The Low Carbon Economy SEMINAR

Risks and Opportunities for the Financial Services Industry

Institute of Actuaries of Australia

finsia

Thursday 9 October 2008 – Sydney

Climate Change: An Investor's Perspective

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Arkx – Australia's First Carbon Fund

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Overview

- **Garnaut Review: key issues**
- Putting a price on carbon: cap and trade schemes vs carbon taxes
- Australia's Carbon Pollution Reduction Scheme: Green Paper
- Carbon offsets
- Learning from overseas
- Complementary policy measures
- Climate change impacts on business & industry
- Investment Winners, Losers and Opportunities

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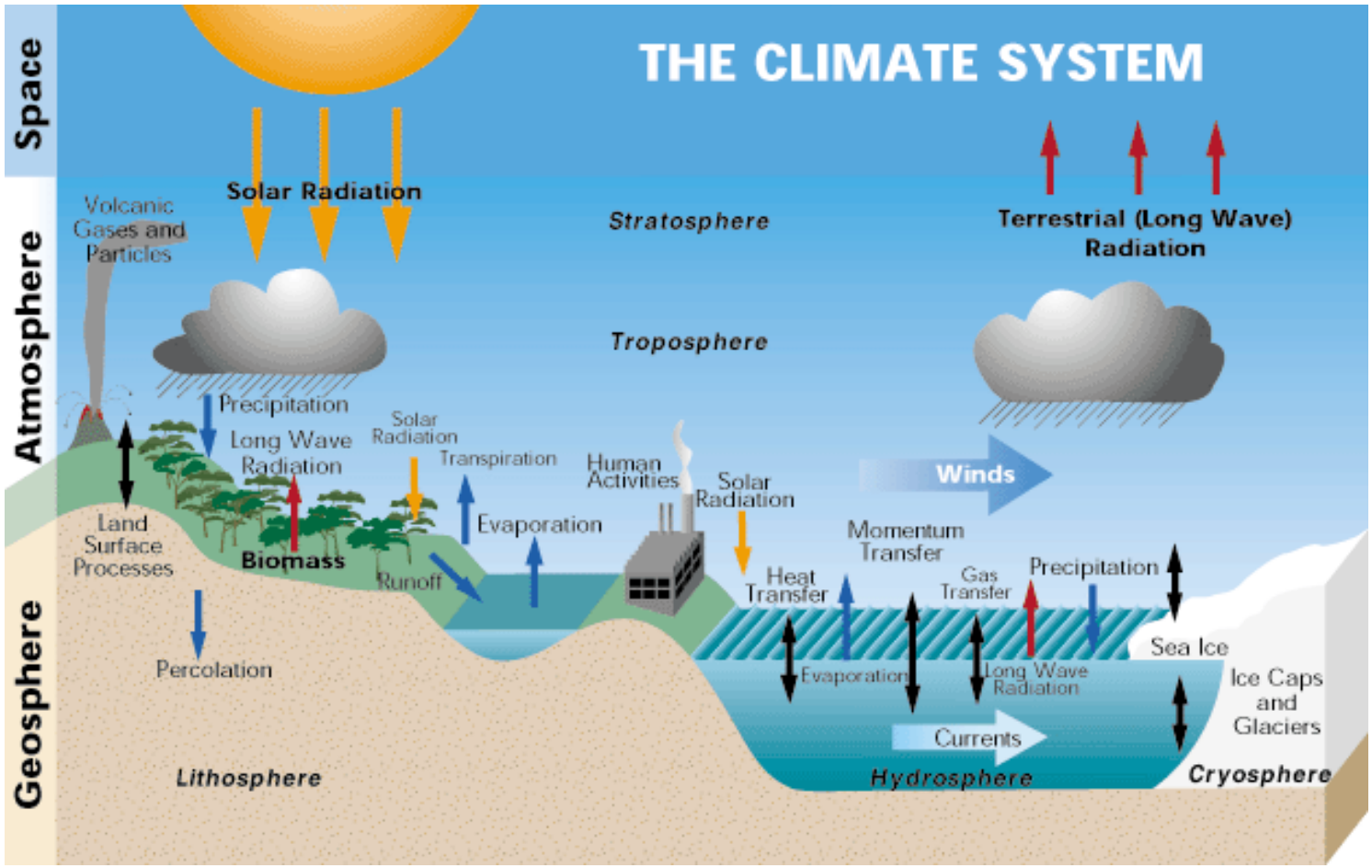
The Greenhouse Effect has complex impacts on the Earth's climate system



Source: Bureau of Meteorology, http://www.bom.gov.au/lam/climate/levelthree/analclim/imagesm/glbwrm.gif

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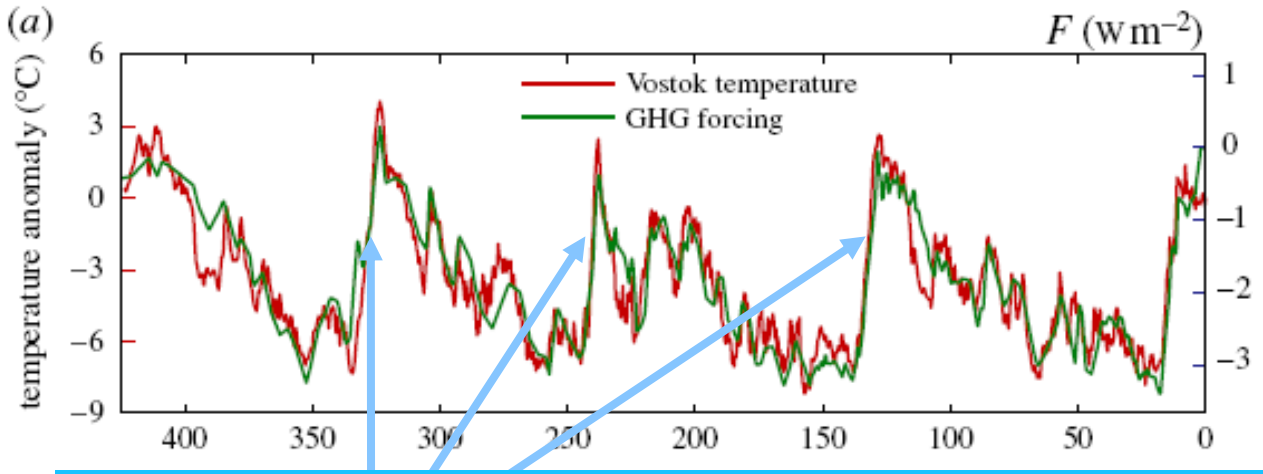
Greenhouse gases (GHG) & temperature are closely interrelated



The graph shows **GHG** and **temperature** have been very closely interrelated for the past 420,000 years.

Why has warming of the Earth happened so much faster than cooling?

Possible explanation: natural systems of "positive feedbacks" speed up warming.

What if human GHG emissions speed up warming even further?

Where does this data come from?

- The ice core drilled at Vostok, Antarctica, is a 3000m-deep 420,000-year sample (horizontal axis shows thousands of years before present).
- Ice core samples are analysed for radioactive isotopes that show temperature history, and for bubbles of trapped gases that show GHG history.

Source: James Hansen et al, *Climate change and trace gases,* Phil. Trans. R. Soc. A (2007)

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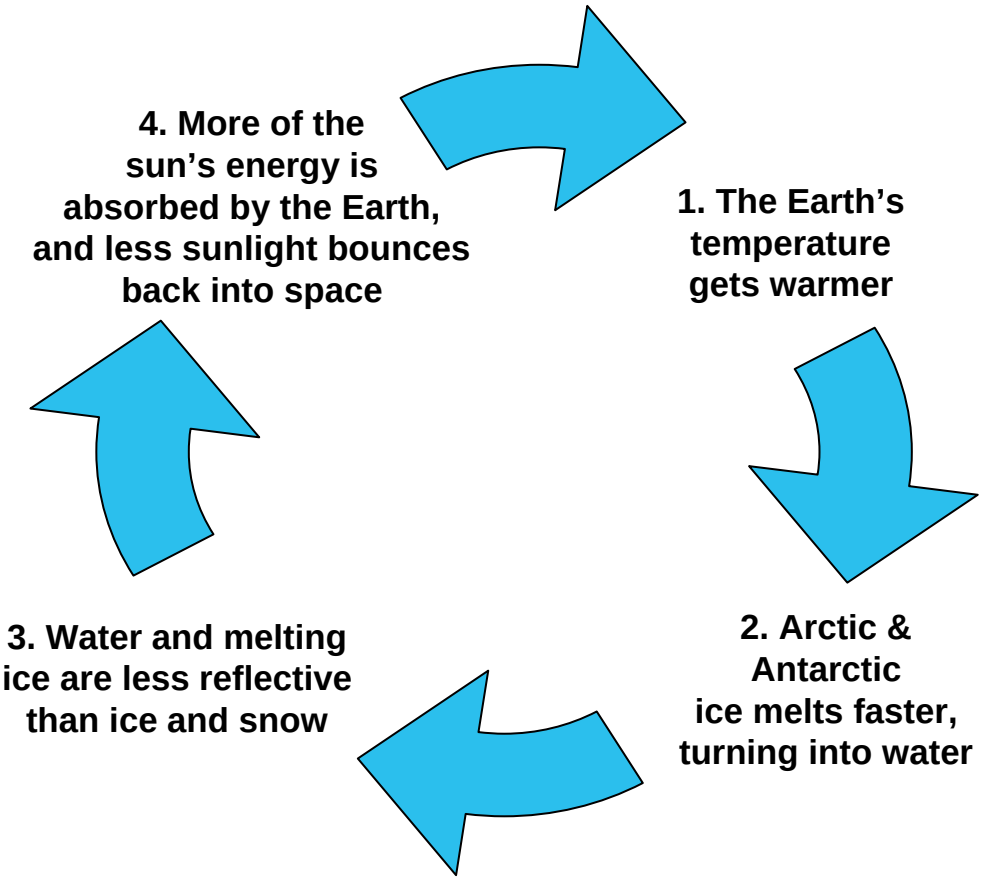
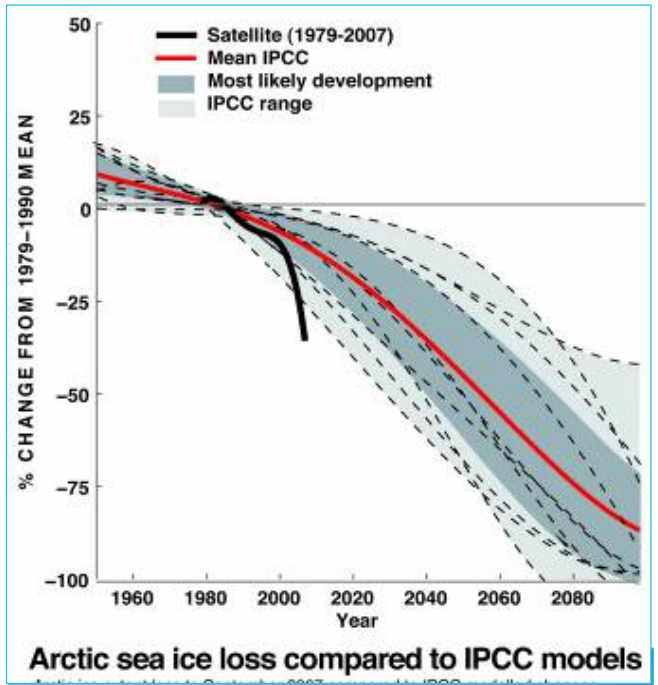
“Positive feedbacks” can speed up global warming

Example: ice melt changes the reflectivity of the Earth’s surface (“surface albedo”)





Arctic sea ice loss compared to IPCC models

Graph courtesy Dr Asgeir Sorteberg, Bjeknes Centre for Climate Research and University Center at Svalbad, Norway, *Retrieved 4 June 2008 from http://www.carbonequity.info/images/seaice07.jpg*
Photo: Fracturing of Ward Ice Shelf: Trent University, Canada, April 16, 2008
Retrieved 21 April 2008 from http://www.sciencedaily.com/releases/2008/04/080415205350.htm

Catastrophic climate change is a growing possibility

If temperatures continue to rise, we risk triggering large-scale, long-lasting events such as:

- releasing large quantities of stored greenhouse gases as the frozen tundra / permafrost thaws out;
- disintegration of the Greenland and West Antarctica ice sheets, raising sea levels and reducing the amount of solar energy being reflected back into the atmosphere;
- making oceans more acidic and less able to absorb carbon dioxide. Rising atmospheric concentrations of CO2 have already made oceans more acidic by about 0.1 pH.

Source: The Australian Climate Group,
Climate Change Solutions for Australia 2008
Pages 3 and 10

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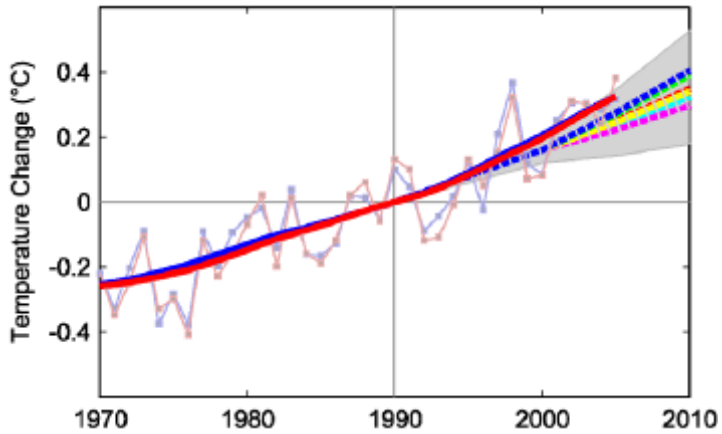
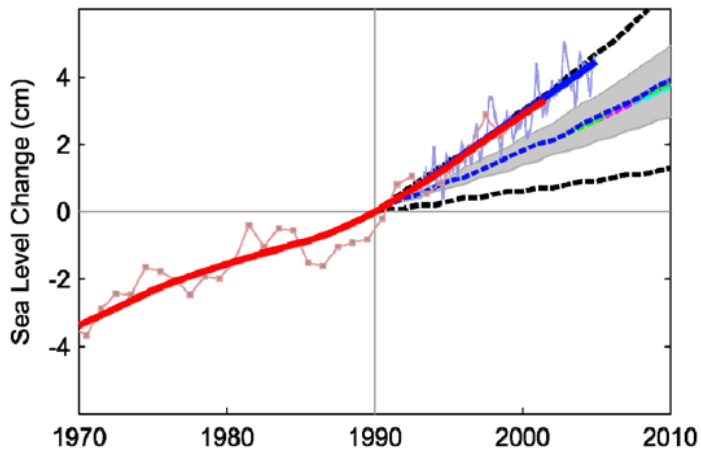
Garnaut: global emissions growth *and* climate response are both emerging worse than expected

- The most pessimistic IPCC emissions scenarios are already being exceeded due to high fossil-fuel-intensive economic growth, especially China and India
- Observed global temperature (top) and sea level change (below) are at the top of the IPCC 2001 predicted ranges.
- The capacity of the oceans and the earth's biosphere to absorb emissions has been falling faster than estimated by the main models.
- Time lag: most of the changes observed so far are the result of historic emissions. What consequences will emerge from this century's unexpectedly high emissions?





Source: *Garnaut Interim Report*, February 2008

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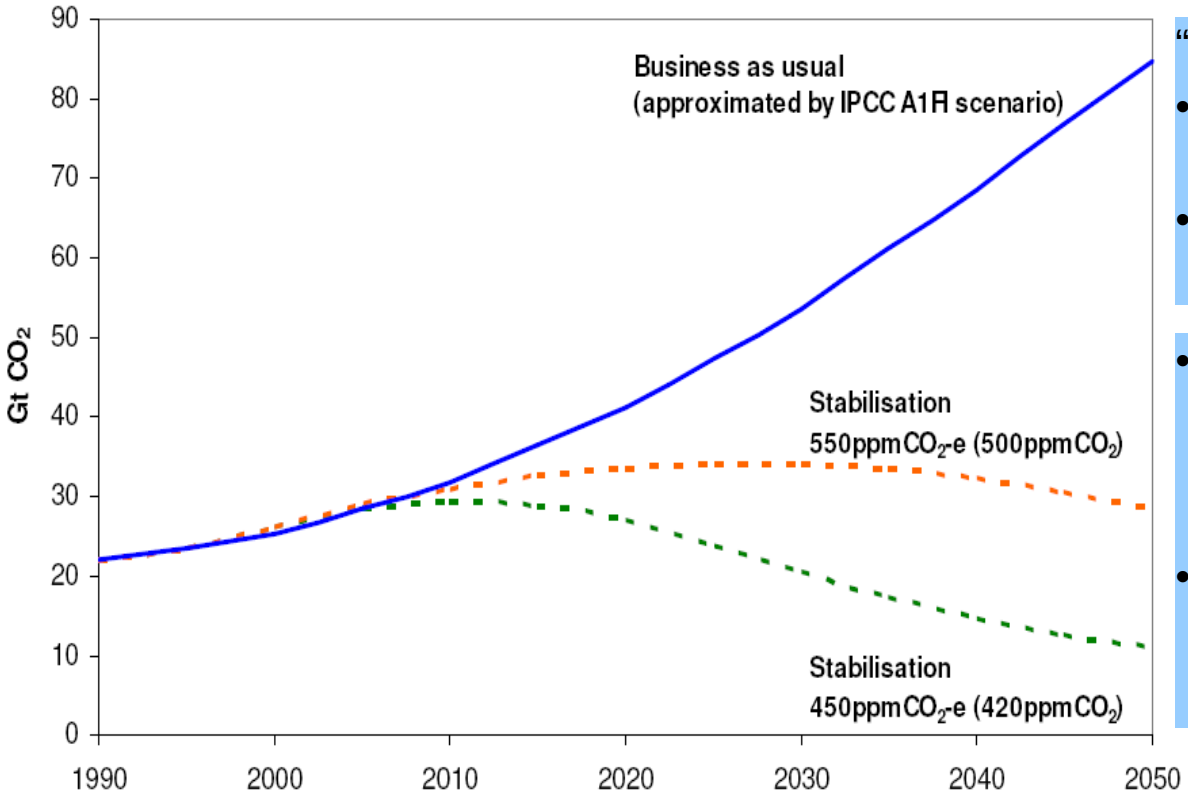
Garnaut: stabilising at 450 ppm CO_2-equivalent will need dramatic, immediate falls in annual global emissions



"Business as usual" scenario:

- Annual emissions continue to climb
- No hope of atmospheric CO_2-e stabilising at safe levels.

- Illustrative reductions in annual emissions to stabilise at concentration targets of 550ppm or 450ppm CO_2-e .
- Even the green path results in some risky temporary overshooting to 500ppm.

Garnaut says: **"Recent acceleration of global emissions growth has made the task even harder than anticipated just two years ago."**

Source: *Garnaut Interim Report*, February 2008, Figure 4

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Garnaut: Australia must focus on achieving global solutions

"It is important to see any period in which an Australian mitigation effort is in place prior to an effective global arrangement as

- **Short**
- **Transitional**
- **Contributing to the achievement of a sound global agreement."**

Source: *Garnaut Climate Change Review Draft Report*, June 2008

Australia would be possibly the biggest loser amongst developed countries from unmitigated climate change

…but Australia is not currently a leader in addressing climate change

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Garnaut: effective international action creates many opportunities for Australia

Australia is well placed to benefit because of:

- exceptional human resource base in engineering, management & finance
- large reserves of uranium and / or natural gas for export
- exceptionally rich resources for renewable energy
- large deposits of high quality (ie low emissions per unit of energy) coal
- exceptionally good sites for carbon capture & storage, if it becomes commercially feasible
- higher transport costs may make it more advantageous to process minerals close to where they are mined - ie here, not overseas – prior to export
- our large livestock industries are less emissions-intensive than competitors in the Northern Hemisphere
- heritage of cheap energy: we have huge untapped opportunities to improve energy efficiency

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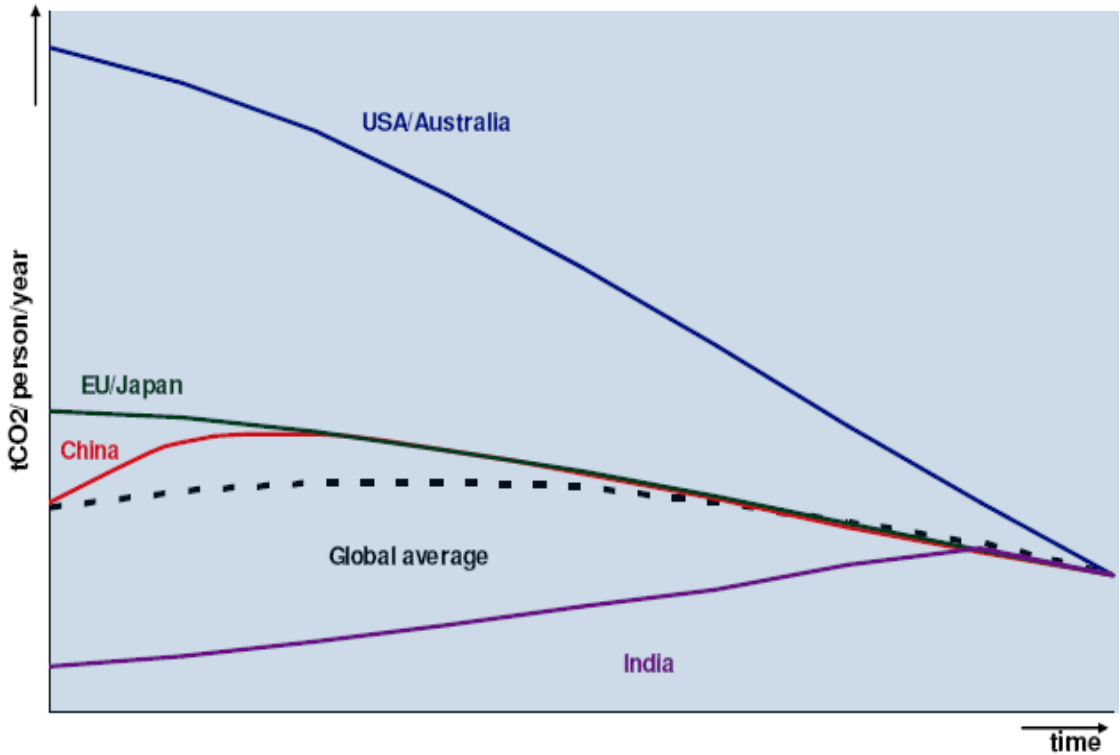
Garnaut: an international way forward could be based on targets per person ("*contraction* and *convergence*")

Developed countries reduce their per capita emissions without delay. High emitters reduce faster.



Over time, global average emissions per person *contract*

Developing countries temporarily increase their emissions per person to address poverty

Emissions budgets start out equal to each country's current emissions per person

Over time, countries *converge* on the same level of emissions per person

Scope for international trade in emissions rights

Source: *Garnaut Interim Report*, February 2008, Figure 7

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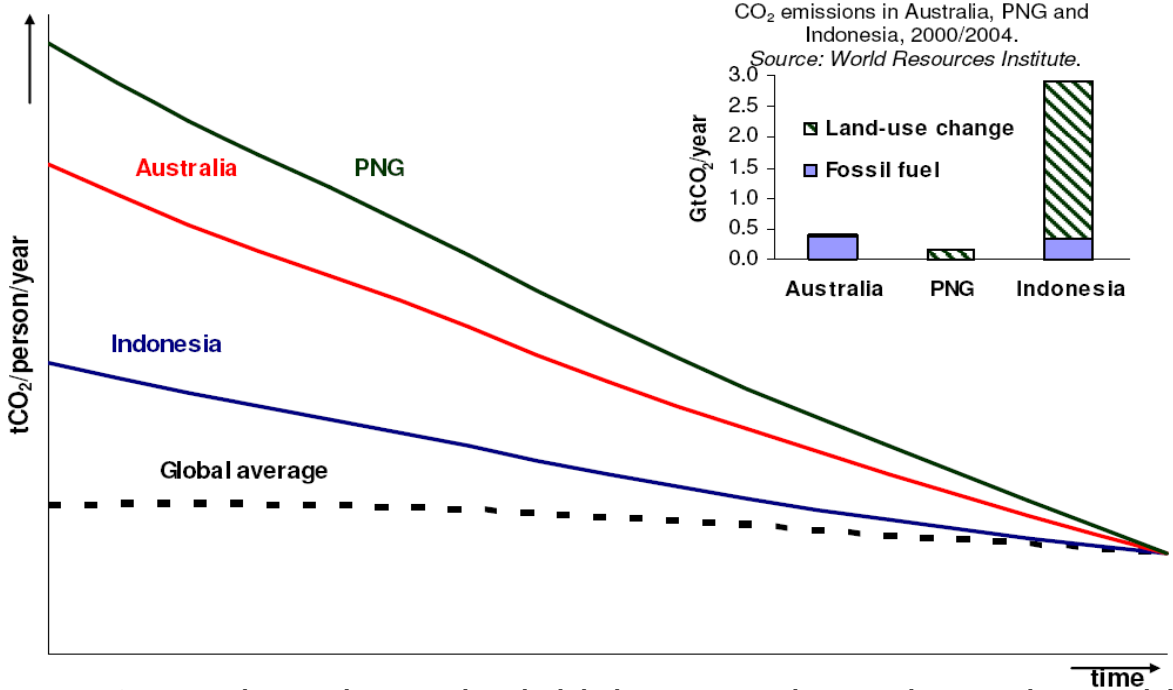
Garnaut: Australia, PNG and Indonesia could all benefit from a regional agreement



- PNG & Indonesia are both high per capita emitters due to high levels of deforestation
- Under a regional agreement, Australia could easily reduce its per capita emissions by purchasing emissions rights from PNG & Indonesia
- This would give PNG & Indonesia a strong financial incentive to reduce their deforestation and change to “greener” land management: a win-win situation

Source: Garnaut Interim Report, February 2008, Figure 9

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Garnaut: Key Points from 5th September announcements

- During 2010 -2012 the carbon price should be $20/tonne of CO2 rising by 4% per plus CPI. A carbon price of $34.50 at 2020 is implied by the modelling and the emissions targets outlined below.
- Start with a global target, then apply to Australia on a per capita basis.
- Global target (CO2 & equivalent GHGs) of 550 parts per million (ppm) with 450 ppm the “ambitious” objective that could be achieved through early action. The current actual level is 455ppm
- For Australia, this implies a 10% reduction in emissions by 2020 (a 27% reduction in per capita emissions) compared to 2000 levels. This compares to a European Union target of 20% reduction by 2020 (17% per capita)
- Treasury modelling suggests the 10% reduction by 2020 would cost 1.1% of GDP by 2020. Garnaut says, therefore, “while substantial” it “does not threaten to derail the long term growth path of Australia”

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Why put a price on carbon?

- **Climate change is “the greatest and widest-ranging market failure ever seen”.**
- Those who produce greenhouse-gas emissions are bringing about climate change, thereby imposing costs on the world and on future generations - but they do not face directly the full consequences of the costs of their actions.

Sir Nicholas Stern, UK Treasury, October 2006

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How a cap and trade scheme works

- **The ‘cap’ achieves the environmental outcome of restricting greenhouse gas pollution, and creates a carbon price by limiting supply.**
- **‘Trade’ allows emission reductions at the lowest possible cost to the economy.**

1. Government issues a limited number of carbon pollution permits, up to the total ‘cap’ for the scheme.
2. Significant emitters must acquire a carbon pollution permit for every tonne of greenhouse gas they emit. Their quantity of emissions is monitored and audited.
3. At year end, liable firms must surrender a permit for every tonne of emissions they produced that year.
4. Firms compete to purchase the number of permits that they require.
   - Firms that value carbon permits most highly will be prepared to pay most for them - either at auction, or on a secondary trading market.
   - For other firms, it will be cheaper to reduce emissions than to buy permits.
5. Certain firms may receive some permits for free, as a transitional assistance measure. These firms could use the free permits or sell them.

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Simplified cap and trade example

Consider a hypothetical economy that emits 120 tonnes CO_2 pa:

- 2 manufacturers; each produces 60 tCO_2 pa giving a total of 120 tCO_2 pa
- **The cap:** Government decides to cut total emissions by 20t to **100 tCO_2 pa**
- Government issues 100 Permits; each manufacturer obtains 50 permits
- Each permit gives the right to emit 1 tCO_2
- **Manufacturer A can reduce emissions at a cost of $10 per tCO_2**
- **Manufacturer B can reduce emissions at a cost of $20 per tCO_2**

With no trading, cost of reduction would be = **10 x $10 [A]** + **10 x $20 [B]** = $300

With trading, Manufacturer A could reduce by 20, at a total cost of $200. A would then emit 40 tCO_2, whilst holding 50 Permits, thereby freeing 10 Permits for sale to B.

⇨ The sale price would be somewhere between $10 [cost of reduction for A] and $20 [cost of reduction for B] per tCO_2

⇨ **Net cost to economy is $200, instead of $300 under the "no trading" scenario**

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Carbon tax vs cap and trade: pros and cons

Carbon tax

- government sets a fixed penalty per tonne of emissions
- the volume of emissions then reacts in response to the fixed price

Pros:
- simpler to administer

Cons:
- environmentally unacceptable, as there is no direct control over the quantity of emissions

Cap and trade scheme

- government sets a fixed limit on the total emissions permitted
- emitters can then trade permits

Pros:
- able to meet the environmental objective
- market forces assist abatement at least cost to the economy

Cons:
- more complex; more scope for political pressure / rent-seeking; carbon price can be volatile

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Green Paper: trajectories and coverage

- **Emissions reduction targets:** 60% below 2000 levels by 2050.
- **Emissions trajectories:**
  - caps will be set for at least 5 years in advance and rolled forward annually
  - guidance over future caps through use of a ‘gateway’, initially for 10 years beyond the minimum 5 years of scheme caps
  - gateways will be extended every five years by another 5 years
- **Sectoral coverage:** approx 70% of national emissions, around 1,000 firms
  - stationary energy, transport, fugitive emissions, industrial processes and waste sectors included from scheme commencement, and
  - forestry activities recognised in Australia’s Kyoto Protocol accounts are eligible to ‘opt in’ from scheme commencement
  - deforestation: not included
  - agriculture: significant challenges, so will not enter before 2015
  - includes all the six Kyoto Protocol greenhouse gases

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Green Paper: design features

- **Domestic offsets:** limited scope due to broad coverage of the scheme
- **Banking and borrowing of permits:**
  - unlimited banking of permits allowed
  - limited amount of short term borrowing
- **Price cap:**
  - transitional price cap for the period 2010–11 to 2014–15, set high enough above the expected permit price to provide a very low probability of use
- **Reporting and compliance:**
  - based on the National Greenhouse and Energy Reporting System (NGERS)
- **Linking to international schemes/markets:**
  - initially, limited import of Kyoto Protocol compliance units and no export of Australia's own Kyoto compliance units
  - longer term, open linking is preferred

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Green Paper: revenue and assistance

- **Permit allocation:**
  - allocations should progressively move towards 100% auctioning
  - transitional assistance to emissions-intensive trade-exposed (EITE) industries and strongly affected industries
- **Use of auction revenue:**
  - help Australian households and businesses adjust to the scheme
  - invest in clean energy options
- **Emissions-intensive trade exposed assistance:**
  - allocations of permits to EITE activities of up to around 20% of permits (30% once agriculture enters the scheme)
  - assistance based on an industry-average emissions intensity baseline: 60% for 1500-2000t/$million revenue; 90% for more than 2000t/$m revenue.
  - assistance does not cover all of the emissions liabilities of the activity

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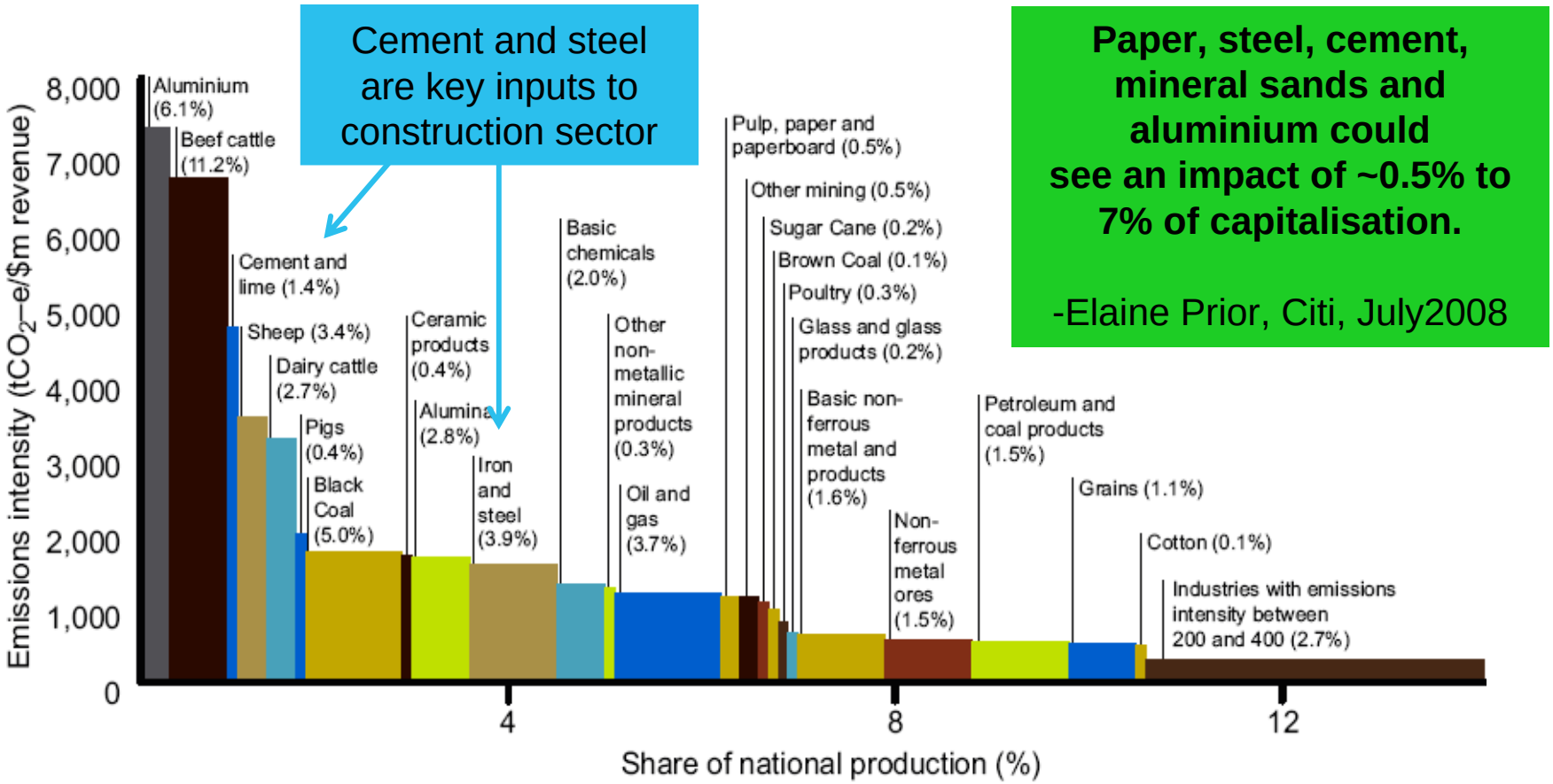
Which are Australia's most emissions-intensive industries?



Source: *Carbon Pollution Reduction Scheme Green Paper*, July 2008, Figure 9.2 - Estimated emissions per $m revenue of Australian industries 2001-2002

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Carbon offsets

Compliance market: To comply with their Kyoto obligations, governments can buy certain carbon offsets in order to meet national caps on the total amount they are allowed to emit.

Voluntary market: Individuals or businesses can choose to buy offsets to voluntarily reduce their own carbon footprint (eg to offset their air travel).

Carbon offsets are:

- Tradeable certificates, used to offset all or part of another entity's emissions
- Represent reductions in greenhouse gases relative to a business-as-usual baseline
- Typically generated from emissions-reducing or carbon sequestration projects such as wind farms, hydroelectric dams, forestry projects, etc
- Carbon offset products vary greatly in quality, reliability and value

Challenges:

- Additionality: hard to prove whether or not the project was going to take place under business-as-usual
- Over-reliance on offsets can dampen the incentive to switch to lower-emitting options

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Carbon offsets under the Kyoto Protocol

- An offset created under the Kyoto Protocol is called a **Certified Emission Reduction** (CER)
- CERs can be created through:
  - **Clean Development Mechanism** (CDM) projects
    - eg a developed country sponsors a wind farm in a developing country with lower costs. The developed country earns CER credits towards its emission reduction targets, and the developing country receives the capital investment and benefits from the new power supply.
  - **Joint Implementation** (JI) projects
    - eg a developed country with high costs sets up an emissions reduction project in another developed country with lower costs.
- The UN Framework Convention on Climate Change (UNFCCC) allows CERs to be traded between participating countries.

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Developments in emissions trading in other countries

- **UK:** voluntary cap and trade scheme commenced 2002; now part of EU ETS
- **EU ETS:** cap and trade scheme commenced 2005; includes 27 countries
- **New Zealand:** ETS commenced 2008; initially covers forestry, expanding to full coverage of all sectors and gases by 2013
- **Norway:** ETS commenced 2005; Norway, Iceland and Liechtenstein linked with the EU ETS in 2007
- **Japan:** Voluntary ETS established in 2005 to trial emissions trading, initially between 31 businesses
- **Canada:** ETS to be introduced in 2010
- **US:** Regional Greenhouse Gas Initiative due to commence 2009 (cooperative effort by nine states); Western Climate Initiative currently under development by 8 states & 2 Canadian provinces; both Presidential candidates support ETS.

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Emissions reduction targets in the European Union

- By 2020, the EU has committed to reduce GHG emissions by 20% of 1990 levels, regardless of what other economies do
- EU has committed to reductions of 30% if there is “a satisfactory global agreement to combat climate change post 2012”
- The EU has the largest emissions trading scheme in the world and it may be in Australia’s interests to be able to link in with this scheme

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Evolution of the EU Emissions Trading Scheme

Phase I
'Learning by doing'
2005 - 2007

→

Phase II
'First commitment period of the Kyoto Protocol'
2008 - 2012

→

Phase III
Now in planning:
'strengthen, expand and improve'
2013 onwards

Key lessons from early years of the EU ETS :

1. "Proof of concept" has been achieved and the EU ETS now has widespread political endorsement.
2. Long-term emission reduction targets and transition targets are key to reducing risk for businesses and investors.
3. It is crucial to ensure scarcity of permits and avoid over-allocation.
4. Allocation of free permits, coupled with opportunity cost pricing, can lead to windfall profits for electricity generators.

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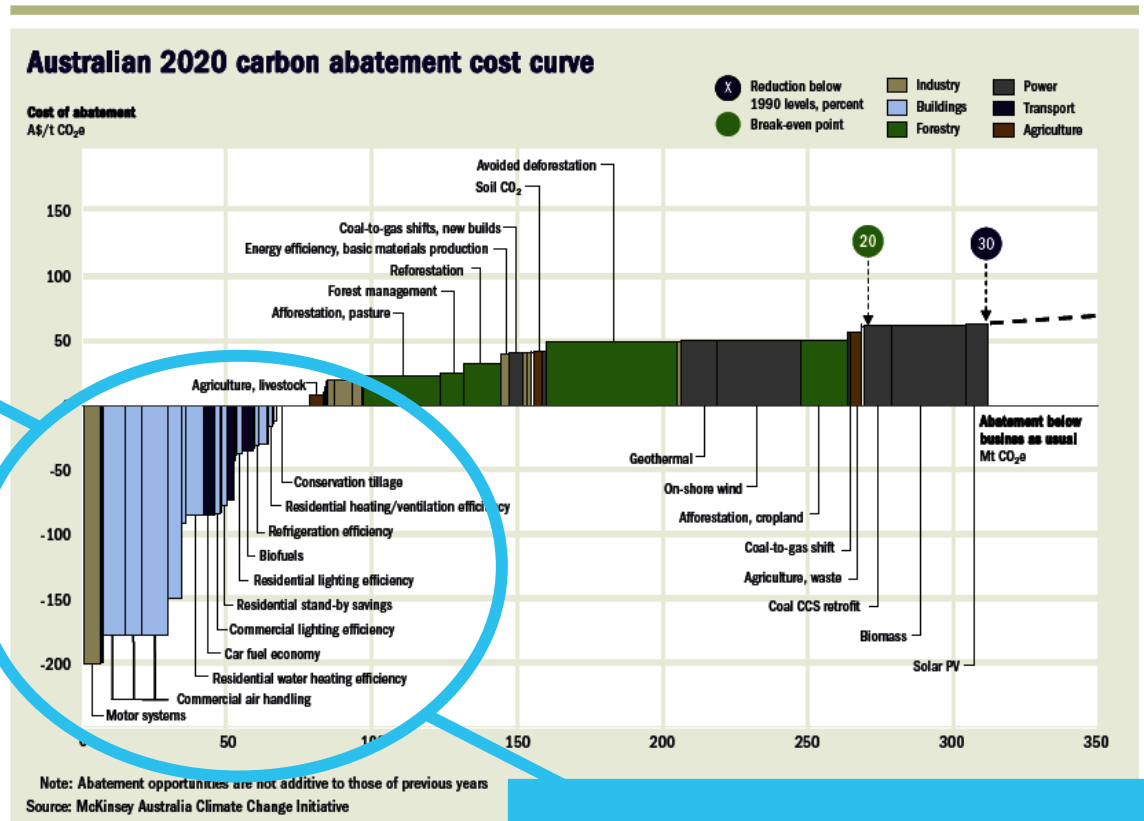
McKinsey research: reducing Australia's emissions 20-30% by 2020 is achievable and affordable

Numerous negative-cost opportunities – **many in the building sector** – would let Australia reduce emissions in 2020 by **20% below 1990 levels at no net cost to the economy**

Australia could reduce emissions in 2020 by 30% below 1990 levels at a net cost averaging only $290 per household per annum



Need complementary policies to address market imperfections

Many energy efficiency opportunities require up-front capital investment

Source: McKinsey & Company, *An Australian Cost Curve for Greenhouse Gas Reduction*, February 2008

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Complementary policy measures promoting energy efficiency

- More than 100 existing government climate change programs exist in Australia
- **Current energy efficiency programs include**:
  - Low-interest Green Loans
  - Low Emission Plan for Renters program, which subsidises the installation of insulation in rental properties
  - Energy efficiency labelling of some consumer goods
- **Energy efficiency programs can complement an ETS by overcoming**:
  - Insufficient knowledge about energy efficiency opportunities
  - Lack of time to weigh up all the information available (“bounded rationality”)
  - Misaligned incentives, where there is little motivation to pay for energy efficiency if someone else recoups the benefits (eg landlord and tenants)

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Complementary policy measures promoting renewable energy

- Australia's Mandatory Renewable Energy Target (MRET) introduced in 2001
- 66 countries around the world have mandated renewable energy targets
- Rudd has committed to expanding MRET:
  - **At least 20% of Australia's electricity supply to be generated from renewable sources by 2020** (approx 60,000 gigawatt-hours, compared to approx 15,000 GWh at present)
- Intention is to phase out MRET between 2020 and 2030 as emissions trading matures and higher carbon prices mean the target is no longer required
- To satisfy MRET, some of Australia's 2020 emissions reduction target will need to be met by switching to higher-cost renewables rather than lower-cost gas (ESAA, July 2008)

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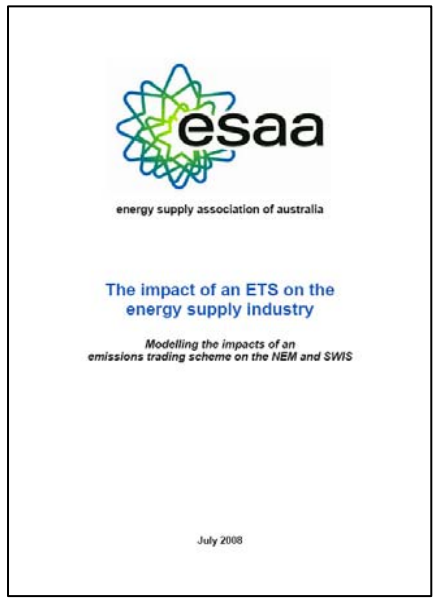
Impact of MRET & ETS on energy supply industry: ESAA

- ETS can deliver least-cost abatement; real energy costs for consumers may rise significantly
- 10-20% emissions cuts (on 2000 base levels for the energy sector) by 2020 could force closure of most of the Vic and SA coal-fired power plants
- MRET of 20% by 2020 is achievable, adding approx 5% to retail tariffs by 2020
- **Risks**:
  - Security of power supply due to misalignment of closure of existing plant and opening of new lower-emitting or renewable plant
  - Adequacy of local gas supply in SE Aust post-2020
  - Environmental approvals etc could delay construction of new generators such as wind



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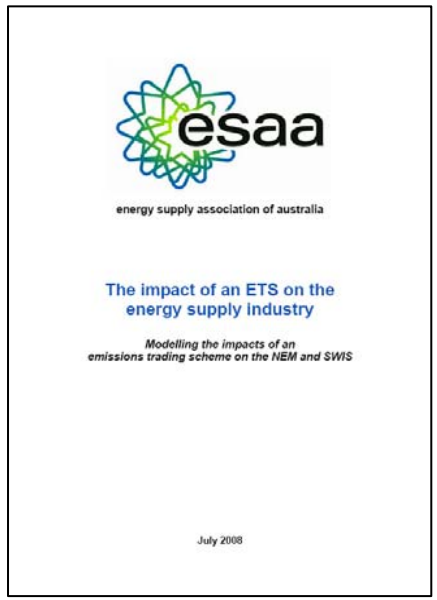
ESAA: unprecedented capital investment & construction will be required

- **The challenge:**
  - 20% cuts (say) in Australia's power sector emissions by 2020 compared to 2000 baseline, plus
  - replace decommissioned or stranded coal plant, plus
  - meet 20% MRET
- **This is a massive construction and investment task!!**
  - **17,600 MW** of new generating capacity is required – approx 1/3 of Australia's current generation capacity
  - This represents capital investment of around **$36 billion** – approximately equal to the depreciated value of the current generation assets
  - Connecting new remote generation (eg geothermal, wind) and increasing gas pipelines capacity will need at least **$4.5 billion** additional investment



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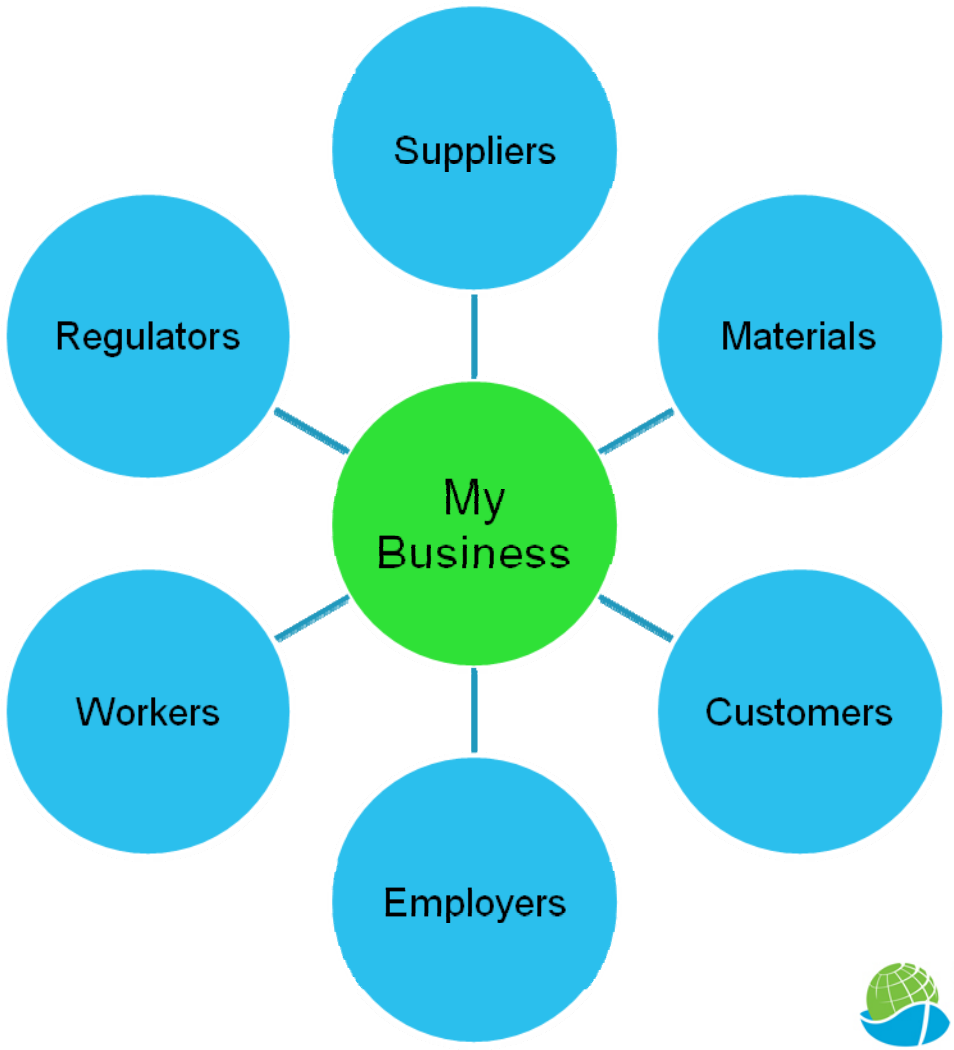
Diverse nature of the impacts of climate change

Physical impacts of climate change

Regulatory impacts

Market impacts



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Climate change will affect cost structures and drive innovation

- **Emissions trading will increase cement and steel prices**
  - Cement production alone contributes around 3.8% of total global greenhouse gas emissions (IGCC 2007); but scope for major abatement eg steel thin slab casting (McKinsey Global Institute, Feb 2008)
  - Concrete and steel production are among Australia's most emissions-intensive activities and these materials will be affected by a carbon price
- **Scope for innovation in materials, products and methods**
  - Regulated and/or voluntary improvements in energy efficiency, both during and after construction (eg air handling; lighting; water heating)
  - Distributed generation of renewable power; cogeneration
  - Buildings and infrastructure (eg urban drainage) will need increased resistance to heat, cyclone, flood – possible changes in building codes

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Small climate changes can dramatically increase risks

Hazard	Change in climate	Resulting change in hazard
Cyclone	2.2 °C mean temperature increase	Increase of 5-10% in Cyclone wind speeds
Bushfire	1°C mean summer temperature increase	17-28% increase bushfires
Drought	1.3°C maximum temperature increase	25% increase in evaporation leading to increased bushfire risk
Floods	25% increase in 30 minute precipitation	1 in 100 yr Flood becomes 1 in 17 yr Flood

Source: Mills et al (2001)

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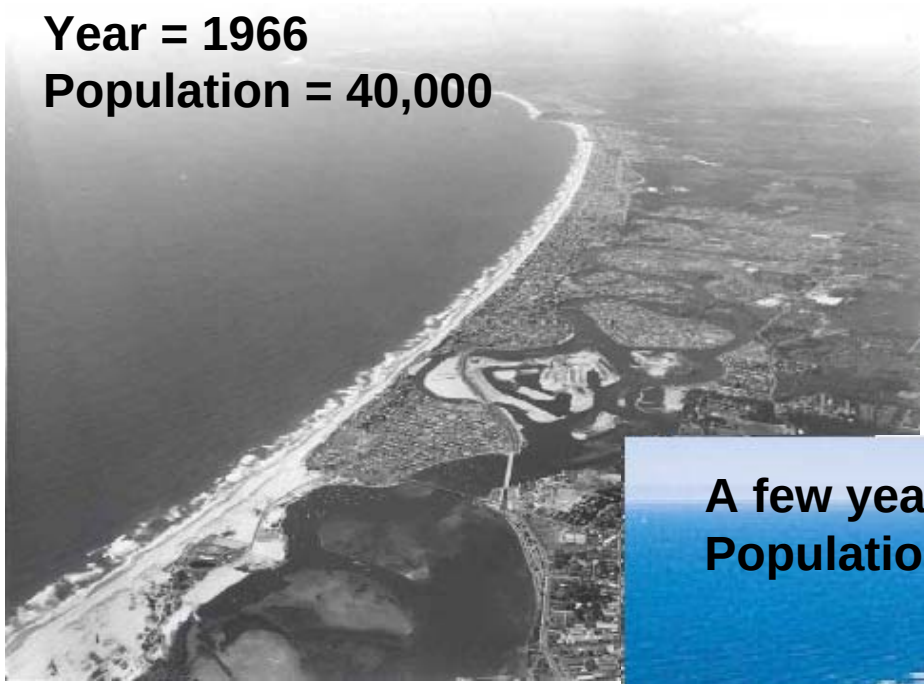
Changing exposures: Gold Coast cyclone exposure



Source: Prof Rodger Tomlinson, Climate Change and Coastal Erosion, June 2005

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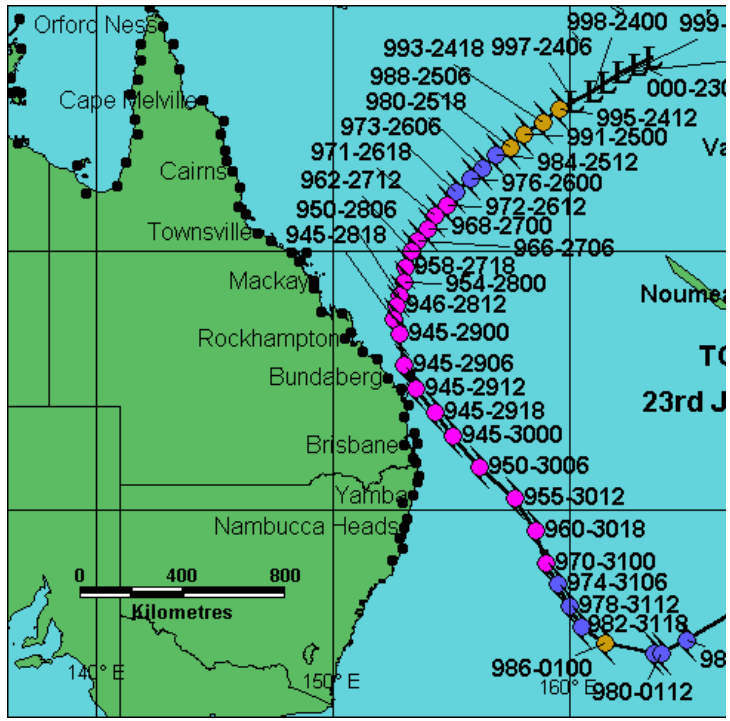
Economic impact if Qld cyclones move further south

- If TC Dinah (1967, Cat 3) took place today, but only 100-150km further south, it would affect Brisbane, Gold Coast & Sunshine Coast.
- Munich Re estimated that potential insured losses would be US$8-14 billion (2006)

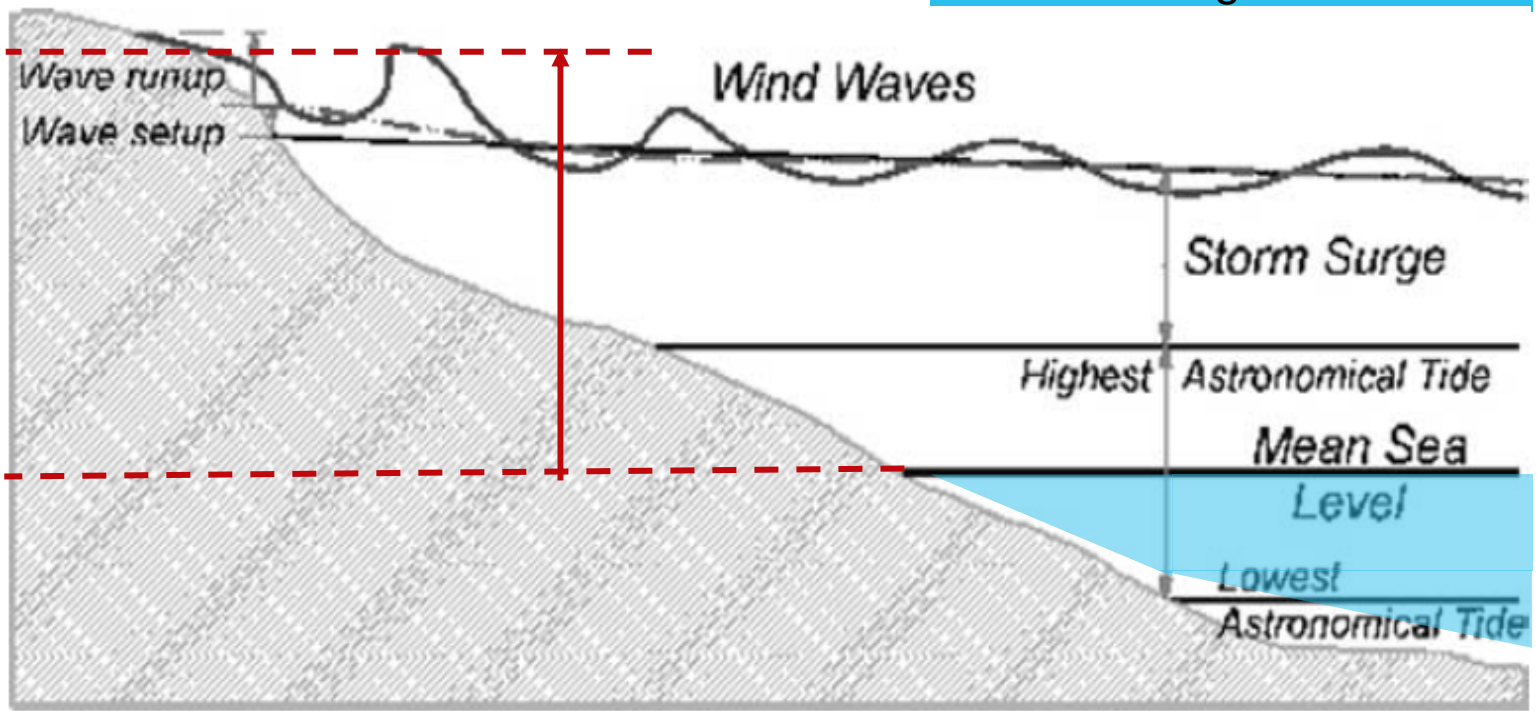
(Source: Munich Re, Topics Geo Natural Catastrophes 2006)

TC "Dinah" Jan – Feb 1967



Coastal vulnerability: storm surge, tides & wind – all affect sea levels

Tides, storm surge, and wind can drive ocean waves several metres above average sea level



K. L. McInnes, K. J. E. Walsh, G. D. Hubbert and T. Beer, *Impact of Sea-level Rise and Storm Surges on a Coastal Community*, Natural Hazards 30: 187–207, 2003

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High waves can flood and / or destroy coastal land

- Erosion on Belongil Beach on the NSW Far North Coast
  © NSW Department of Land and Water Conservation

- Property damage at Wamberal, 1978, due to beach erosion
  http://www.environment.gov.au/coasts/publications/nswmanual/appendixc2.html

Sea levels are rising because of climate change – much of the potential loss is not currently insured

- IPCC: global sea level rise of 18-59 cm by 2100, plus possible additional contribution from ice sheets of 10 - 20 cm. But this is only a small (?) part of the story!
- Potential melt/slippage of land-based ice sheets would increase sea level by several metres. Warning period and rapidity of impact are unknown.
- Crucial risk area: How much will polar temperatures increase if average global increase is say 4 degrees? What would this magnitude of warming mean for land-based ice masses?
- *What happens when higher sea levels, greater windstorm intensity/storm surge and natural high tide all combine?*

- More than **425,000 Australian addresses** are below 4m above mean sea level and within 3km of the shore
- Greater Sydney: **46,000 addresses** within 1km of the shoreline have elevations less than 3m
- Nerang River, Gold Coast: around **15,000 properties** are vulnerable to both coastal and riverine flooding

"A national coastal vulnerability study"
Risk Frontiers (2006)

Property insurance does not cover land value.

Consider financial risk to banks & owners if land becomes unusable.

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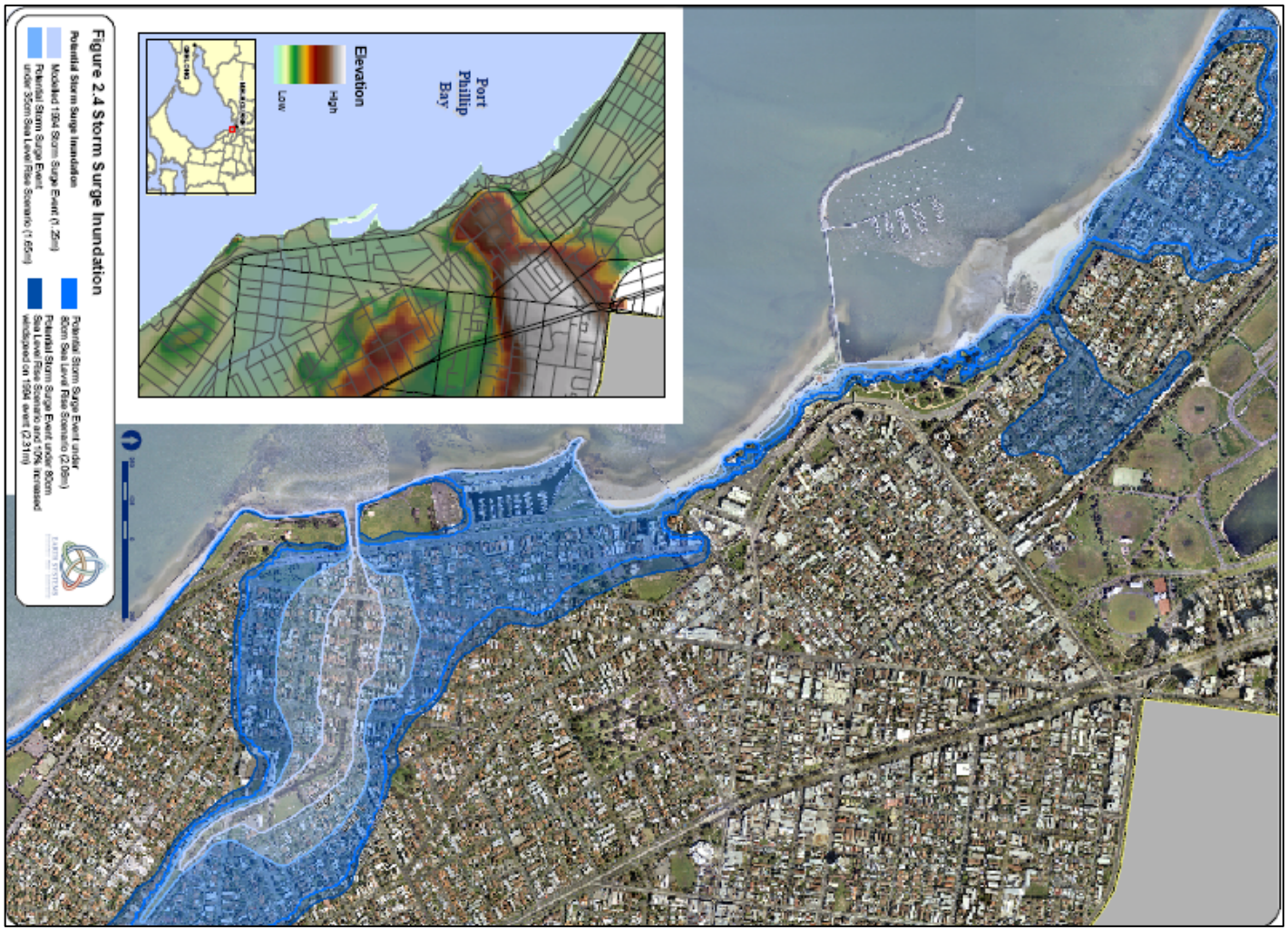
St Kilda, Melbourne: models of rising sea levels plus worsening storm surge under climate change



1.25m storm surge (historical)

1.65m storm surge + 35cm sea level rise

2.06m storm surge + 80cm sea level rise

2.31m storm surge + 80cm sea level rise

Source: http://www.portphillip.vic.gov.au/attachments/o23359.pdf

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Manly, Sydney: Annually exceeded water levels under current, low- and high- climate change scenarios

100% Annual Exceedence Probability water levels:

Current = 1.25 m AHD

With low climate change = 1.25 + .18 = 1.44 m AHD

With high climate change = 1.25 + .91 m = 2.16 m AHD

With abrupt land ice disintegration = 1.25 + ??? m

Source: http://www.manly.nsw.gov.au/IgnitionSuite/uploads/docs/280408%20Draft%20for%20Discussion.pdf

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Some Other Climate Change Impacts

- **Huge opportunity for construction of renewable and cleantech power generation + transmission infrastructure**
- **Alpine and barrier reef tourism destinations will come under threat as ecosystems are damaged**
- **Future changes in sea level, flood & storm surge are already impacting approvals for development: how will this affect coastal land values ?**
- **Urban development patterns: how will cities address needs for low-fossil-fuel transport ? Implications for residential density around transport hubs ?**
- **Ensuring water security: further desalination plants ?**
- **Future demand for housing for environmental refugees? A 1 metre sea level rise displaces more than 140 million people, many in our region.**

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Overview

- Garnaut Review: key issues
- Putting a price on carbon: cap and trade schemes vs carbon taxes
- Australia's Carbon Pollution Reduction Scheme: Green Paper
- Carbon offsets
- Learning from overseas
- Complementary policy measures
- Climate change impacts on business & industry
- **Investment winners, losers and opportunities**

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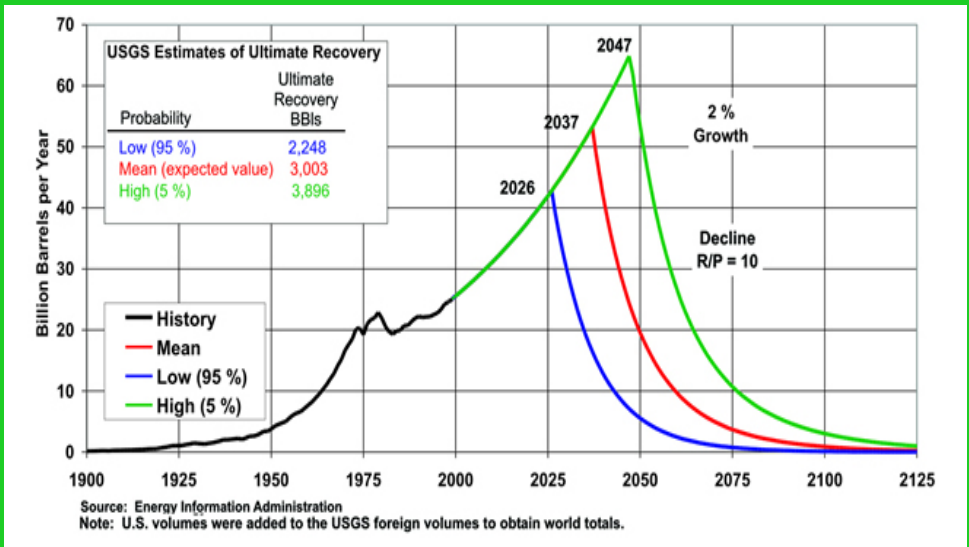
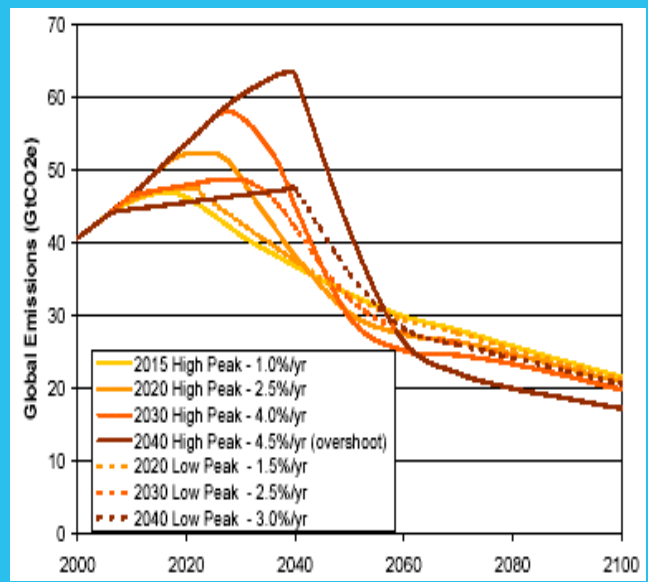
Peak oil is emerging as a simultaneous driver

Long-Term World Oil Supply Scenarios 2004: peak oil scenarios



- Oil production peak now-2040
- Timing is uncertain; Merrill Lynch estimates around 2015
- 80–95% of all transport currently fuelled by oil products
- Supply constraints will increase oil prices

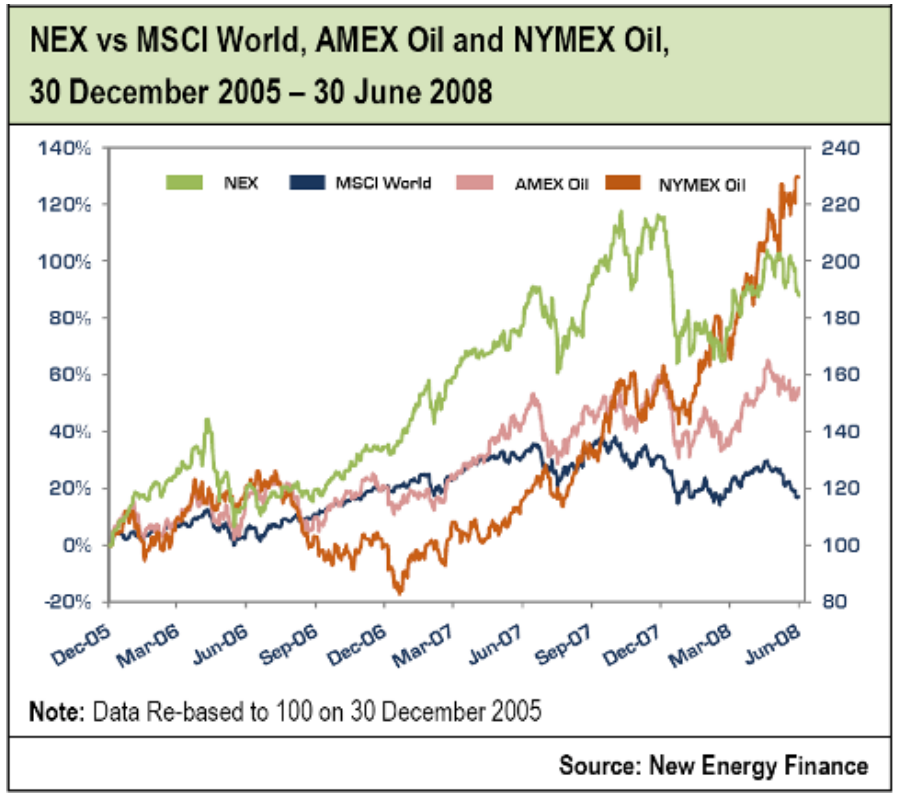
Illustrative peak GHG scenarios (Stern Review)



- Emissions peak 2020-2040
- Loss of oil may complement GHG reduction efforts – but how will industries adapt?

Where are the big opportunities?

- **Listed and unlisted global renewable, cleantech and energy efficiency companies**:
  - wind, solar, biofuels / biomass, hydro, geothermal, wave
  - energy efficiency
  - hydrogen & fuel cells, power storage
  - climate change service providers
- **Investment in these is a prerequisite to living with climate change**
- **NEX: New Energy Global Innovation index**
  - 91 companies in 20 countries
  - focusing on cleantech and renewables
  - market capitalisation US $364.8bn
  - returned 57% in 2007
  - has outperformed the MSCI for 3 years



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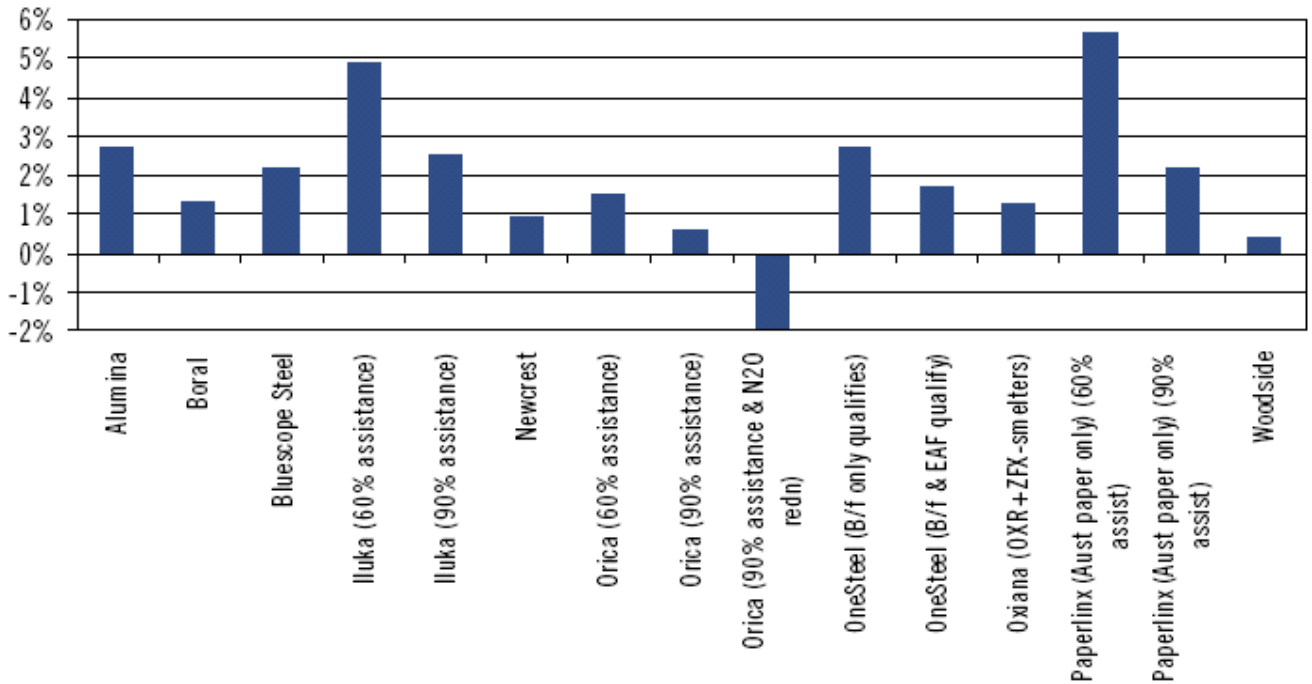
Winners and Losers from Carbon Pricing

- Analysis of ASX100 companies by Elaine Prior, Citi Investment Research:
  - Assumed $20/tCO2-e carbon price and actual emissions
  - For about 75% of ASX, potential impact of CPRS would be less than 2%

Figure 1. Potential Cost Impact of CPRS as Percentage of Market Capitalisation – Base Case



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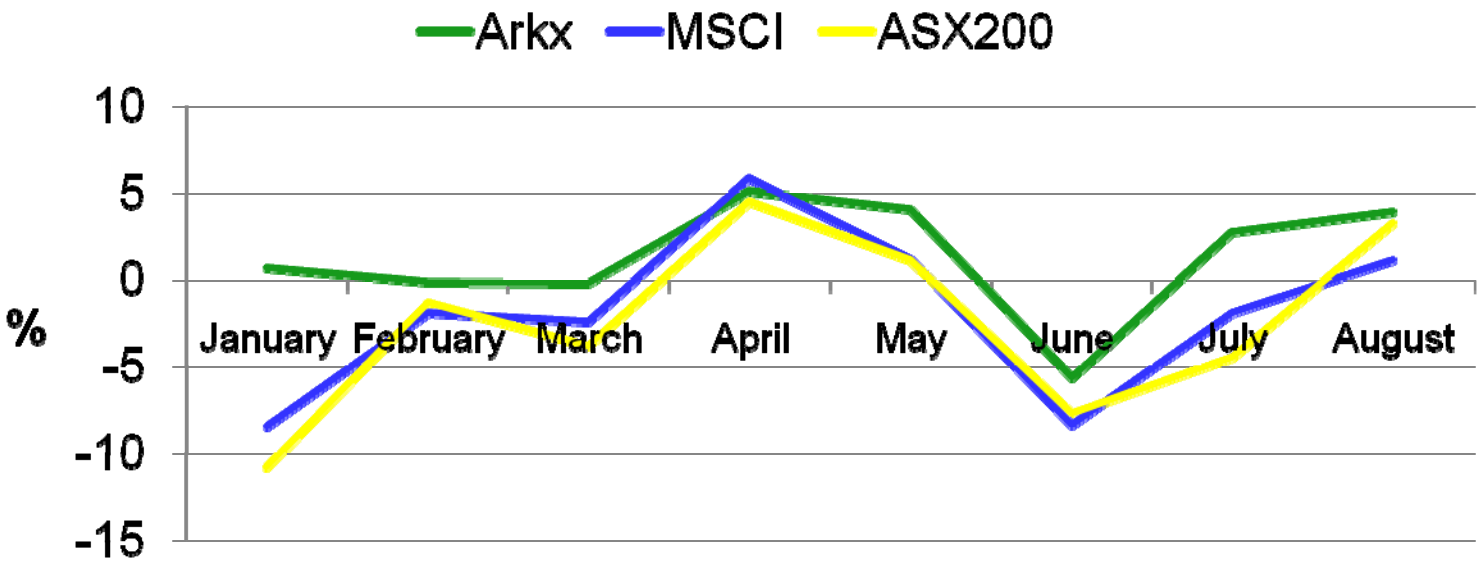
Arkx Performance 2008



Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	YTD
Arkx Carbon Fund	+0.68	-0.14	-0.25	+5.12	+4.10	-5.70	+2.77	+3.94	+10.55
MSCI	-8.47	-1.88	-2.41	+5.87	+1.2	-8.36	-1.90	+1.13	-14.65
ASX200	-10.88	-1.38	-3.88	+4.48	+1.06	-7.77	-4.56	+3.20	-19.00

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