Barriers and drivers towards the transition to a low carbon built environment

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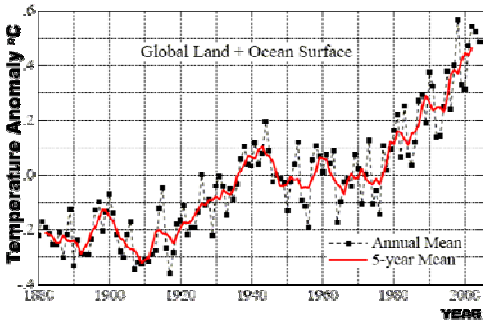
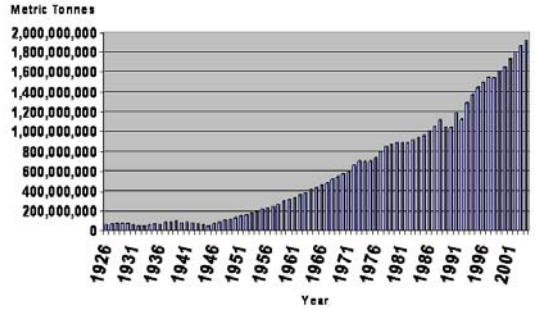
Overview

- In 150 years greenhouse emissions have increased global mean temperature by 0.6^0 C (IPCC 2001, CSIRO 2005)
- Buildings offer scope for reduction of emissions
- Technology to reduce emissions is available
- 'Business as usual' scenario will not deliver sufficient reductions
- The real estate and construction professions are the catalyst for change
- Findings of preliminary research

Global Warming since 1880's



World Production of Cement



Approximately 1 tonne of cement produced = 1 tonne of CO_2 (Source: Pearce, G., 1997)

Approximately 2 billion tonnes of Portland cement produced in 2004

(Source: Van Oss, 2006)

Existing research

- Australia predicted to increase emissions from 32Mt to 63Mt between 1990 and 2010 (AGO, 1999)
- 12% of Victoria's greenhouse gas emissions are derived from commercial buildings (DSE, 2005)
- Physical characteristics of buildings influence consumption
- Replacement of the stock and impact of building regulations
- City of Melbourne 2020 Zero Net Emissions
- Melbourne CBD – PCA and classification of stock

Scope and Limitations

Scope

- Profile existing office buildings in a global CBD in terms of energy consumption and efficiency
- Undertake scenario planning based on 5 year time frames (2010, 2015, 2020)

Limitations

- Access to entire population
- Research timeframe
- Sensitivity of data
- Other factors (embodied and transport energy)

Data

- Direct consultation with stakeholders
  - *City of Melbourne*
  - *Property Council of Australia (PCA)*
  - *Investa*
  - *ISPT (Industry Superannuation Property Trust)*
  - *Jones Lang LaSalle*
  - *CB Richard Ellis*
  - *Colliers International*
  - *Knight Frank*
  - *Real Estate Institute of Victoria (REIV)*
  - *Valuer General of Victoria*
  - *Australian Property Institute*
  - *RICS Oceania*
  - *RICS Victoria and Tasmania*
- Local government databases
- Industry databases
- Survey for data validation
- Calculating CO_2 emissions via industry standard model

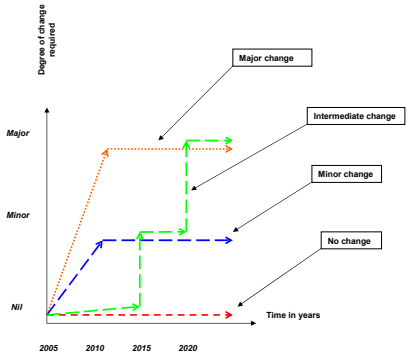
Methodology

1. Assemble the primary dataset
2. Add additional information from the marketplace
3. Identify and validate office buildings
4. Validate database using survey of individual buildings
5. Calculate CO_2 emissions for individual office buildings
6. Model 5 year time frames - 2010, 2015 and 2020
7. 4 scenarios: no, minor, major and intermediate change

Table 1. Variables altered in scenario analysis – 2010, 2015 and 2020

Variable	Scenario 1 - no change	Scenario 2 - minor change	Scenario 3 - major change
Number of employees	0%	Increase by 10%	Increase by 25%
Green power use by grade (premium, A, B, C and D)	5%,2%, 1%, 0%	10%,5%, 2%, 1%	50%,25%, 10%, 5%
Electricity consumption (kWh)	No reduction	Less 10%	Less 25%
Gas (MJ)	No reduction	Less 10%	Less 25%

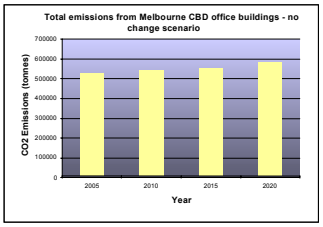
(Source: author's dataset)



Findings

Finding 1:

Based on the 'no change' scenario, emissions from office buildings will increase.

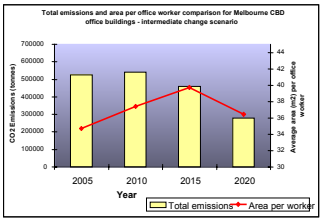


(Source: author's dataset)

Findings

Finding 2:

Emissions per worker is linked to office space per worker for all scenarios.

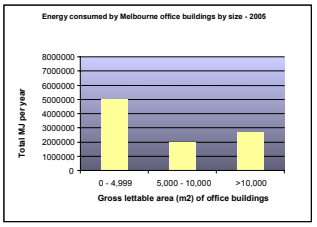


(Source: author's dataset)

Findings

Finding 3:

Smaller buildings consume more energy in the Melbourne CBD.

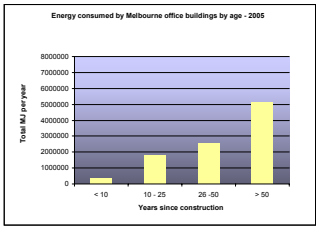


(Source: author's dataset)

Findings

Finding 4:

Older buildings currently consume more energy.

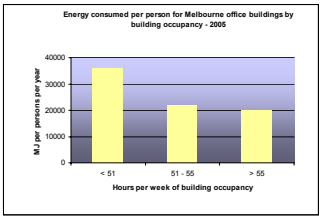


(Source: author's dataset)

Findings

Finding 5

Lower energy consumption per person is currently linked to longer periods of occupancy per week.



(Source: author's dataset)

Summary

- Increasing the density of workers in office buildings will lower emissions on a per person basis
- Occupancy levels of older office buildings should be monitored
- Ensure energy efficiency has highest priority in refurbishment
- Smaller office buildings are generally less efficient and property and construction professionals must recognise this
- Reluctance to reveal information about energy consumption
- Widespread apathy towards climate change - $ is most important

Outcomes

- More effective and targeted policy making is essential
- Potential for short and long term incentives
- Short term examples: owners of older buildings encouraged to modify use of building to reduce CO_2 emissions
- Long term examples: closely monitor overall stock with regards to both quality and quantity
- Draw clearer links with value and financial operation
- Lease structures are under question – length and flexibility
- Real estate and construction professions are now more informed