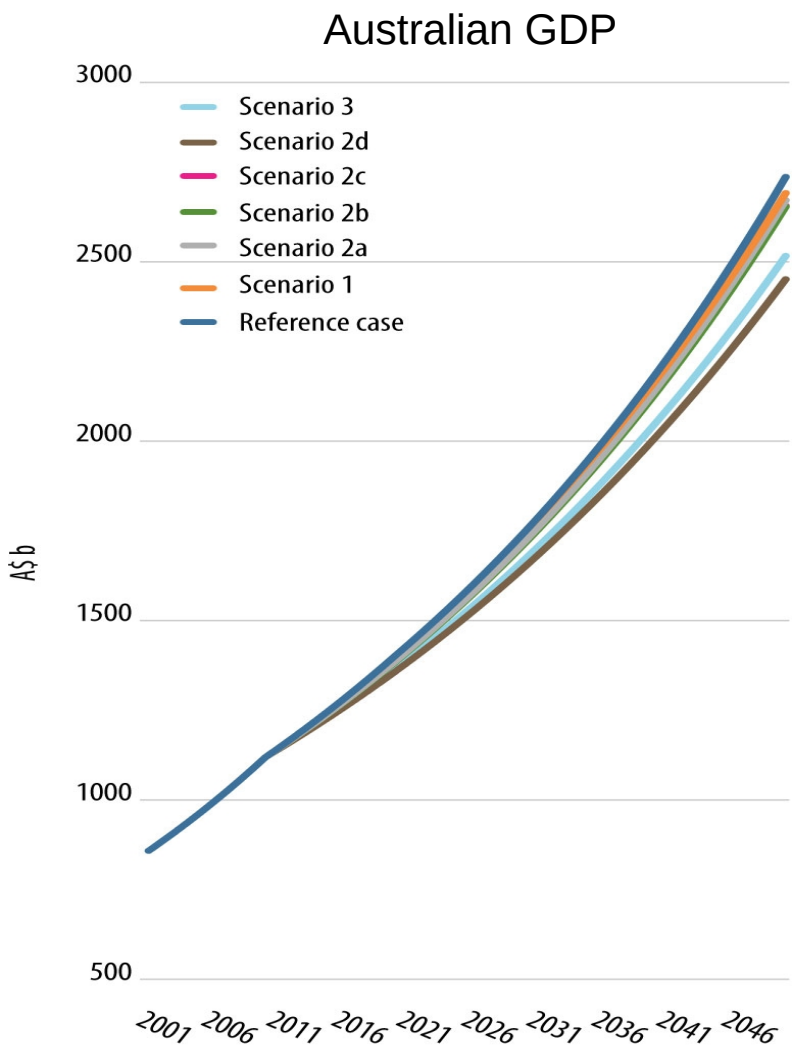
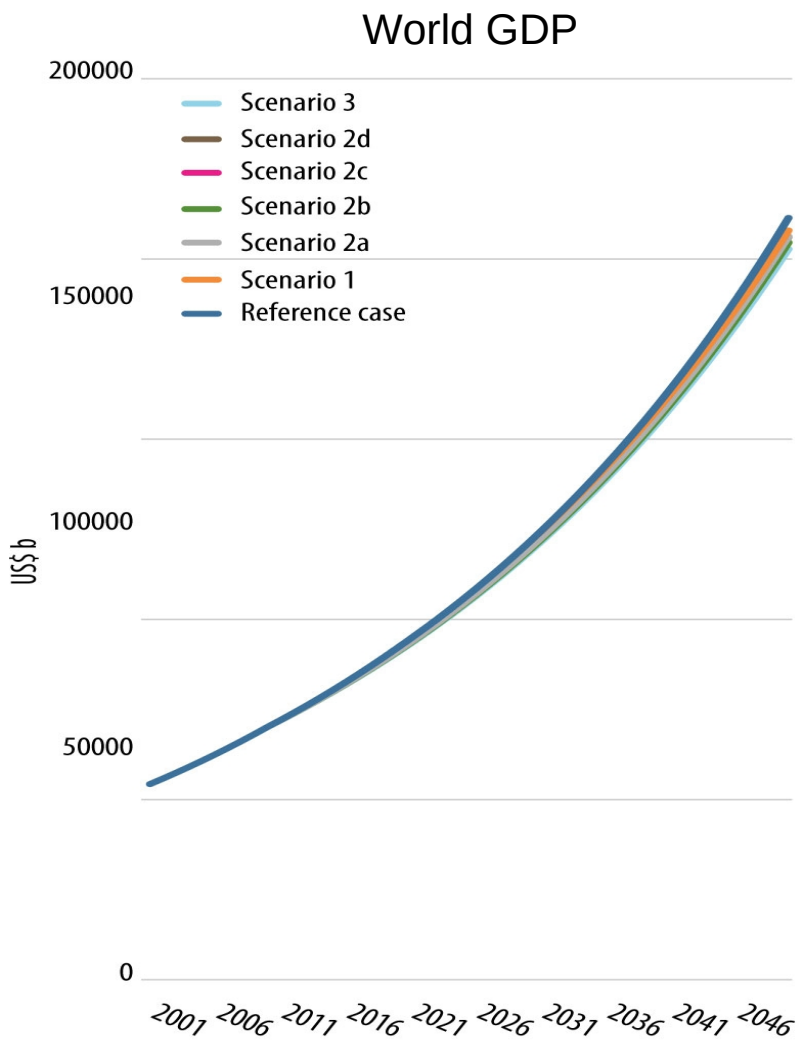
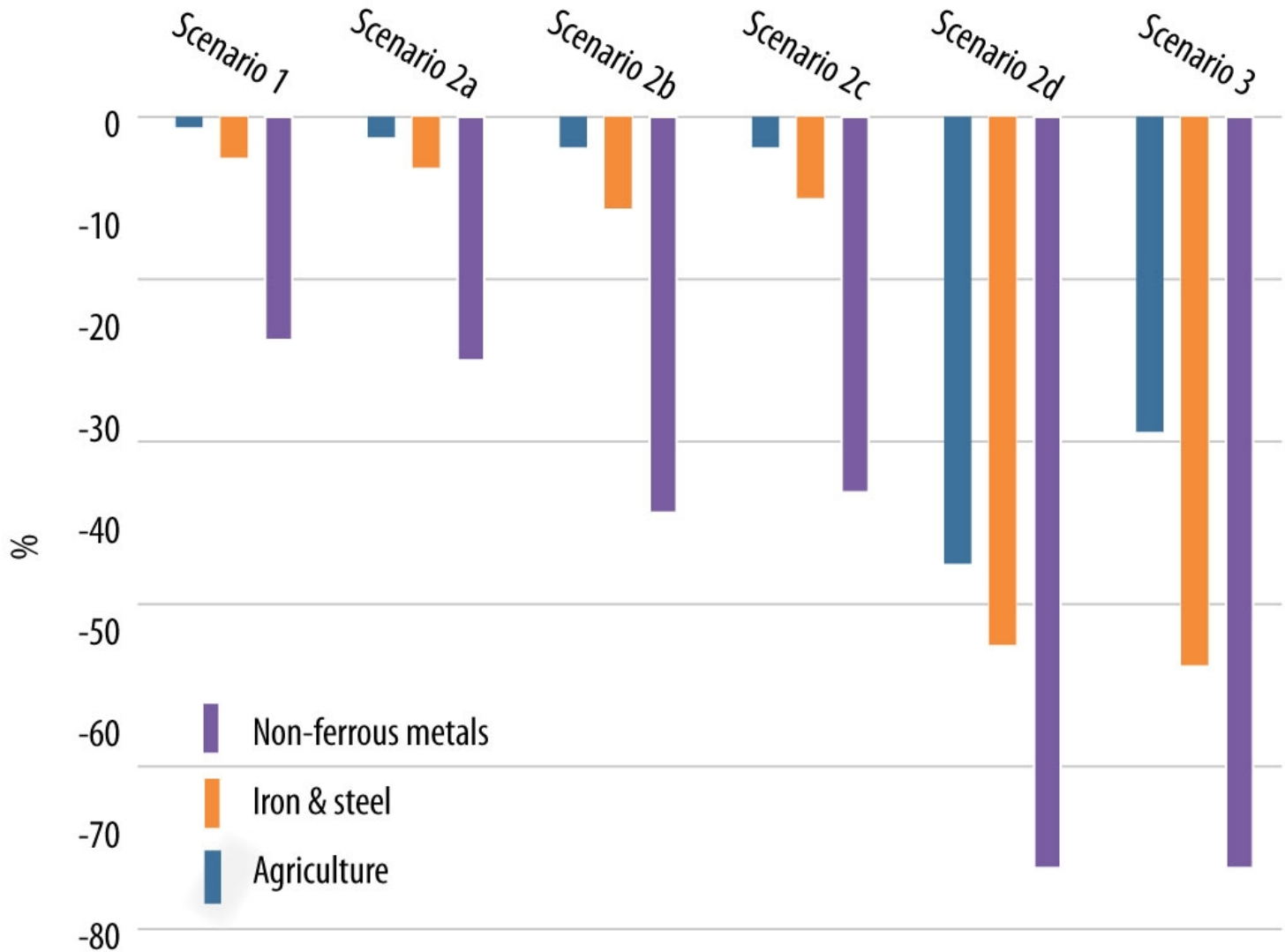
# Economic modelling results – Economic growth under all scenarios



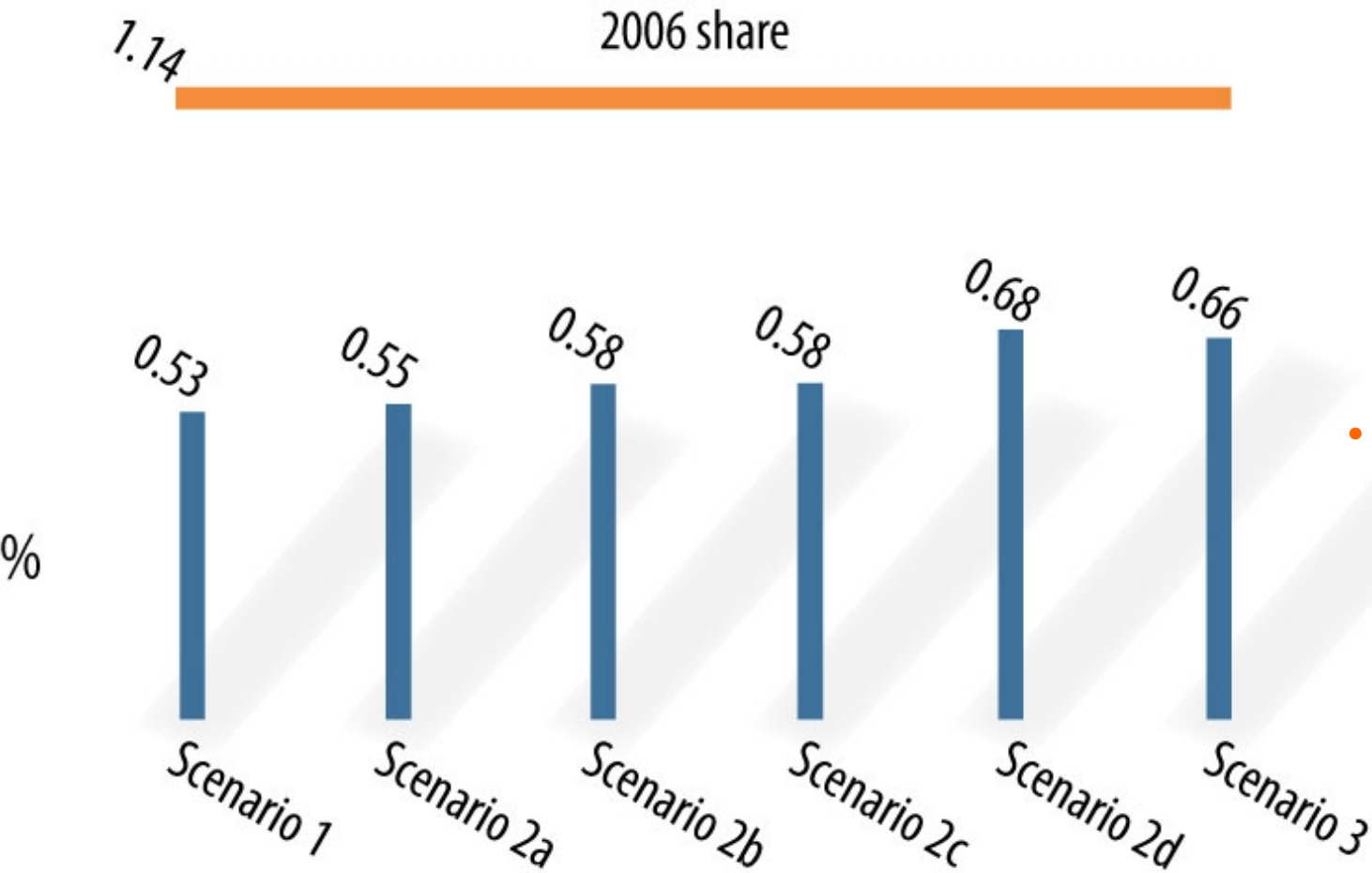
# Economic modelling results – A carbon constrained world will be different

**Industry impacts: Changes in output in 2050 across mitigation scenarios**



# Economic modelling results

**Electricity affordability: Share of household electricity costs in real average full time wages in 2050**




- Surprisingly the affordability of electricity improves - even when more expensive technologies are used
- Why? – whilst residential electricity prices increase between 7 and 20%, real income per capita increases by 100%

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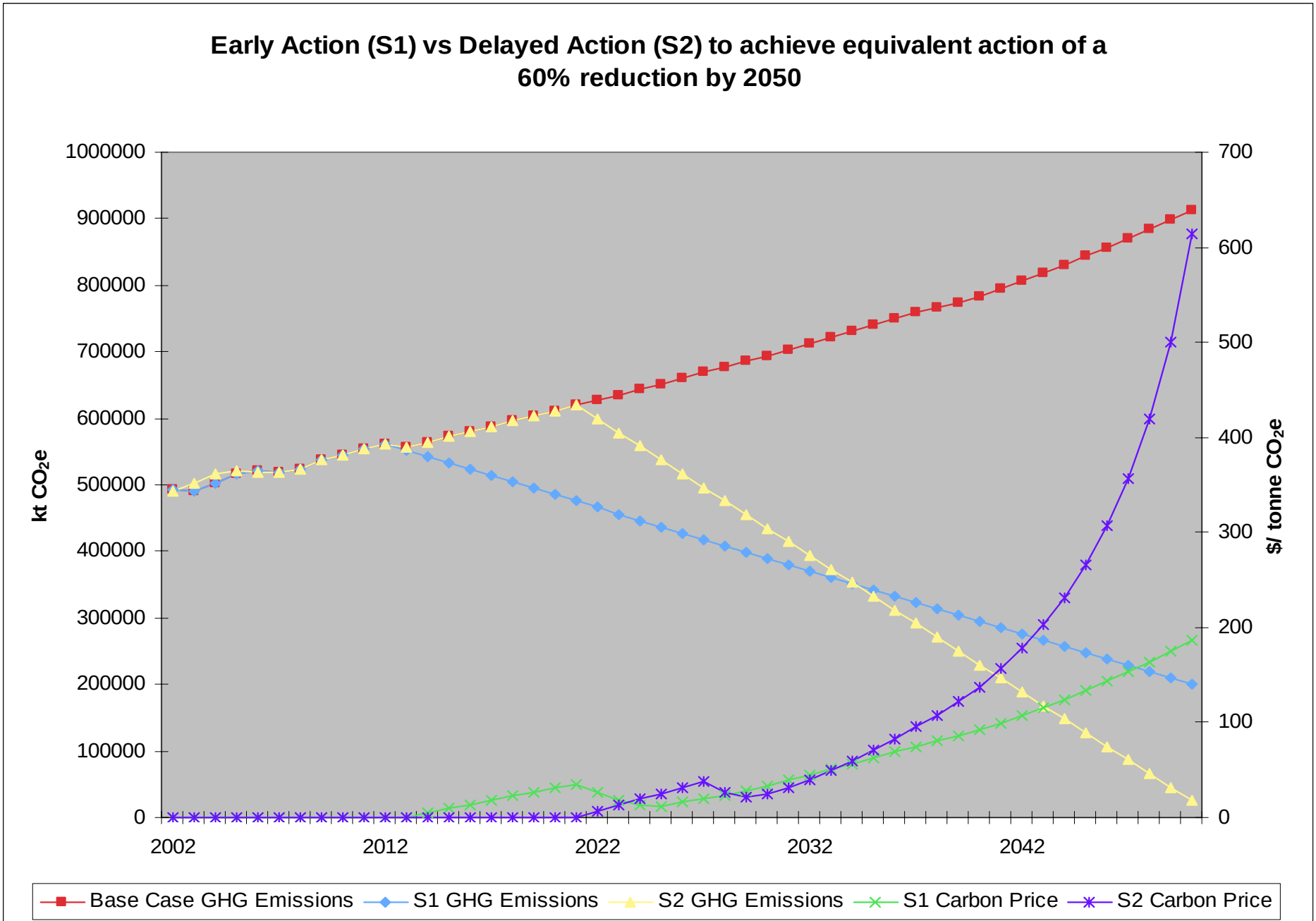
Early Action (S1) vs Delayed Action (S2) to achieve equivalent action of a 60% reduction by 2050
kt CO2e
$/ tonne CO2e
1000000
900000
800000
700000
600000
500000
400000
300000
200000
100000
0
700
600
500
400
300
200
100
0
2002
2012
2022
2032
2042
Base Case GHG Emissions
S1 GHG Emissions
S2 GHG Emissions
S1 Carbon Price
S2 Carbon Price

# Findings of the Energy Futures Forum

- **On the basis of risk assessment, it is likely that the global benefits of avoiding climate change will outweigh the global costs of mitigation. However, Australia's energy intensive and trade exposed industries and the regions they are based in may be disproportionately impacted.**
- **The Australian and World economies will continue to grow when carrying out greenhouse gas mitigation. Furthermore, electricity can be expected to remain affordable for households.**
- **The cost of addressing climate change is lowest for Australia when global participation is high and Australia can choose from all available low emission technologies, in partnership with energy efficiency improvements and demand management.**
- **Uncertainty regarding climate change policy in Australia increases investment risk, particularly in electricity generation. If the risks remain too high for too long then it could lead to higher electricity costs.**
- **There are a wide variety of emission reduction policies which could be brought to bear in Australia at different times.**

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# Conclusions

- Climate Change impacts are evident and climate change responses are occurring
- A carbon-constrained world will lead to shifts across the economy
- Government intervention is necessary, BUT can and should be constrained
- There are solid reasons for Australia to introduce a domestic emissions trading scheme while the international framework is still emerging
- The net outlook is confused by the apparent clarity of the costs of acting, against the opaqueness of the costs of not acting
- Risk management principles and economic analysis support action
- As with all such changes, climate change and responses to perceptions of climate change will create threats and opportunities

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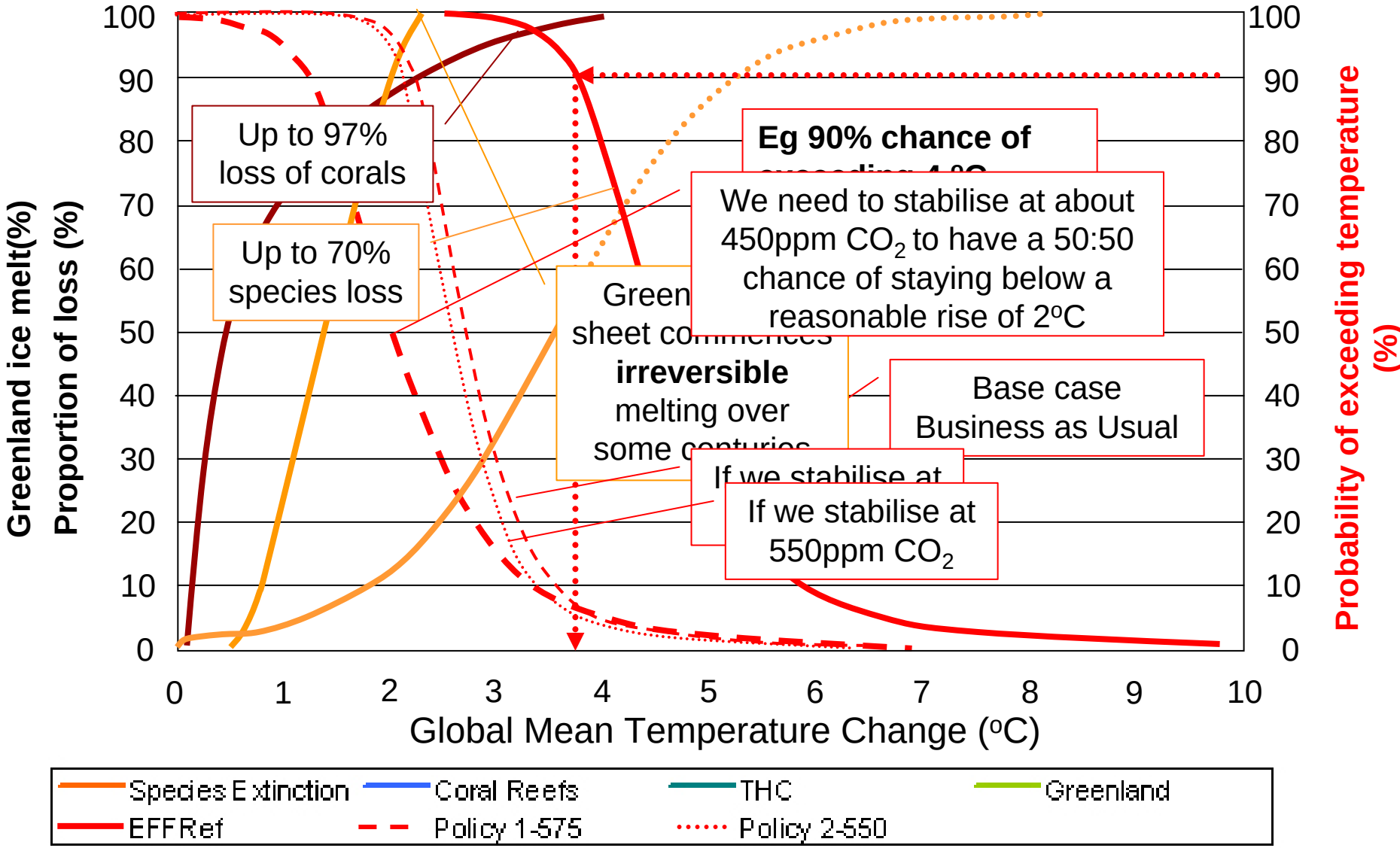
**Thank you**




Ref: CSIRO 2006