



Centre for Energy and
Environmental Markets

UNSW
THE UNIVERSITY OF NEW SOUTH WALES
SYDNEY • AUSTRALIA



1. Introduction to ETS

Baseline and Credit schemes

Clean Coal, Brisbane, August 2005

Masterclass: Developing a National Carbon
Trading Scheme for Australia

Presented by
Iain MacGill



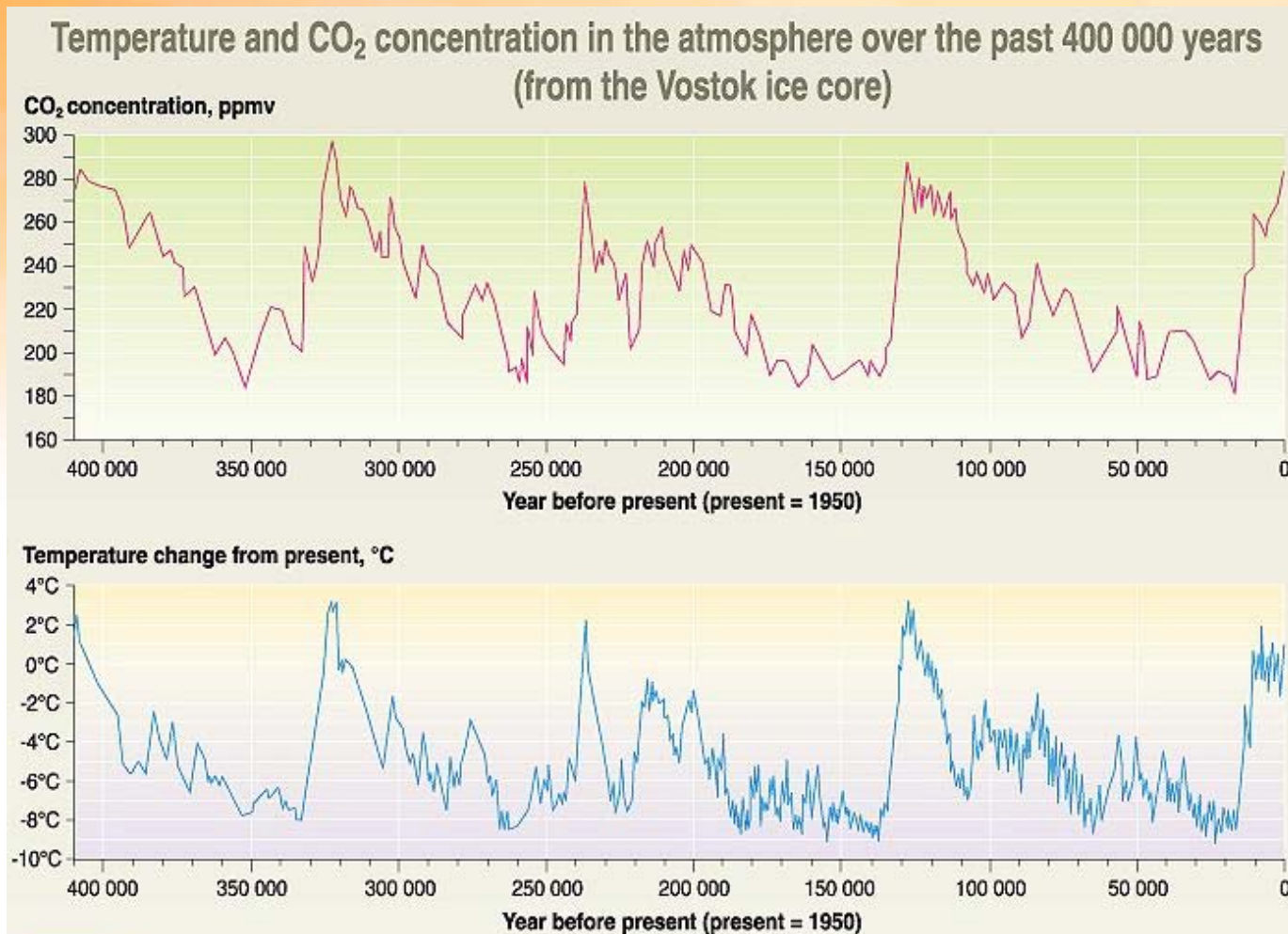
Australian energy policy

- COAG has agreed to the following national energy policy objectives: (COAG ENERGY POLICY DETAILS: 8 JUNE 2001)
 - Encouraging efficient provision of reliable, competitively-priced energy services to Australians, underpinning wealth and job creation and improved quality of life, taking into account the needs of regional, rural and remote areas;
 - Encouraging responsible development of Australia's energy resources, technology and expertise, their efficient use by industries and households and their exploitation in export markets;
 - **Mitigating local and global environmental impacts, notably greenhouse impacts, of energy production, transformation, supply and use.**
- *What is mitigating climate likely to require?*



The link between climate change and CO₂

Source: <http://www.grida.no/climate/vital/>

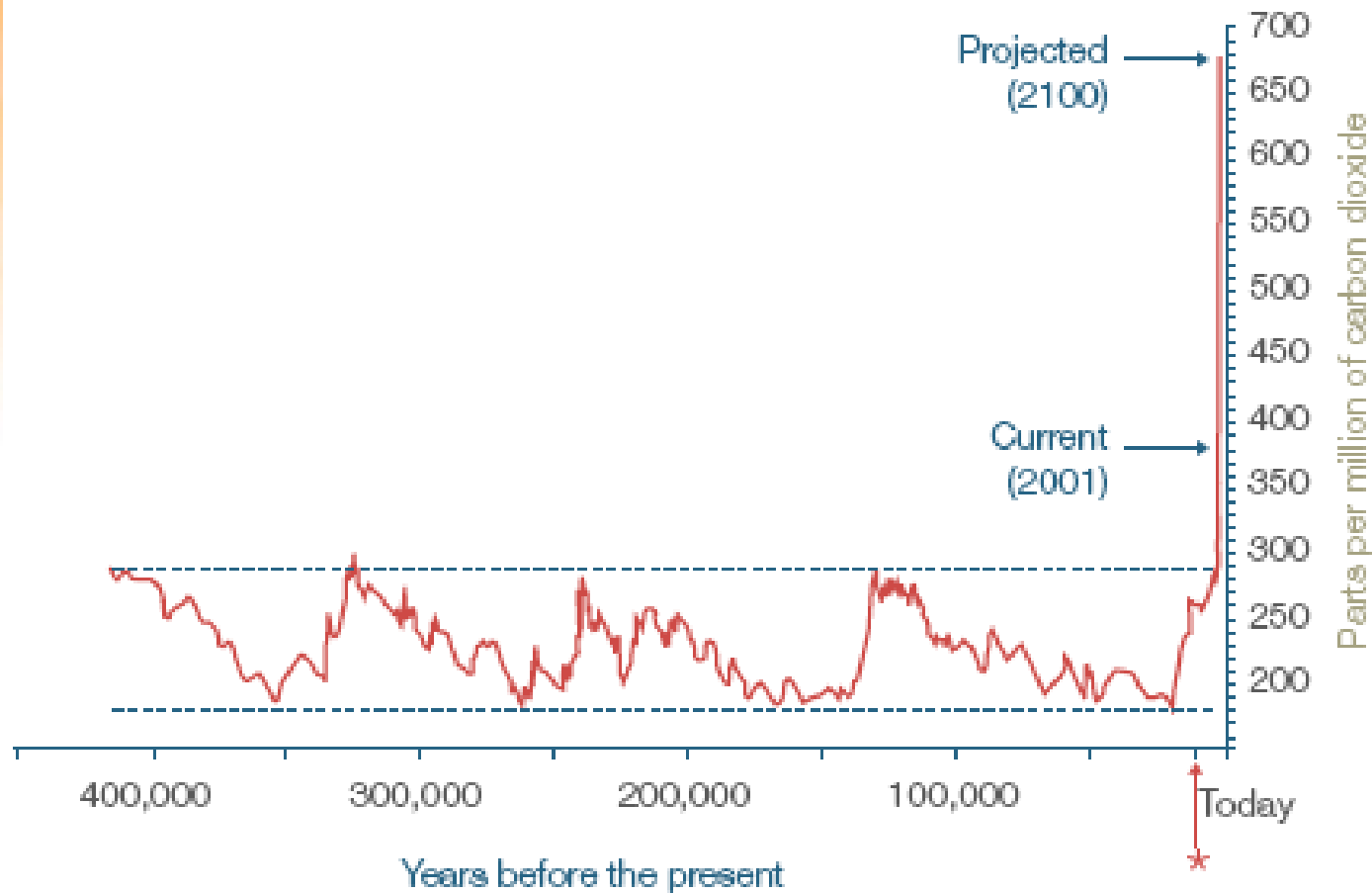




CO₂ concentration in the atmosphere

(Climate Action Group, 2004)

Source: Co-operative Research Centre for Greenhouse Accounting, 2001

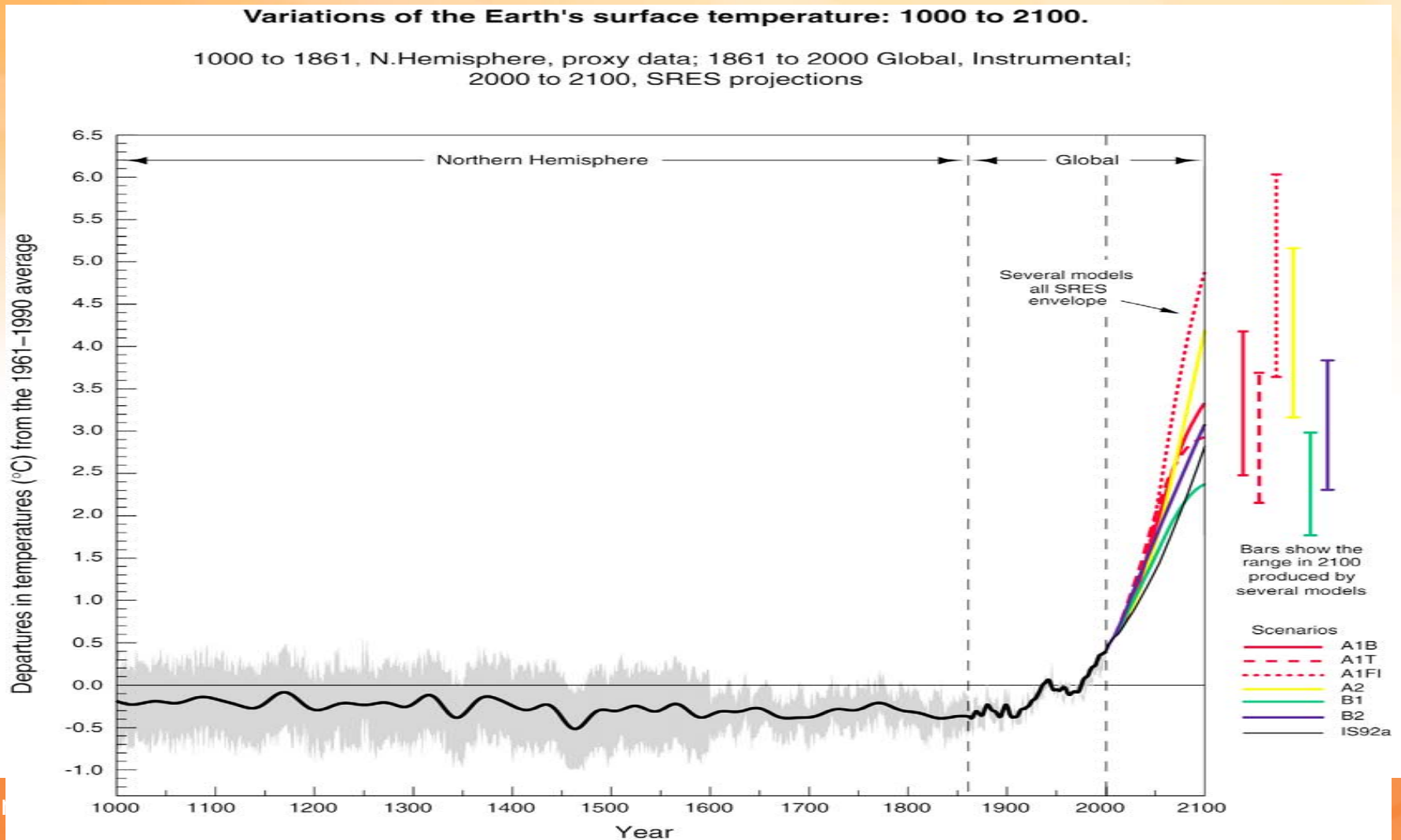


National carbon dioxide concentration *Note: Civilisation began 7,000-10,000 years ago



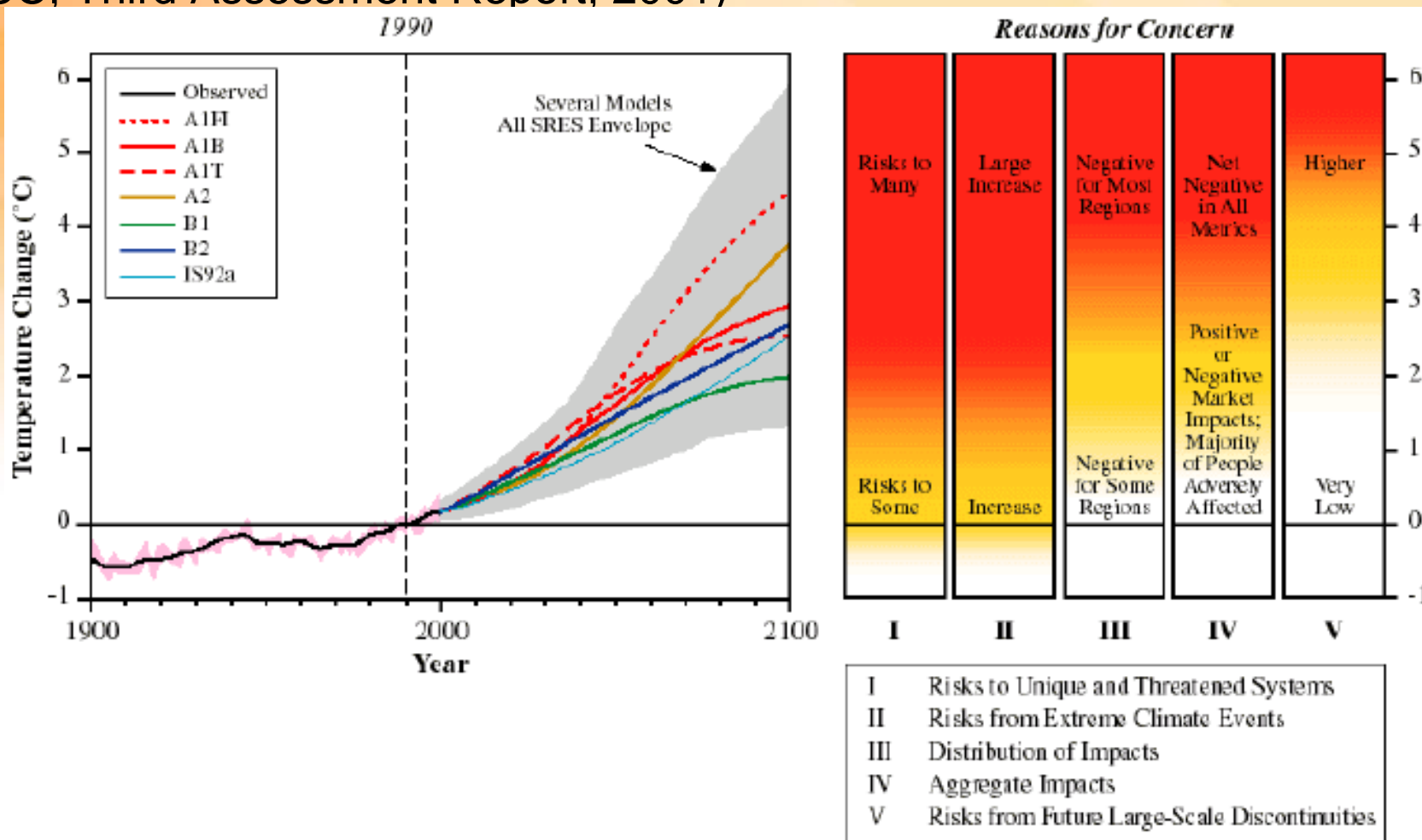
It all suggests major warming if emissions continue

(www.ipcc.ch)



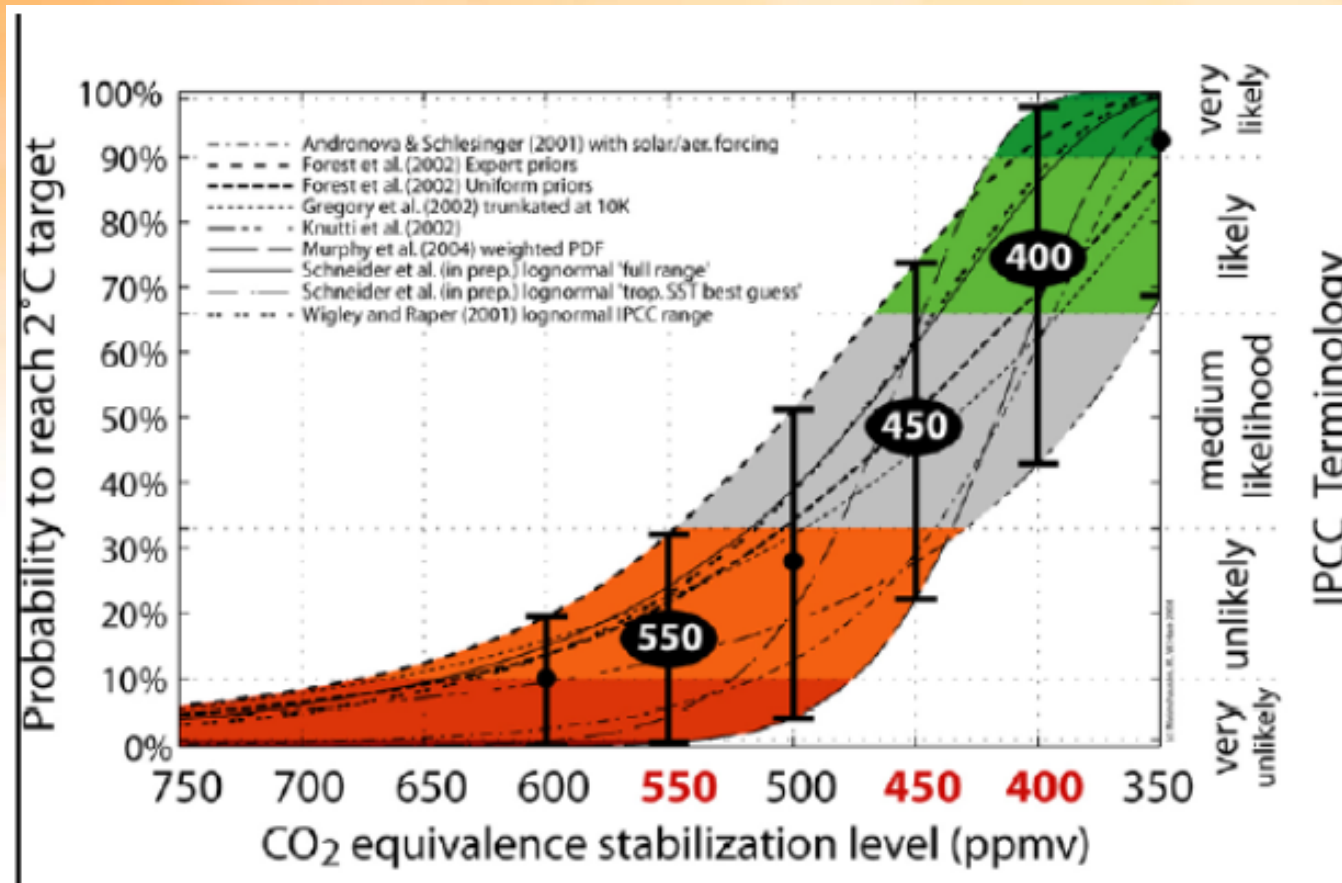


Avoiding dangerous climate change – stay <2 deg.C (IPCC, Third Assessment Report, 2001)



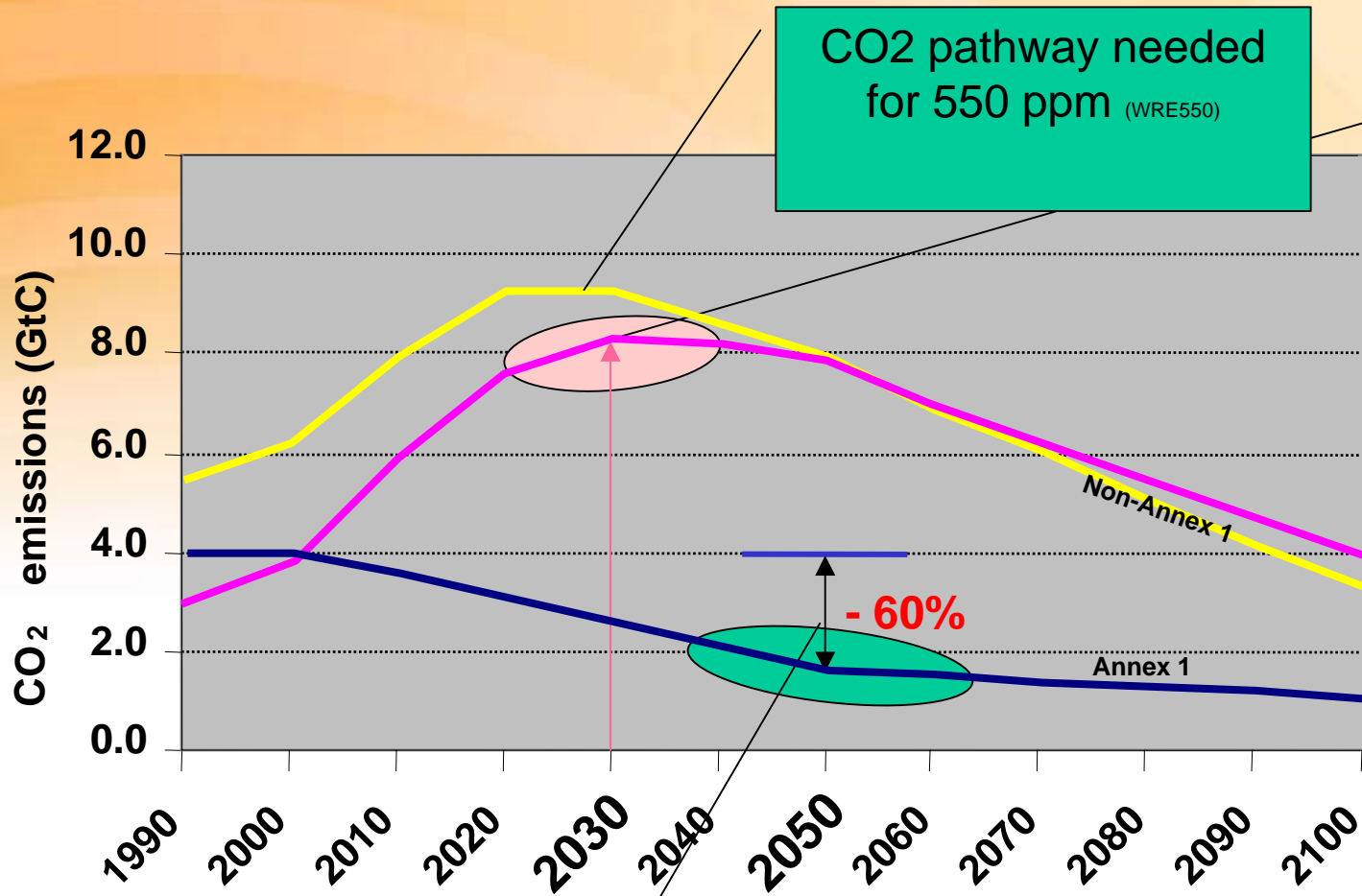


What stabilisation target might then be required? (EEAC, 2004)





Possible emissions scenario for stabilisation (Bourne, 2004)



CO₂ pathway needed for 550 ppm (WRE550)

Developing world emissions grow as they “catch up” then need to diminish from ~2030

Developed world needs to reduce emissions ~60% by ~2050 starting now!

Developed and developing worlds converge on some combination of emissions/capita and emissions/GDP while contracting their emissions



The climate policy challenge

- avoiding dangerous climate change likely to require *major* (60 - 80% from present levels) *rapid* (peaking within 30 years) + *then sustained* (centuries or more) reduction in global emissions,
- nearly all reductions have to come from < fossil fuel emissions,
- wide range of proven options for reducing energy-related emissions through improved end-use energy efficiency, lower emission fossil fuel, cogeneration + renewable energy supply,
- **infrastructure and major capital investment by far most important decisions that policies need to target,**
- technical innovation and progress essential as present technology options almost certainly inadequate for scale of change required,
- such transitions in infrastructure and technical innovation have important time lags + therefore require urgent attention (IPCC).

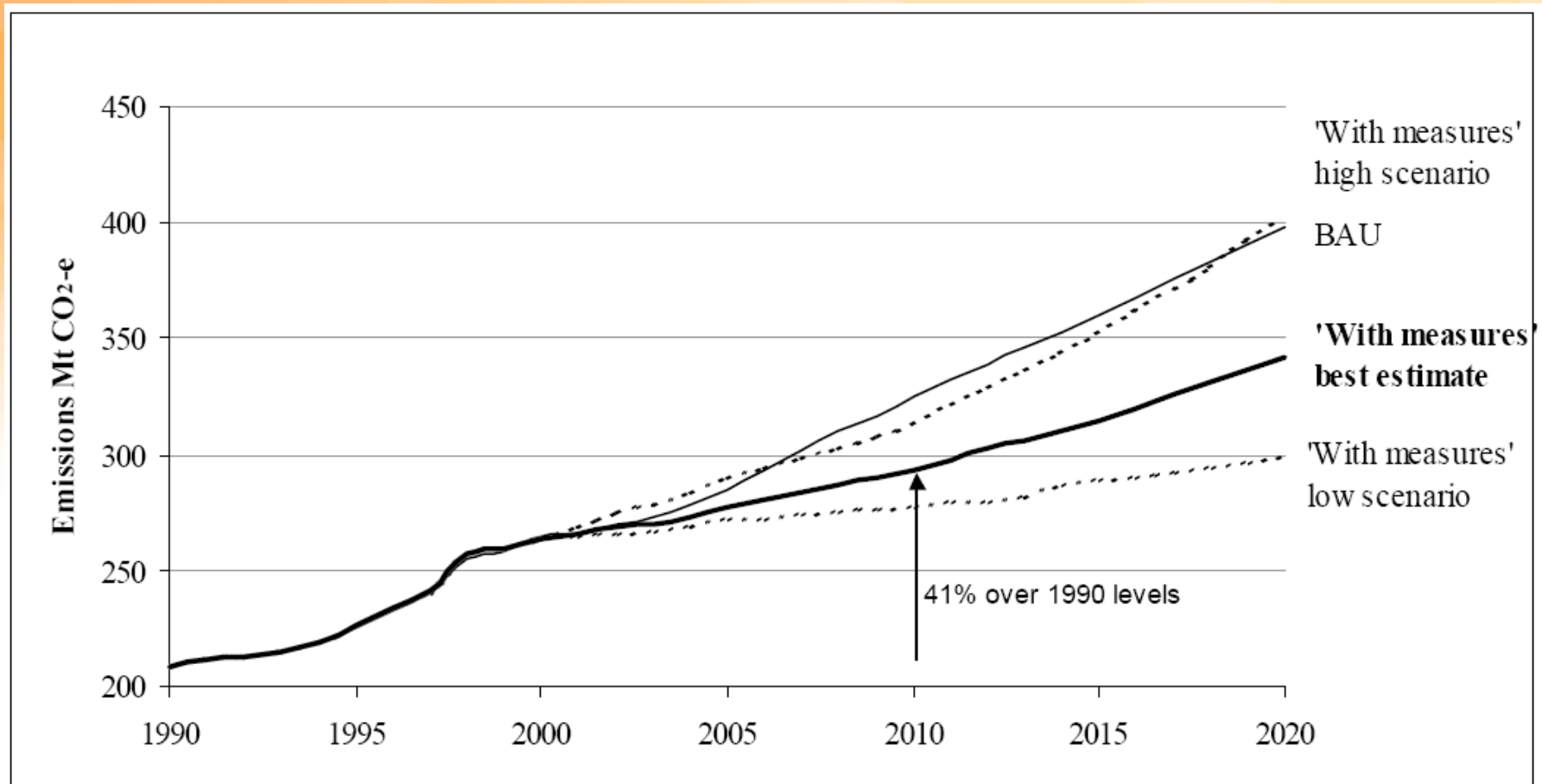


Australian climate policy development

- Australia committed to meeting Kyoto target
 - modest target + generous **land-use rules**
=> no major policy effort in energy sector required
 - AGO projections we are within “striking distance” of Kyoto even with energy emissions up 40% from 1990 – 2010
- ...and preparing for for the large scale emissions reductions required over coming century
 - Acknowledged need for global 50-60% emissions reduction over coming century
- The Australian context
 - Australian per-capita emissions **2 X** *developed* world av.
(Australia Institute, Updating per capita emissions for industrialised countries)
 - Almost 50% of Australian emissions from stationary energy sector, electricity 33%



Projected emissions from stationary energy sector, 1990-2020



Source: Australian Greenhouse Office (2003)



Climate policy options

- broad measures that ‘reach’ across many + diverse sectors **vs** mechanisms targeted at particular sectors or technologies

- Policy categories:
 - support mechanisms – eg. information, encouragement and perhaps financial assistance,
 - direct control or regulatory mechanisms – eg. technical standards,
 - market mechanisms including environmental taxes and emissions trading, that change effective ‘price’ seen by decision makers for different energy options.



Emissions Trading Schemes (ETS)

- potentially economy-wide policy measure that creates competitive market to deliver climate policy objectives of controlling GHG emissions
 - Such emissions represent ‘unpriced’ externalities in present mkts
- emissions trading established by
 - setting a target of allowable emissions
 - establishing associated quantity of allowances
 - requiring market participants to have allowances sufficient to cover their emissions
- Trading b/n participants with low cost emission reduction options + those with only high cost options maximises economic efficiency
- *Notes: Other ways to put ‘price’ on emissions eg. carbon taxes
What matters is physical emissions from physical plant*



What policy role can ETS play?

- In theory, assuming idealised markets,
 - universal ETS only policy required
 - any additional climate change policies can only increase the cost of meeting the cap while not changing its environmental effectiveness
- In practice, emissions trading markets + energy markets they interact with
 - suffer from wide range of market failures
 - may struggle to appropriately ‘price’ uncertainties about future
 - Established by political process inevitably involving compromises that reduce effectiveness
- ETS contribution to policy mix
 - For some, ETS major policy measure both in driving action, + as backstop ensuring environmental objectives met regardless of how other policies perform.
 - For others, ETS as strategic contribution to a wider range of policies.
- .. In the context of our policy challenge
 - Can’t expect ETS to solve all problems, but has to support framework
 - Transformation of economy + fossil fuel dependence requires we *innovate + regulate*
 - “What counts is not what we do, but what we don’t. Success or failure... depends on just one thing: how much fossil fuel we leave in the ground” (Editors note. *or can stick back down there*). (George Monbiot, 2005)



Establishing ETS

- ETS are designer markets
 - governments create + can change rules.
 - enormous amount of flexibility in chosen design + this poses both opportunities yet risks for system designers
- Any effective market will require:
 - a tradeable commodity,
 - willing buyers and
 - willing competing sellers.



A tradeable commodity

- *CO₂ versus six Kyoto greenhouse gases vs...*



Physical, measurable
emissions from fossil-
fuel consumption

≠



Estimated net CO₂
fluxes from select
ecosystems

≠



Hypothetical estimates
of emission reductions
from counter-factual
BAU baselines



Willing buyers

- Generally, mandatory requirement must be placed on chosen participants
 - The greater the reach and consistency of the price signals generated by a trading system, the greater its capacity to drive emission reductions in those areas of the economy where this can be accomplished most cheaply.”
 - Measurability, however, a key issue – accurately estimating emissions outside fossil-fuel combustion activities can be challenging – eg. Ecosystem sequestration
 - small numbers of upstream or larger numbers of downstream participants

- Motivating buyers depends on allowance allocation + severity of target.
 - Baseline and credit schemes effectively grandfather emission allocations, or worse.....
 - Cap and trade schemes either auctioning or grandfathering, or mix.

 - Some economic theory suggests allocation doesn't affect economic efficiency but based on idealised view of energy markets not realised in practice.
 - auctioning likely to drive greater innovation than grandfathering



Willing sellers

- also depends on allowance allocation + target
- In ‘cap and trade’ schemes
 - participants typically either or both buyers and sellers
- In ‘baseline and credit’ schemes
 - similar arrangement possible with participants buyers or sellers depending on how emissions depart from baseline
 - ..but, often, certified emissions reductions provided by project developers who don’t have direct liability under scheme, but volunteer to be involved on basis of emissions reductions they deliver. This liability falls, instead, on major parties such as electricity retailers



'cap + trade' vs 'baseline + credit'

Baseline and credit	Cap and trade
Only emissions reduction compared to baseline or target are tradable	Allocated allowances are tradable
<i>Ex-post</i> Credits are generated after verification (and certification)	<i>Ex-ante</i> Allowances are allocated to covered entities
Wide participation in credit generation	Tradable surplus of allowances can only be created by covered entities
Examples: NSW Greenhouse Abatement Scheme Clean Development Mechanism UK Emissions Trading Scheme	Examples: EU Emissions trading Article 17 of Kyoto Protocol



Design choices for an ETS

Feature	Options
Coverage	liable entities, included sectors and greenhouse gases, flexibility
Target	relative or absolute, scale
Allocation	existing entities, new entities, arrangements for early action
Flexibility	banking and borrowing options
Monitoring/verification	on-line or annual, scheme administrator or third party agents
Sanctions	direct penalties, other possible arrangements
Technical aspects	including registry arrangements



Assessment framework for ETS schemes

- Environmental performance – *objective achieved?*
 - Economic efficiency – *at least cost?*
 - Dynamic incentive – *in way that drives innovation?*
 - Technical administration – *and is practical?*
 - Equity – *while not being unfair or working against other societal objectives? Includes competitive impacts*
-
- *Note:* early days for almost all ETS implemented to date + most schemes continue to evolve **so any assessment somewhat speculative**
 - *Note:* in the final analysis, it all comes down to physical greenhouse emissions from physical plants – existing and coming investments



Baseline + credit schemes

- B+C schemes the ultimate designer market
 - Almost any choice of objectives, coverage, target, allocation, flexibility, monitoring, sanctions
 - “Reality is what you can get away with!” Robert Anton Wilson
 - *Examples:* B+C markets for renewables (MRET), Gas generation (Qld 13% scheme), Energy Efficiency (UK EEC), Biodiversity and salinity (Aust. MBI Projects)

- Focus here on schemes trading greenhouse emissions
 - The NSW Greenhouse Gas Abatement Scheme (GAS)
 - The Clean Development Mechanism (CDM)
 - The UK Emissions Trading Scheme (ETS)



Market design – start with context + objectives

- NSW GAS
 - An ambitious state scheme where Federal Govt. has chosen not to implement ETS or taxes
 - Scheme “requires NSW electricity retailers and certain other parties to meet mandatory targets for reducing the emission of greenhouse gases from the production of the electricity they supply or use.” (IPART, 2004)
- CDM
 - Kyoto sets emission caps for developed countries but needs to engage developing countries with far lower p/capita but rapidly growing emissions
 - CDM has dual purpose – assisting developing countries to achieve sustainable development + assisting developed countries to meet Kyoto targets
- UK ETS
 - Introduced into a complex climate policy framework including energy tax (CCL), negotiated Climate Change Agreements
 - Objectives – achieving cost-effective emission reductions, give UK companies early experience with ETS, establish London as trading hub



Market design fundamentals

- Any effective market will require
 - Something to trade – *a fungible instrument*
 - Willing buyers, *likely to req. incentives or coercion*
 - Willing sellers, *certain to req. incentives or coercion*

- NSW GAS
 - NSW Greenhouse Abatement Certificates (NGACs), Liable parties retailers + some large users, Voluntary project based sellers

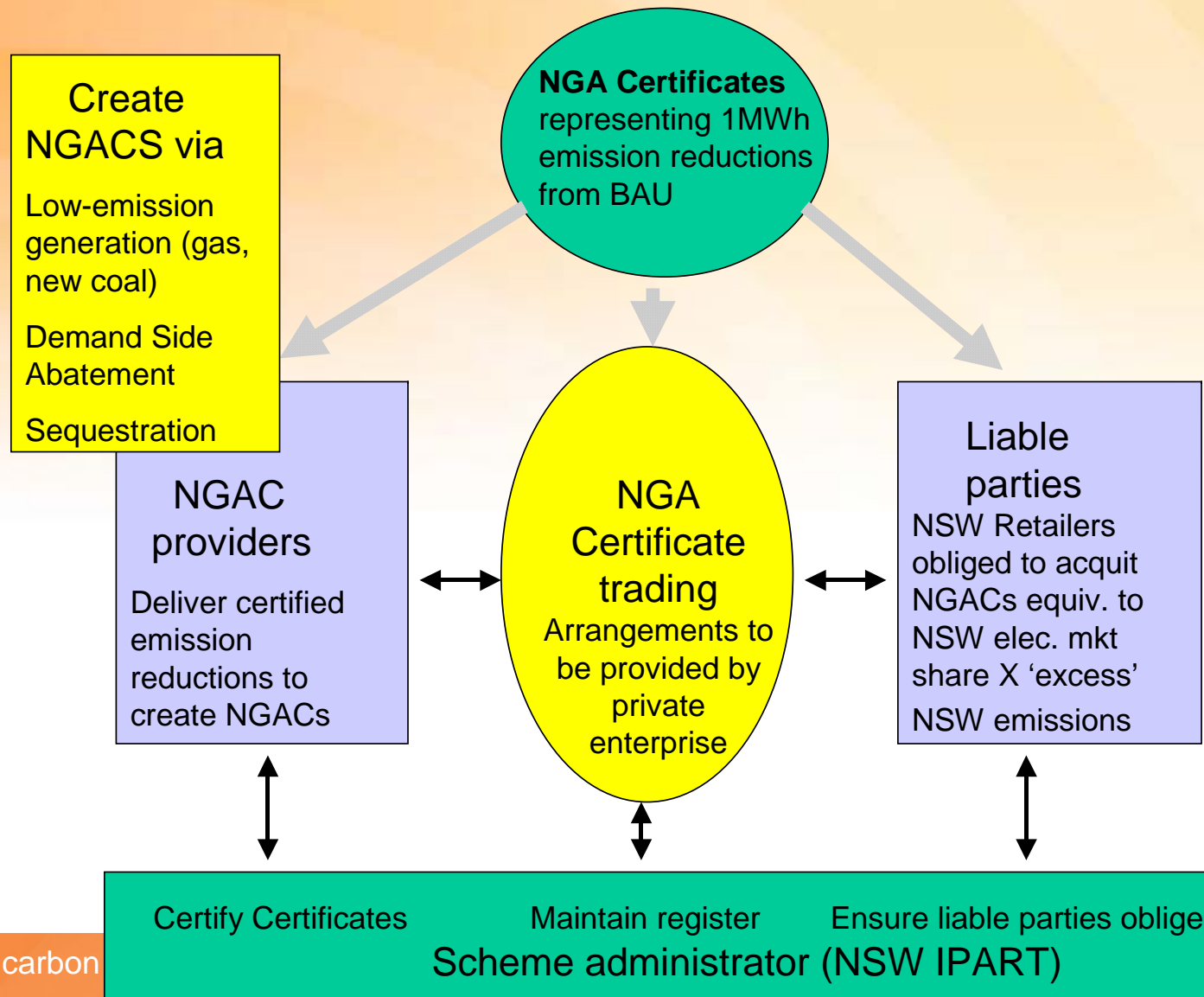
- CDM
 - Certified Emission Reductions (CERs), Interested parties are developed countries (also EU ETS participants), Voluntary project based sellers

- UK ETS
 - tCO₂-e, Voluntary buyers from incentivised auction + mandatory participation by parties with CCAs, Sellers are under (over?) achievers *ie. emissions below their baseline*

- *Note: generally private ‘carrots’, socialised or private ‘sticks’*



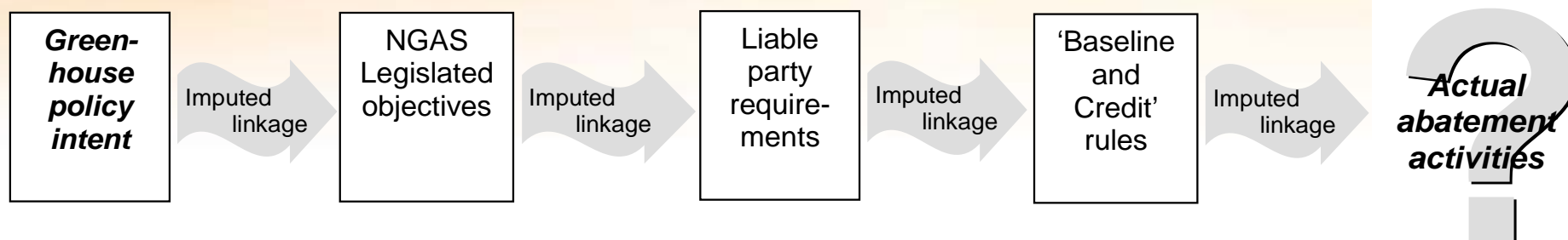
Example: NSW GAS as a 'designer' market





Environmental performance - abstraction

- Schemes can physical caps targets (similar to 'cap and trade' with grandfathering)
...or more abstracted ones (eg. NSW GAS)





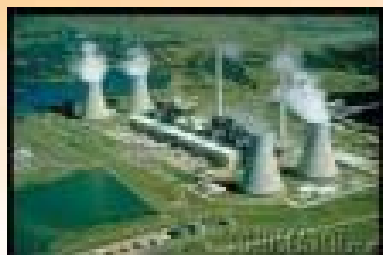
Example - NGAS Abstractions

- Complex ‘imputed’ linkages between:
 - *policy intent* of reducing emissions created through NSW electricity consumption
 - climate responds to physical emissions, and these need to be reduced
 - eg. Kyoto Protocol sets physical caps on developed country emissions,
 - *legislated objectives* to “reduce emissions associated with production + use of electricity, + to encourage participation in activities to offset the production of emissions.”
 - based on estimated emissions from consumption, not physical emissions from generation.
 - credit for non-electricity related activities including sequestration
 - credit for interstate activities – indirect impacts on emissions, no multi-jurisdictional legal framework
 - liable parties are retailers who don’t create emissions, not NSW generators who do
 - *requirement that liable parties* “...meet mandatory targets for reducing the emission from the production of the electricity they supply or use.” and calculation of NGACs target
 - calculated from declining per-capita target, state electricity demand, ‘imputed’ pool coefficient etc: not intuitive or accurate, particularly with wrt pool coefficient, and NGAC calculations
 - ‘Emissions reductions’ an estimate of how emissions reduced from what otherwise happens
 - *‘Baseline and credit’ assessment of abatement:*
 - complex rules for eligibility + amount of abatement projects can claim



Environmental performance – fungibility?

- *“Greenhouse tonnes ain’t greenhouse tonnes”*



Physical, measurable emissions from fossil-fuel consumption

≠



Estimated net CO₂ fluxes from select ecosystems

≠



Hypothetical estimates of emission reductions from counter-factual BAU baselines



Environmental performance - baselines

- Q – What’s the easiest way to save?
- A – By spending!
 - “By some kind of financial alchemy – saving has become something we do while we’re spending”
 - Ross Gittins, quoting Hamilton and Denniss, *Affluenza*



Shop Now and Save with Visa
Take advantage of incredible savings when you use your Visa card. Get the latest discounts delivered to your email inbox: [sign up and save](#).

- *And the easiest way to save greenhouse emissions?*

THE GOOD GUYS ELECTRIFYING SAVINGS

Barville

Bar Maker

- Includes steel case
- Compact and efficient
- Easy assembly

Meal Sandwich Press

- Safe hot metal plates for heat
- Extra large non-stick Bar making plates
- Durable heating top plate with removable wiring
- Heavy duty metal case

Assort Frypan

- 20 Cook Frypan with high shank metal lid
- 100 Series 4-inch stainless steel frypan
- 1000 Series pan

SAVE \$20

SAVE \$10

120% OFF THE REFERENCE

EACH \$59.95

LESS FOR CASH



Example: Hazelwood Power Station



- Hazelwood is spewing out an astonishing **1.58 Mega tonnes of carbon per TWh (over 17 Mt/a)** and is the **most polluting** of the major coal-fired power stations WWF has come across in the OECD, and possibly the world!
- Not only is it the most polluting power station we've been able to find, but it's actually getting worse. A recent study found that between 1998-2004 Hazelwood's emissions intensity trend increased 2.7%...
- Hazelwood also accredited abatement certificate provider under NSW GAS + earned 250,000 NGACs in 2003