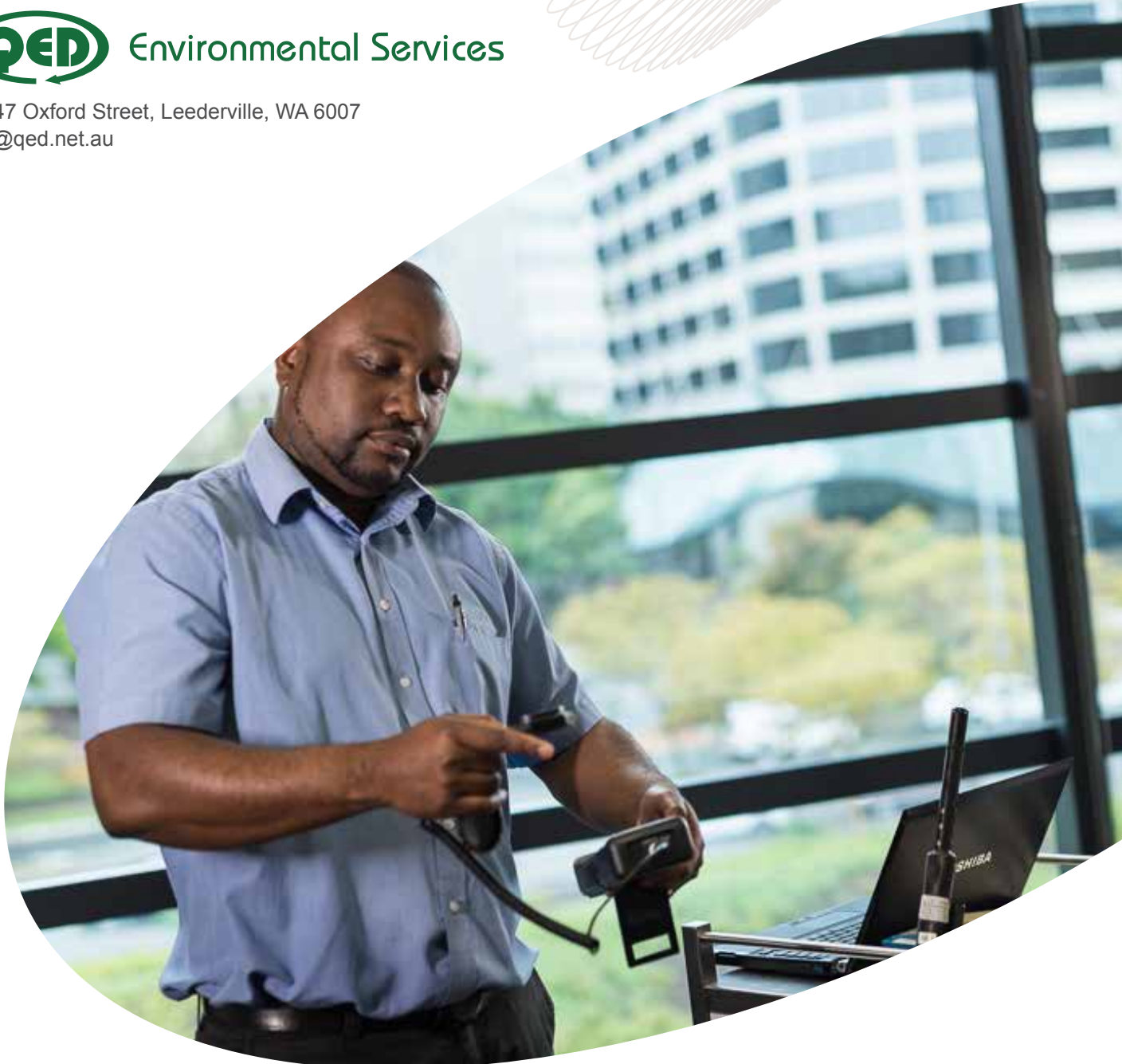


THE IMPACT OF INDOOR ENVIRONMENT QUALITY ON COGNITIVE FUNCTION

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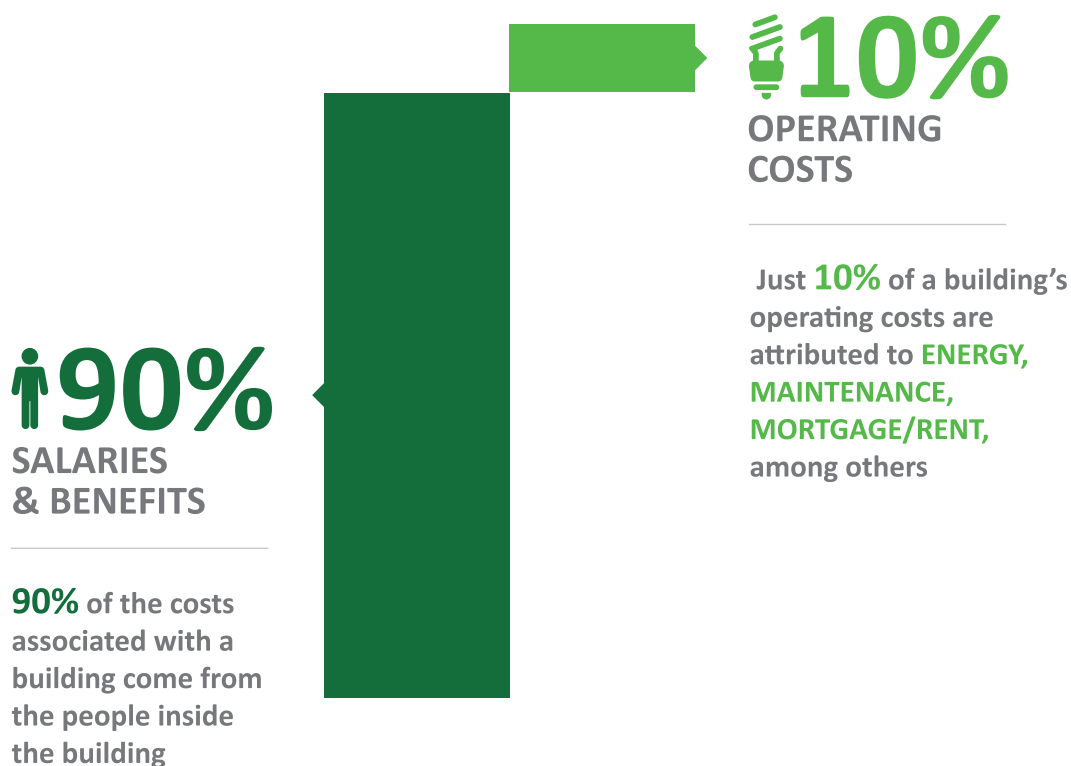


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New studies have proven that intelligence really is in the air. Let us tell you how creating a better indoor air quality can boost your business' productivity and cut your costs.

Did you know that we spend 90 per cent of our time indoors, and only 10 per cent outside? And yet we seem to focus so much on the quality of the environment for that smaller margin of our time, while rarely examining the situation we find ourselves in for the larger slice of our day.



THE FACTS

Thirty years of public health research has demonstrated that buildings have the ability to positively or negatively influence our health, however recent research has delved into the impact that the indoor environment has on cognitive function and productivity. We heartily support sustainable design and green building strategies, but at QED are even more excited about that “green” interest being a catalyst for reinvigorating research into the specific factors in a building that create an optimised environment for BOTH health and productivity.

New studies by a group of researchers from The Harvard T.H. Chan School of Public Health's Center for Health and the Global Environment, SUNY Upstate Medical University and Syracuse University have found that a poor quality indoor environment can weigh heavily on our cognitive function. The researchers set up a replica office with desks and cubicles in a lab setting, where they controlled key indoor environmental factors such as carbon dioxide, volatile organic compound gases and ventilation rate. They assigned subjects random mental tasks in different environments and found that their cognitive function test scores doubled in a favourable indoor environment. Interestingly, the effect escalates along with the higher the level of cognitive function required, so it has more impact on complex strategic decisions and crisis response, as opposed to performing some simple arithmetic.



How “green” a building is also has sway. The Impact of Green Buildings on Cognitive Function studies, also known as The COGfx studies, revealed that the occupant’s test scores averaged 101 percent higher (doubled) in high-performing, green-certified buildings with enhanced ventilation compared to those in conventional, non-certified buildings. Additionally, in a sample of 10 high-performing buildings, participants in green certified buildings had 26.4% higher cognitive function scores, better environmental perceptions and fewer symptoms than those in high-performing, non-certified buildings.

This outcome may be partially explained by IEQ (indoor environmental quality) factors, including thermal conditions and lighting, however the findings suggest that the benefits of green certification standards go beyond measureable IEQ factors. Simply put, its findings are that by occupying a green certified, high-performing building, the occupants can expect the best benefits to their health and productivity.

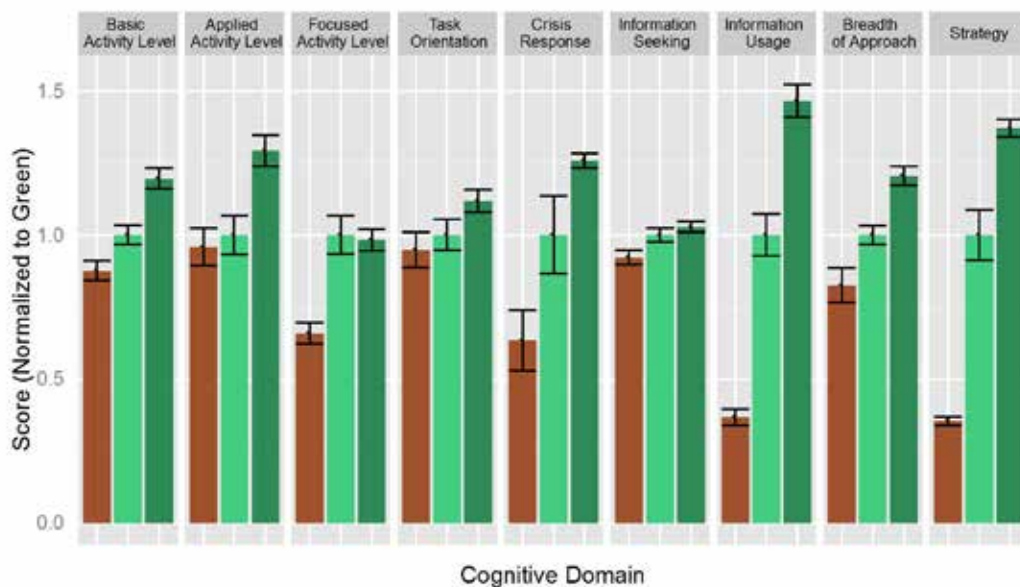
Further research supporting these results has been done by Pawel Wargocki et al. at the Technical University of Denmark, who reported his findings in two recently published papers *Effects of exposure to carbon dioxide and bioeffluents on perceived air quality, self-assessed acute health symptoms, and cognitive performance* (Indoor Air 2017) and *Performance, acute health symptoms and physiological responses during exposure to high air temperature and carbon dioxide concentration* (Building and Environment 2017).

In the afore mentioned study the researchers wanted to supplement the results of these recent studies by exposing human subjects to bioeffluents, including everyday factors such as a stuffy room or the odour of too many people in a space, and then examine subjective responses of discomfort, acute health symptoms, physiological reactions and cognitive performance. This was then also conducted for pure carbon dioxide, which is commonly used as an indicator of bioeffluents. Mr Wargocki found that the increases in bioeffluents produced measurable changes in cognitive performance and negative physiological reactions (such as headaches, fatigue, increased blood pressure or heart rate) and elevated stress levels, whereas increases in pure carbon dioxide did not.

In the latter study, researchers found that high temperatures caused subjects to feel more sleepy and the intensity of some acute health symptoms increased with the temperature. Through measuring eardrum temperature, skin temperature, heart rate, respiratory ventilation rate and body weight loss – the study observed higher stress levels, lower arterial oxygen saturation and decreased accuracy of addition and subtraction tasks.

The experiments collected responses of young college-age adults, and the researchers subsequently agree that further verification of the results is needed for other groups in population such as elderly and infants.

Principal investigator for the Harvard study Dr. Joseph Allen – who is Assistant Professor of Exposure Assessment Science at the Harvard T.H. Chan School of Public Health, and Director of the Healthy Buildings Program at the Center for Health and the Global Environment – concludes that these results are provocative. They suggest that the levels of carbon dioxide and volatile organic compounds (VOCS) that we commonly encounter in conventional office buildings are associated with decreases in worker performance compared to when those same workers are in green building environments. Secondly, he says when we enhance ventilation and optimise indoor environmental conditions, we see improvements in the cognitive function of workers.



THE BENEFITS OF BETTER IEQ

For both building owners and the end users – the tenants/occupants – there is a need to be better informed about an holistic “buildingomics” approach, which means understanding the drivers of human health and performance in buildings. Simply put, people will be more comfortable, and more productive in a building with better IEQ.

The over-arching aim of each of the studies mentioned was to confirm that complex measurements and testing of the indoor environments will be required to quantify the productivity benefits of good indoor air quality. However each building and each indoor environment is different, and so at QED we have become experts in conducting tests and producing measures based on the nuances of each situation. Ultimately this offers our clients the tools to make changes in their buildings, giving their tenants and occupants the best outcomes.

BETTER IEQ CUTS COSTS

However better IEQ not only contributes to the health and wellbeing of a building’s users – it can also save costs.

AT QED we seek to educate owners, managers and end users on how sustainability and investment in better buildings with better indoor air quality is a cost saver, not a cost drain.

Consider the fact that most of us spend about 90 percent of our time indoors, and that 90 percent of the costs associated with a building are due to the people inside it. In a typical office building, the salaries of the occupants make up around 90% of the cost, the rent is about 9% and the energy consumption is roughly 1%. So just 10% of a building’s operating costs are attributed to energy, maintenance, and mortgage/rent, among others!

If a whopping 90% of the costs associated with a building come from the people inside the building, simply by focusing on bettering the air they breathe could turn your building into your business’ most revolutionary human resources tool. It’s an opportunity to boost productivity through healthier, more productive and mentally sharp building users who take fewer sick days and engage better with their colleagues and their daily tasks.

The proof is in the data, for example Macquarie Bank was one of the first banks to jump on sustainability and green principles in moving its headquarters to the iconic six-Star Green Star-rated One Shelley Street on Sydney Harbour. A study followed the bank’s employees as they transitioned into their new workspace, revealing an incredible 15 percent jump in perceived productivity.

Better indoor environments aren’t confined solely to new buildings either, as for existing buildings the key is to remember that any green improvement is positive, and that incremental changes do add up. Changing to LED lighting, increasing ventilation and natural light, generating comfortable temperatures and switching to eco-friendly cleaning products are simple to implement with measureable results.

LET US LEAVE YOU WITH THIS...

You all deserve better! Tenants should demand a better indoor environment because it improves their bottom line.

The best advice we can give is to vote with your feet, and make your rent dollars work for you when selecting the building to be your new company headquarters. Don't hesitate to engage with landlords on the indoor environment quality with the same level of importance at which you consider the energy consumption or the carbon footprint of a building. Insist on addressing IEQ aspects in the Tenancy Lease and request regular auditing of the indoor environment in your building.

On the flipside, building owners will attract a better quality of tenant and consistent leasing with a building that subscribes to the needs of its users.

For more information on indoor air quality and how to assess its impact on employee performance visit www.qed.com.au

WHO WE ARE

In the built environment you will find us at the intersection of risks to wellbeing, and global concerns for sustainability. In that place our people find meaningful work, leading to mutual relationships with our customers.

Our customers rely on us to manage risk by combining scientific knowledge with regulatory information, to develop solutions that are innovative, compliant and pragmatic.

We inspire our customers to maximise the potential for wellbeing of their property occupants, with financial and environmental sustainability.

QED's services include inspections, sampling and performance-rating of properties for office, retail, healthcare, education hotel and industrial.