

Sustainable Spaces A Case for Improved Performance Monitoring and Facility Management

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While business use of commercial buildings makes a significant contribution to greenhouse gas emissions, our current approach to the supply and use of property may do little to improve building sustainability and ultimately the sustainability of some businesses. New "green buildings" have the potential to change environmental outcomes, but only if investment in new technologies is matched by investment in "human capital". There are worrying signs that despite our best intentions the current approach to creating more sustainable spaces might actually deliver the opposite greenhouse outcomes to the ones we seek. We need to change the way occupants actually think about and use buildings and increase our emphasis on performance monitoring to ensure the next generation of new or refurbished buildings will actually deliver on their promise.

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Why sustainable spaces?

The Australian Greenhouse Office has reported that the expanding commercial building sector "with fast growing emissions can significantly contribute to meeting Australia's greenhouse gas reduction target and simultaneously improve the comfort and health of Australians in their built environment" (1). This sector is expected to almost double its 1990 greenhouse gas emissions of 32Mt of CO₂ per annum to 63Mt of CO₂ per annum in 2010.

The commercial office building is the most significant culprit currently contributing around 15Mt of CO₂ per annum or 27% of the total sector greenhouse emissions.

Further, greenhouse gas emissions relating to embodied energy, that is energy used in the production and placement of buildings is estimated at only 8% to 10% of total emissions caused by energy use over a 40 year life span. Space cooling, ventilation and lighting account for around 52% of commercial building energy consumption but 71% of greenhouse gas emissions.

These figures highlight the leverage effect building use has on wider environmental sustainability.

Energy consumption "in-use" is most significant, despite the inclusion of building technologies used to reduce operating energy consumption.

Sustainable spaces or sustainable business?

Property development, building design and construction still largely responds to the needs of a "generic-business", even if there is a pre-let anchor tenant for a new or refurbished building. Consequently, only a limited number of business critical issues can be taken into consideration in the early stages of new building delivery.

This oversimplification of the complexity of modern business dictates that the building's ability to meet organisation needs will always be sub optimal and may well constrain it's ability to operate at full effectiveness. When the physical space limits the adoption of more innovative forms of organisation or work practices, it negatively impacts occupant satisfaction and productivity.

A building is also a highly structured and hierarchical system. It is well known that in the delivery process constraints are pushed down this hierarchy as service providers endeavour to minimise their own exposure to risk. Location decisions may influence building type, orientation the building, fabric, options for building engineering services and so on. And in the construction phase, pressure to meet project time, cost and quality targets may result in sustainability initiatives being wound back or removed entirely.

Such decisions reflect supply side or project needs, not necessarily those of users.

Most often, near the end of this chain of events, comes decision making about space for business use. Under these circumstances it is not difficult to imagine tenants as unwitting "co-conspirators" in this process as responsibility for managing risk is transferred to the demand side of the equation. Supply side constraints then become accepted as organisation constraints.

Of greater concern is that this linear model for decision making about space is transferred to the mind-set of the organisations which "choose" to occupy the space. This has the potential to severely limit what occupants believe is possible from their use of space. It may well deny some the opportunity to implement the more innovative work systems required for their business to be sustainable in a globally competitive economy. (2)

Enter the green building!

Against this background, there is a shift in thinking towards the need for more sustainable "green buildings". However this is still very much an initiative that is supply side driven.

As conventional economic wisdom holds that investment in physical capital, including buildings is the best means for achieving economic growth, the creation of more advanced green buildings should herald the beginning of a "new wave" of property investment.

Currently new green buildings initiatives appear to be focussed on embedding more sophisticated hard technology in the building itself. New facades, enhanced building automation, energy management and lighting control systems are examples of how more sustainable spaces can be delivered.

The key question is; will this technological determinism - the belief that all will be solved by technology - actually deliver the greenhouse gas outcomes required in the commercial property sector?

Since the Australian Greenhouse Office considers the greatest technical impact is to be found in "lighting", yet it is estimated that technical fixes in this specialist area alone "will require an additional capital investment of some \$4.2Bn (1990) to achieve a 30% emissions reduction by 2010" (1), then, clearly, the answer to the question is...not necessarily. A technical strategy alone would appear to be unsustainable. Some of the reasons for this are;

- Over time, the property industry may be able to deliver a more technically advanced but relatively standardised new building "product". But the process for the supply of space may continue to prescribe what tenants can expect from this space and constrain them from accepting responsibility for delivering better environmental outcomes from its use.
- Even the domestic video player, packed with redundant functionality in the hands of the most technically savvy user, has an instruction manual. With little attention given to tenant user manuals, there will be an "intelligence" disconnect. Transfer of knowledge about how to get the best business results from building use to the initial tenant may be low and across multiple tenancies over the life of the building, non-existent.
- It is well known that new technologies create entirely new categories for human error and more automated environments contribute to a breakdown of clear cut definitions as to who does what at any given time and who is responsible for what. In the case of more automated buildings a culture of "fit and forget" has prevailed (3) with a consequent reduction in the number of facilities personnel considered necessary to "maintain" the system. Research consistently shows more complex systems require more not less management resources to deliver their promised value, despite what technology suppliers would have us believe. (4)
- Technological determinism risks dis-empowering those who actually use the space. Sustainable value is embedded in the building not in the core values of those occupying the building. Without taking on these sustainable values, business cannot derive maximum benefit from its use of this new space.

So, should the property sector alone take responsibility for reducing the greenhouse gas emissions resulting from the commercial use of space?

What is a building for?

As the push to create greener buildings gathers momentum it is worthwhile reflecting on the question: "what is a building for?" (5)

Productive human endeavour could be the catch-all answer addressing the need for buildings to support occupant comfort, health, satisfaction and better work performance; but in the future, not at the expense of the wider, natural environment.

Productive human endeavour will therefore remain an outcome to be delivered in the provision of more sustainable spaces.

Investing in Human Capital

But to compete effectively, business today must not only grow faster, it must deliver *productivity increases* as well.

Economists believe that even with technological advances, investment in physical capital provides only a one off boost to economic activity and is subject to diminishing returns. *It cannot produce increases in the rate of economic growth.* Green building investment would theoretically contribute to this boost, but with a lesser impact on the natural environment.

However "new growth theory" holds that investment in human capital does not result in diminishing returns, because it can be embodied in the organisation and produces *sustained increases in the rate of economic growth.* (6)

By emphasising investment in human capital, business can get closer to the factors that actually drive sustainable improvements. The reasons for this are as follows;

Firstly, ideas (like how to deliver better environmental outcomes from building occupancy) are not restricted to the intellectual property of building technologists and other specialists who compete to have them incorporated in new or retro-fitted buildings. When ideas about sustainable spaces are "non-exclusive" they can be used simultaneously by a wide range of occupants in a diversity of applications or outcomes. This approach can provide sustainable productivity increases as well as sustainable spaces.

Secondly, ideas in any tenant organisation become cumulative. New knowledge is added on top of existing knowledge that may initially come from a diversity of user experiences, including those outside of the commercial building environment. The more occupants acquire knowledge of how to use green buildings, the easier it is for them to acquire knowledge and skills for the sustainable use of space generally.

Thirdly these skills become complementary in that individual benefits flow to others in the broader business community through networks and connections. This has been demonstrated with technology tools used in buildings such as computers and mobile phones, but is yet to be demonstrated for technologies embedded in buildings themselves.

An analogy for the green building in its current form is that of the situation in which a tenant "buys" a more intelligent fridge, but the users continue to leave the door open! The new product may be rated as more energy efficient, but the purchase decision has not been accompanied by any behaviour change. In use energy performance could be worse than expected.

A more empowered workforce facilitates more rapid adoption of new ideas. The green building challenge if managed well could actually be a catalyst for improved performance on a much wider front.

Is there a role for the informed user?

If we are serious about reducing the negative environmental impacts of commercial buildings, then it is paramount that users be more informed and aware of how to actually use the buildings they occupy.

The Australian Greenhouse Office has also reported that despite the energy rating of consumer white goods the total energy consumption by white goods in Australia has actually increased. Why? Because consumers believing their responsibility to reduce energy consumption rests only with buying the most energy efficient appliance, have continued to buy more of these appliances. Similarly in the residential housing sector, total energy consumption continues to increase, despite energy smart housing design, because dwelling size is also increasing. We have to put all those appliances somewhere!

The property industry is faced with more than one generation of commercial space users who know only the automatically controlled, fully air-conditioned building and who probably believes accountability for building energy management and greenhouse gas emissions rests not with them but elsewhere; perhaps the Facility Manager.

There is a danger that despite our best intentions the current approach to creating more sustainable spaces might not deliver the greenhouse outcomes we seek... unless we do more than just embedding buildings with technology, conducting energy simulations and giving them star ratings.

There is an underlying assumption driving current initiatives that must be challenged. It is that because people occupy buildings they actually know how to use them, or squeeze the best value out of them. As new, green buildings come on stream, particularly those that are more naturally ventilated or mixed mode in operation they will require greater, not lesser involvement of the user in their operation. These buildings may be simpler, more robust, but will necessitate a more informed and empowered user if they are to be successful. Research conducted by The University of Sydney (7) shows mixed mode office environments can deliver energy savings up to 70% of their air-conditioned equivalent where good user controls in place. Further it was concluded that around 50% of normal office occupancy in Sydney is suitable for passive and natural drivers of ventilation. Similar results might be expected in other Australian capital cities although more work is needed to confirm this. (8)

The Australian Greenhouse Office has concluded that energy management initiatives alone will never achieve the same outcomes as the combined effects of "voluntary measures and improved level of awareness in the marketplace". (1) Clearly there is very little incentive for users to change their behaviour if the green building movement emphasises hard technologies in the design of a building over human technologies in its 30 to 50 years of occupancy.

The way forward

There are signs that a broader demand driven agenda is emerging. My participation on the Australian Building greenhouse Rating scheme (ABGR) National Steering Committee leads me to believe that in the next phase of "market transformation", there will be more emphasis on engaging tenants and ensuring energy efficient spaces are monitored to ensure they are comfortable and productive as well. KODO is working with the New South Wales Sustainable Energy development Authority (SEDA) and the NSW Police Service on the evaluation of their new accommodation at Parramatta in Sydney using its **probe**© methods.

The Facility Management Association of Australia is more actively advocating demand side issues and has prepared a position paper. It is also securing funding to build a web based *Environmentally Sustainable Design Toolkit* for use by Facility Managers and will assist the Barton Group (a think tank involving built environment industry experts) to prepare a retrofit strategy for commercial buildings to support the Australian Federal Government's Environment Industry Action Agenda (EIAA).

The Green Building Council of Australia will also incorporate "in-use" issues as it develops its Green Star rating system.

Beyond these broader industry initiatives, what other strategies could be adopted?

Firstly, tenants should demand more evidence based solutions as opposed to those relying on mere anecdote. Processes like **probe**© enable occupant health, comfort, satisfaction and productivity to be independently assessed alongside the building's external environment performance. There is little to be gained by saving energy at the expense of occupant productivity.

New integrated performance management tools like **Workplace Mentor**^{ck} (9) objectively map and manage any form of human endeavour, the efficiency, effectiveness and value-add in service delivery and the workplace resources used to deliver measurable outputs to internal or external customers.

Secondly, adopting a more integrated or "systems" approach in strategic planning for space would result in closer alignment of financial, organisation, technology and building objectives in the pursuit of sustainable environment outcomes.

Thirdly the demand and supply sides of the property industry need to work much closer together and overcome the "intelligence disconnect". Better briefing processes that consider occupancy and use issues earlier, tenant user manuals and closing the feedback loop between actual performance and design intent would be helpful.

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