OFFICE BUILDINGS

THE IMPORTANCE OF “MAKE GOOD”, FITOUT AND RECURRING EMBODIED ENERGY

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Existing building stock makes up 95% of o’all stock
- Office buildings 22 mill. m² (Aust.) - 83% > 5 years old

Sustainability - LCA measures total energy (GHG, CO₂)

“Initial embodied energy” is often a key focus in studies - “Recurring embodied energy” is often under-reported

Office buildings have large turnover of tenancies, thus large retro-fit .......... therefore large recurring embodied energy ??
Purpose

- Research Recurring EE as part of sustainability improvement in office building
- Recognise and optimise a trans-disciplinary problem
- Develop cogent research questions and a related research agenda
Operating and Embodied energy often dominate the proportions of total energy
OE is often higher for high energy usage buildings
IEE can be higher for low OE buildings
IEE proportions vary widely e.g. 2% to 60% of total energy. Reasons:
- Type of building - office building IEE max is 5.5 times > min.
- Climate - in a favourable climate OE may be low
- Efficiency of materials production
How much could Recurring Embodied Energy (REE) contribute

- Time is often cast as a fixed variable - many LCA studies do not take into account REE
- Offices - cyclic retro-fit at about 7 year intervals
- Limited research indicates that REE may similar in amount to initial embodied energy
The impact of tenancy agreements on retrofit - “Make Good”

- *Make Good* - written into property leases about hand back procedure:
  - Strip-out the outgoing tenant’s fitout,
  - Reinstatement of the pre-lease fitout
  - Incoming tenant’s fitout
  - Problem - many iterations of waste and recurring energy
Office buildings unwittingly allow the *Make Good* process to take place unhindered - small building regularly re-constructed within a large one.

Unfortunately - fit-out for permanency but strip-out for transitory needs.

Quick cycle obsolescence - not only recurring energy problems, but reduces Green fit-out.
Tenancy churn – an upstream driver of Retro-fit and Make Good

- Churn - the movement of building occupants due to organisational change
- Cause - changing temporal, spatial, facilities, business, labour, logistical needs.
- Scale - 30% churn of building occupants per year is considered normal (UK)
- Large, expensive and increasing business sector
- Understanding Churn is important to reducing embodied energy brought about by short cycle *Make Good* and fitout.
Rethinking Office Design to lower recurring embodied energy

- Design for reduced need to churn - adaptability
- Design for focus on short term but reusable fitout:
  - Easy installation/de-installation
  - Leasable fitout
  - Potential for furniture lead approach (re-skinable and relocatable)
- Other inputs to learn from
  - Upgradeability
  - Theatre sets, events management,
  - Modularisation
  - Services - greater use of access floors, wireless technology
Conclusions and Research Agenda

- Transdisciplinary problem/solution

Phase 1 – Scaling the problem:
- Does recurring embodied energy impact on the total embodied energy? Is it enough to be a problem?
- Does churn impact on the extent and rate of Make Good / retrofit in office buildings?
- Does current “Make Good” practices and “churn” limit the implementation of “green” building leases?
Phase 2 – Responsive strategies

- Moderate recurring energy by reuse and recycling of fitout materials?
- Potential to reduce the impact of churn on recurring embodied energy?
- Optimise design led solutions – design for churn and reducing recurring embodied energy?
- Develop new leasing fitout arrangements?
Questions