



Institute of Actuaries of Australia

INSIGHTS

Carbon Pollution Reduction Scheme

- Business Implications & Opportunities for Actuaries

Peter Eben

Agenda

- Introduction
- Overview of CPRS
- Sectoral and business level impacts
- Opportunities for actuaries



Introduction

Overview of CPRS

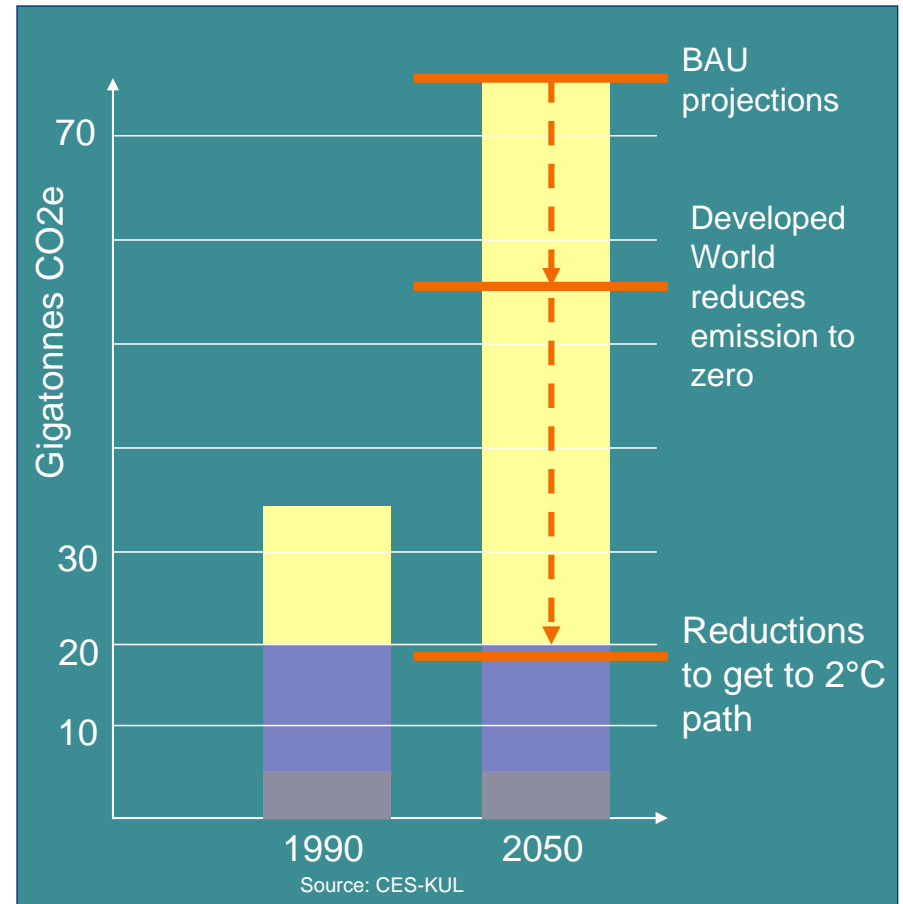
Sectoral and business level impacts

Opportunities for actuaries

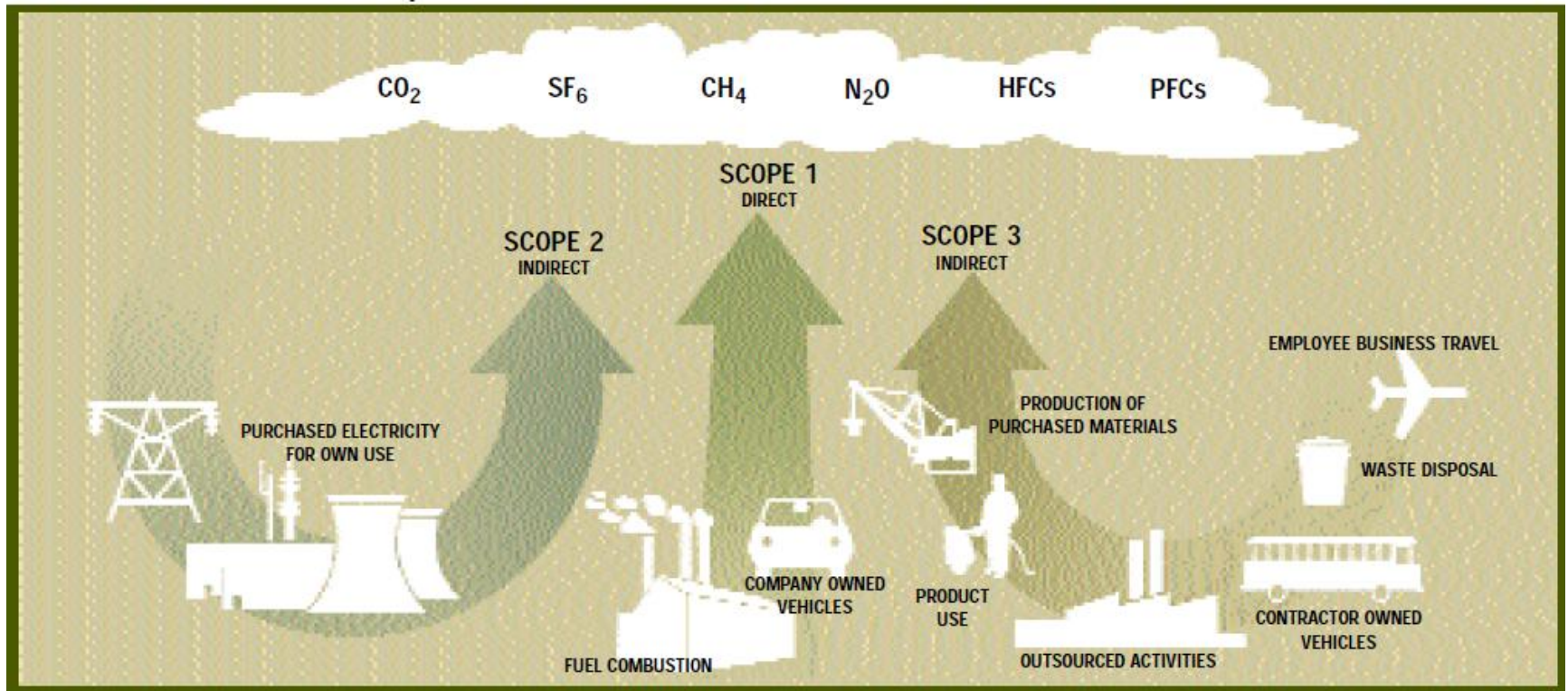


Global perspective

- 55GT needs to be avoided annually by 2050, same as:
 - 5000 average coal fired power plants
 - 1000 x renewable target for Australia
 - 110 x California's emissions



Classification of Greenhouse Gases

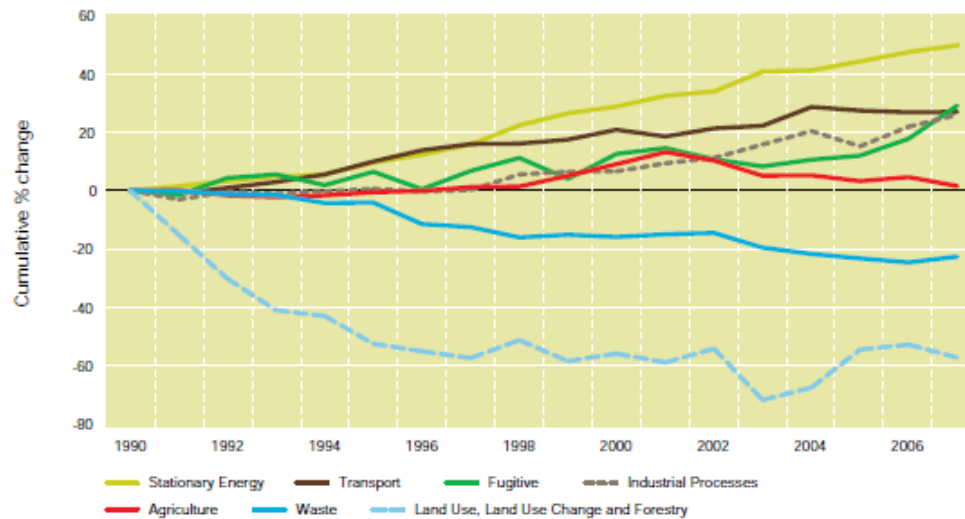


Source: *The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard*, World Resources Institute



Australia's Greenhouse Gas Emissions

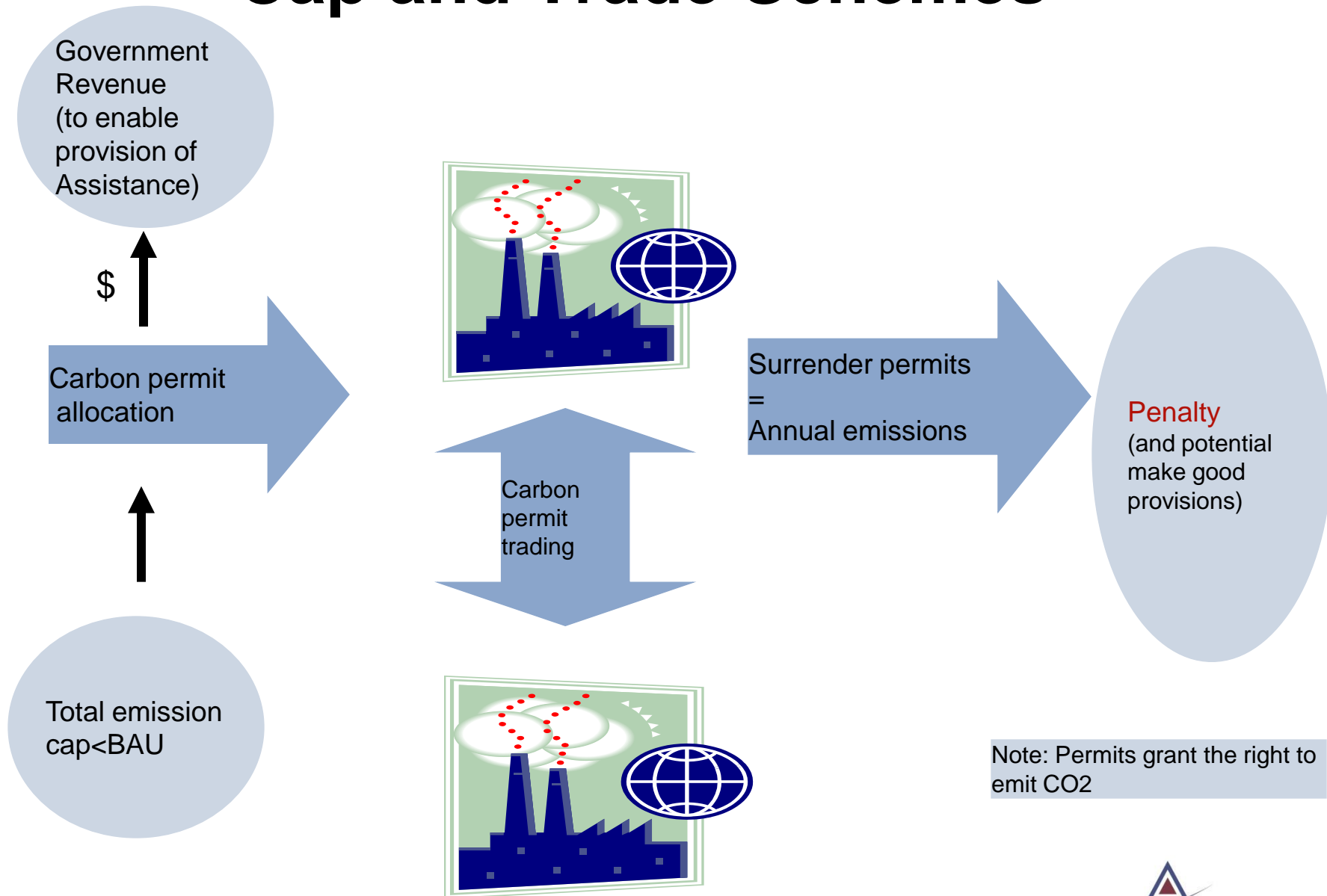
Category	Annual emissions through to the December quarter Mt CO ₂ -e ^(a)		Per cent change in annual emissions ^(a)
	2007 December quarter ^(a)	2008 December quarter ^(a)	
National Inventory – Annex A sectors			
Energy – fuel combustion	374	377	1.0%
Energy – fugitive emissions	39	39	-0.3%
Industrial processes	31	32	2.3%
Waste	15	15	0.7%
Agriculture	89	91	1.7%
National Inventory total ^(b)	547	553	1.1%



Source: *National Greenhouse Gas Inventory, Accounting for the Kyoto target*, Australian Government Department of Climate Change May 2009



Cap and Trade Schemes



Note: Permits grant the right to emit CO₂



Global Carbon Market Comparison 2007 v 2008

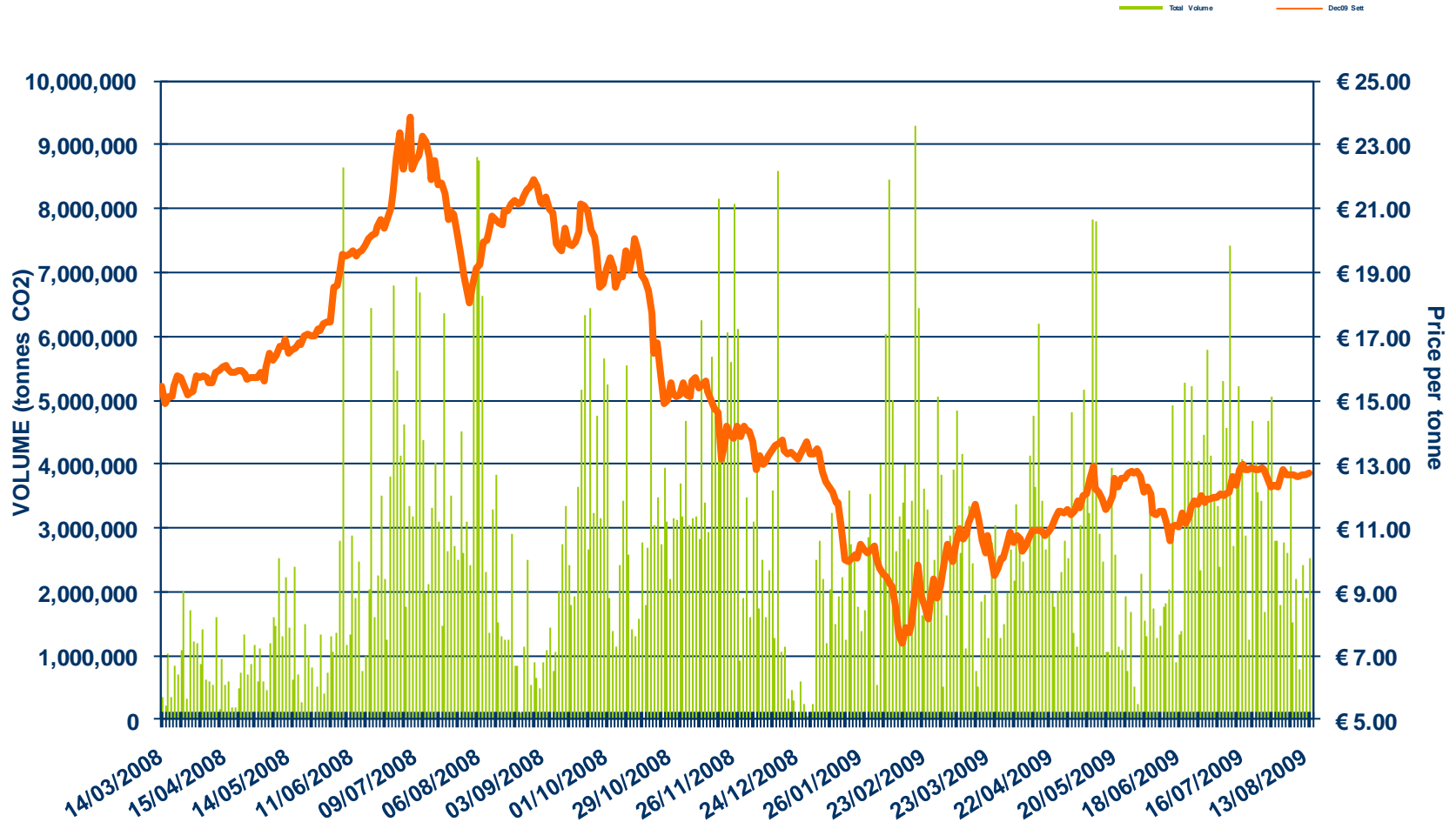
	2007		2008	
	Volume (MtCO ₂ e)	Value (MUS\$)	Volume (MtCO ₂ e)	Value (MUS\$)
Project-based Transactions				
Primary CDM	552	7,433	389	6,519
JI	41	499	20	294
Voluntary market	43	263	54	397
Sub total	636	8,195	463	7,210
Secondary CDM				
Sub total	240	5,451	1,072	26,277
Allowances Markets				
EU ETS	2,060	49,065	3,093	91,910
New South Wales	25	224	31	183
Chicago Climate Exchange	23	72	69	309
RGGI	na	na	65	246
AAUs	na	na	18	211
Sub total	2,108	49,361	3,276	92,859
TOTAL	2,984	63,007	4,811	126,345

Source: World Bank



European Experience

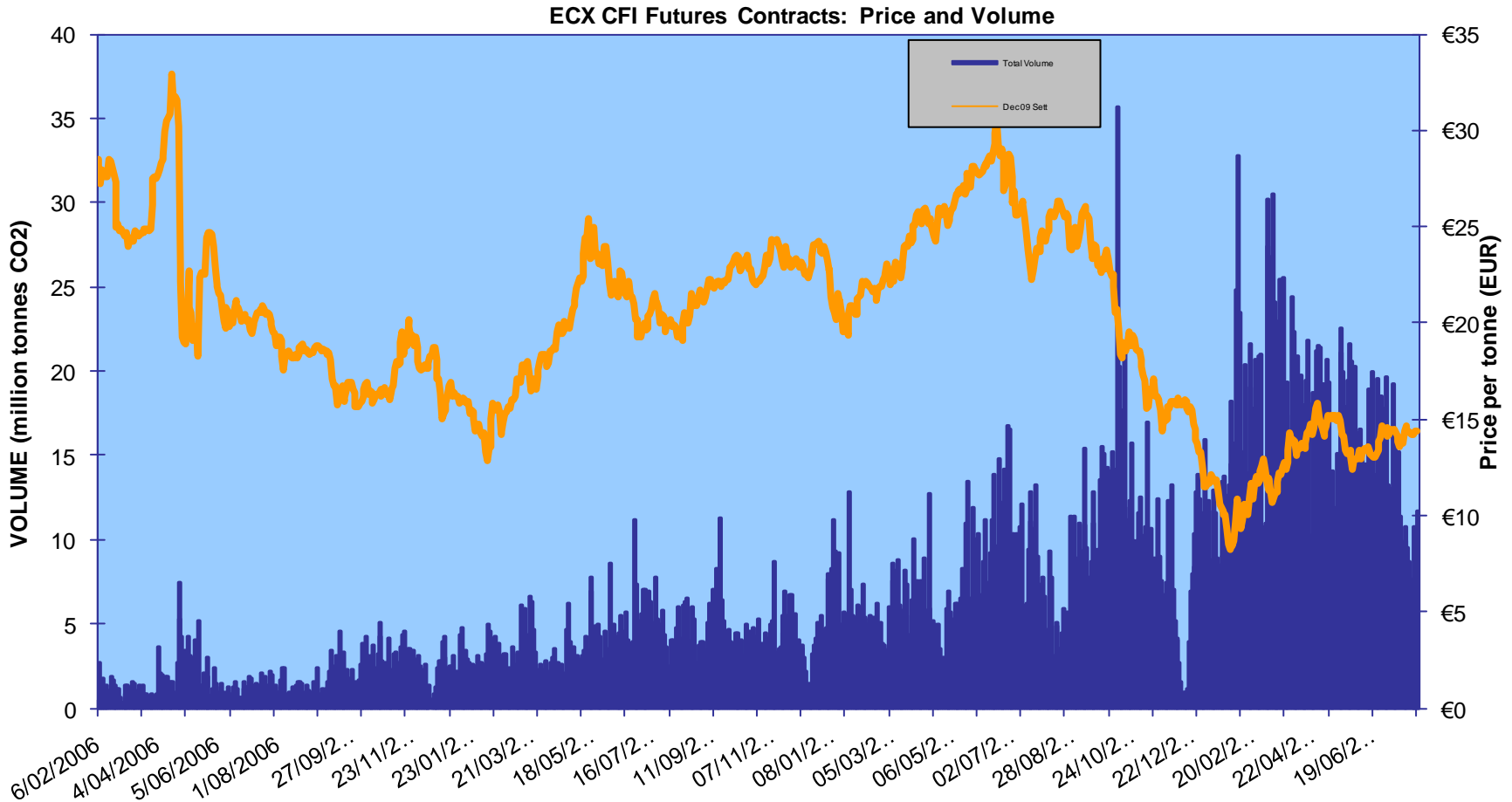
ECX CER Futures Contracts: Price and Volume



Source: :European Climate Exchange



European Experience



Source: European Climate Exchange



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Australian Government's broad policy objectives

- Achieve emission reduction targets
- Price carbon externality
- Shift value within the economy
- Manage the transition



Key Policy Milestones

2007	2008	2009	2011	2020	2050
Kyoto Ratified	Garnaut Review NGER Green Paper White paper	Draft Bills Final Bills	CPRS	20% RET	60% Emission reduction target



Recent Legislative Changes

- Rejected by Senate (second time) – 14 August 2009
 - Separation of RET and CPRS
 - Potential election issue
-

- Delay in CPRS introduction
 - 2011 fixed carbon price \$10 / Tonne
 - 2012 full market starts
- Increased compensation to industries
 - Recession buffer of additional 10% on sliding scale
 - First 5 years only
- Creation of Australian Carbon Trust
- Climate Change Action Fund
- Enhanced emissions reduction targets
 - 25% reduction by 2020 conditional on global agreement



Legislative Overview

- Carbon Pollution Reduction Scheme Bill
- CPRS (Consequential Amendments) Bill
- Australian Climate Change Regulatory Authority Bill
- 3 charges bills – ‘safety nets’
- Numerous regulations (still to be developed)



CPRS compliance obligations

- Register for NGER (mandatory or voluntary)
- Calculate annual emissions number
- Submit emissions reports
- Surrender emissions units
- Relinquish units (if required)
- Notify significant holdings
- Keep records
- Audit



CPRS transactional obligations

- Auction participation and settlement
- Obligation transfer number requirements
- Liability transfer certificates
- Secondary market participation
- International market participation



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Business impact drivers

Driver

Emissions profile

Transitional assistance

Cap and permit allocation basis

Complementary measures

Market elasticity

Strategy adopted

Key factors

Carbon intensity of production / earnings (direct and indirect emissions)?

Relative competitiveness

Level

Duration

Eligibility criteria

Emissions cap and trajectory levels

Permit price caps

International linkages

Tax rebates / grants / concessions

Renewable energy targets

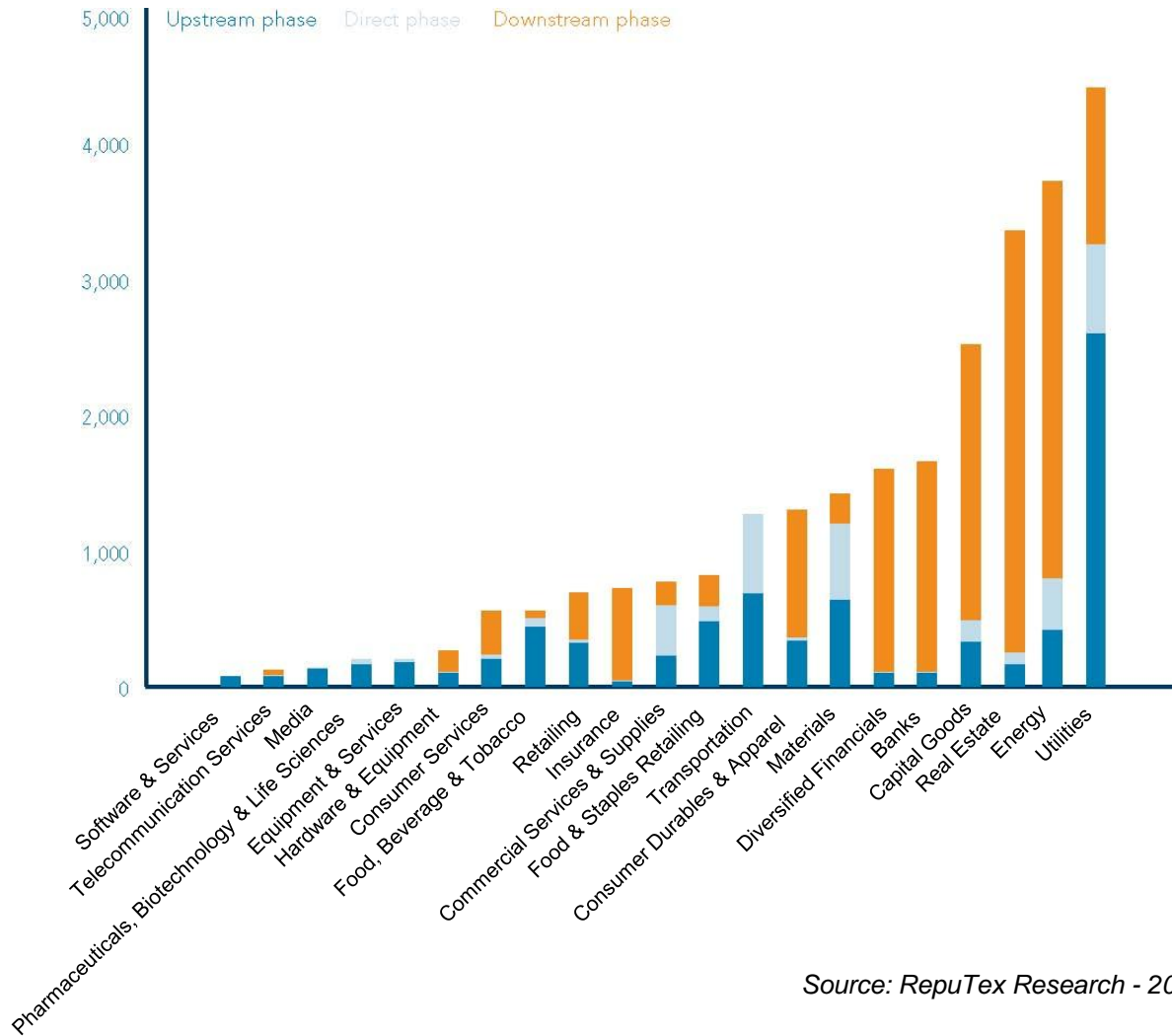
Energy efficiency targets

Pricing and volume impacts on major inputs and outputs

Relative position - from adaptation and mitigation, through to trading



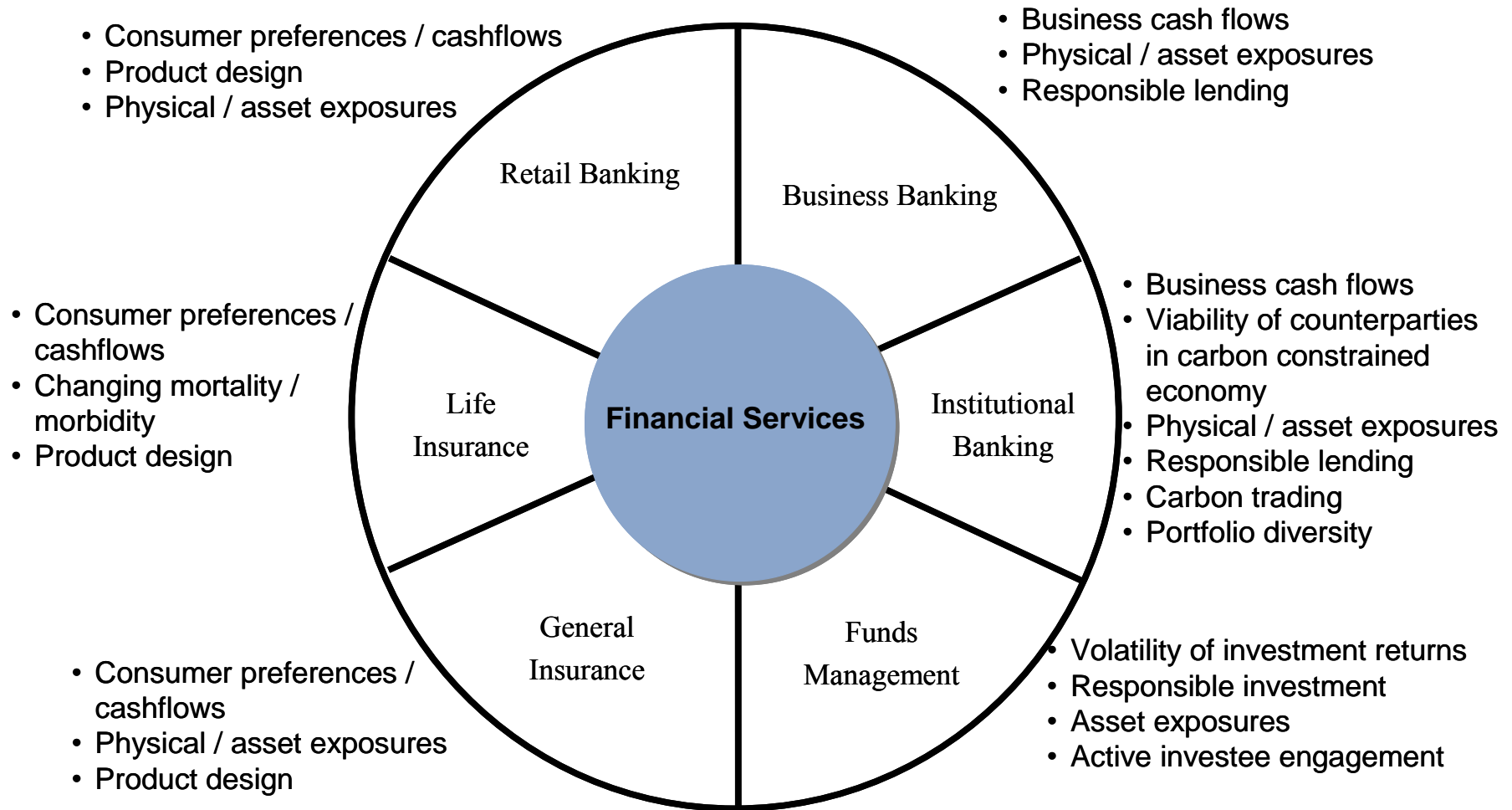
ASX 200 - Carbon intensity (tonnes CO₂-e / \$m)



Source: Reputex Research - 2008



Financial Services Impacts



Carbon risk - impact points

Capital Expenditure

- Emissions reductions technology (energy efficiency, fuel switch, investments etc)
- Location change
- Compliance costs

Market Elements

- Market risk (beta)
- Reputation & brand

Balance Sheet

- Physical weather exposure
- Asset base depreciation, underperformance
- M&A activity, transactions
- Litigation risk

Operating Expenditure

- Permit costs
- Supply chain costs (electricity), fuel costs
- Abatement costs or savings
- Compliance costs (monitoring, verification, disclosure)
- Foreign exchange (CER's)

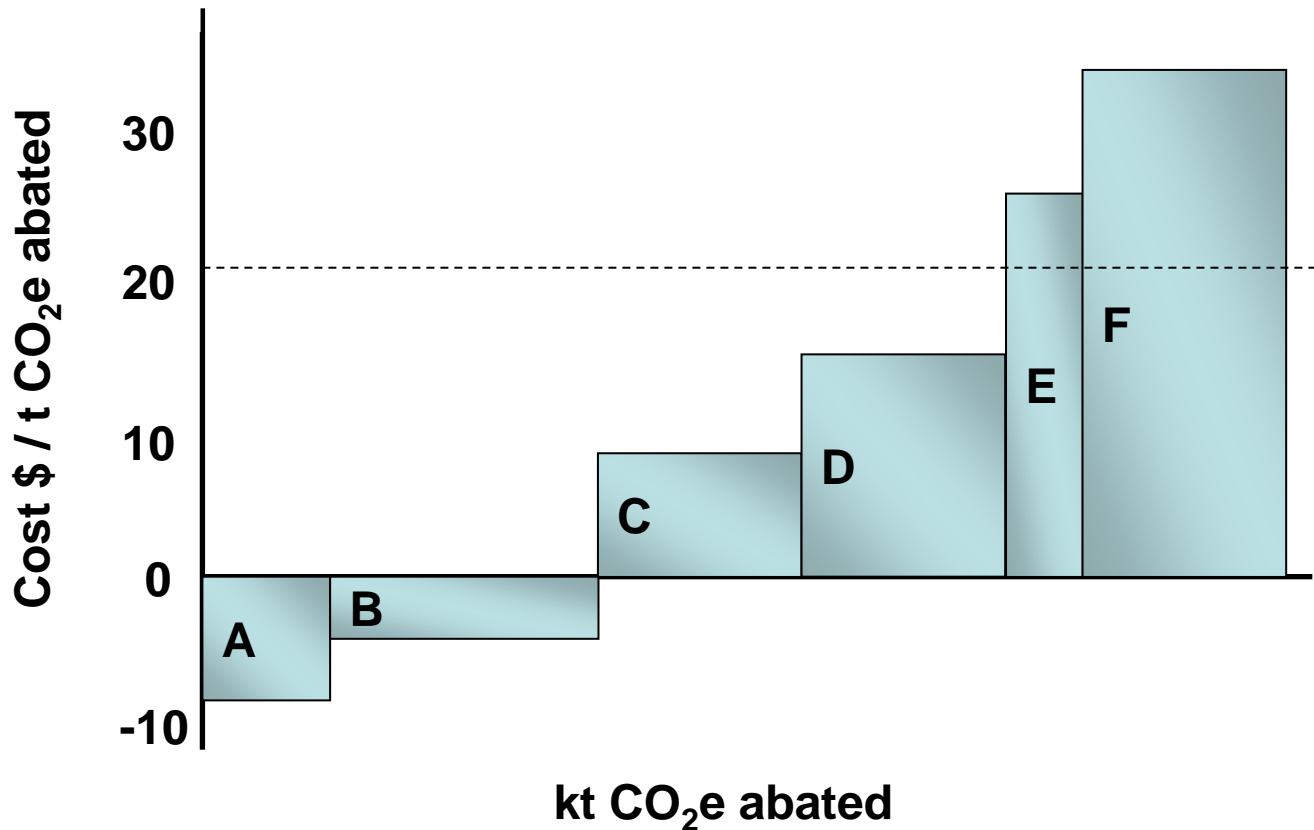
Revenue

- Sale of excess credits
- Consumer preferences
- CDM pipeline, portfolio, assets
- Foreign exchange (CER's)

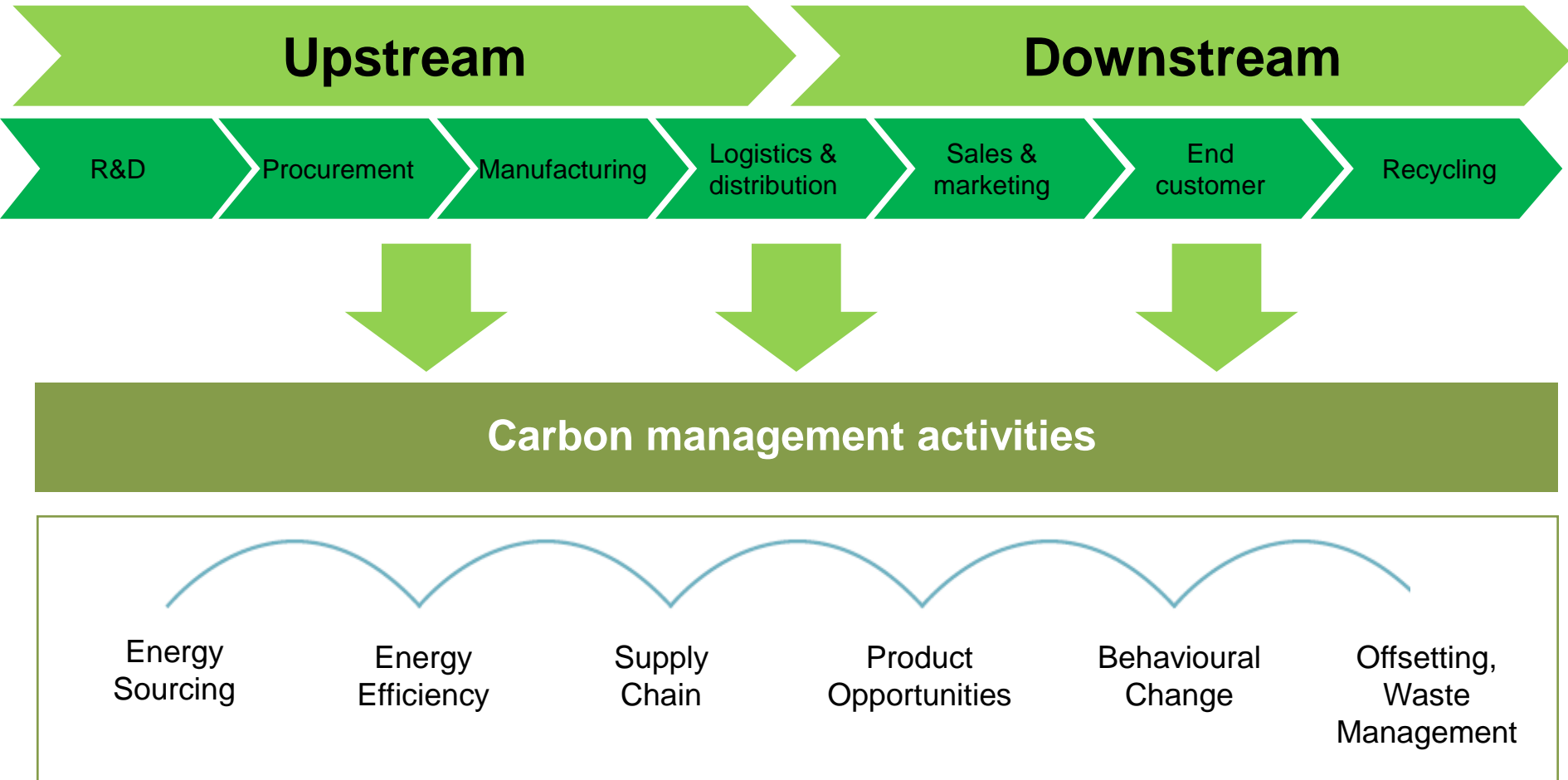


Marginal abatement cost curve

The fundamental question is do you buy permits or reduce emissions?



Carbon management activities across the value chain



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Eligibility requirements – ACCRA member

- A person is not eligible for appointment as a member of the Authority unless the Minister is satisfied that the person has:
 - substantial experience or knowledge; and
 - significant standing;in at least one of the following fields:
 - economics;
 - industry;
 - energy production and supply;
 - energy measurement and reporting;
 - greenhouse gas emissions measurement and reporting;
 - greenhouse gas abatement measures;
 - financial markets;
 - trading of environmental instruments



Actuarial skills are readily applicable

- The vision of the institute is to *‘position the profession so that wherever there is uncertainty of future financial outcomes, actuaries are sought after for their valued advice and authoritative comment’*
- Climate change has significant uncertainty about future financial outcomes
- This will provide a significant growth opportunity for the profession going forward



Climate Change Committee Mission

It is the mission of the Climate Change Committee to promote the role of the profession and facilitate opportunities for members to practice in climate change related fields through:

- Identifying research and thought leadership opportunities to contribute to the public policy debate and commercial decision making.
- supporting the development of actuarial practice and capabilities in these fields through activities including research, training & education, and seminars
- communicating on a regular basis with members (e.g. via electronic newsletters and articles for Actuary Australia) on issues and developments
- developing links with other actuarial bodies (overseas) and relevant professional and industry bodies
- identifying new and emerging issues, technical and practice needs of members



Moving beyond traditional areas

- Many actuaries focussed on addressing traditional actuarial problems impacted by climate change, e.g.:
 - General insurance - flood / bushfire increases
 - Life Insurance - mortality / morbidity changes
- Opportunity exists to add new thinking to climate change policy / industry problems using traditional actuarial techniques e.g.:
 - Application of actuarial control cycle in assessing future outcomes of CPRS
 - Reserving techniques in forestry permit calculations
 - Using extreme value theory to forecast maximum electricity demands
- There is a strong need also for thought leadership / research to position the profession in the public domain as innovative thinkers that provide a fresh perspective



Potential thought leadership topics

- Develop a probabilistic / risk adjusted approach to valuing (or assessing) the costs and benefits of mitigation / adaptation and inaction to climate change.
- Develop an approach for a nationally certified carbon labelling or ecological rating for consumer products to build on the existing rating schemes such as the energy efficiency labels on electrical appliances.
- To develop an actuarial approach to establishing key policy parameters within an Emissions Trading Scheme (e.g. using reserving, option pricing theory, control cycle).
- To undertake a detailed cost / benefit analysis of investing in clean coal technology (and potentially other renewable energy technologies)
- Others?



Permit creation from reforestation

- A land developer is investigating the potential to generate carbon permits from a reforestation project
- The number of permits to be issued by the Government will be calculated based on information such as:
 - forest management actions (e.g. forest establishment date, species planted and any harvesting events)
 - natural disturbances such as fire and wind-throw.
- In addition the developer will most likely need to plant additional trees to cater for unforeseen events and provide a buffer
- Traditional actuarial reserving techniques can be used to assist the developer in understanding the likely number of permits available, the distribution of outcomes, the required buffers and any impact from natural disturbances



Carbon leakage from waste facilities

- A landfill owner seeks to understand the potential exposure from future fugitive emissions arising from a waste facility
- The fugitive emissions arising from the facility are a function of items including:
 - Type of waste in facility
 - Future waste flows
 - Facility structure and sequestration, co-generation facilities
- Traditional actuarial pricing and control cycle techniques can be used to assist the engineers and owner in understanding the distribution of emissions and the sensitivity to changes in assumptions



Maximum demand on energy networks

- Rising temperatures and heatwaves are causing increased risks of power shortages and stress through additional unexpected and unplanned electricity demand.
- Demand forecasting has traditionally been accomplished using trend analysis and econometric measures but regression type analysis does not deal with the paucity and highly variant data that exists for extreme temperature events.
- Actuarial techniques, in particular extreme value theory can be used to provide new techniques to forecasting extreme demand and provide a potential distribution of such events. (not an outlier) if the associated peak demand is to be served by appropriate infrastructure.



How can we make it happen?

- Climate Change Committee has worked on re-focussing its efforts to increase the profile of practice area amongst profession as well as Government / broader business community
- We have refocussed and refined committee name, mission and also identified a number of research topics
- CCC developing sub committees to focus on the following areas:
 - Innovative research / thought leadership (active engagement in policy debate)
 - Materials and information to raise awareness within profession
 - Website and external other profile enhancement



Questions?

Peter Eben

peben@bigpond.net.au

Ph: 0411 207 505

