COMP 3410 – I.T. in Electronic Commerce

eTrading 6. Carbon Trading

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http://www.rogerclarke.com/EC/ ...

{ETIntro.html#L6, OhdsET6.ppt}

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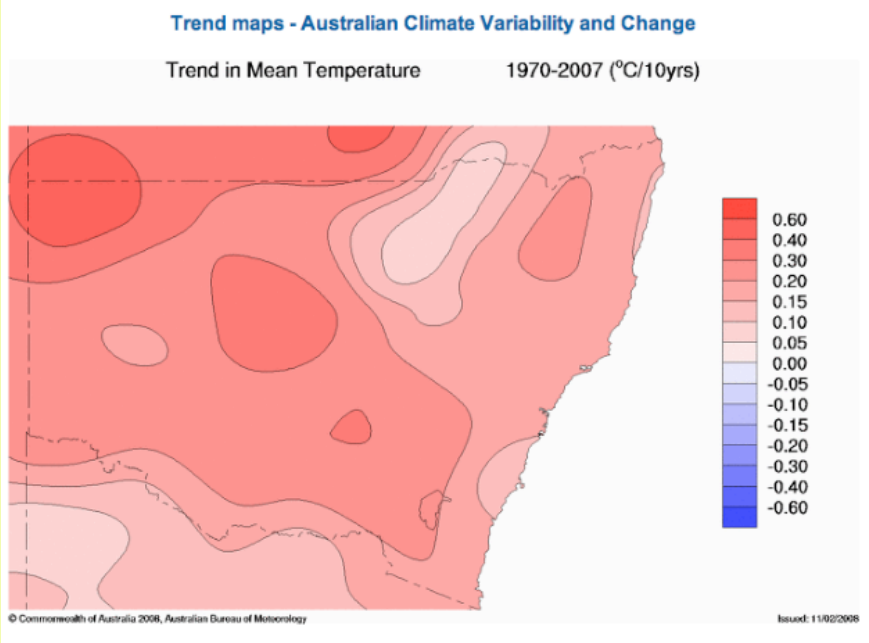
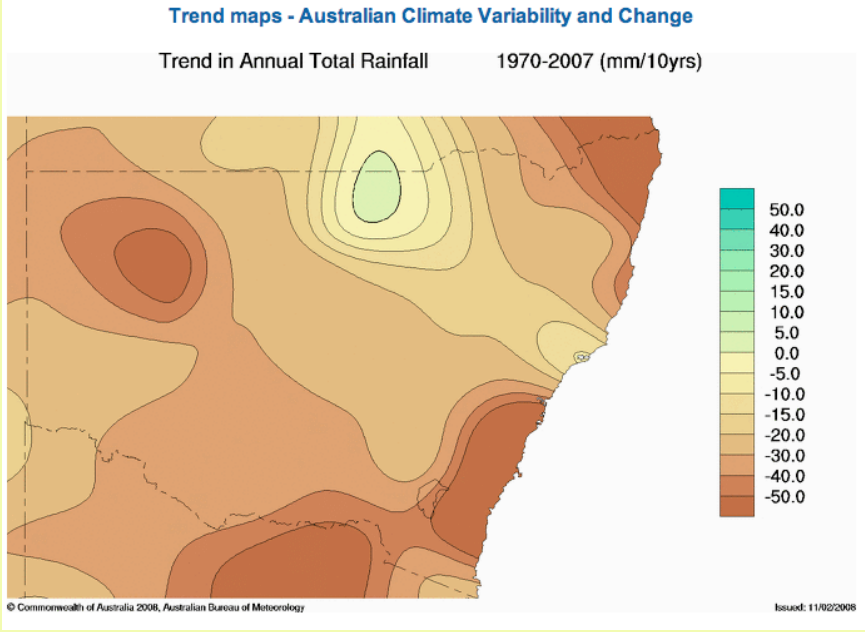
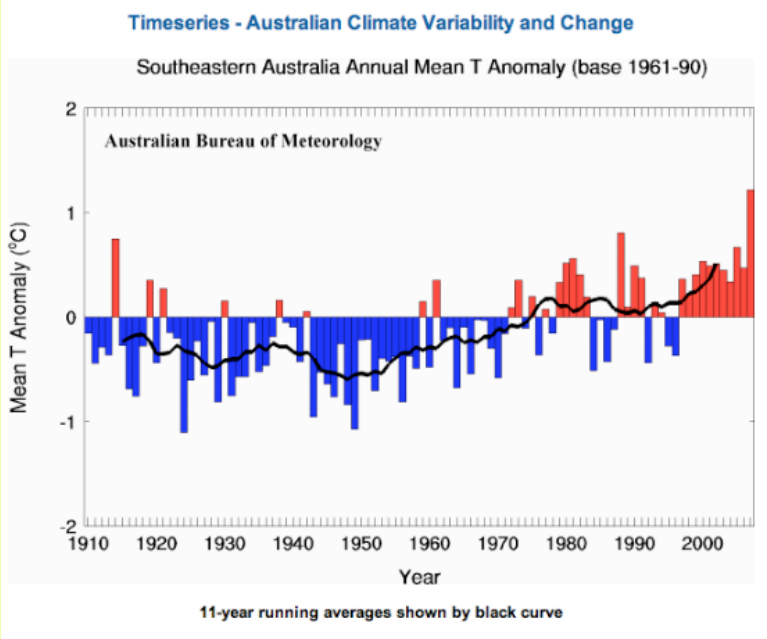
http://ec.europa.eu/environment/climat/emission/review_en.htm



http://www.bom.gov.au/cgi-bin/silo/reg/cli_chg/trendmaps.cgi?variable=tmean&region=nsw&season=0112&period=1970



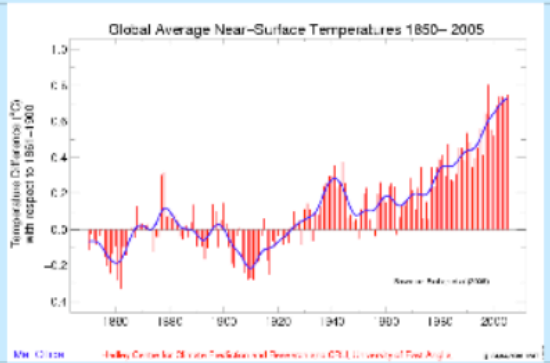
http://www.bom.gov.au/cgi-bin/silo/reg/cli_chg/trendmaps.cgi?variable=rain&region=nsw&season=0112&period=1970



http://www.bom.gov.au/cgi-bin/silo/reg/cli_chg/timeseries.cgi?variable=tmean&region=seaus&season=0112

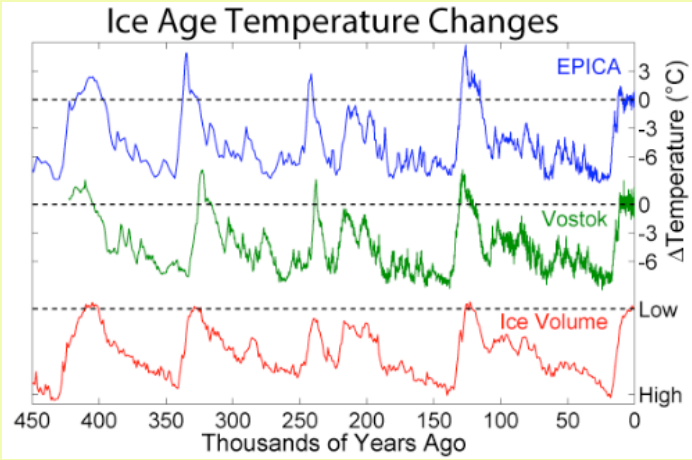
Figure 1.3 The Earth has warmed 0.7°C since around 1900.

The figure below shows the change in global average near-surface temperature from 1850 to 2005. The individual annual averages are shown as red bars and the blue line is the smoothed trend. The temperatures are shown relative to the average over 1861 – 1900.

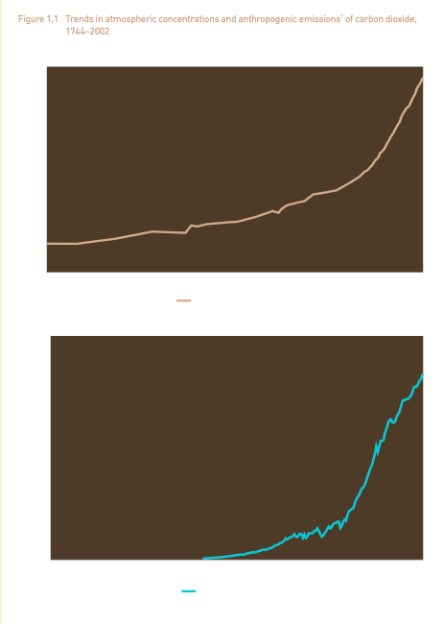


Source: Brohan et al. (2006)

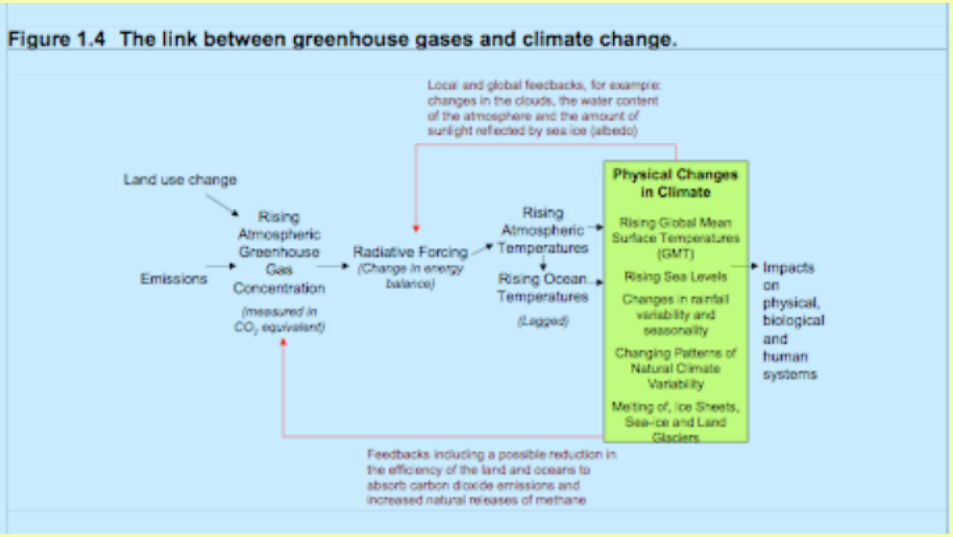
http://www.hm-treasury.gov.uk/d/Chapter_1_The_Science_of_Climate_Change.pdf, p. 4



http://www.globalwarmingart.com/wiki/Image:Ice_Age_Temperature_Rev_png



http://pandora.nla.gov.au/pan/79623/20080117-2207/...
dpmc.gov.au/emissions/index.html, p. 19



http://www.hm-treasury.gov.uk/d/
Chapter_1_The_Science_of_Climate_Change.pdf, p. 7

The Proposition

Land Use Change + Emissions

==>> Higher Greenhouse Gas Concentration

==>> 'Radiative Forcing'
(Change in the Earth's energy balance)

==>> Atmospheric and Ocean Warming

==>> etc.

The Proposition

Land Use Change + Emissions

==>> Higher Greenhouse Gas Concentration

==>> **'Radiative Forcing'**
(Change in the Earth's energy balance)

==>> Atmospheric and Ocean Warming

an imbalance between incoming solar radiation and outgoing infrared radiation that causes the Earth's radiative balance to stray away from its normal state [there's a 'normal state'?]
http://en.wikipedia.org/wiki/Radiative_forcing

the influence of a climatic factor in altering the balance of incoming and outgoing energy in the Earth-atmosphere system
http://www.eoearth.org/article/radiative_forcing

Relative Importance of the Greenhouse Gasses

Gas	Preindustrial Level	Current Level	Increase since 1750	Radiative forcing (W/m^2)
Carbon dioxide	280 ppm	384ppm	104 ppm	1.46
Methane	700 ppb	1,745 ppb	1,045 ppb	0.48
Nitrous oxide	270 ppb	314 ppb	44 ppb	0.15
CFC-12	0	533 ppt	533 ppt	0.17

Intergovernmental Panel on Climate Change (IPCC)
http://en.wikipedia.org/wiki/Greenhouse_gases

Relative Importance of the Greenhouse Gasses

Table 2.1 Kyoto Protocol gases—global warming potential

Kyoto gases	Global warming potentials	%
Carbon dioxide (CO_2)	1	75
Methane (CH_4)	21	20
Nitrous oxide (N_2O)	310	4
Sulphur hexafluoride (SF_6)	23,900	
Hydrofluorocarbons (HFCs)	140–11,700	1
Perfluorocarbons (PFCs)	6,500–9,200	

Source: Intergovernmental Panel on Climate Change Second Assessment Report: The Science of Climate Change

Alarm Bells

- Intergovernmental Panel on Climate Change (IPCC) 1988-
- The Kyoto Protocol – 1992, 1997, 2005, 2009
- Al Gore's 'An Inconvenient Truth' – 2006
- The Stern Report – 2007
- The Copenhagen Failure – 2009
- …

Why Not Regulation?

- Conventional Regulation is difficult:
  - Transnationality
  - Polluters are big, and have considerable lobbying power
  - Jurisdictional Arbitrage

Why a Market?

- The Capitalist's Solution – **Markets Are Good**
  Because 'greed is good'
  Because it greases the wheels of the economy
  [but uncontrolled greed has, yet again, been discovered to be bad for our health]

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- The Economist's Rationale – **Efficient Intervention**:

A market in tradable instruments enables polluters to:

- reduce their pollution (if they can do it cheaply enough); OR
- buy tradable instruments from other sources (if other polluters can reduce their own pollution more cheaply)

The Kyoto Protocol

- An International Agreement
- Establishes Commitments
  by (almost) all Industrialised Nations
  to reduce greenhouse gas (GHG) emissions
- Involves Developing Nations
  (but doesn't yet impose commitments)
- Provides a Framework for 'Carbon Trading'

How Kyoto Facilitates Carbon Trading

Each industrialised country:

- sets a 'cap' on emissions
- creates 'permits' equal to its 'cap'
- requires organisations to meet their target within the 'cap'

Polluting organisations comply by:

- using 'allowances' (gratis permits)
  and / or
- buying permits from the government
- reducing their emissions, and selling excess permits
- buying permits from someone else
- buying credits

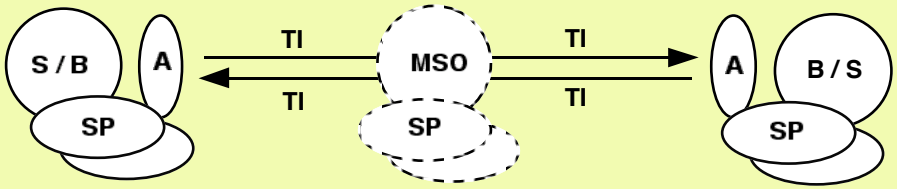
Credits arise from emission reduction projects:

- in industrialised countries (often expensive)
- in developing countries (often inexpensive)

Relevant Elements of eCommerce Theory

- Marketspaces and Marketspace Actors
- Characteristics of Viable Markets
- Tradable Items
- How to Achieve Market Depth
- Price-Setting / Trading Mechanisms

Marketspace and Marketspace Actors



Sellers/Buyers **Tradable Items** **Buyers**/Sellers

Agents **Marketspace Operator(s)** Agents

Service Providers

Business Processes Infrastructure

Characteristics of Viable Markets

- **Credible Tradable Items**
  - Obligations
  - Obligation Enforcement
  - Transferability
- **Sufficient Scale**:
  - Tradable Items
  - Sellers, Buyers, Turnover
- **A Suitable Market Mechanism**
- Coherence and Comprehensibility
- Robustness

Credible Tradable Items for Carbon Markets

- **The Basic Tradable Items**
  - Permits (disincentive to pollution)
  - Credits (incentive to solutions)

How to Achieve 'Market Depth' i.e. enough Items, Buyers and Sellers

- **Tradeability**
  - 'Commodification' / Substitutability
    A Common Denominator (tonnes of '$C0_2$-e')
  - Transferability
  - Guarantee of Substance
- **'Bankability'**
  - Flexibility as to the time of surrender
- **Derivatives**
  - Freedom to construct deals

Credible Tradable Items for Carbon Markets

- **The Underlying Commodities**
  - Permits (disincentive to pollution)
  - Credits (incentive to solutions)
- **Derivatives**
  - **Futures** (the right and obligation to deliver a specified amount, at a specified price, on a specified date)
  - **Options** (the right, but not obligation, to buy ('call') or sell ('put') a specified amount, at a specified ('strike') price, during a specified period of time
  - **Complex or 'Structured' Derivatives**

Trading / Price-Setting Mechanisms

- **Sellers' Markets:**
  - Catalogue-Sale / List-Price Sale
  - Auction (of many kinds)
- **Buyers' Markets**:
  - RFQ (Sealed First-Price Auction)
  - RFT (Tender) / EOI-RFP (Proposal)
  - 'Reverse Auction'
- **Balanced Markets**:
  - Negotiation Processes
  - Two-Sided Offers with Matching
    aka Clearinghouse Auction or Exchange

Auction Process A Definition

A particular kind of trading process
where price is the key factor to be negotiated
and offers are simple, stating price, perhaps quantity

Auctions are particularly applicable to commodities
(i.e. undifferentiated goods and services)

Common Categories of Auction

- **Sellers' Markets:**
  - **English Auction / Open Ascending Price Auction**
  -
  -
- **Balanced Markets:**
  -

http://en.wikipedia.org/wiki/Auction
http://en.wikipedia.org/wiki/Exchange_(organized_market)

'An English Auction'

- The Auctioneer identifies the 'Lot'
- The Auctioneer seeks an Opening Bid
- Bidders successively make higher Bids
- The Auctioneer stimulates more Bids
- The Auctioneer warns that time is expiring
- The Auctioneer 'knocks down' to the last Bidder

Common Categories of Auction

- **Sellers' Markets:**
  - English Auction / Open Ascending Price Auction
  - **Dutch Auction / Open Descending Price Auction**
    price runs down, first bid wins,
    forces a motivated buyer to bid early and high
  -
- **Balanced Markets:**
  -

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    bids non-visible, time-limited,
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- Balanced Markets:
  - Clearinghouse Auction / Exchange
    both sellers and buyers submit offers,
    offers are 'matched', may be continuous or periodic

http://en.wikipedia.org/wiki/Auction
http://en.wikipedia.org/wiki/Exchange_(organized_market)

Clearinghouse Auction / Exchange Special Challenges

- **Trading Volumes** can be substantial
  e.g. shares, derivatives, forex
- **Volatile Prices**, which attract 'day traders' and 'arbitrage dealers', which increases 'market depth', but also further increases volatility
- **Matching** needs to be performed fairly,
  e.g. priority based on price, then time of receipt
- **Price-Based Matching is not enough**
  because offers to buy and to sell, whose prices match, may not be for quantities that match

eCommerce Practice Markets in Tradable Items

- **Initial Sale and Purchase**:
  - **Permits ('Carbon Units')**
  - Credits and Offsets
- **Trading**:
  - Permits (Kyoto)
  - Credits (Kyoto)
  - Offsets (Voluntary)
  - Derivatives

Kyoto-Compliant Tradable Items

- **Permits**, which may be:
  - Granted as 'allowances' – especially initially (Assigned Allocation Units – **AAUs**); or
  - Sold by the government on the open market; and
  - may be for a specific year,
    or for any one year after a specific year
- **Credits**, from emission reduction projects:
  - Unit Emission Reduction Units (**ERUs**)
    Joint Implementation (JI), in industrialised countries
  - Certified Emission Reductions (**CERs**)
    Clean Development Mechanism (CDM), in developing countries

Current Carbon Markets

- **Precursors to Carbon Markets**
  - US sulphur dioxide permits
  - US and European electricity and gas markets
- **Carbon Markets**
  - EU Emissions Trading Scheme (EU ETS)
  - Smaller ETS emergent in other countries esp. NZ (2008??10??13?), Australia (2015?)
  - the 'Voluntary' approach, esp. US, also Japan, and in regions of USA, States of Australia

Current Carbon Markets Some Reality Checks

- EU ETS Phase 1 2005-07 was:
  - a success, because trading occurred
  - a failure, because of price collapse due to (a) gratis permits, and (b) over-issuance
- US schemes are:
  - a failure – small volumes
  - a success – standards for tradable items
- 95% of trading has been in derivatives
- Free-marketeers say government-driven schemes will be and/or should be supplanted by an industry-driven scheme based on 'carbon offsets'
- The GFC slowed <u>everything</u> down

The Aust Govt's Request For Tender

https://www.tenders.gov.au/?event=public.atm.show&ATMUUID=03D6504F-BD15-C3B1-844579B7B2E2977D

- **An Auction Solution and Settlement Solution for the Initial Sale of Unallocated Permits**
  http://www.cleanenergyfuture.gov.au/auctions-for-carbon-units/
  http://www.cleanenergyfuture.gov.au/wp-content/uploads/2012/08/CEF-factsheet-Auctions-for-carbon-units-201207201.pdf
- To be operated by a contractor, on behalf of a specialist agency, the Clean Energy Regulator
  http://www.cleanenergyregulator.gov.au/
- Released 10 Aug 2012, closing 12 Oct 2012
- **The Basis for Assignment 2**

An eCommerce Perspective on Carbon Trading

Recapitulation

- Global Warming
- Why Carbon Trading?
- Tradable Items
- eCommerce Theory
- eCommerce Practice

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