Cost and Value: Multiple Benefits of Green Commercial Buildings

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Multiple Benefits of Green Commercial Buildings

• A green ‘sustainable’ building will provide added value

• Difficult to attach an actual financial value to the all benefits of green buildings

• Are they more attractive to tenants and occupiers ?

• Can they attract a financial premium ?

• Are people aware of the full benefits.
Are people aware of these benefits?

Why aren't all houses energy + ?
Commercial Buildings

Energy relatively small in relation to overall operating costs - not top priority for operators.

Energy must be considered with other ‘green’ building attributes.

• Comfort + Health
• Productivity

• Green agenda
• Asset value
EMPA zero carbon office, Zurich
Demand Reduction
Predicted vs Measured

Can we guarantee comfort?
Value of a green building is the overall return on investment:

• quantitative terms, for example, energy saved.
• qualitative nature, such as, improved quality of life, accepting that such qualitative improvements can also result in cost benefits.

Multiple benefits, include:
increased occupant satisfaction; longer tenancies and higher lease rates, reduced absenteeism in businesses and an overall higher asset value; future proofed and reduced risk of obsolescence; less need for refurbishment in the future; higher demand from institutional investors and satisfying corporate social responsibilities; and, lower operating and maintenance costs.
Cost of a green building

- Perceived to be as high as 29%
- In practice are less than 12.5%
- Studies have shown around 2%
- Sometimes less than standard costs
OVERALL COSTS

Design/construction costs : O&M costs : business costs


1 : 0.4 : 12  (Hughes, WP and Ancell, D and Gruneberg, S and Hirst, L, 2004)

Energy costs typically 1% of O&M costs
(Kats G, Leon A, & Adam B, 2003)
PRODUCTIVITY, HEALTH AND COMFORT

An estimated average increase in productivity for a green building with a good environment is **4.8%** (Johnson Controls, 2012) to **30%** (Davis Langdon 2007).

- individual temperature control +3%;
- improved ventilation +11%;
- improved lighting design +23%;
- Natural environment (daylight / openable windows) +18%.

**Reduced absenteeism** (Lucuiik M, Trusty W, Larsson N, and Charette R, 2005)
spaces with higher office ventilation rates -35%.
Sick Building Syndrome

USA, potential annual savings through productivity gains are $10 to $30 billion from reduced Sick Building Syndrome symptoms and $20 to $60 billion from direct improvements in worker performance that are unrelated to health. (Fisk WJ, 2000)

20% of workers might be affected by SBS symptoms (J. Heerwagen, 2010). Reducing SBS symptoms can potentially reduce absenteeism, as well as increasing productivity, and creating a more favourable working environment, which in turn can reduce staff churn.
SBS related to operations and maintenance

buildings that are poorly operated and maintained have higher BSS

Green buildings easier to maintain and operate
Green buildings have good IAQ
SBS and Absenteeism

UK

Figure 7.7. Effect of Building Sick-symptom Score to No. of Sick Days/Person/Year

\[ y = 0.4135x + 1.552 \]

\[ R^2 = 0.3812 \]

Heritage Project, UK

Figure 7.8. Effect of Building Sick-symptom Score on No. of Sick Days, Heritage Project, UK

\[ y = 3.8688x - 4.2453 \]

\[ R^2 = 0.6013 \]

\[ y = 1.3535e^{0.5492x} \]

\[ R^2 = 0.5753 \]

Hong Kong

Green Buildings have less absenteeism
Multiple Benefits

FUTURE PROOFING
- Retrofitting may be increasingly dealt with through regulations;
- Green buildings may be considered a lower risk, which could result in a higher yield on investment.

CORPORATE RESPONSIBILITY
- Corporate Social Responsibility (Carroll, AB, 1991) for a business includes ethical and philanthropic responsibilities, alongside economic and legal responsibilities.

MARKETABILITY
- Sustainability credentials enjoy increased marketability;
- More easily attract tenants and to command higher rents and prices;
- Emerging ‘brown discounts’, where buildings that are not green may rent or sell for less;
- Green leases can provide benefits to both tenants and landlords.
GREEN RETROFITS

Many of the buildings that will be here in 2050 already exist.

Commercial buildings often fast track and not sustainable.

Not operated by owner – green leases.
GREEN RETROFITS

i. *Commissioning*, typically **22%** energy savings, with payback period of 1.1 years;

ii. *Standard retrofit*, **25-45%** savings with payback period less than 4 years. Such retrofits generally adopt a package of component-level replacements of existing equipment;

iii. *Deep retrofits*, integrated whole-building approach typical savings of **45%**, with payback period of up to 3 years, upgrades to the building envelope are combined with retrofits of lighting and mechanical systems.

(Pacific Northwest National Laboratory, 2011)
SUMMARY

Typical costs

Cost benefits

£/m²/year
Multiple Benefits of Green Commercial Buildings

**National / Global**
- Carbon emissions reduction.
- Reduced use of resources.
- Security of energy supply.
- Improved public health and well-being, and reduced health related costs.
- Reduced environmental damage.

**Building**
- Increased resale value.
- Increased rental rates.
- Higher occupancy rates.
- Lower operating expenses.
- Higher net operating income.
- Lower capitalization rates.
- Increased energy efficiency and lessening greenhouse gas emissions.
- Reduced risk of obsolescence.
- Less need for refurbishment in the future.
- Lower tenant turnover affecting renewals, inducements and fitting out costs amongst others.
- Quicker to secure tenants.
- Better indoor environment: health, well-being and productivity gains.

Attract grants, subsidies and other inducements to do with environmental stewardship.
Higher demand from institutional investors mandatory for government tenants.
Contribute to company CSR policy.

How can our cost models place value on multiple benefits?
Thank You