

ENERGYSMART BUILDINGS

APRIL 2010
VOL 1 ISSUE ONE

LEADING THE EVOLUTION IN LIGHTING AND ENERGY EFFICIENCY



**Engineers critical to
our sustainable future**

- CHÉ WALL, FOUNDING CHAIR,
WORLD GREEN BUILDING COUNCIL

**Aust govt's response
to energy efficiency and
the proposed CPRS**

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Welcome to EnergySmart Buildings

Around 80 per cent of the carbon footprint of a city comes from its buildings and supplying the infrastructure to service those cities.

The building sector provides more potential for quick, deep and cost effective greenhouse gas mitigation than any other industry, according to a range of authorities including the Intergovernmental Panel on Climate Change (IPCC), McKinsey and Vattenfall.

This presents an opportunity to become more efficient in the way we design, operate and manage buildings into the future. And that is what *EnergySmart Buildings* is all about.

With a focus on trends, technologies and action by industry and government related to 'green' commercial buildings, this special supplement to *Lighting Magazine* is a bonus to our readers that aims to educate, inform and inspire.

It could be argued that the energy rating of commercial buildings attracts undue attention – that they are an easy target for scrutiny. They are responsible for around 10 per cent of Australia's overall greenhouse gas emissions. Most of this figure comes from office buildings, which is the focus of this edition of *EnergySmart Buildings*, however these buildings span a range of uses from retail to healthcare and educational institutions.

If you look at the figures another way, the built environment (that is, domestic and commercial buildings), is responsible for 40 per cent of global greenhouse gas emissions; uses 12 per cent of the world's water; consumes one third of the world's resources; and produces 40 per cent of the waste in landfills. This data places the impact of buildings beyond carbon emissions, and yet we still have not found a way to comprehensively stop the growth of them alone.

No matter what the incremental energy savings are from one property to the next, the reality is that energy intensity of buildings is intrinsically part of the solution to climate change.

EnergySmart Buildings is responding to this 'green' building market and the potential this movement offers as a means of engagement in a 'new' low carbon economy; to deploy the most cutting edge technologies; to be at the forefront of climate change action; and ultimately to provide a pathway for the survival of the commercial property industry.

The readers of *Lighting Magazine* are lighting designers, engineers, architects, consultants and lighting suppliers. Therefore we believe that this edition of *EnergySmart Buildings* will be enormous added value to their thinking and forward projections. In addition, it will be distributed to selected members of the Facility Management Association of Australia and the Energy Efficiency Council.

Whether you design buildings or the systems to operate and maintain them, whether you manage them or occupy them, *EnergySmart Buildings* provides you with the most up-to-date information on energy efficiency.

Being our first edition of *EnergySmart Buildings*, we are particularly interested in receiving your feedback and suggestions. We hope you find the publication to be both informative and thought-provoking. Regards,



Paula Wallace
Editor – *EnergySmart Buildings*
paulamwallace@bigpond.com

This page: No 1 Shelley Street, Sydney – featuring restrained LED architectural lighting, the central atrium is overlooked by a series of meeting 'pods', which feature motion sensors and time-out sequences to minimise energy usage (Photo by Andrew Krucko)

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ON THE COVER



One Shelley Street in 'after hours' mode: motion sensors and time-out sequences ensure that lights are on only when and where needed.
Image courtesy of Philips Dynalite
(Photo by Andrew Krucko)

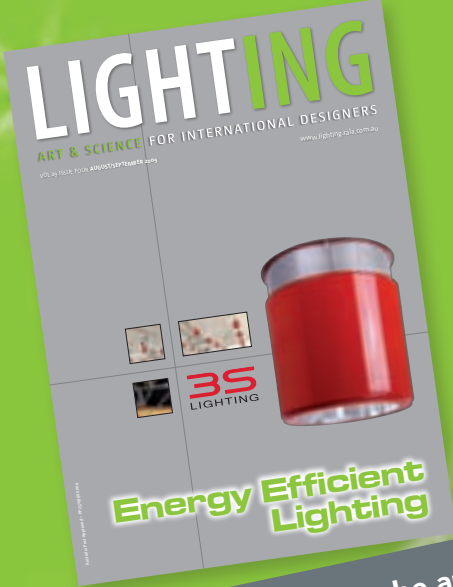
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The road ahead for 'green' buildings

BY PAULA WALLACE



The Gauge, the evolutionary workplace by Lend Lease at Victoria Harbour in Melbourne's Docklands

We've heard many times in recent years about how energy efficiency can solve a large part of the greenhouse gas (GHG) emissions dilemma in our cities. Often referred to as the 'low hanging fruit', existing technologies and approaches to energy efficiency are increasingly being considered more like fruit lying at the base of the tree.

So, who is not pulling their weight to create the conditions needed for wide-scale uptake of energy efficiency? Is it lack of economic stimulus, government inaction or complacency in industry? Like most of the responses to the global challenges of climate change, the answer is not so simple.

From an economic point of view, buildings are one of the most cost-effective target areas for climate change action. The Intergovernmental Panel on Climate Change (IPCC) has concluded that with proven and commercially available technologies the energy consumption in both new and old buildings could be cut by an estimated 30-50 per cent without significantly increasing investment costs.

But like the IPCC's reports and those of numerous economists, the longer the wait in investing in lowering emissions, the higher the impact on a nation's economy.

"I don't buy into comparisons with other sectors as an excuse for inaction." – Ché Wall (managing director of WSP Lincolne Scott and founding chair of the World Green Building Council)

The comparative simplicity of the energy efficiency argument is that it does not require an emissions trading scheme (ETS) for its effective deployment. In fact, it is a widely held view that an ETS or carbon tax will do little to stimulate widespread uptake of energy efficient practices.

"Under a CPRS, the cost increase for electricity for a commercial building tenant would be less than 20 per cent," said Ché Wall, managing director of WSP Lincolne Scott and founding chair of the World Green Building Council.

"In terms of investment decisions it won't be anywhere near the catalyst you need to get the return on investment that's palatable for institutional investors."

According to the Property Council of Australia (PCA), there are 22 million square metres of commercial office accommodation in Australia. The majority of these buildings are controlled by institutional investors operating listed and unlisted property trusts.

Wall said the proposed CPRS (Carbon Pollution Reduction Scheme) has failed to address energy efficiency and points out that other ETSs around the world have complementary measures.

Peter Szental, of Szencorp, a firm providing services that make commercial buildings more resource efficient said, "The reason the CPRS will not affect energy efficiency is because the barriers are both

price and non-price related and price alone won't do it."

According to Szental, there are four steps to addressing carbon pollution, namely a trading scheme; rewards for energy efficiency; addressing avoided infrastructure issues; and government leadership.

"Part of the problem is the [electricity] transmission companies invest in more capacity because they get a regulated return rather than reducing demand and consumption...this investment will exceed \$40 billion over the next five years...that's how the markets are skewed.

"I don't know any energy company that has expressed interest in avoiding energy infrastructure costs."

Szental suggested that tapping into some of these funds could assist in developing co-generation or tri-generation systems for whole city blocks that are energy efficient.

Ché Wall said, "Electricity use is still growing through buildings because we keep building new stock, but for every dollar the government can get invested in demand management, they save \$6.50 in deferred infrastructure investment."

This leads back to the argument for energy efficiency and reducing the power demand through such measures as improved lighting and air conditioning systems in buildings.

"It's an intrinsic part of the solution you can't ignore," said Wall.

Australia has a high carbon content of grid energy, over 1kg CO₂/kWh due to use of coal in generation. It is estimated that buildings are responsible for 23 per cent of Australia's total GHG emissions

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The Gauge, the evolutionary workplace by Lend Lease at Victoria Harbour in Melbourne's Docklands

– equivalent to 130 megatonnes of GHG released into the atmosphere each year – about half of this is attributable to commercial buildings.

Between 70 per cent and 90 per cent of a commercial building's total GHG emissions are produced during the operational phase. As only around 2 per cent of total commercial building stock is built new each year, improving the environmental performance of existing buildings during their life cycle is a crucial challenge.

"If you could clean up the grid you could compound the benefit of improving energy efficiency," said Craig Roussac, general manager of sustainability, safety and environment for Investa Property Group.

"It's disappointing to compare Australia's experience with Germany's where the carbon intensity of electricity has reduced by 20 per cent, since 1990. Every building that did nothing in Germany has effectively achieved the same result as we have by improving our portfolio over the same period of time."

It could be argued that the energy rating of commercial buildings attracts undue attention – that they are an easy target for scrutiny because they are more measurable than other sources of emissions.

A recent report showed that six companies accounted for almost 65 per cent of Australia's direct emissions in a 12-month period. Three of these companies were engaged in mining and metals production, with that sector's emissions up by 28 per cent in 2007-08.

"I don't buy into comparisons with other sectors as an excuse for inaction," said Wall.

To provide a global perspective, the built environment (that is, residential and commercial buildings), is responsible for 40 per cent of global GHG emissions; uses 12 per cent of the world's water; consumes one third of the world's resources; and produces 40 per cent of the waste in landfills. This data places the impact of buildings beyond carbon emissions.

"If buildings are the low-hanging fruit and can respond quickly and relatively easily then why wouldn't you put that level of emphasis on buildings and increase it in years to come," said Tony Arnel, chair of the World Green Building Council and Victoria's Building and Plumbing Industry Commissioner.

The Australian Government has acknowledged the need to develop complementary measures alongside any ETS to address

energy efficiency, although some would argue these have been put in the "too hard basket".

The Government has taken action to increase energy efficiency requirements in the Building Code of Australia for new or refurbished commercial buildings, although this will not impact on the 97 per cent of existing buildings. It has also flagged the upcoming introduction of mandatory energy efficiency reporting for commercial buildings, designed to give investors and potential tenants an idea of the energy credentials of individual properties.

"Another instrument that has been significant is the increase in industry and consumer awareness...if you go back five years this kind of conversation at an industry level was considered a bit edgy, a bit experimental, but now it's a mainstream conversation," said Arnel.

A section of the industry has been working on its own emissions scheme for the property sector which aims to overcome market barriers and make energy efficient investment more competitive - barriers linked to the disconnection between building ownership and building tenancy. While they pay the energy bills, tenants are not responsible for the base building, and building owners have little incentive because energy costs are a very small line item in their balance sheet, and they can be passed onto the tenants in any event.

The industry-led Efficient Building Scheme (EBS) moves the point of obligation to the building owner.

"The scheme is able to drive through the split incentives and unlock the significant abatement opportunities at the design, construction, refurbishment and operation phases of a building, enabling developers and owners to make a competitive financial return," said Wall.

Peter Szental is concerned that the EBS requires a 'cap and

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QUICK STATISTICS

Estimated carbon savings from certified Green Star (Green Building Council of Australia's rating system) offices:

- Office buildings in Australia are estimated to contribute 8.5m tonnes of CO₂/annum (1990 AGO). The average CO₂ emissions from Green Star certified buildings is 62kg/CO₂-e/m² per annum (base building only) which is a 60 per cent saving on the emissions of an average Australian office building.
- Around 11 per cent of Australia's CBD office space is currently Green Star certified.
- Green Star Office space saves on average 159,300 tonnes CO₂-e per annum when compared to the average Australian office buildings or 72,000 tonnes CO₂-e per annum when compared to the minimum building code compliant buildings built today.
- 159,300 tonnes CO₂-e per annum is equivalent to the emissions from 11,375 average Australian homes or taking 37,000 cars off the road.
- 72,000 tonnes CO₂-e per annum is equivalent to the emissions from 5,143 average Australian homes or taking 16,744 cars off the road.

Source: SIX CONTINENTS, ONE MISSION – How green building is shaping the global shift to a low carbon economy – The World Green Building Council, November 2009



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► continued from page 6

trade' to be applied to all buildings which potentially means higher transaction costs.

"You get more bang for your buck with schemes that place the obligations on say electricity retailers...a white certificate scheme covering all energy efficiency [including buildings] can be implemented by placing obligations on less than say 20 energy retailers rather than on thousands of building owners," he said.

In response, Wall pointed out that compliance costs per building under the EBS remain significantly lower than the Government's proposed Mandatory Disclosure legislation.

"Clearly broadening the number of buildings captured will increase the cost of compliance proportionally, however the cost per building is unaffected and remains low," Wall said.

The EBS is currently being considered by the Senate Economics Committee after being raised in the Senate as a private members bill by The Greens.

Tony Arnel said that in his view, "the next five years will be absolutely crucial in terms of how we make an impact on existing commercial buildings."

"It's not just about investors and developers but also about the people who work in these buildings. This will be more and more important over next few years...The bottom line is productivity." ●

NEW CSIRO TECHNOLOGY HELPS CUT BUILDINGS' ENERGY & COSTS BY 30%

Technology developed by Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO) has the potential to help building owners worldwide dramatically reduce their energy consumption and costs, improve tenant comfort and reduce GHG emissions.

The BuildingIQ Energy Management System, now being commercialised worldwide under exclusive license by BuildingIQ Pty Ltd, uses sophisticated mathematical algorithms and other advances to actively and continuously optimise a building's energy management control systems to achieve substantial reductions in energy usage.

BuildingIQ CEO Michael Zimmerman said interest from building owners and property fund managers had been very strong.

"The potential to increase a building's NABERS (National Australian Built Environment Rating System) rating when there is such a heightened focus from investors, tenants and the Government on environmental initiatives is adding to the interest," he said.

A trial of BuildingIQ last year at the CSIRO's 4.5 star rated Newcastle Energy Centre achieved cost and energy savings of up to 30 per cent.

The technology was launched recently in Sydney, with the first installation of the system in partnership with Investa Property Group.

Investa had previously worked with the CSIRO on a 'smart thermostat' project which established that through changing the temperature setting across its buildings it could achieve a 15 per cent saving in HVAC energy use.

"We're applying Building IQ across ten buildings at the moment, it's in 'learning' mode in those buildings...it learns how the building functions and information about occupants and responses of the building to outside conditions," said Investa's Craig Roussac.

He expects Investa will be able to take that knowledge and use it to provide optimum comfort conditions and increased energy efficiency across its commercial property portfolio.



Szencorp's landmark building at 40 Albert Road, South Melbourne – a leader in energy efficient design and operation

WHAT IS AN EFFICIENT BUILDING SCHEME?

An Efficient Building Scheme (EBS) is identical to an ETS except that it recognises energy efficiency improvements in non-residential buildings, rather than emissions avoided. Simply put, it treats one tonne of GHG emissions (tCO₂-e) that is not emitted because energy is not used in the same way that a conventional ETS treats one tonne of tCO₂-e that is not emitted due to a change in energy generation.

It provides a competitive return on investments in emissions reduction initiatives, which would drive significant GHG abatement through energy efficiency improvements.

For industry players who improve the energy efficiency of their buildings there would be a financial return. But, unlike other policy measures, an Efficient Building Scheme, like an ETS, would provide a 'carrot' and a 'stick', balancing permit allocation with an obligation to acquit permits. This would stimulate the whole sector to upgrade.

An EBS could easily and effectively be stapled to an ETS without compromising it or requiring it to be re-designed. It could also operate as a 'stand alone' scheme.

HOW WOULD AN EFFICIENT BUILDING SCHEME WORK?

For each climatic and/or commercial region government would set separate trajectories for energy efficiency for each building class (ie. office buildings, schools, hospitals etc). In order to provide certainty

for the industry it is envisaged that each trajectory would be set for a minimum ten year period, and ideally longer. The first year of trading might be based on the average energy efficiency of each building class, with future years set as aggressively as needed or wanted, according to national targets.

An EBS in which efficiency is 'capped-and-traded' using price-linked permits, works like this:

STEP 1: Each year a building owner calculates the total GHG emissions for each building – including both onsite fuel consumption and emissions from purchased electricity - using fuel (electricity and gas) bills and official GHG coefficients.

STEP 2: The total emissions are divided by net lettable area (NLA) to derive efficiency (or 'emissions intensity') figures in tonnes of GHG per square metre (tCO₂-e/m²), so that large inefficient buildings aren't inadvertently rewarded.

STEP 3: An independent broker verifies the efficiency figures and compares them to the predetermined cap (or 'trajectory' or 'threshold') set in advance by the governing body and the building's avoided emissions or excess emissions are calculated.

STEP 4: Permits are allocated or acquitted respectively.

Source: The summary case for an efficient building scheme – Lend Lease, WSP Lincolne Scott, Advanced Environmental.



Albert Goller
Chairman &
Managing Director
Siemens Australia &
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The key to reducing carbon footprint whilst increasing productivity

At Siemens, our technology-based solutions address the most pressing issues for our customers. Challenges stemming from mega-trends such as climate change, demographic change, urbanisation and globalisation have led Siemens to focus on solutions for the areas of water, energy, environment, healthcare, productivity, mobility, safety and security.

Increasingly, we need energy and environmental solutions to address challenges in the industrial and commercial sectors.

Siemens is a leading provider of energy efficiency solutions and believes that from a technology perspective, energy efficiency is the simplest challenge industry can tackle to reduce its energy bills and carbon footprint.

We have technology available today that can solve energy efficiency problems - immediately reducing our carbon footprint whilst increasing productivity. Energy efficiency is the fastest and cheapest option to address climate change; if we take action now, we will be able to lead the way.

We believe we can approach ultimate efficiency,

whereby you have direct conversion of energy, from the source to the end-user. While recognising that ultimate efficiency is theoretically impossible, we are striving to improve the efficiency of all its products through ongoing research and development (R&D), in an effort to move closer to our goal.

Harnessing R&D in the local marketplace will drive technological progress, and leveraging on those proven technologies, such as lighting, smart building automation, high efficiency motors, drives and power management will enable us to see the future of energy efficiency.

Technology, collaboration and commitment are the key for a sustainable future. To achieve Australia's efficiency goals, industry, customers and government have to work together.

Australia has the potential to lead energy efficiency best practice, generate productive businesses and new business models, stimulate local R&D and social wellbeing. At Siemens, we believe in applying these solutions today. Let's work together to make it happen.

Philips commits to making cities more energy efficient

Philips has called for action to ensure that renovation of existing infrastructure and buildings in cities is accelerated in the battle against climate change. At the UN Leadership Forum on Climate Change, Philips called upon governments worldwide to help ensure a green recovery by setting ambitious CO₂ reduction targets as well as strong legislative standards for implementation. The company puts weight behind its appeal by partnering with the World Green Building Council (WorldGBC), committing to make cities 40 per cent more energy efficient in the next 10 years.

More than half of the world's population now live in cities and they are responsible for 70 per cent of global energy consumption. Up to 50 per cent of a municipality's energy spending goes to lighting. Making buildings alone energy efficient could save more carbon dioxide than the entire emissions of the transport sector. At the same time, the cost of energy efficiency measures is usually greatly overestimated.

Philips argues that the current rate of renovation of existing infrastructure, based on inefficient 1960s technology or even older, is much too slow. For office lighting for instance, it is only about 6-7 per cent per year. In city lighting, it's just 3 per cent. At this pace, it will take 30 years before the environmental, economical and quality of life benefits of latest technologies can be reaped.

The partnership between Philips and the World Green Building Council is intended to set up some 100 local taskforces in the coming years, joining forces with other partners such as governments and civil society to aggressively reduce the world's carbon emissions over the next ten years that are a direct result of buildings and infrastructure.

"Business can deliver technologies and financial solutions as well as improve awareness. Efficient technologies for all segments exist today, but the one thing we can't afford is delay their implementation," said Rudy Provoost, member of the Board of Management, CEO of Philips Lighting and chair of its Sustainability Board.

"Governments have to provide economic stimuli and appropriate policies and regulations. So we urge them to act, setting ambitious legislative standards, stimulate the economy to ensure a green recovery and, moreover, lead by example by making their own public buildings, schools and streets energy efficient today.

"After all, this is a triple win saving us money, reducing emissions and creating new jobs for a green economy," said Provoost.



Rudy Provoost
Member of
the Board of
Management,
CEO of Philips
Lighting

Philips' commitment to sustainable cities

Q. How is Philips going to deliver on its commitment to help cities become 40 per cent more energy efficient?

A. By combining our existing knowledge in non-residential buildings (public & private offices; schools; retail; industry; sports), street lighting and residential lighting, fuelled by our increasing expertise in LED technology, Philips has developed a broad and flexible range of lighting solutions that will revolutionise the way municipalities are lit in the future.

We have launched an accelerated renovation program helping cities become 40 per cent more energy efficient consisting of the following:

1. Investment in green technologies such as LED technology of 1 billion euro by 2012.
2. Global and local partnerships for implementations. One example of this is our partnership with the World Green Building Council but we are also working together with the World Business Council for Sustainable Development's Green Building's initiative to collect data and propose implementation measures as well as a number of similar regional building and city networks.
3. Making upfront financing easier by working together with financial organisations. We cooperate with some commercial and private banks, and can look into tailoring specific public/private and city requests for energy efficient renovation financing.
4. Raising awareness by powering the online platform asimpleswitch.com. Philips aims to contribute to awareness raising of the urgency for existing infrastructure renovation to help meet our CO₂ reduction targets necessary to stabilise climate change.

Lighting accounts for 19 per cent of global electricity and 60 per cent is used in non-residential buildings - like offices/schools (15 per cent) in street lighting and in residential lighting (25 per cent). With Philips' sustainable lighting solutions spending can be cut down by up to 80 per cent per individual assignment and 40 per cent on global average.

To illustrate the urgency, taking the country of France as illustration, if that country is going to meet in any way near the CO₂ reduction targets necessary, they need to renovate 1,000 buildings a day for the next thirty years.

Energy efficient lighting must consider 'human dimension'

BY CHE WALL

Sustainability is the domain of the engineer. Indeed there is a growing currency to the notion of an engineering renaissance as engineers become more and more critical to our sustainable future. In the case of green buildings, it is the building services engineer that can identify and realise the biggest opportunities, or can create the biggest impediment.

If we scope the opportunity within buildings, we find they are responsible for 40 per cent of global energy usage and provide more sectoral greenhouse gas emissions than transport, industry and resources. It is clear that whilst there is a desire to reduce greenhouse gas emissions, the building sector will attract increased attention and the demand on engineers to find better and better solutions will be further amplified.

If we drill down further still, we find that lighting is second only to heating, ventilation and air conditioning (HVAC) in its demand for energy in buildings. Knowledge that lighting is a good opportunity to reduce energy at reasonable paybacks has grown a whole industry of Energy Service Contracting Organisations (ESCOs) which provide turnkey solutions for design, financing, supply and installation of lighting retrofits. Payback is typically less than five years and the financing is recovered and profit made through the resulting reduction in electricity bills.

The ESCO market is currently worth \$5.6 billion in the United States alone and, in the largest study of its kind, Lawrence Berkley Laboratories found that lighting-only ESCO projects on average saved 47 per cent of targeted equipment energy savings and that lighting-only upgrades comprised 43 per cent of projects in the private sector. But perhaps their most interesting finding was that the median payback period for the lighting-only projects was just two years. This surely begs the question of why a turnkey financing solution is required in the first place.

True, from a policy-maker's perspective, ESCOs are effective, not least because they are self-financed. However, unfortunately for lighting and buildings, this can often be an erroneous assumption and one that fails to recognise the fundamental tenets of both sustainability and lighting.

Lighting requires a far more comprehensive consideration than the ESCO approach can ever afford. Lighting is not just about counting units of consumption over units of output. After all, lighting's *raison d'être* is the person who experiences it. Lighting has an emotional and psychological impact that can influence both our mood and our



Ché Wall
Managing Director
WSP Lincolne Scott

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We believe it's important to understand how technology can positively impact on the way we interact with our environment. That's why when we develop our products and systems, we consider all issues including infrastructure, available technologies and the well being of a building's occupants.

A sophisticated lighting control system is not only good for the environment, but can also provide significant cost savings. From simple on/off and dimming through to sophisticated time-based controls and powerful monitoring and reporting solutions, we provide the ultimate in energy conservation.

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sense and simplicity

Energy efficient lighting must consider 'human dimension'



The lighting design for the Lincolne Scott Melbourne office was undertaken by the firm's specialist division, Vision Design, and is a showpiece exhibit for staff and clients of 'green' lighting design.

Ché Wall is managing director of WSP Lincolne Scott; is co-founder, Green Building Council of Australia and founding chair, World Green Building Council.

► continued from page 10

enjoyment of a space. Importantly lighting also has direct physiological impacts that affect our efficiency in performing tasks and hence impacts on productivity.

When we remind ourselves that sustainability needs to balance ecology with social and economic impacts it is clear that energy efficient light selected without consideration of the human dimension can result in a very poor sustainability outcome. Indeed, with our increasing policy focus towards energy efficiency and carbon abatement, we must be cautious that we don't end up delivering a lasting legacy of visually uncomfortable, mundane and unproductive buildings.

The challenge for tomorrow's lighting designer is to produce solutions that delight and stimulate as much as they reduce their environmental footprint. This is a task of balance to ensure that one agenda does not override or diminish the other. This is the balance between art and science with a clear understanding of what constitutes a good result. The immediate opportunity is for lighting designers to recalibrate, innovate and lead the policy debate through delivery of exemplars and thus ensure that policy-makers do not continue to see ESCOs as the preferred solution. They must ensure that policymakers understand that considered design, which addresses multiple facets of good performance, is the best answer. Practical demonstration makes it easy for those who set policy to understand the best answer, without requiring them to attempt to understand the science. In the absence of something to physically experience, the simple and legible will almost always win the day.

More projects like the new 6-Star Green Star rated Global HQ for Macquarie Bank, located in Sydney, are needed to show policy-makers and the ultimate clients of buildings, the tenants, what can really be expected from lighting and sustainable design. More projects like this will also increase the demand for, and value placed upon, specialist lighting design and it is clear that a balanced sustainability agenda will create rich opportunities for those who dedicate their professional careers to good lighting design.

Canberra and the Coalition of Australian Governments (COAG) are currently debating a range of policy options to accelerate the refurbishment of existing buildings. The policy platforms chosen will have a fundamental impact on whether we deliver future lighting solutions that balance the needs for carbon abatement against the needs of those who visit and work in buildings. The current preference seems to be policy that attempts to pick winners through promotion of delivery mechanisms that mandate solutions and direction of funding (remember when the Federal government announced inefficient incandescent lighting was to be abolished?). Those within the profession should be concerned and must engage with this debate as a fundamental informer for the future development of the lighting design discipline.

For our part we have collaborated with Lend Lease Corporation to produce a model policy that would enable simple, low-cost, accurate reporting and benchmarking of energy efficiency in the built environment, but also carbon trading. This would provide a market-based carbon pricing mechanism to incentivise and reward action in upgrading existing buildings but is deliberate in its avoidance of proposed solutions.

At the time of writing, this model is being considered by the Senate Economics Committee after being raised in the Senate as a private members bill by the Greens.

I firmly believe that the best innovation and solutions will come from the continued maturation of the lighting design profession and that, with the right policy mechanisms, Australia's skills will be increasingly valued worldwide. ●

Government programs and energy efficiency

**ROB MURRAY-LEACH,
CEO ENERGY EFFICIENCY COUNCIL**

Energy efficiency may not feature in any Indiana Jones movies, but in political circles it's the new Holy Grail.

A report by the Centre for International Economics found that energy efficiency in the building sector could dramatically reduce emissions and save Australia \$38 billion every year by 2050.

As a result, Labor, the Coalition and the Greens have started to take upgrading commercial buildings very seriously. To understand the types of programs that governments have already introduced, and will introduce over the coming years, it helps to understand the barriers to energy efficiency.

Energy efficiency makes good business sense. Property owner Investa recently completed some energy efficiency projects that had returns on investment exceeding 40 per cent. However, energy efficiency is often ignored because:

- Tenants can't find out how efficient buildings are;
- It's a low priority for building owners, and they're not experts in energy efficiency;
- Building owners can't capture the full benefits from tenants and the electricity market.

Things are about to change in a big way. More stringent energy efficiency standards will start to take effect in the Building Code of Australia in May 2010. Governments are investing in information and training to build the industry's capacity to improve its energy efficiency.

However, probably the most important program so far is the new "mandatory disclosure legislation" that has been promised for mid-2010. This legislation will require building owners to disclose energy efficiency ratings and tenancy lighting details when they sell or lease building areas over 2000 m² NLA. This legislation will mean that tenants will start to really demand energy efficiency, making it core business for building owners.

These changes are only the start. The next big step is incentives. In 2009 the Australian Government launched a "Green Building Fund" that offered grants to help companies improve the energy efficiency of buildings. This fund is about to run out of money, but the Government might top up the fund or replace it with a different incentive program.

The New South Wales Government is already offering commercial building owners incentives to upgrade their energy efficiency through a market-based 'Energy Saving Scheme'. With similar schemes in Victoria and South Australia that only apply to the residential sector, it is looking increasingly likely that a national scheme will emerge in order to provide national consistency and cut red tape.

There are other ideas floating around for incentive schemes. The Greens are suggesting a 'trading scheme' for the commercial property sector. This scheme would require owners of less efficient buildings to buy special certificates from owners of more efficient buildings, creating an incentive to improve energy efficiency. The Opposition have proposed accelerating the depreciation on more efficient buildings.

There will be a hot debate in 2010 about which incentive scheme will be the most effective. The party that comes up with the best proposal could win some powerful strong supporters. Whichever scheme is chosen, the future is looking bright for energy efficient lighting.

The Energy Efficiency Council

The Council, established in 2009, is the voice for the commercial and industrial energy efficiency sector. It aims to:

- grow the market for energy efficiency products and services;
- ensure that energy efficiency is implemented with excellence and accountability;
- establish energy efficiency as the key measure for carbon abatement to 2030.

For more information visit www.eec.org.au or tel: +61 (0)3 8327 8422

Getting the metrics right

What kind of emission reductions can we actually achieve in office buildings and what impact could this have on climate change efforts worldwide?

BY PAULA WALLACE

The notion of targets for the abatement of Greenhouse Gas (GHG) emissions and other factors contributing to climate change has become a part of our everyday language. The most notable 'target' in recent years has been that associated with the Kyoto Protocol, not so much from its latest iteration in the Copenhagen Accord which some have criticised for its lack of definitive targets.

Australia's current commitment is to make a 5 per cent cut in GHG emissions (on 2000 levels) within the next ten years. Alongside this, there are a range of organisations and individuals now examining their respective carbon footprints, coming up with evaluation frameworks and setting their own targets.

Consensus now is that that we can reduce existing buildings' carbon footprints by up to 80 per cent by 2050 using technology that is available today. But a policy framework is required to make this happen, which includes placing a value on carbon.

How does the commercial property industry rate now in terms of its contribution to meeting Australia's stated targets? What kinds of targets are being set within the industry and what could be achieved given the right commercial drivers?

The current state-of-play

Building ratings schemes operating in Australia, namely Green Star (available from the Green Building Council of Australia) and NABERS (National Australian Built Environment Rating System), result in a combined average of around 360,000 tonnes of CO₂-e being saved each year – around 4.2 per cent of the total amount of CO₂-e produced by office buildings in Australia. Its participants account for around 57 per cent of the national office market which have been certified or rated using either of these tools.

Research compiled by global architecture practice Woods Bagot found that more than 80 per cent of the 200 senior property professionals surveyed worldwide believed the industry is not doing enough to deliver sustainable solutions.

"I'd make that statement about pretty much

The Gauge, the evolutionary workplace by Lend Lease at Victoria Harbour in Melbourne's Docklands

any element of society you want to point to," said Craig Roussac, general manager of sustainability, safety and environment for Investa Property Group.

"Householders, are they doing enough? No. People manufacturing cars, are they doing enough? No. Are governments doing enough? Definitely not."

Survey respondents felt that despite the awareness of climate change, the property industry's two most significant challenges are the lack of industry support to deliver sustainable solutions, and the ability to provide a convincing argument for the benefit of sustainability to clients.

"I think the commercial property industry is not on track, because it's only dealing with new stock at the moment," said Ché Wall, managing director of WSP Lincolne Scott and founding chair of the World Green Building Council.

"If you're talking about a target in 2020, most of that stock already exists now, so there's no way you're going to get a five per cent cut unless you address that."

Wall is currently developing a scheme, in conjunction with Lend Lease and Advanced Environmental that could cut national GHG emissions by 7.7 per cent by 2020. Known as the Efficient Building Scheme, it is an emissions trading scheme for non-residential buildings that works by providing an incentive to maximise energy efficiency improvements in all kinds of buildings when they come up for re-lease or earlier, balanced by penalties for inaction on inefficient buildings.

"We're all capable of doing better... in terms of quality of environment and environmental impact, there's no benefit in anyone saying we're too small to make a difference. It concerns me that that attitude still exists," said Wall.

Tony Arnel, chair of the World Green Building Council and the Green Building Council of Australia; and Victoria's Building and Plumbing Industry Commissioner, told EnergySmart Buildings, "On the one hand you can say the market is responding in relation to new buildings hardly a new building of any note can be built without some kind of environment focus but on the other hand 90 per cent of the market is existing built environment, which remains the elephant in the room."

He said that until the industry gets "some real rubber on the road" and makes an impact in relation to existing buildings, it won't be making the gains that it needs to.

Whilst it is technically feasible to deploy energy efficiency measures in commercial payback periods, and targets could be set industry-wide, there are market barriers that need to be addressed.

Peter Szentol of Szencorp, a firm providing services in retrofitting and making commercial buildings more resource-efficient, said, "In terms of being able to set targets, that's a difficult one...we'd love to do it but we need to trap the benefits of what we do.

"I believe we should have a national energy efficiency scheme, we should be meeting all future demand growth through co-generation...where energy retailers have an obligation to assist in reducing the amount of energy use."

He believes this would address the primary market barrier by making the electricity grid less energy intensive, and would not leave the obligation on building owners to trade between themselves which could lead to more efficient buildings being penalised.

"The major focus of the green building movement has become the performance of green-rated and green-labelled buildings," said Jerry Yudelson, the principal of US-based green building consultancy, Yudelson Associates.

"What we're seeing is many high-level rated green buildings falling well short of predicted performance."

Yudelson advocates reducing the certification level of green buildings that fall short of initial performance claims.

"Certifying existing buildings as green

"We're not in the business of believing but really trying to prove things up and in doing so if we can better inform discussion, policy... that's probably the best thing we can do"

- CRAIG ROUSSAC

(general manager of sustainability, safety and environment for Investa Property Group)

uses actual performance data; new buildings should be held to the same standard," he said.

In regard to GHG reduction targets, Yudelson likes the '2 per cent solution'.

"Make the entire existing building stock use 2 percent less energy each year from 2010 to 2050, based on 2009 numbers, and you'll easily hit your 80 per cent reduction target."

He said that if all new buildings were required to be "zero net energy" (with on-site or purchased green power) and dramatically more efficient, then the target could be reached 10 years earlier.

Approaches to ratings and targets

A recent survey conducted by PricewaterhouseCoopers found that although there was unanimous agreement that buildings have an essential role to play in meeting carbon

continued on page 16 ►

VARIOUS AUSTRALIAN STATE AND TERRITORY ENERGY AND NABERS ENERGY REQUIREMENTS (2009)

Jurisdiction	NABERS targets
Australian Government	4.5-star NABERS Energy by 2011/2012
New South Wales	4.5-star NABERS Energy & Water by 2011/12
Victoria	Base building <2,000m ² – 4-star NABERS Energy Base buildings >2,000m ² – 5-star NABERS Energy Tenancy – 5-star NABERS Energy New Building – 4.5-star NABERS Energy Commitment Agreement
Queensland	4.5-star NABERS Energy for new buildings, refurbishments, fitouts and leases > 2,000m ² 4-star NABERS Water, 3-star NABERS Waste, 3-star NABERS Indoor Environment
South Australia	5-star NABERS Energy for new leasee and new buildings
Western Australia	Base building – 3.5-star NABERS Energy Tenancy – 4-star NABERS Energy New building – 4.5-star NABERS energy Commitment Agreement
Australian Capital Territory	4.5-star NABERS Energy for new buildings, new leases and new fitouts

Source: ESD Operations Guide for owners, managers and tenants – Department of the Environment, Water, Heritage & The Arts

► continued from page 15

reduction targets, there was far less clarity over the role that buildings might play in an international agreement.

The idea of efforts towards an international target for zero or lower carbon buildings was not supported, with concern over 'carbon miles' involved in negotiating such a target and the possibility of any agreement equating to the 'lowest common denominator'. However, international dialogue towards a common language and measurement methodology for zero carbon buildings was supported by the majority.

At the COP15 United Nations meeting in Copenhagen in December, the first international tool for measuring energy use and reporting GHG emissions from building operations was officially launched.

The Common Carbon Metric will allow emissions from buildings around the world to be consistently assessed and compared, and improvements measured.

The UNEP Sustainable Building & Climate Initiative will continue the development of a protocol to guide implementation of a series of pilot projects to test the Common Carbon Metric. Individual buildings and building stocks will measure emissions from building operations over a 12-month period to establish baselines by building type in climate regions.

In Australia, the NABERS is used widely within industry, with building owners and managers around the country using the ratings scheme as an integral part of the management of their buildings.

Australian governments have collaborated on common tools and systems for evaluating aspects of building environmental performance (such as the NABERS scheme), and have subsequently included these as requirements for their own properties and leases.

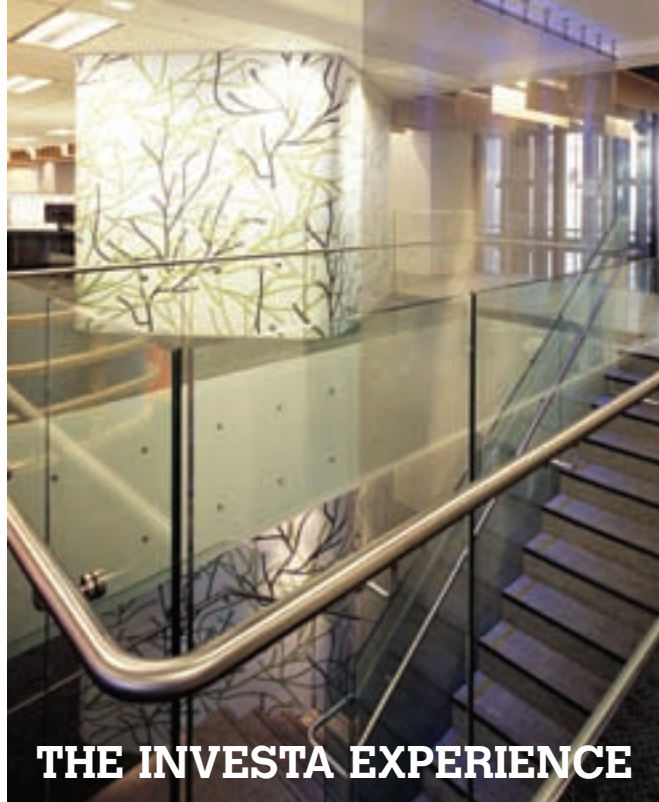
The Australian Government has a specific policy regarding government energy use, including:

- energy intensity portfolio targets by the 2011-12 financial year of 7,500 Megajoules (MJ)/person/annum for office tenant light and power; and 400 MJ/m²/annum for office central services
- minimum energy performance standards (generally 4.5 stars on the NABERS Energy Rating or equivalent scheme) in contracts, leases and other relevant documentation for new buildings, major refurbishments and new leases over 2,000 m²

Similar to government, many large companies with significant office tenancy needs (such as large financial services organisations) are requiring that their new buildings and existing buildings meet minimum requirements for energy, greenhouse, water and other environmental issues.

A case study presented on a Sydney CBD, single-tenanted building showed that with an investment in lighting, HVAC and commissioning costing \$320,000, outgoings were reduced by \$3.32/m² or \$99,700, and \$3 million in capital value return was added on an investment of 10.67 per cent. The NABERS Energy rating was also raised by 1-star.

The Property Council of Australia has also changed the market's expectations of buildings by integrating ESD (Ecologically Sustainable Development) requirements into its Building Quality Grades. It specifies that a Premium grade new building should achieve a 4-star Green Star and 4.5-star NABERS Energy rating; a Grade A new building should achieve a 4-star Green Star and 4.5-star NABERS Energy rating; and Grade B new building a 4-star rating for both. Only existing buildings can qualify for a Green Star rating of below 4-star, due to the different considerations of older properties. ●



THE INVESTA EXPERIENCE

Investa can safely say it is exceeding the Australian Government's GHG reduction target, reducing the emission intensity of its commercial office portfolio by 39 kg.CO₂-e/m² (or 24 per cent) between 2004 and 2008 – a portfolio which represents almost 5 per cent of the estimated 22 million square metre Australian commercial office market.

Investa has been generating data over the past 7-8 years on its commercial building portfolio and has recently established the Investa Sustainability Institute (ISI) with the express purpose of knowledge sharing and giving policy makers and others in industry the opportunity to scrutinise the buildings' performance data.

"We take an action research approach," said Investa's Craig Roussac.

"We're not in the business of believing but really trying to prove things up and in doing so if we can better inform discussion, policy...that's probably the best thing we can do."

What the ISI's first report showed was that Australia's GHG emissions from stationary energy would be reduced by 0.29 per cent if Investa's results were replicated across the entire Australian commercial office market.

Furthermore, the analysis showed that if Investa's reduction of 24 per cent over four years was found to be replicable in other countries and across other commercial building forms, it would produce an annual saving of 660 MT Co₂-e – enough to offset 110 per cent of Australia's GHG emissions.

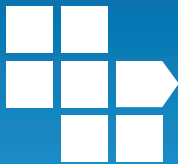
Further analysis showed that the results achieved by Investa to-date may represent only half the potential reduction that may be extracted.

The ISI also proposed that the Intergovernmental Panel on Climate Change's estimates of the GHG emission reduction potential for the building stock in developed countries up to 2020, considered a yardstick for industry, may be conservative.

Across a balanced cross section of 13 Investa buildings, the average improvement in energy intensity was 32 per cent.

"Experience to-date from the above sample, with nine of the 13 buildings achieving greater than 30 per cent reductions and six of the buildings achieving reductions that exceed 'market' range of 15-37 per cent, suggests the IPCC 'market' estimate may be conservative," the report stated.

IMAGE: A number of energy saving measures have been implemented at Investa's showcase tenancy – at 126 Phillip Street, Sydney – but the most significant savings are being achieved through the ECS smart lighting system.



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New

PRODUCT INNOVATIONS FOR 2010

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- 6m diameter detection at 2.5m height
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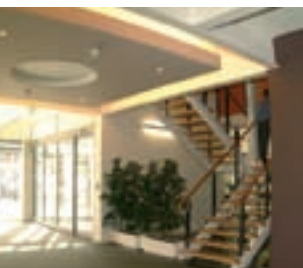
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- High performance regulating photocell
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Hi-Bay PIR Presence Detector

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Making light work

A HOLISTIC PERSPECTIVE OF

How can lighting designers use intelligent controls to improve building energy management? Philips Dynalite's energy management segment manager, Brett Annesley, explains how an environmentally sustainable development (ESD) strategy can deliver energy efficiency outcomes, while addressing indoor environmental quality (IEQ) and changing occupancy requirements.

Lighting installations can be rendered more energy efficient and a building's lighting design made more 'future-proof' by the implementation of LCA (lifecycle assessment) principles. Future-proofing can be enhanced by the selection of products that will give an extended service life, the adoption of modular installation practices, and the use of systems providing a high-resolution of control. Such high-resolution – or 'granular' – lighting control systems allow the lighting to be changed as required during the evolution of a building.

Changes to a building's fabric and occupancy are usually referred to as 'churn'. The flexibility of a lighting system to accommodate churn can be best achieved by enabling lighting grid changes and luminaire group re-zoning, without the expense and disruption associated with rewiring a facility. User-friendly configuration software is an important component

of these flexible installations, but is also dependent on the control technologies in place – such as digital addressable lighting interface (DALI) and structured wiring.

DALI is a dedicated lighting control protocol, where each light unit has its own individual digital address, allowing re-zoning of luminaires easily across a network using an appropriate software interface. Structured wiring,

by contrast, comprises combined power and data cabling that can be quickly connected and disconnected from a lighting installation, thereby facilitating physical reconfiguration of lighting systems.

While LCA is an important consideration in environmentally sustainable lighting design, the energy consumption of a lighting installation will impact the energy efficiency on a day to day basis. Specific strategies to reduce energy consumption include the increased use of daylight in preference – or as a bolster – to artificial lighting, and the use of sensors to automatically adjust lighting levels in accordance with natural lighting levels and area occupancy.

'Smart sensors' have developed from simple on/off control, into a 'front-line' energy-management technology, capable of adapting dynamically to changing occupancy, environment and daylight requirements.

Daylight and detection

Daylight harvesting involves the strategic substitution of artificial fluorescent light with natural light – slowly dimming lights to balance daylight entry – and this can achieve considerable energy savings. Window treatments – such as curtains, blinds, and glass-transmission factors – become an important factor, as these have a direct impact on how much natural light enters the office environment.

Moreover, sensor positioning can be as essential as sensor selection. Positioning a photoelectric (PE) sensor within a direct

pathway of reflected light from shading louvers, for example, can lead to incorrect lux levels being applied by the PE sensor.

Such demands on sensor functionality have led to the rise of multifunction sensor devices that incorporate PE detection for changing light levels, and passive infra-red (PIR) and ultrasonic for motion detection. While these sensors are commonly used in a single mode, they

can also have the intelligence to be used in 'multi-mode' to provide logic control. For example, if the sensor detects that lux levels have fallen below a specified value, then artificial lighting levels can be increased, but only when motion is detected. In this way lighting levels will be maintained for occupied areas only.

Occupant comfort

However well-intentioned or effective the energy management strategies within a building, they should not be implemented at the expense of IEQ – another important driver for ESD of commercial buildings. A lighting design can



ENERGY MANAGEMENT



be flexible and save energy, but if occupants do not feel comfortable, the design can be considered to have failed.

The use of natural light not only saves energy, but also has an important bearing on the well-being of occupants. Studies have shown that people need to feel connected to the world outside, and exposure to daylight – when correctly managed – can measurably improve worker productivity. Fade time is critical to occupant comfort when using sensors to manage lighting levels. Typically, an extremely slow fade-time during the process of daylight linking will result in minimal disruption and a greater acceptance rate by occupants.

Instead of the traditional solution of illuminating an entire floor-plate after core working hours, the control system can be tasked to provide a worker with more specific illumination – such as their immediate surrounding areas and an egress path – using motion detection sensors. Gradual closure after all movement has ceased will ensure that energy is not wasted after the departure of the last worker.

The implementation of control-management software further enables the individual user to control task lighting requirements from their own workstation, aiding individual worker comfort.

Energy savings can also be realised by minimising lux levels for overhead lighting in preference for individual task lighting over the desk area. This solution is becoming increasingly practical with the development of LEDs, and such a strategy may well serve to avoid conflict between individual and general lighting requirements.

Commissioning and building tuning

While the selection of energy-saving strategies – such as daylight harvesting and sensing technology – is important, the real skill is to bring it all together with a professional and accountable commissioning approach. Commissioning guidelines are provided by CIBSE Code L and M for the Australian Green Star and by ASHRAE under the LEED tool in the US. It is becoming an increasing requirement to implement commissioning guidelines such as CIBSE or ASHRAE as the nominated standard to safeguard against substandard installation and commissioning practices.

Once commissioning is complete, further improvements can be realised through ‘building tuning’. This provides an ongoing performance evaluation for a new building - through quarterly assessments - for the first 12 months of occupancy. Building tuning is strongly recommended by the Green Star, LEED, and BREEAM rating tools. ●

ABOVE: The use of natural light not only saves energy, but also has an important bearing on the well-being of occupants.

OPPOSITE PAGE: The control system can be tasked to provide a worker with more specific ‘after hours’ illumination – such as their immediate surrounding areas and an egress path.

Images courtesy of Philips Dynalite

Lower operating costs linked to NABERS tool

A 2009 study by Sydney University’s Warren Centre, looking at low energy high rise buildings, found a correlation between a reduction in operational expenditure and obtaining a NABERS rating. Buildings that disclosed their NABERS ratings were found to have significantly lower operating costs. The study found that disclosing ratings led to the identification of low cost, non-technical improvements and enhancements to maintenance regimes and control systems. It also encouraged dialogue between parties.

The study reported that most buildings have the capacity to easily make energy savings equivalent to half a star – or about a 10 per cent reduction in energy use. It also highlighted that innovative strategies are being used to extract capital for environmental improvements from maintenance or operating expenses, rather than from capital budgets, and show a return on the investment within 12 months.

NABERS is now the industry standard, with building owners and managers around the country using NABERS as an integral part of the management of their buildings. NABERS ratings are used throughout the property sector to drive deep cuts in environmental impacts and evaluate the real results of initiatives. NABERS star ratings are used as part of the common language to intuitively place any environmental initiative in the broader market context.

This deep knowledge of building performance and potential for improvement has transformed the property industry. It has

led to a real, measured and significant reduction in environmental impact. The energy efficiency of approximately 10 million square metres of office space – 46 per cent of the national office market – has been rated using NABERS Energy. Together, NABERS rated buildings are saving more than 200,000 tonnes of greenhouse gas emissions every year – an average of 13 per cent.

Widespread uptake of the NABERS tools is assisting Australia’s property owners and tenants to make an easy transition to a more energy-efficient world - where productivity can be increased and costs can be slashed.

With the Federal Government recently announcing that all building owners and tenants will, from late-2010, be required to disclose the energy efficiency of their office building before sale or lease using NABERS, the tools will become even more crucial.

NABERS is a national initiative managed by the NSW Department of Environment, Climate Change & Water (DECCW) on behalf of State and Federal Governments. The NABERS suite of tools was developed to provide a simple operational measurement of how a building performs in the categories of energy, water, waste and indoor environment.

NABERS provides a rating on the sustainability performance of buildings on a scale of one to five stars. Tools are available for commercial office buildings, homes, hotels and shopping centres. New tools for hospitals, schools and data centres are under development.

Source: NSW Department of Environment, Climate Change and Water



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Building energy efficiency - An update Environment, Water, Heritage and

The measures being taken by Australian, state and territory governments form part of the National Strategy on Energy Efficiency – a landmark agreement signed off by the Council of Australian Governments in July 2009 that will accelerate energy efficiency improvements for households and businesses across all sectors of the economy.

Energy efficiency work by the Australian Government over the last year includes tougher standards for the efficiency of TVs, set top boxes, lighting, fridges, freezers, air conditioners, external power chargers and an agreement to require office buildings to disclose energy efficiency ratings at sale or lease as well as tougher standards in the Building Code of Australia.

Changes to the Building Code

Australia's governments have agreed to strengthen energy efficiency requirements in the Building Code of Australia to ensure more energy efficient new homes and workplaces.

Buildings typically last for many decades and we have a tremendous opportunity to improve their efficiency and avoid locking in high energy use from the start.

Building Ministers have agreed that tougher energy efficiency requirements will now be written into the 2010 Building Code of Australia expected to come out in May this year. State and territory governments are responsible for scheduling the implementation of the new building code requirements.

The decision by building Ministers means that more stringent standards will be introduced for new commercial buildings and major renovations in order to improve the energy efficiency of construction. These standards will include: walls, floor, glazing and sealing; heating, air conditioning and ventilation; lighting types and controls; hot water systems, swimming pools and spas; and energy efficiency monitoring and building maintenance.

An update to commercial buildings standards is more than overdue with analysis showing that the new requirements will deliver a return of \$1.61 for every \$1 invested in meeting the new requirements.

Meeting these requirements will address market barriers to energy efficiency and encourage innovative design and construction. It is a great opportunity for builders, architects, material developers and providers to develop and adopt more efficient materials, make the most out of the design process and invest in energy efficient practices.

The new standards in the Building Code of Australia for commercial buildings will reduce the sector's annual greenhouse gas emissions by 1.2 million tonnes in 2020.

On Lighting

What are the energy efficiency measures for lighting in the updates to the Building Code of Australia?

- Lighting requirements for all residential buildings will be included in the code for the first time while lighting requirements for commercial buildings will also be tightened
- The installed power density for artificial lighting in residential and commercial new buildings has been limited encouraging more efficient light fittings, and smarter lighting layouts and lighting controls
- The illumination power density requirement is now capped according to the expected functional use of each building space. For example: office space is capped at 9 W/m² while retail space is capped at 20 W/m² but a service area like a locker room is capped at only 5 W/m²

Commercial building disclosure scheme

The Ministerial Council on Energy has approved the key policy parameters for the new disclosure scheme for office building energy efficiency.

This is an exciting new policy development that will help prospective buyers and tenants make more informed decisions when they are looking for office space.

The scheme will also provide a strong market-based incentive for building owners to invest in cost-effective energy efficient upgrades by making ratings publicly available.

Greener offices are not only more comfortable to work in, they can also deliver happier workers, better productivity, bring down sick leave, support green building



Image courtesy of City of Sydney

industry jobs and have the potential to deliver savings of 20-40 per cent on energy bills.

The Australian Government has also committed itself to meeting disclosure requirements for commercial buildings.

Key statistics:

- The commercial building sector is responsible for approximately 10 per cent of Australia's greenhouse gas emissions
- Commercial building sector emissions grew by more than 80 per cent over the 16 years since 1990

from the Department of the the Arts



- There is more than 21 million square metres of commercial office space in Australia's cities spread across more than 3,900 buildings
- An expected 2,170 buildings (of 2,000 square metres or more) will be required to provide energy efficiency information when they are sold or leased

Specific details of the scheme:

- Building owners will have to provide up-to-date energy efficiency information when they sell or lease office space covering more than 2,000 square metres

- Commonwealth legislation will be developed to give effect to the scheme in the second half of 2010
- Building owners will have to supply a valid building energy efficiency certificate including a base building rating from the National Australian Built Environment Rating System (NABERS Energy), an assessment of the lighting energy efficiency of tenancies, and some suggestions on how to improve the building's energy efficiency
- Once legislation is in place, building owners who do not comply may face fines or prosecution
- Tenancy requirements have been refined in response to feedback through industry consultation processes

Further information is available on the Department's website at www.environment.gov.au/buildings

On Lighting

- The building energy efficiency certificate will include an assessment of the lighting energy efficiency of office tenancies
- This assessment will provide information on illumination power density in watts per square metre and will benchmark the tenancy lighting against best practice
- To generate these metrics, accredited assessors will complete a survey of the tenancy and then input data into a rating calculator

Australia's leadership on lighting energy efficiency

Since the launch of the National Framework for Energy Efficiency (NLEE) in 2004, new measures have been introduced to improve the energy efficiency of appliances and commercial and industrial buildings.

Lighting is the fourth highest energy

user in the home. In 2007, Australia led the international agenda as one of the first nations to announce a phase-out of inefficient lighting.

The first stage of the phase-out was the prohibition on the importation of inefficient general lighting service (GLS) incandescent light bulbs in February last year. A retail sales ban was introduced in November 2009 as part of the introduction of minimum energy performance standards for incandescent lighting and compact fluorescent lamps.

The phase-out will also deliver considerable savings to the environment and the economy. Australians spend more than \$900 million a year on lighting. By switching to more efficient light bulbs householders can cut their costs by up to 80 per cent.

Across the country, the move to more efficient lighting, such as compact fluorescent lamps (CFLs), is expected to save around 30 terawatt hours of electricity and 28 million tonnes of greenhouse gas emissions between 2008 and 2020. This is equivalent to permanently decommissioning a small coal-fired power station or taking more than 500,000 cars off the road permanently.

The phase-out of inefficient lighting will continue in a staged approach until 2015, subject to review. Work is already underway to review minimum energy performance standards for linear fluorescents which currently dominate Australia's commercial buildings.

Electricians play a key role in providing advice about energy efficient lighting to their increasingly environmentally savvy clients. That's why, Australian governments in partnership with the lighting industry and the National Electrical and Communications Association (NECA) are rolling-out training as part of the successful EcoSmart Electricians Electrical Energy Efficiency program. ●

To view the training course please visit: www.ecosmartelectricians.com.au/starter-kit. This training will equip electricians with the skills and knowledge to design and install energy efficient lighting systems.

For more information on the phase-out of inefficient lighting visit: www.environment.gov.au/lighting

For more information on the National Framework for Energy Efficiency visit: www.ret.gov.au/documents/mce/energy-eff/default.html



Bryan Douglas
CEO Lighting
Council Australia

LED standardisation

As a consequence of their energy savings potential LEDs (Light Emitting Diodes) hold great promise as a light source. Recently it was announced that an LED had achieved a phenomenal 208 lm/W under laboratory conditions. However adoption of LED products for general illumination has suffered in Australia and elsewhere because of poorly performing product and misrepresentation of product performance. The immaturity of standards has been partly responsible.

The first LED standards were based around laser technology and especially the need for eye safety. With the rapid expansion of LEDs into more traditional lighting areas, electrical safety and performance standards have been produced, although the suite is not yet complete. Some of the performance aspects have proved difficult due to the inherent nature of LED manufacturing, rapid product development and the need for testing to adequately define new requirements within old parameters. A good example is life testing of a luminaire with 100,000 hours claimed life, where the product would be superseded before tests have been completed. Life is now (somewhat tenuously) determined by a combination of limited testing and prediction.

Major organisations that have developed and introduced LED performance standards include the US Department of Energy with its Energy Star requirements, IES (North America) with LM79 and LM80, the UK Energy Savings Trust, IEC and CIE.

The IEC has recently published safety and performance standards for LED modules for general lighting applications. The IEC published LED standards include:

- IEC 61347-2-13 Lamp control gear – Part 2-13: Particular requirements for DC or AC supplied electronic control gear for LED modules
- IEC 62384 DC or AC supplied electronic control gear for LED modules - Performance requirements

- IEC 62031 LED modules for general lighting – Safety specifications
- IEC/PAS 62612 ed1.0 Self-ballasted LED-lamps for general lighting services – Performance requirements
- IEC 62471 ed1.0 Photobiological safety of lamps and lamp systems

While considerable work is being devoted to the task of standardisation, the suite of LED standards is by no means complete. No standard, for example, is yet available for LED fluorescent tube replacements.

Australia has direct input to IEC LED standardisation by participating membership of technical committee TC34 and Standards Australia committee EL-041. Lighting Council Australia and other nominating organisations are represented on these committees.

Twelve major lighting manufacturers, including Philips, Osram, Cooper Lighting and Zumtobel, announced in February they had formed an organisation to develop standard specifications for the interfaces of LED light engines. The organisation, dubbed Zhaga, will facilitate interchangeability between products made by diverse manufacturers.

Interchangeability will be achieved by defining interfaces for a variety of application-specific light engines. Zhaga standards will cover the physical dimensions, as well as the photometric, electrical and thermal behaviour of LED light engines. Zhaga's goal is to speed industry innovation and adoption of LED technology, as well as prevent market fragmentation from incompatible LED light engines.

The Global Lamp Forum, of which Lighting Council Australia is a member, is in the process of forming an LED Working Group. While its draft charter is not specifically directed at LED standardisation, it will gather information on standardisation processes to assist arguments supporting the business case for adoption of LEDs. ●

Lighting Council Australia's response to lack of standardisation

In response to the immaturity of LED standards which threaten the uptake of this important technology, Lighting Council Australia has introduced a Solid State Lighting Quality Scheme. The SSL Quality Scheme is a voluntary industry program providing confidence to the market that a luminaire carrying the Scheme's label matches the following performance claims made by the supplier:

- Luminaire efficacy
- Light output of the luminaire
- Measured input power
- Correlated colour temperature
- Colour rendering index

LIGHTING COUNCIL AUSTRALIA'S SSL QUALITY SCHEME LABEL WITH EXAMPLE LUMINAIRE PERFORMANCE CHARACTERISTICS



New LED LUXPOINT MINI Downlight range

A TRUE REPLACEMENT FOR 50W HALOGEN DOWNLIGHTS

Light Emitting Diodes (LEDs) are a reliable light source of choice for various applications due to their robust nature, long life, energy saving and low total ownership costs.

OSRAM is committed to develop state-of-the-art LED technologies to lead the industry and to serve the market.

The new LED LUXPOINT MINI recessed downlight range by OSRAM meets the highest demands in commercial and residential lighting applications by offering a true replacement for the traditional 50W Halogen dichroic MR16 downlights.

The OSRAM LED LUXPOINT MINI recessed downlight range utilises the COINlight Power LED light engine, which is intelligently designed with 7 high power LEDs to ensure high brightness with optimum efficiency.

The COINlight Power LED light engine, is what gives the OSRAM LED LUXPOINT MINI range its sophisticated thermal design to ensure longest lifetime and the highest lumen maintenance.

The range comprises of two colour temperatures warm white (3000 K) and cool white (4000 K), as well as two different beam spreads 30 degrees and 60 degrees which are identical to standard halogen beam angles, so it can cater to the same wide range of lighting applications that a 50W halogen does.

The impressive COINlight Power light engine coupled with the clean matt white finish which blends in seamlessly with white ceilings, and up to 70 per cent energy savings, the LUXPOINT MINI range is the complete package. It is a win-win for

environment and your energy bill.

Take a step towards the new, up and coming LED technology from OSRAM and use the LUXPOINT MINI in your next project with absolute confidence. It is ideal for orientation and accent lighting, in hotels, corridors, meeting rooms, restaurant and shops as well as home lighting.



OSRAM's new LED LUXPOINT Mini recessed Downlight

Product features:

- Up to 70 per cent energy saving compared with standard 50W Halogen downlights
- Low power consumption of 15W
- True replacement of traditional 50W MR16 recessed downlights and spotlight luminaires
- Extra long life of up to 30,000 hours
- High lumen output: 3000K version – 700lm, 4000K version – 750lm
- Simple and easy installation
- Perfectly matched OSRAM OPTOTRONIC drivers available

All these features make this a genuine replacement for standard 50W halogen downlights.

For more information on the OSRAM LED LUXPOINT MINI recessed downlight tel: 1300 4 OSRAM; email: sales@osram.com.au; or visit: www.osram.com.au

Control Freaks sought after worldwide

Over the last 21 years, Queensland-based manufacturer Creative Lighting has evolved with continuous research and development, coupled with rising demand for its products resulting in some of the most inexpensive yet powerful lighting control solutions available.

Creative's products, under its trademark Control Freak brand, offer unique features which have led to its products being exported around the world. The company's clients ranging from the Winter Olympics 2010 to major lighting manufacturers and green projects such as William McCormack Place, Queensland Performing Arts Centre and Brisbane's Inner Northern Busway Tunnel.

One example is Creative's robust portable tool that offers the ability to not only program, test and debug lighting control installations, but to backup the programming as well. Other Control Freak® products power the data lines to the lights; add intelligence to security sensors and switches; provide scene and group control; provide computer interfaces and protocol translators; dim LED and fluorescent luminaires and control HID luminaires, switched loads and even ceiling fans.

"Energy-efficient lighting – that is, lighting with the lowest power consumption for the highest useful light output for the task - generally falls into three main categories," said Creative Lighting's CEO Lance Stewart.

Those categories are: LED for accent and feature lighting; HID for general area lighting such as roads; and fluorescent and compact fluorescent for wash lighting such as offices.

According to Stewart, "Even the most energy-efficient lights can be made even more efficient and more useful with good

lighting control and we make products to control them all."

There is only one international standard for digital lighting control in commercial applications, and the advent of this standard, called DALI, has meant that intelligence has been distributed to the lights themselves. In simple terms, the lights are the dimmers, needing only to be instructed by data to automatically turn off when not required (occupancy-sensing), or dim to lower energy states when full intensity is unnecessary (such as with daylight harvesting).

All the major lighting manufacturers offer their products as DALI and all Control Freak products are DALI-compliant, which means Creative can control lights from a variety of manufacturers and simultaneously reduce energy while improving visual amenity with scene control.

Creative's team of electronics engineers can also provide bespoke solutions and assistance with specifications and drawings – simply contact Creative Lighting on tel: +61 (0)7 3282 8777.

Depending on the products required, Control Freak solutions in Australia can also be purchased from Clipsal, Gerard Lighting companies (such as Sylvania, Pierlite and Inlite), Lumascope, Solus, Planet Lighting and many others. For more information visit: www.creativelighting.com.au





Tim Shotbolt
MBdgSc FIES RLP
Associate Director
AECOM Australia Pty Ltd

LED luminaires for use in commercial buildings

There are a range of LED luminaires useful for commercial developments, many of which utilise arrays of discrete LEDs. Luminaires are also emerging with large single chips. The larger chips are covered with phosphor, each chip containing multiple LEDs and these larger chips provide usable lumen packages.

LED luminaires as replacements

These are luminaires that use LED but appear no different compared to other luminaires and include diffused downlights and diffused office troffers. The opening size of the LED luminaire is either the same or marginally smaller than using other light sources. The amount of clear ceiling space required for LED recessed luminaires may be greater than other lamp types to accommodate heat sinks and varies between manufacturers. There is a strong tendency for this type of lighting to be based primarily on cost.

LED luminaires as a point of difference

Currently, it is expected that clients will pay a premium for LED technology providing they can see a benefit. That benefit is not necessarily just about the potential to save energy or the potential to reduce maintenance; it is also about seeing a difference.

A point of difference requires that high quality luminaire design criteria has prevailed so that the light provided is at least as good as any alternative lighting, minimises luminous intensities to appropriate angles and provides practical features for installation and or maintenance. In addition, the appearance of the luminaire provides interest and character to a fitout.

Decorative effect is where LED has been mostly successful to-date in minimal spaces and includes colour change and lighting control.

LED luminaire 'nasties'

These products show little attention to quality lighting parameters; this kind of product appeared rapidly in the marketplace seeking to capitalise on the myth and enthusiasm for anything LED related. Some typical characteristics include:

- multiple LEDs mounted on a flat plate directly behind a clear glass diffuser providing large amounts of glare
- poor light distribution showing dark spots and or bright spots
- the edge of the lit zone shows multiple patterns and or brownish yellow colouring like soap scum around a dirty hand basin

LED lamp replacement

MR16 lamp replacement: There are many LED offerings in the market and performance is equally varied. Insist on trying before buying to make sure the lighting looks the same; provides the same accent, has no unfortunate peripheral effects and has some guarantee on performance.

T8 replacement: A potential quick fix, low luminaire cost with immediate energy savings and benefits. A tube of similar cross sectional dimension to a T8 lamp with a printed circuit board (PCB) running along the centre of the tube and multiple LED mounted on the surface on one side of the PCB and integral electronic gear to run the LEDs mounted on the reverse side. Many of the offerings to-date have failed to perform to published data according to investigations conducted by the Illuminating Engineering Society of North America.

Earlier LED T8 lamps had narrow distribution LEDs and light was only equivalent to T8 fluorescent when measured directly below the lamp (nadir) diminishing rapidly in intensity to zero as the angle increased from the nadir. Other manufacturers are using wider angle LEDs and there is a better intensity distribution than previously.

In February we were provided with yet another manufacturer's LED T8 lamp that provided improved luminous intensities up to 90 degrees from the nadir.

Items such as harmonics from these types of lamps should be closely checked before bulk replacing an existing T8 fluorescent installation. Modifying existing T8 luminaires to accommodate an LED T8 replacement should be questioned as any original warranty or safety aspect covered by the original luminaire manufacturer will be void.

Current Issues

Issues include but are not limited to:

- performance and temperature sensitivity
- availability of manufacturer's data
- new suppliers with no track record in the industry selling a long life product and providing minimal guarantees. If there is a problem in 3 to 5 years time and the supplier has disappeared, who does the client turn to?
- micro-lense systems shifting orientation during transport and no-one on site can re-orient the micro lenses with the accuracy required to meet the predicted photometric performance of the specific luminaire
- characteristics and life of the electronics driving the LEDs ●



LED Lighting

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Office lighting gets six stars

Rated world class in the sustainability stakes, Sydney's One Shelley Street has propelled green office design into a new realm. A significant contributing factor in the building's environmental 6-star Green Star rating is the lighting control and energy management system.

Located on the banks of Sydney's Darling Harbour, the new Sydney premises of the Macquarie Group has set new standards in sustainable office design. Developed, built, owned and managed by Brookfield Multiplex, One Shelley Street boasts a host of environmental initiatives that include innovative lighting, air conditioning and water management technologies. In November 2008 it was awarded a 6-star Green Star - Office Design v2 Certified Rating from the Green Building Council of Australia – just the third office building in Sydney's central business district to do so.

Brookfield Multiplex earmarked One Shelley Street for the coveted Green Star certification from the building's inception, aiming for the highest 6-star rating indicative of 'world leadership' in environmentally sustainable design and/or construction.

The use of light - both natural and artificial - plays a key role in Green Star accreditation, with points awarded for various lighting credits related to both indoor environment quality (IEQ) and energy management. From an architectural standpoint, the innovative design by architects fitzpatrick+partners includes a high-performance facade and central atrium for promoting natural light ingress. This is complemented by an advanced lighting energy management system, conceptualised by lighting designers Vision Design (a specialist service of WSP Lincolne Scott), and founded on a lighting control system from Philips Dyalite.

Smart & sustainable

The One Shelley Street structure essentially comprises two window-dressed buildings separated by a central atrium. The vast majority of the 11-level 33,000-square-metre premises is devoted to open-plan office areas, with multiple meeting room 'pods' jutting into the atrium cavity, several board and multimedia rooms, two cafeterias, plus kitchens and amenities on both sides of each level.

The designers specified that a centralised control system from Philips Dyalite be deployed to manage lighting energy consumption for the entire building. According to Donn Salisbury, Associate at WSP Lincolne Scott and head of Vision Design in Sydney, the lighting design incorporates several strategies to optimise energy consumption. A distributed single-lamp solution was selected for the office areas, utilising high-performance luminaires incorporating 16mm T5 linear fluorescents to achieve the required uniform lux levels (320 to 400lux).

"The resulting light power density is just over 5W per square metre – significantly below the targeted level of 9W per square metre outlined in the initial brief," said Salisbury. Moreover, the control system permits lighting levels to be tailored to the use of space, allowing total flexibility for zone switching and dimming, ensuring no areas are overlit or illuminated when not in use.



1



2



3



4



5



6

1: The One Shelley Street structure essentially comprises two window-dressed buildings designed to maximise natural light, separated by a central atrium.

2: A distributed single-lamp solution lights the open-plan office areas, with a light power density of just over 5W per square metre

3: The integrated system also controls lighting and blinds in several board and meeting rooms

4: The impressive central atrium.

5: Featuring restrained LED architectural lighting, the central atrium is overlooked by a series of meeting 'pods', which feature motion sensors and time-out sequences to minimise energy usage (Photo by Andrew Krucko).

6: One Shelley Street is the new Sydney premises of the Macquarie Group

Fundamentally, the lighting system is programmed to operate in two distinct modes - 'trading' and 'after hours' - which are timer-based. Although the precise timing and functionality is individually configurable for each floor and/or zone, it essentially corresponds to 'lights on' at the commencement of trading mode, followed by a timed sequence of dimming to 'lights off' when the system goes into after hours mode. At this time, motion sensors are activated in amenities areas and lift lobbies to initiate lighting if motion is detected, with a 30-45min time-out sequence. Intermittent-use areas, such as the meeting pods, utilise motion detection at all times.

When in trading mode, daylight harvesting sensors ensure that the perimeter lighting is dimmed when natural light is available.

"There is a massive amount of perimeter on this building, coupled with the full-height, high-performance glazing. Even on a cloudy day you get excellent usable daylight penetration from outside, so the perimeter lights should rarely be on anywhere near 100 per cent during the day," Salisbury says.

DALI masterclass

A key consideration in sustainable commercial fit outs is making sure the building will accommodate re-configuration as tenancy requirements change. This means the lighting solution - for the open office areas in particular - needs to cater for a multitude of different scenarios and be easily configurable.

To ensure the required level of flexibility, the digital addressable lighting interface (DALI) data protocol and transport mechanism is used in the main open office areas. Up to 64 individually addressable DALI devices - including the fluorescent HF ballasts and various sensors - can be controlled by a single DALI network (or 'universe'). Moreover, control groups/zones can be configured and reconfigured from a computer terminal, without reconfiguring the fittings themselves.

According to Salisbury, this is where the DDBC320 DALI controller from Philips Dynalite comes into its own as the only controller on the market that can control three DALI universes - up to 192 ballasts/devices per controller. "We have used a single controller for each 'quadrant' (or half-floor) in the two adjacent buildings," he said. "Yet all the DALI ballasts can be individually controlled - be they dimmed or switched - depending on how you set up the zones. There's ultimate flexibility to cater for tenant functionality and environmental influences - dimming wherever and whenever."

Another energy-saving feature of the DDBC320 DALI controller is that it powers down the DALI universe when not in use. The controllers have integral relays that switch off standby power to the DALI ballasts, when luminaires are dimmed to zero per cent.

"That is the difference with this system," said Anthony Seddon, Philips Dynalite NSW State Manager. "With most DALI systems all the ballasts have to be powered up all the time, because they need to know if the signal is coming. But with this system there's no wasted energy."

Salisbury adds that this is not such an issue for buildings that operate 24/7, but the reality is most commercial buildings shutdown for long periods every day.

continued on page 30 ►

Case Study: DLA Phillips Fox office fitout

Northrop Consulting Engineers was engaged by DLA Phillips Fox to provide a lighting solution for its new office located in Kingston, Canberra. The new office was designed as an integrated fitout within levels 2 and 3 of the newly constructed 5-star Green Star commercial base building located at 55 Wentworth Avenue, Kingston ACT.

In a world first, high efficiency indirect pendant luminaires were partnered with DALI controlled local task lighting, resulting in a general office environment that was visually comfortable, aesthetically pleasing and energy efficient.

While a well designed installation using predominately indirect luminaires can create a visually comfortable environment, the energy efficiency of the system is less than a standard downward recessed 'troffer' installation (for an equal lighting level). This is mainly due to the indirect light being absorbed by the ceiling during the process of reflection. To counteract this additional energy consumption, low glare task lights were proposed to provide efficient supplementary illumination at each



► continued from page 29

Energy by numbers

Another energy goal for the One Shelley Street building is to meet the 'National Australian Built Environment Rating System' (NABERS) Energy rating. This evaluates the actual energy consumption and greenhouse gas emission performance of an existing building, and is derived from the actual amount of energy (electrical, gas, coal and oil) a building or tenancy consumes over 12 months.

A separate energy monitoring system sub-meters all electricity, water and gas consumption across the whole of the One Shelley Street building.

Floor lighting may be switched on as the result of timed events, activation of motion sensors, or manual override via a host of attractive user touch screens spaced at regular intervals on each floor of the building. These Philips Dyalite DTK600-SS LCD touch screens (with stainless steel facia) display an interactive graphical representation of each floor, with details of each zone available with a tap of the LCD panel. This allows employees to control the lighting in their workspaces – particularly after hours when the default state is lights off and workers might need to manually extend the lighting in selected

zones. The touch screens are also used to put the system into after hours 'cleaning mode'.

Given the predominance of open-office areas at One Shelley Street, it is not surprising that these have attracted most of the lighting energy management focus. However, as with any large, high-end, office building, there are many other important areas that are also controlled by the fully integrated Philips Dyalite lighting system. These include LED architectural lighting in the central atrium lobby areas and adjoining multifunction room; DSI control of lighting and blinds in various meeting/board rooms; and relay control of lights used in public/amenities areas. The system, which was engineered and installed by HeyDay Electrical, also supports integration with third-party AV systems in meeting rooms.

The entire lighting control system is founded on Philips Dyalite's sophisticated peer-to-peer communications serial bus network, DyNet, which links the multitude of controllers with over 300 multi-function sensors and around 75 LCD touch screens throughout the building. ●

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workstation. With the addition of task lights, the general lighting level provided by the indirect system can be lower than is required for complex reading and writing tasks, meaning less energy is required to light the space.

While a standard 'troffer' installation with task lights may be more efficient from an energy point of view, it does not lead to an effective visual outcome.

In an effort to improve the energy credentials of the lighting concept, it was proposed to utilise the base building DALI lighting control system to its full capabilities. Motion sensors and/or switches with timer overrides were chosen to control the lighting (including the task lighting), and in an effort to prevent over lighting the space, individual luminaires were to be dimmed to a maintained lighting level appropriate for the specific area in question. It was deemed critically important that the lighting controls be simple and intuitive, to ensure the occupants did not subvert the lighting controls.

The combination of indirect pendants and low prevailing lighting level allowed fewer luminaires to be used across the space and in the offices, satisfying the architect's desire for minimalism.

The lighting solution for the new DLA Phillips Fox Fitout in Kingston incorporates highly innovative control strategies that are believed to be a world first. These ground breaking

solutions addressed issues that were brought about by the inclusion of task lights into the environmentally sustainable design.

Until now, it has been difficult (if not impossible) to cost effectively integrate the operation of task lights into a building lighting control system.

This problem of task light control was elegantly addressed by a new solution devised by Northrop Consulting Engineers known as the 'Taskmaster' system. The 'Taskmaster' system is comprised of two principal components, the Control Unit and the desk mounted Power Rail.

These devices integrate into the existing base building DALI lighting control system and provide economical control of the task light at the desk.

Although the 'Taskmaster' system was originally designed for controlling the task lights only, it soon became apparent that the system would be ideal for controlling a variety of power hungry desktop devices. As a result, the final design of the 'Taskmaster' system evolved to encompass many different power loads using a clever system architecture.

The task light and indirect lighting solution that was used throughout the general office areas consumed an instantaneous load of approximately 7W/m² (with all task lights turned on). This was the worst case, in reality a considerable number of task lights were switched off throughout most of the day, especially in perimeter offices where there was ample natural light.

As the office occupants controlled the operation of their task lights according to the amount of natural light, it was deemed unnecessary to provide photo electric cell control to the offices.

The benefit of user control, in lieu of automated PE cells, was that the visual comfort of the worker could be sustained throughout varying light conditions.

The DALI control system was also designed with energy efficiency and user comfort in mind. The indirect pendants in the open space were controlled after hours by combination passive infra red and 'Microphonic' 360 degree ceiling mounted sensors manufactured by SensorSwitch. These sensors first detect movement using the PIR function and then listen for sounds in the environment to indicate continued occupancy (for example, someone typing at a keyboard). This high degree of sensitivity prevents the luminaires in the space from turning off while the space is occupied, but also allows for shut down time delays to be relatively short.

The task lights at each desk are also controlled using the DALI control system through use of the innovative and world first 'Taskmaster' system. Northrop Consulting Engineers designed and developed the 'Taskmaster' system with the assistance of CMS Electracom and DALI Control.

The Artemide Tolomeo tavolo task lights utilise an 18W TC-T compact fluorescent lamp and electronic control gear. This lamp – ballast combination maximises the life time of the CFL source and minimises re-lamping. ●

Easing the transition to green lighting

ENERGYSMART BUILDINGS MAGAZINE SPOKE TO LEE L. VANATTA, THE PRESIDENT AND CEO OF PURESPECTRUM TO FIND OUT MORE ABOUT HIS COMPANY'S FOCUS ON TECHNOLOGY DEVELOPMENT WHICH HAS GENERATED PATENTED AND PATENT PENDING TECHNOLOGIES FOR OPTIMISING ENERGY USAGE.

"OUR COMPANY HAS BEEN ABLE TO INTRODUCE PREVIOUSLY UNATTAINABLE PERFORMANCE STANDARDS FOR BALLAST DRIVEN LIGHTING APPLICATIONS".

Technology development has been the major driver of the company since its creation in the United States in 2006. It joins the lighting evolution and acceleration of energy efficient lighting applications by concentrating intensively on enabling the transition from old lighting technologies to the new. Vanatta points out that the transition to new state-of-the-art technologies will not happen overnight. Instead there will be an easing-in process.

Vanatta is targeting this market transition space with PureSpectrum's new technology—dimming ballasts for CFLs (Compact Fluorescent Lamps).

EnergySmart Buildings magazine asked Lee Vanatta to contrast his market positioning with the surge of information about LED technologies and their energy efficiencies. He said, "I accept LEDs are in a strong evolutionary mode but I believe their uptake and full acceptance will take ten to twelve years because of their expense and also the need right now for diffused lighting".

He sees PureSpectrum's role in the evolution of green lighting, using state-of-the-art ballast technology, as the bridge, the enabler, for effective transition of complete energy efficient lighting in commercial buildings.



Government legislation is driving energy efficient lighting standards in all new buildings and retrofitting established buildings is a growth market. "Our technology eases the transition and is immediate," he said.

Vanatta enthusiastically described the company's showcase technology: a step dimming ballast. He claims outstanding dimming capability for linear fluorescents. The step dimming ballast dims down from 100 per cent to 40 per cent and 10 per cent.

"The technology includes the option to manually dim the lighting or have it on sensor control," said Vanatta. "Commercial high rise buildings can leave their lights on all night at 10 per cent and have sensor control activated by movement when necessary."

He added, "By researching lighting technology from a fresh perspective, our company has been able to introduce previously

unattainable performance standards for ballast driven lighting applications at the costs of standard electronic ballasts."

This new Step Dimming Ballast is universal and Vanatta believes, will ease the transition process and make it much more cost effective to enter the new world of green lighting.

"Which ever way you look at it, it's a big evolutionary move and an effective procedure, the easing into it all, is a realistic time cost consideration", he said.

The multi voltages for the ballast accommodate 120 to 277 in either 50 or 60 hertz – making it possible to comply with the differing electrical requirements in each country.

When it comes to existing buildings the ballast can work with existing wiring; there is no need to run wiring to the toggle boxes.

"It works on the originating two wires which are already installed and works without having to put in expensive controlling devices, that is, the third wire which is the control wire," said Vanatta. "Therefore, the cost of installation is

not prohibitive – no huge labour cost."

In the context of say a conference room, power savings

can reach up to 77 per cent when compared to normal fluorescent lighting. Retrofitting the room, which has two wall switches, with one universal ballast can enable light levels to reduce to 10 per cent. The 77 per cent savings were on T8 fixtures and the savings are greater if replacing the old magnetic T12.

Beyond the step dimming ballasts, PureSpectrum is in the process of launching a complete linear dimming ballast which will operate just like a standard light bulb – with dimming capability from 10 per cent to 100 per cent. Additionally the company has a line of dimmable CFL's in both 220 and 120 versions. All the technology is based around the capability of integrating natural light with lighting control and without a major disruptive cost in extensive re-wiring. According to Vanatta many buildings are recouping their capital costs within 12-14 months and then realising savings every month.



LIGHTING IS GOING BACK TO THE DRAWING BOARD!



3-STEP DIMMABLE BALLAST FOR T8 LINEAR FLUORESCENT FIXTURES

The Right Choice for Energy Efficiency and Cost-Effective Dimming

The linear fluorescent fixture is the most popular lighting application for commercial and industrial usage, and there are millions of 2-lamp, 3-lamp or 4-lamp linear fixtures in the U.S. controlled by one of more ballasts. The quest to conserve energy is a top priority, and building codes throughout the U.S. and the world are mandating increased energy efficiency.

Electricity for lighting accounts for approximately 30 percent of energy consumption for commercial and industrial structures, and building owners are being tasked with identifying the fastest, most cost effective path to reduce energy consumption as the outdated and inefficient ballast for T12 linear fluorescent fixtures are phased out. As the T12 linear fluorescent fixtures are retired, facility managers and new construction project managers will be looking for cost effective electronic ballasts which will provide optimum performance for the T8 linear fluorescent fixtures that will become the standard for commercial lighting. PureSpectrum's 3-step dimming ballast provides a dual solution – a cost-effective electronic ballast that can also be a gateway to additional energy conservation through dimming.

PureSpectrum's 3-step dimmable ballast is a cost-effective choice that will provide immediate access to energy savings as a stand-alone product and will offer access to flexible lighting control options. It can be installed in new linear fluorescent fixtures or retrofitted with minimal changes to existing wiring to enhance existing fixtures. The ballast-to-lamp connectors are just like conventional electronic ballasts, and without changing the lighting concept or design, a room, a floor or an entire building

can save energy through the use of manual lighting controls, illumination planning and other green lighting strategies.

This innovative electronic ballast is easy to install, functions with standard wall switches, provides three consistent levels of light output and can function with a variety of energy saving green lighting strategies that depend on reliable dimming – motion sensors, occupancy sensors, vacancy sensors, photocells, time delay switches and other lighting systems which adjust light levels according to present prerequisites.

The Step-Dimming Advantage

There are a variety of reasons that support being able to adjust light levels, and PureSpectrum's step-dimming ballasts will work with virtually any lighting control device – from occupancy sensors which dim or extinguish lights when a room is vacant to ambient sensors which adjust light levels depending on available natural light.

Through manual dimming, time delayed dimming or a sensing system, implementing the PureSpectrum dimmable ballast will result in incremental energy savings during dimming and can provide as much as 77% power usage reduction. When applied to an entire building or structure through a planned lighting or sensing lighting design system, controlling light levels results in huge reductions in both energy usage and energy costs.



www.purespectrumlighting.com

FEATURES

-  Universal Voltage (120-volt to 277-volt)
-  Program Start
-  Energy Efficient
-  3 Levels of Dimming
-  Optimal Lamp Longevity
-  Compatible with Sustainable Lighting Designs
-  Complies with specifications for Title 24 of the California Building Codes
-  Easy Installation
-  Does Not Require Special Wiring or Control Devices

PERFECT FOR

-  Offices
-  Hallways
-  Bathrooms
-  Conference Rooms
-  Storage Facilities
-  Classrooms
-  Conference Rooms
-  Stairwells
-  Warehouse Aisles
-  Retail Stores

Case study: Szencorp Building

The Szencorp Building sets a new benchmark in office refurbishment, combining cutting-edge sustainable design with a high-end look and feel.

This 1,200 square metre office building in South Melbourne is the headquarters of the Szencorp Group of companies, who provide expertise in sustainable business.

The aim of the Szencorp Building is to demonstrate how to recycle a typical existing suburban office into a leading edge building offering best practice performance in energy, greenhouse and sustainability.

Key areas of achievement:

- First Australian building retrofit to have 5 Star NABERS ratings for energy and water, and a 6 Star Green Star – Office Design (v1) rating.
- Thought to have a world first integrated sensor and management system for occupancy lighting, HVAC and security control.
- First building in Australia, if not the world, to produce zero net emissions.
- Australian first use of ceramic fuel cells to reduce electricity used from the grid.
- Australian first use of the DryKor dry conditioning unit, which dries and cools the office space simultaneously, using a desiccant to absorb the water vapour from the air.
- Australian first use of natural gas engine AC units.

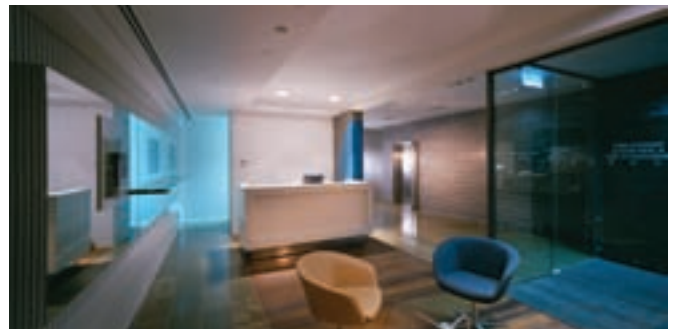
Energy

- 5 Star NABERS +20 per cent reduction in carbon dioxide
- Integrated sensor and management system for occupancy lighting, HVAC and security control
- Ceramic fuel cell to generate low-emission, off-grid energy with potential of providing for >30 per cent of building's energy requirements on-site. This is the first time this technology has been used in an Australian commercial office building
- Three solar PV grids (one amorphous) with capacity of approximately 8kW
- Australian first permanent commercial office installation of natural gas VRV engine air conditioning units
- Increased ceiling height (reclaimed from the old building plenum) allowing use of thermal mass for improved energy efficiency patterns have all contributed to the success of the Szencorp Building ●

*Compared to industry average, as measured by NABERS Water rating of 2.5 Stars

**Compared to energy consumption prior to retrofit

***Compared to waste generated by average Australian office worker



Investa: Leading by example

Since its inception, Investa Property Group has been committed to minimising the energy use of its commercial assets and has reduced electricity consumption by 24 per cent across its portfolio. As a part of this commitment, Investa works with its tenants through initiatives such as the Greenhouse Guarantee and EcoSpace that educate tenants on how to improve the environmental performance of their work space.

Investa saw the Green Building Fund as a great opportunity to enhance its energy reduction program and achieve further energy savings. It has also enabled Investa to lead by example and showcase the financial and environmental benefits of investing in efficient lighting controls.

120 COLLINS STREET

120 Collins is a Premium 50 level office tower located at the Paris end of Collins Street. Home to numerous large multi-nationals including Merrill Lynch, Standard & Poor's and Rio Tinto, this iconic modernist building is the corporate hub of Melbourne.

120 Collins, Melbourne. Image courtesy of Investa Property Group

In recent years, 120 Collins has implemented an upgrade program to improve the environmental performance of the building. This program has included the installation of electricity sub-metering to better manage energy performance, waterless urinals, a rain water capture system with over 35,000L capacity, a commingle tenant waste program and water efficient toilet pans, which are soon to be installed.

A number of energy-saving projects are planned at 120 Collins with the assistance of funding provided by the Green Building Fund, one of these being a lighting upgrade to the base building lift lobbies and bathroom facilities.

Investa appointed Energy Conservation Systems (ECS) to undertake a trial of a networked Managed Lighting System (MLS) on level 36, which incorporated movement detectors so lights would only function when the areas were in use. The trial was a success and resulted in significant energy savings. The lighting upgrade is currently being rolled out across 30 floors. The remaining floors are currently under review for further Green Building Fund assistance.

Green Building Fund contribution	\$46,000
Annual cost savings.....	\$19,300
Annual energy reduction	175,000kWh
Annual CO ₂ reduction	230 tonnes

260 ELIZABETH STREET

260 Elizabeth Street is a 10 level A-grade office tower located near Central railway station in Sydney. Overlooking Belmore Park and neighbouring vibrant Surry Hills, the building is currently undergoing a full building refurbishment and has been



260 Elizabeth Street, Sydney. Image courtesy of Investa Property Group

designed to achieve a 4.5 NABERS Energy Rating.

A component of the refurbishment involves the installation of new T5 light fittings to all floors and base building areas.

Energy Conservation System (ECS) motion sensors and Managed Lighting Systems (MLS) have been installed through the common areas of building and car park.

Investa is planning to implement green lease agreements with new tenants which will deliver greater energy savings for tenants and the building.

Green Building Fund contribution.....	\$75,000
Annual cost savings.....	\$40,000
Annual energy reduction	315,000kWh
Annual CO ₂ reduction	330 tonnes

Australia's Green Building Fund

The Green Building Fund aims to reduce the impact of Australia's built environment on green house gas emissions, by reducing the energy consumed in the operation of existing commercial office buildings.

The program targets owners of existing commercial office buildings. It supports them to reduce their energy consumption, by retro-fitting and retro-commissioning of these buildings.

The program will provide \$90 million in grants across five years, from 2008-09 to 2012-13, through two streams of activity.

Stream A targets the owners of existing commercial office buildings. It aims to help them to reduce their energy consumption, by retro-fitting or retro-commissioning projects.

Grants range from \$50,000 to \$500,000 and are available, for up to 50 per cent of project costs. Eligible projects could involve:

- common area lighting
- heating, ventilation and air-conditioning (HVAC) systems
- the building fabric, for example glazing and shading
- monitoring equipment, building automation systems, and control systems linked to improving the energy efficiency of the building.

The sixth and final round of funding will close for applications on April 27th, 2010. Further information about the Green Building Fund contact the AusIndustry hotline on 13 28 46 or email hotline@ausindustry.gov.au



RIVER of LIGHT – Gateway Plaza Building



A collaboration between 3S Lighting, Meinhardt Light Art and Hassell Architects

In 2009, the Gateway Plaza building in Sydney underwent a complete transformation in its entrance and lobby areas.

A significant addition to the space is a spectacular lighting installation known as the 'River of Light', the product of collaboration between 3S Lighting, Hassell Architects and Meinhardt Light Art.

Working to a short timeframe, 3S Lighting was able to produce the 400 LED custom pendants to the client's specifications.

"We are happy from a factory point of view with how we executed this project, we are even happier with the results. The lighting not only exceeded the technical performance but also provides an exciting visual experience," said Peter Spirko, director of 3S Lighting.

The brief from the client, Dexu Wholesale Property was to provide an innovative, exciting and energy efficient lighting design solution for the entrance of the building. The new lighting in the foyer was required to use energy efficient luminaires to reduce the energy consumption of the lighting by 15 per cent.

The installation comprises a sparkling chandelier in which each pendant is mounted individually to the ceiling, and this array flows through the entrance lobby of the building. All parts work harmoniously together to create one complete light sculpture.

"This idea came about due to the unique layout of the Gateway

Plaza foyer. The foyer is an elongated space which meanders around the base of the Gateway Plaza tower with a lift lobby in the centre," said Reinhard Germer from Meinhardt Light Art.

"The introduction of more energy efficient light sources and a new lighting control system meant we could achieve a further reduction in energy consumption of about 50 per cent when compared with the previously installed lighting in this area."

In the development process of the transparent luminaire for the sparkling chandelier effect, Meinhardt Light Art worked together very closely with 3S Lighting to achieve the desired effect.

"The result is an astonishingly light and translucent sculpture with a highly efficient lighting performance," said Germer.

Luminaire Design

"The actual luminaire is the result of a long design process which started with a frosted glass, surface mounted tube, fitted with LED light sources with a power consumption of approximately 12 W per luminaire," said Germer.

"The initial concept of the light sculpture was to assemble a large number of frosted tubes of different lengths to create a solid object flooded by waves of light."

At a later stage, the design changed to a modern interpretation of a transparent crystal chandelier flooded by waves of sparkling light.

Each pendant consists of a transparent acrylic tube designed in three different lengths. The visible light fixings within each tube consist of LED direct/indirect light component. The direct down-light provides an atmospheric functional illumination whereas the indirect up-light creates a halo effect on the ceiling above. Varying mounting heights create a fluid spatial distribution of light along the length of the sculpture.

Along with providing functional lighting to the foyer, the design intent was to maximise refraction by exploring the shape and reflectance of the acrylic tubes and the chrome surfaces of the individual luminaires. The light emitted from each single pendant interacts with the adjacent pendants reflecting, refracting and transmitting light. This results in a brilliant light sculpture incorporating an ever changing visual experience.

Due to the relatively low light output of the individual luminaires, visual comfort levels are high as the light is distributed in a multitude of glare free sparkles.

The sensation of an ever-changing visual experience is strengthened by a variety of pre-programmed light scenes. The 'Starry Sky' is a random on/off switching to produce an intense sparkle. The 'River of Light' groups pendants together and gently dims up and down in one direction. This creates waves of light flowing through the sculpture.

The Meinhardt Light Art team were also challenged to further improve the lighting efficiency of the entire installation.

"This resulted in one LED light fixing per luminaire instead of the initial two LED fixings with a power consumption of only 7 W per luminaire," said Germer.

Each pendant consists of an LED direct/indirect light component. Each component uses 3 x 1.2 W LEDs controlled by a 1-10 V dimmable control gear. The maximum energy consumption of one fitting is approx. 7.8 W.

All luminaires are connected to a daylight sensor which automatically dims down during daytime hours. All pre-programmed light scenes, include the light sculpture are dynamically switched on or off or dimmed down. ●

Gateway Plaza Building, Circular Quay Sydney Australia



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Manufactured

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LIGHTING

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Green Star gives the green light

Source: Green Building Council of Australia

Since its introduction in 2003, the Green Star environmental rating system for buildings has penetrated the market to the extent that more than 11 per cent of Australia's CBD office space is now Green Star certified. More than 215 buildings have been certified, and a further 460 buildings are registered to achieve Green Star ratings.

This rapid uptake of green building practices reflects the growing awareness of climate change, with the environmental benefits of green building practices now well established. In 2008, the Green Building Council of Australia (GBCA) released *The Dollars & Sense of Green Building*, which confirmed that green buildings consume less energy and water, and generate less waste than traditional buildings.

What is less understood is the financial, productivity and health benefits that green buildings deliver. Green building practices can reduce a building's operating costs by as much as 9 per cent, increase building values by 7.5 per cent and realise a 6.6 per cent increase in return on investment. What's more, green buildings are healthier and more productivity places for the people who live and work in them – and this is partly the result of good lighting.

With most office workers spending 90 per cent of their days indoors, it shouldn't surprise us that the indoor environment quality of buildings – including fresh air, access to natural light and high-performance task lighting – can have an effect on productivity and performance.

Comfortable, bright facilities promote alertness and motivation. The Office Lighting KnowHow report (2008) found that if poorly designed lighting distracts the average worker for only one per cent of the time, this is equivalent to a US\$5 per square foot annual loss.

The Green Star environmental rating tools award points for projects which encourage and recognise designs that provide



Green Star rated Mirvac School of Sustainable Development at Bond University

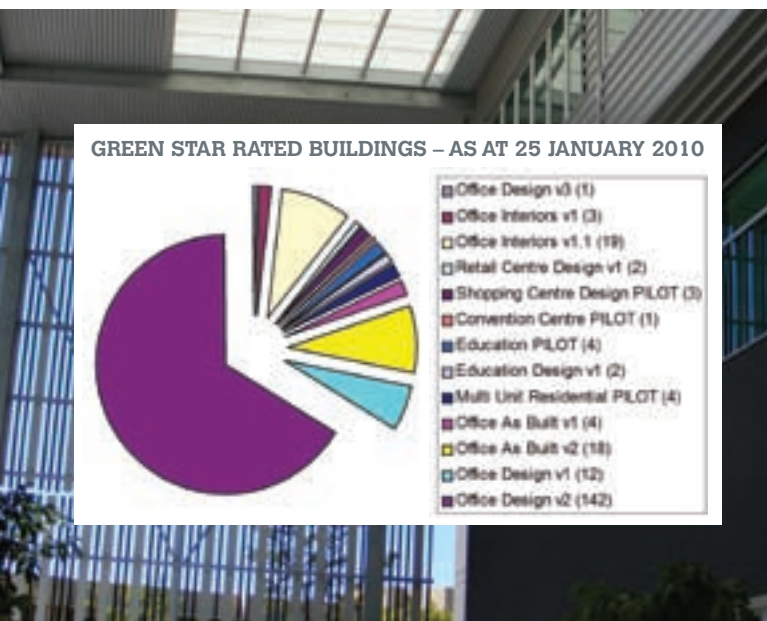
artificial lighting with minimal energy consumption. Building projects which incorporate lighting that is not over-designed (with a maintained illuminance level of no more than 400 lux for 95 per cent of the nett lettable floor space) also achieve points, as do those that include greater flexibility for light switching (making it easier to light occupied areas only).

Bond University's Mirvac School of Sustainable Development, for instance, was awarded its 6-star Green Star rating after participating in the pilot rating project for the Green Star – Education v1 tool. The building was awarded Green Star points for offices and classrooms that are positioned to minimise the impact of direct sun and reduce the need for air-conditioning, as well as for the lighting system of daylight sensors, motion detectors and task lighting, which reduces energy consumption. The building is expected to reduce annual CO₂ emissions by more 82 per cent, with a benchmark for 101,851 kilowatt hours (kWh) of annual energy consumption.

Green Star has changed the property landscape and green building design – such as those achieved at the Bond University's Mirvac School of Sustainable Development – is rapidly gaining acceptance as the 'norm'.

The number of Green Star certified buildings is expected to grow exponentially as developers, investors and tenants all recognise that green makes good business sense. And even building projects that aren't attempting to achieve a Green Star rating will still be designed by the same architects and designers working on Green Star projects, so current Green Star standards will be integrated into general practice. ●

To find out more about Green Star, or to download the tools for free, visit: www.gbca.org.au



LEDs add up to real savings for building owners:

Lighting Science Group

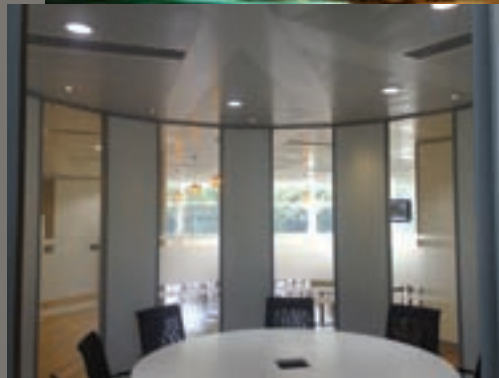
In recent years, LEDs (lighting emitting diodes) have changed the face of lighting as we know it. These lighting sources are used in so many applications usually reserved for compact fluorescent or even metal halide lamps. As the light outputs have increased, the range of applications that LEDs can now be applied has broadened from the decorative to functional and architectural.

The features and benefits of LEDs speak for themselves: they are more compact, require significantly less power than traditional light sources, have longer lamp life, generate little to no heat, and contain no mercury or other toxic materials.

In most cases, the LED fittings now on offer from reputable manufacturers in the USA and Europe are fully recyclable and can contribute to reducing a building's overall carbon footprint.

Growth areas for LED fittings can be found in the markets of more traditional architectural light fittings, such as atriums with greater than usual ceiling height. There are LED fittings which can give designers and engineers the same lumen output as metal halides, but without the high maintenance factor that the traditional lamps have posed in these hard to reach areas. This provides a 'set and forget' lighting option for periods up to 50,000 hours, which at 10 hours running time per day, can provide 14 years of continued lamp life.

A recent project in the ACT is an example of the difference that LED fittings can make in a commercial office setting. Featuring five levels of office space and foyer areas, the building replaced 50W halogen fittings with 8W LED fittings both with similar output. The results were as follows:



- A total of 196 x 8W LED fittings were installed, replacing the originally proposed 196 x 50W halogen fittings in the ground floor and levels 1-5 lobby areas:

- Reduction in energy consumption by using LED was 62.86 per cent
- Annual cost saving of LED, energy + maintenance was \$5772.98
- Approximate annual greenhouse gas reduction was 16.8 tonnes CO₂ per year

- For the front entry area, and the bathrooms, a total of 18x 9W LED fittings were used to replace 18 x 50W halogen fittings in the front entry ground level and bathrooms and showers:

- Reduction in energy consumption by using LED was 78 per cent
- Annual cost saving of LED, energy + maintenance was \$731.21
- Approximate annual greenhouse gas reduction was 2.7 tonnes CO₂ per year

The owner of this building is now looking at the other areas where LEDs could be incorporated, such as the car

park, walkways, façade and exterior landscape.

With a broad range of products available in high IP rated (waterproof) LED fittings, projects can now achieve visual interest as well as high levels of energy efficiency.

Car park shoe box fittings are now available with running costs of less than half that of traditional lamps, whilst still meeting the strict lighting codes that apply to public areas.

A traditional car park pole mounted fitting, at minimum, would include a 150W HID lamp, with a lamp life of approximately 15,000 hours. This can now be replaced with an equally effective but more efficient LED post top fitting that will operate at 85W for at least 50,000 hours.

There is also a broad range of landscape fittings that will illuminate the tallest tree, or low level gardens and pathways.

There is linear façade lighting that will wash the entire building and produce a long-term, low-cost and appealing display, which can also serve to increase or reinforce a brand or image.

More and more professionals from all aspects of the commercial building industry – engineers, architects, designers and contractors alike – are now researching product alternatives and looking for ways to save energy. The pressure is on for manufacturers to continue researching and developing products that will ensure we are creating a much greener future.

For more information tel: +61 (0)2 9899 8777 or visit: www.lsgc.com

Sydney Water Headquarters, Parramatta

Sydney Water's new head office in Parramatta is a 5-star Green Star example of how to reduce water and energy consumption. Created and managed by Brookfield Multiplex, the building incorporates innovations in the design and construction fitout. The new head office contains five basement levels for plant equipment and car parking; a smart and sophisticated ground floor with cafes and public space; and office space across levels 1-15.

The lighting systems, operated by DALI Control, include T5 low energy consumption lamps set at 400 lux.

See the light with DALI Control

The DALI Control system provides complete lighting control for Sydney Water HQ and plays a pivotal role in the building achieving its 5-star Green Star rating and 5-star NABERS rating. Through clever use of override sequences, time scheduling and PIR sensors, DALI Control provides Sydney Water HQ with substantial energy savings.

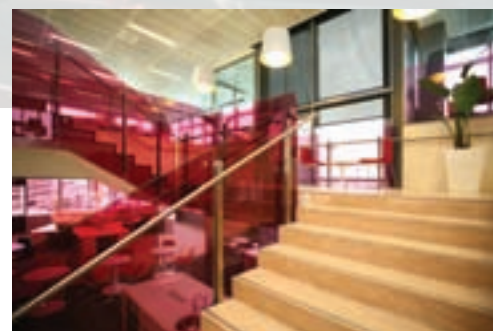
The lighting control products used on this project consisted of power supplies and interfaces, 4-input modules, line controllers and PIR occupancy sensors. The 4-input modules used in conjunction with the line controllers allow for the connection of occupancy sensors and

push button switches, which are configured to operate the lighting.

Using override sequences, the lighting system is configured in such a way that the lights are never left on when an area of the building is not occupied. In addition, the use of digital dimming ballasts allows for shorter override times, which means greater energy savings can be achieved. When the PIR sensors detect no movement in an area the lights will slowly dim down to warn people the lights are turning off.

Corridor linking is also configured into the line controllers to keep corridor lighting on when the offices are occupied. Once the offices are unoccupied the corridor lighting automatically turns off. The entire system is operated via an OPC server, which is connected to the building management system (BMS) and can be reprogrammed for different lighting schedules or sequences if required.

A unique feature of the control system is that the status of every ballast and light fitting is monitored, including emergency lighting. This feature enables building management to constantly monitor lighting status and conduct emergency lighting tests and reports when required. The installation was relatively simple,



Images courtesy of Sydney Water, Parramatta

as there were no major obstacles or wall chasing and the use of soft wiring greatly reduced installation time. The only post installation alterations made at Sydney Water HQ was the decrease of light intensity in common areas, such as corridors, during overnight. The light intensity was reduced from 320 lux down to 100 lux, which again creates additional energy savings.

To find out more about how Clipsal DALI Control can help you on your next commercial project visit: www.dalicontrol.com or clipsal.com/platinum



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