Productivity from Indoor Environment Quality – Time to Act

By Dr Vyt Garnys, CETEC Pty Ltd in collaboration with Tony Arnel, global director of sustainability, Norman Disney & Young

Our declining productivity is a daily discussion issue in Australian media and government. However, missing in the discussion is the role of our major asset – the existing built environment. Various estimates for existing commercial or non-residential stock buildings range from 200 to 500 million m^2 and wages earned are of the order of $400 billion with office workers earning about $150 billion annually.

Based on Facility Ecology projects by CETEC over the past 25 years and estimates overseas, the quality of the indoor environment of existing buildings can be improved so as to yield between 1-15% gain in occupant productivity. Considering an average potential improvement of 7% (the target set by Melbourne City Council's CH2 building), this would lift national productivity by about $10 billion each year or almost 40% of the annual forecasted non-residential construction and most likely exceeding the value of annual new office construction. Pre and post IEQ and productivity studies conducted by CETEC in the past 5 years have yielded 4 – 13% financial productivity gains from improvements to existing or new buildings. In the recent LGS Sydney portfolio energy upgrade, a gain of $20/$m^2$ from Energy and $170/$m^2$ from IEQ was achieved or projected.

Both NABERS and GBCA have recognised the value of the indoor environment on worker wellbeing and productivity and are intensifying their efforts to improve their rating systems for occupant satisfaction, comfort, contaminants, lighting and acoustics in buildings.

PCA, FMA and AIRAH have been active for over 10 years in promoting the value of IEQ in buildings as have a number of state and local governments.

The importance of IEQ on productivity and wellbeing was highlighted at the *HB2012 International Healthy Buildings Conference* in Brisbane where CETEC was the Platinum Sponsor and conducted the world's first international IEQ/Productivity masterclass. NDY and CETEC are assisting Woods Bagot deliver the cutting edge SA Health and Medical Research Institute (SAHMRI) in Adelaide and worked with Lend Lease on the New Royal Childrens Hospital.

Both CETEC and NDY are active in assisting clients and rating agencies with scientific and engineering expertise respectively. Expert multidisciplinary professional input is critical for successful assessment, design, construction, facility management and refurbishment stages of projects. Proper scientific and engineering measurement of existing operating conditions will ensure informed and cost effective design and commissioning for optimum occupant and client satisfaction and operations for both refurbishment and new projects. Productivity based financial systems can then benchmark the corporate gains for rational and information based operational and maintenance management to maintain staff wellbeing and productivity.

Since the potential contribution to national productivity and worker satisfaction is so significant, both state and federal governments should support the IEQ efforts of NABERS and GBCA rating agencies, plus private and public research. National statistics and guidelines overseen by the Productivity Commission should also be established.

Whilst the gains achieved by a focus on saving resource sustainability such as energy, water, ecology and waste must be continued, a focus on IEQ will yield the outputs needed to improve national wealth, harmony and wellbeing.

Apart from the massive total capital value, buildings are a means of conducting business and hence part of the productive capacity of the nation. Due to the huge invested capital in buildings both in construction and infrastructure their role in contributing to national wealth should be considered by the Productivity Commission. The challenge is how to cost the output to input ratio required for productivity assessment. The next challenge is to quantify the aspects of the building that influence the overall building productivity.

Both GBCA and NABERS can contribute to the assessment of the proportion of productivity contributed by the building itself as distinct from the contribution of equipment and management. For the past 15 years (NABERS Energy) and 10 years of GBCA rating, the emphasis has been on energy and water assessment – the Resources components. Whilst CETEC for 25 years has emphasised the much higher value financially and socially of Indoor Environment Quality and the PCA (2009) and AIRAH have issued guidance publications, the emphasis has remained on Energy and Water assessment.

Consider the simplified costs and outputs to each business:

Costs = $3,300/m2pa

[Rent ($300/m2pa) + Energy ($750/m2pa) + Operations ($1800/m2pa)]

Output = $16,500/m2pa

[Labour ($15,000/m2pa) + Profit ($1500/m2pa)]

Hence Energy Productivity is $750/$16,500 = 4.5% whilst labour productivity is $15,000/$16500 = 91%

Assessment and focus within offices on the effect that the working environment IEQ, ergonomics, office equipment, management and remuneration is now imperative to assist in reversing the decline in national productivity by improved design, engineering, construction, facility and financial management.

Benchmarking tools developed by NABERS and GBCA are the only reliable means of assessing the integrated design and performance features of the built environment as a contribution to the total productivity assessment.

Numerous studies overseas have confirmed the high value of Indoor environment quality over the past 10 years and most recently as presented in papers at HB2012, Brisbane July 2012. The early pilot studies in Australia have been succeeded by more substantial pre and post occupancy integrated studies by CETEC using NABERS methodologies e.g., Umow Lai, Sydney Water, ISIS, Victorian Health Department, SA Water, Queensland Public Works, Local Government Super, Monash City Council. These more recent studies have confirmed the high wellbeing, satisfaction, productivity and financial value of improved Indoor Environment Quality.

In the UK, In addition to the British Telecom, UK Commission for Architecture and the Built Environment (CABE) and British Council for Offices (BCO) studies, EC Harris, a leading international built asset consultancy, changed its business culture, improved productivity, and created a catalyst for change across its entire business with its move to a new 66,000 sq. ft. (6,132 sq. m.) workplace in London's King's Cross.

The way EC Harris went about this, was to create a partnership at the outset including: its own FM team, architects Swanke Hayden Connell and IT consultants Mitel.

In considering the holy grail of business performance and workplace productivity measurement the program has produced the following performance results:

Financially:

- The £1.5 million targeted benefits were realized in fewer than 6 months
- Net Profit Margin increased by 13 % from pre-move levels
- Fee turnover per head increased by 7.5 %
- Total occupancy cost per head went down 36 % from £539 to £343
- Staff attrition dropped from 25 % to 15 %
- Staff attraction: attrition ratio improved from 1:1 before, to 2.5:1
- Overhead costs as per percentage of staff costs reduced by 14 %
- Utilization of workspaces increased from 62 % to 85 %.

Business impact:

- Positive impact on how staff and clients view EC Harris; the building helps the business to win work
- Business wide impact on transforming EC Harris
- The success on the 'return on investment' means 11 other EC Harris locations have since followed suit
- New working practices increased integration, flexibility and transfer of knowledge
- Increased visibility of leadership and increased access to its senior people
- Improved sustainability; increased recycling and reduced paper consumption - Carbon footprint improved 251 %
- The building won industry recognition with the team winning key industry awards including British Institute of Facilities Management (BIFM) – Best impact on organization and workplace; and Premises and Facilities Management (PFM) – Best partners in business change

In the USA Fisk, Mirer and Mendel (2009) reviewed all published studies and showed that Sick Building Syndrome (SBS – now replaced by Building Related Illness – BRI) symptoms prevalence increases 23% (12-32%) as ventilation drops from 10 to 5 l/sec/person and 29% 15-42%) for 10 to 25 l/sec/person.

Source:

1. Source: Cetec, Facility Ecology Projects
2. Source: Cetec, Case Studies

About the authors

Tony Arnel is the Global Director of Sustainability at NDY. He is immediate past Chair of the Green Building Council of Australia (2007-2012) and a founding Director. He is also immediate past Chair of the World Green Building Council (2008-2011).

Dr. Vyt Garnys is Managing Director of CETEC, a multi-disciplined consultancy offering professional scientific solutions. The company was founded 25 years ago and has built a consideration reputation in the area of Indoor Environment Quality advising many organisations on the benefits of workplace health, wellbeing and productivity.

To find out more about CETEC visit: **www.cetec.com.au**