DECEMBER 2010
VOL 1 ISSUE TWO

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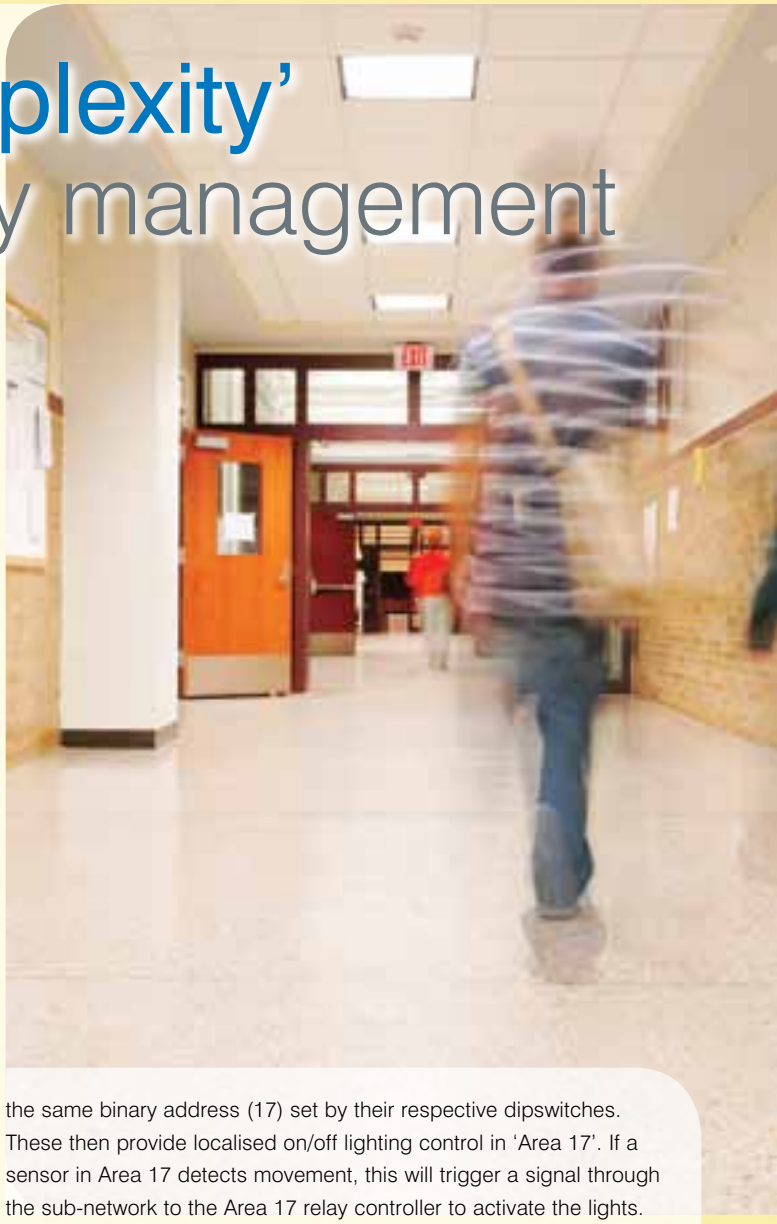
Removing 'complexity' in lighting energy management



Energy management through networked lighting control is no longer reserved merely for large-scale enterprises with large budgets. Robert Shenstone, Philips Dynalite Australia and New Zealand project solutions manager, explores a new sub-networked lighting control architecture designed to assist all operators leverage the benefits of energy-savings technologies.

Energy management is a powerful driver in the refurbishment and construction of new commercial buildings. However, until recently, fully-networked lighting control systems that can deliver powerful energy-saving outcomes have tended to be targeted predominantly at large commercial installations. Here, integration between lighting and building management systems is increasingly seen as a base requirement.

By contrast, there has not been a single obvious lighting control solution that meets the requirements and budget for designers, contractors and businesses of all sizes wishing to improve their lighting energy efficiency – until now. Recently, sub-network control systems have been emerging on the market. While able to operate as a fully-capable network in their own right – effectively meeting the lighting controls needs of both small and large installations alike – sub-networks also have the ability to be upgraded to, or incorporated into, a fully-networked solution in the future.

Much of the investment in a fully-networked lighting control solution stems from the configurable software and the installation and commissioning processes required to obtain optimal results. The challenge for lighting control specialists is to develop a simpler, but scalable and upgradeable lighting control solution, that delivers energy-management benefits without the need for complex commissioning. Such systems allow quick and easy installation by electricians, rather than requiring specialised systems integrators.

Removing complexity

One elegant and simple solution utilises 'rapid-setup' relay controllers and multifunction sensors to provide occupancy-based sub-networked lighting control, in place of a software-configurable control system. Here, the individual lit 'areas' within a building space are controlled through a simple rapid-setup addressable system used to identify and activate devices on a sub-network. Sensors are used in each area to determine if it is occupied or not; this information is then conveyed via the sub-network to an area-addressed relay controller to activate, deactivate or dim – the lighting.

The ability to assign area designations during onsite commissioning – using a bank of rapid-setup dipswitches located on each sensor, relay controller, dimming controller or user-input panel – negates the need for computer programming. A series of five dipswitches will allow 32 different combinations of on/off settings, through simple binary coding. These combinations of switch settings can be used to identify up to 31 different lighting areas within a larger space.

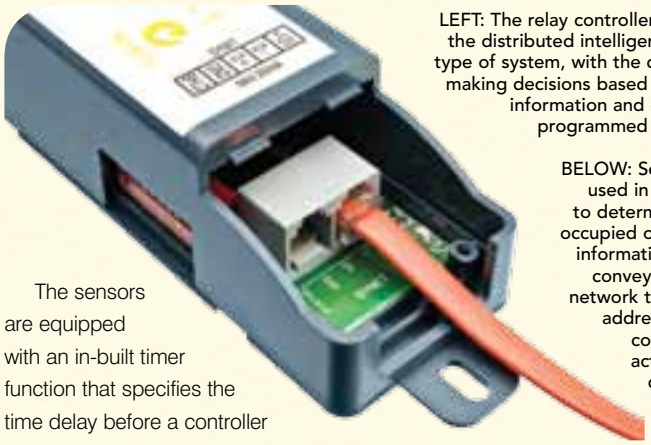
For example, 'Area 17' might represent a general meeting room, where a corresponding presence sensor and relay controller have the same binary address (17) set by their respective dipswitches. These then provide localised on/off lighting control in 'Area 17'. If a sensor in Area 17 detects movement, this will trigger a signal through the sub-network to the Area 17 relay controller to activate the lights. Similarly, when the sensor has failed to detect occupancy for a preset time interval, it will instruct the relay controller to switch off lighting for this area.

All sub-networked sensors, controllers and associated luminaires within a space are therefore associated with one of the 31 specific lighting areas. The size and allocation of areas can be established to suit the building layout and the end-user requirements for each area. Simply changing the dipswitch configuration on any device will allow it to be easily re-assigned and addressed to a different area.

Such a sub-networked architecture allows multiple tenants of a single building to each enjoy an occupancy-based energy-managed lighting system for their own space, without this having to be supervised by, or integrated with, an overall building-management system. It also allows conventional lighting systems to be readily upgraded in order to provide immediate energy-management benefits.

Embedded intelligence

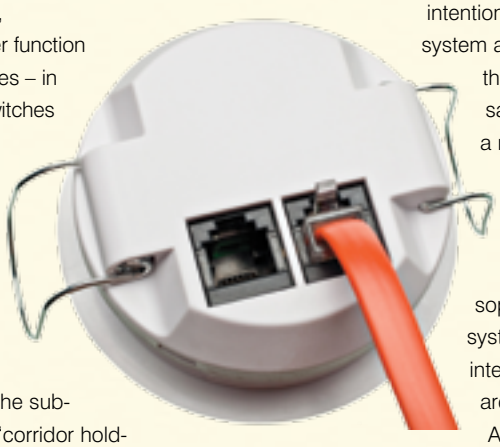
The sub-networked relay controllers and sensors harbour the distributed intelligence of a fully-networked system. This allows the controllers to make decisions based on sensor information and other pre-programmed functions. Information sharing across the sub-network is essential, particularly where more than one sensor is present in a given area. For example, an area's lighting should only be switched off upon the direction of the last sensor in the area to detect movement. ➤



LEFT: The relay controllers harbour the distributed intelligence of this type of system, with the controllers making decisions based on sensor information and other pre-programmed functions.

BELOW: Sensors are used in each area to determine if it is occupied or not; this information is then conveyed via the network to an area-addressed relay controller to activate – or deactivate – the lighting.

The sensors are equipped with an in-built timer function that specifies the time delay before a controller is instructed to deactivate lighting. Here, dipswitches can be used to set the timer function on the sensors. Two rapid-set dipswitches – in addition to the five 'area address' dipswitches – allow a choice of three different timer settings, plus a test function for the electrician during installation and commissioning. The actual time delays would be factory pre-programmed to specified values, but might typically be 10 seconds (for testing), 5, 15 and 30 minutes.



Another important consideration is the sub-networked system's ability to assign a 'corridor hold-off' function to two areas. With this functionality, the corridor lighting area will remain activated if occupants are detected elsewhere in any of the other 29 areas, even if no presence has been detected within the programmed timeframe in the corridor itself.

This is important for instance, if a meeting in a conference room runs late, and everybody else has vacated the building. Without a corridor hold-off function, the attendees will be faced with a darkened corridor when they emerge from their meeting, presenting an OH&S risk hazard. With this function set, however, the corridor lights remain activated until no occupants are detected in any of the other 29 areas. This ensures a safe illuminated egress pathway is maintained while the building remains occupied.

Furthermore, multifunction sensors can include photoelectric (PE) 'light level' detection. On-site settable PE sensitivity – matched to the local environment – can also be selectable through a rapid-set dipswitch on the sensor. With rapid-set functionality fitted to an appropriate ballast controller, this permits dimming of fluorescent luminaires in balance with natural light levels, to achieve even greater energy savings.

Appropriate solution

For applications where a wider array of lighting and building management control functionality is required – such as a range of preset lighting moods, blind/louvre control, and HVAC integration – then a sub-networked energy-management solution can be upgraded to a fully-networked lighting control system, which can be overlayed on the user's initial investment.

However, for straightforward applications, such as offices, schools, public buildings and many commercial environments, a sub-networked distributed rapid-set control system has the functionality to address all basic lighting energy-management requirements. Furthermore it allows uncomplicated installation and configuration. This often represents the most cost-efficient means to leverage the energy-management benefits from an automated system – typically realising lighting energy savings of 30 to 60 per cent.

Moreover, these systems represent an excellent return on investment when used in retrofit scenarios, where the intention is simply to add an energy-management control system and retain existing luminaires. Studies have shown that simple occupancy-based switching solutions can save significant energy costs extremely quickly, with a return on investment typically achievable within 24 months of installation. For retrofit scenarios, the return can be even shorter.

The challenge for solutions providers is how best to introduce these new systems. While more sophisticated computerised-networked lighting control systems are generally installed by specialist systems integrators, the rapid-setup sub-networked systems are designed to be installed directly by electricians. As such, it is necessary to develop these electrical contractor networks. This can be achieved through education of the benefits that these systems offer, backed by the provision of training to deliver the installation skills required.

Looking to the future, simple occupancy-based sub-networked lighting control systems present huge energy-saving potential for a broad range of applications. The capacity for these to be seamlessly upgraded to a fully-networked lighting control system further ensures their 'future-proofing' and system resource utilisation, even if the lighting requirements of a building radically changes over time.

Energy-management has never been more important to provide cost-efficient solutions that meet evolving regional regulatory and legislative requirements. Less complex energy management solutions provide an appropriate solution for installation designs that do not currently need all the features of a sophisticated integrated networked lighting control solution.

For further information, please contact: http://dynalite-online.com

GLOBAL
Peter Glasheen, global marketing manager – indoor networked controls, Philips Dynalite
Telephone: +61 2 9019 8819
Email: peter.glasheen@philips.com

UK
Barbara Neate, media relations manager, Philips Lighting
Telephone: + 44 (0)1483 293 071
Email: barbara.neate@philips.com

EUROPE
Paul Wilmshurst, Philips Dynalite Europe
Telephone: +44 (0)798 932 4046
Email: paul.wilmshurst@philips.com

Putting sustainable buildings in broader context

What we can see in green building movements around the world is that the solutions for cutting our energy usage in commercial buildings automatically provide many positive knock-on effects.

In creating buildings with energy efficient qualities we not only unlock the key to emissions reductions, we create better places for people, create jobs, contribute to the overall sustainability of the surrounding area and to city-wide, even nation-wide, efforts to operate more efficiently. And importantly, better design, placement and planning of commercial buildings can assist people in living more sustainable lives, an important social driver.

As many property companies and participants in the green building market are aware, world-class performance in buildings also makes business sense. We have known this for some time, but communicating this to a wider audience is essential to ongoing development of the industry.

While the Energy Efficient Non-Residential Building Scheme Bill was ultimately rejected by the Senate in Australia, based on a program for energy efficient buildings developed by Lend Lease, WSP Lincolne Scott and Built Ecology, there are encouraging signs yet that the Government recognises the important role of energy efficiency in meeting greenhouse gas (GHG) reduction targets.

The Prime Minister's Energy Efficiency Opportunities (EEO) taskforce released its report in October and what it shows is that ambitious cuts in energy use will be easily achieved in conjunction with an emissions trading scheme (ETS) or carbon price. The report, handed to Cabinet in July, recommends that Australia adopt a target of a 30% increase in energy efficiency by 2020.

The key recommendations include cleaner vehicles, greener building codes, greater energy efficiency standards and disclosure requirements, and encouraging power generators to help their customers use less energy.

Crucial year for the building sector

The executive director of the United Nations Environment Program, Achim Steiner, says for GHG emission reduction targets to be met, decision makers must unlock the potential of the building sector with much greater seriousness and vigour than they have to date and make mitigation of building-related emissions a cornerstone of every national climate change strategy.

He supports national and regional baselines for building-related emissions using a consistent international approach, such as the Common Carbon Metric which is currently in development. This year is a crucial year for the building sector and the success of the next global protocol on climate change, says Arab Hoballah, chief sustainable consumption & production for the United Nations Environment Program.

He believes if we fail to act in a collective and coordinated manner this year, we may indeed fail to effectively address climate change.

This page: The energy performance contract currently in place with Honeywell is guaranteed to lift the rating of GPT Group's property at 530 Collins Street (Melbourne) to 5 Stars, the highest rating achievable.

Even if it is not part of the carbon reduction efforts of the Kyoto protocol China has taken giant steps to have an impact on climate change challenges. In its latest five-year plan, covering the period 2011-15, China set an energy target to reduce energy intensity by 15-20 per cent. Its carbon target could be even more ambitious: officials have aired a goal of a 40-45 per cent cut in carbon intensity by 2020, and the new five-year plan will reinforce that with an interim target for 2015. To achieve these goals, China is preparing a big spending program to boost clean energy that could reach Rmb5,000 billion ($753 billion) over the next decade.

With this approach China has moved from just greening buildings to greening entire cities, introducing a sustainable cities pilot program and ambitious goals for 40 master planned "eco cities" and 21 LED lighting "pilot cities". While many of the challenges in Australia and similar to those of Chinese cities, albeit on a smaller scale, the approaches are different.

The Green Building Council of Australia is well advanced with the development of a voluntary ratings tool to provide a common language and national basis for defining best practice in sustainable communities.

Taking a precinct or community approach places the built forms within that space in a different perspective than just rating performance of lone developments, and generally sees commercial buildings take on a variety of roles, providing office space as well as supporting retailing and recreational activities.

All these aspects for commercial development are discussed in this edition of EnergySmart Buildings, with a focus on energy efficient design, planning, operation, management and technologies.

We hope you find the publication to be both informative and thought-provoking.

Regards,

Paula Wallace
Editor – EnergySmart Buildings
energysmart@paulawallace.com.au

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ON THE COVER

The energy performance contract currently in place with Honeywell is guaranteed to lift the rating of GPT Group's property at 530 Collins Street (Melbourne) to 5 Stars, the highest rating achievable.

MAIN IMAGE:
Norman Disney & Young's corporate office in Batman Street, Melbourne, has achieved Green Star 5 Star rating under Office Design and As Built v2 rating tools.

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P: +61 (0)2 9555 1944 | **F:** +61 (0)2 9555 1496
E: adam@rala.com.au

PUBLISHER: Barbara Cail | barbara@rala.com.au

MARKETING DIRECTOR: Adam Cail | adam@rala.com.au

EDITOR & PROJECT MANAGER:
Paula Wallace | energysmart@paulawallace.com.au | T: 0404 088 501

SUBSCRIPTIONS: Melinda Cail | melinda@rala.com.au

ACCOUNTS: Cheryl Welsh | accounts@rala.com.au

ART DIRECTION & DESIGN:
Anthea Vandertouw, Ferncliff Productions | ferncliff@tpg.com.au

Visit the Lighting website at:
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PIXEL GAINS HIGHEST GREEN STAR SCORE EVER

Grocon's new Pixel building, the first carbon neutral office building in Australia, has achieved the highest Green Star score ever awarded by the Green Building Council of Australia, and taken out the built environment award at this year's Banksia Awards.

Built on the site of the former Carlton United brewery on the northern fringe of the Melbourne CBD, the Pixel Building's standout sustainable feature is an anaerobic digestion system for heating and cooling that is powered by captured sewerage gases.

The building also features photovoltaic solar panels on the roof, a sophisticated energy capture system that only distributes and uses fresh air, reed beds to cool the air on its northern and western facade as well as reduced car parking.

Pixel has achieved a perfect score of 100 points under the Green Star rating system for building design, with 75 points the benchmark for 6 Star Green Star. It gained an extra five points for innovation, equating to world leadership.

The distinctive looking sun shade system on the exterior of the building will provide the maximum amount of daylight into the office space, while protecting it from too much glare and heat in the summer.

Pixel will also feature smart window technology, whereby windows will open automatically on cool nights to enable air flow into the building to cool the structure.

A true carbon neutral building, Pixel makes maximises sunlight and incorporates features such as low energy lighting, heat exchange with underfloor system and gas-fired heat absorption pump as well as renewable energy technology, including wind turbines and fixed and tracing solar photovoltaic panels.

What role for buildings in sustainable communities?

BY PAULA WALLACE

What makes a community sustainable? That's a question that many planners, designers and policy makers have been attempting to answer as future needs and present climate concerns increasingly inform our decisions around our places of work, our neighbourhoods, our centres of industry, our natural and cultural sites.

And within those systems how can built forms, particularly commercial buildings as we know them, contribute or integrate into the sustainable goals of their areas of operation and beyond?

EnergySmart Buildings spoke to a number of engineers and planners working in this area to find out more about this emerging field which brings in a wide range of expertise.

The need for sustainable communities

What we do know is that Australia's population is going to grow. It is expected to rise by 60 per cent by 2050, reaching 35 million people. Most of us – nearly 85 per cent – will choose to live in cities.

The Australian Government is establishing a clear urban cities agenda for the nation, to ensure our cities grow efficiently with respect to major infrastructure networks (such as transport and communication networks), are affordable and liveable, and shape a sustainable legacy for future generations.

With its core business being the development and administration of rating tools, the Green Building Council of Australia (GBCA) was asked by government and industry to lead

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WHAT IS GREEN STAR – COMMUNITIES?

The development of Green Star – Communities ratings tool, by the GBCA, involves a two-staged process, including:

Stage 1: development of a national framework for sustainable communities that establishes five national best practice principles to guide sustainable communities in Australia and the development of the Green Star – Communities rating tool; and

Stage 2: development of the Green Star – Communities rating tool that assesses sustainable communities against best practice sustainable benchmarks.

The framework is not designed to provide specific development solutions or strategies nor is it intended to provide case study examples of sustainable communities. The objectives of the framework are to:

- **Provide national consistency and a common language around the definition of best practice sustainable communities**
- **Encourage innovation and excellence in our approach to creating communities of the future**
- **Promote integration and collaboration across the spectrum of sustainability issues relating to sustainable communities**
- **Facilitate stakeholder engagement during the evolution of sustainable communities**
- **Provide a basis for consistent and ongoing assessment and evaluation of sustainable communities.**

IMAGES: Aurecon assisted in developing a sustainable framework for Central Coburg, north of Melbourne, which requires buildings to meet objectives using environmental assessment tools for residential and non-residential built forms. Sustainable approaches to non-residential development being encouraged in Coburg include:

- increased localised employment opportunities
- provision of goods and services to the local, increased population
- the opportunity to improve the environmental performance of new commercial development that traditionally is a high–energy use form of development
- the potential to work with established local business groups to implement environmental programs.

Images depict areas within Coburg targeted for sustainable development as produced by Aurecon.

SUSTAINABLE ELEMENT IN WOKING'S DESIGN

Many precincts are being designed with innovative lighting systems both within the buildings and in the streets, with much greater use of daylighting in buildings with atria, rooflights and light scoops and light shelves.

A recent example comes from Woking in the United Kingdom, which has installed LED powered street lights featuring vertical axis wind turbines developed by Thameswey Energy, a subsidiary company of Woking Borough Council. Known as Hybrolights, these light sources use renewable energy and produce less pollution, greenhouse gas emissions and carbon dioxide than standard street lights. Approximately 170kg of carbon dioxide emissions are saved per light, per year.

Hybrolights are powered by two forms of renewable energy: solar and wind. The energy is harnessed by four photovoltaic panels and a wind turbine. Each lighting column has a solar battery underground which, once fully charged, stores enough energy to light the column for three to five days. The battery has a lifetime of approximately ten years. Sensors also monitor light levels to ensure the lights switch on at dusk and off at dawn.

For more information visit: www.woking.gov.uk

the development of a rating tool for sustainable communities.

The resultant Green Star Communities project is being led by the GBCA in conjunction with partner, VicUrban, together with a number of other prominent organisations in property development, governance and education. Every government land organisation in Australia has agreed to participate in the tool's development.

In August, the project delivered a framework document which outlined numerous principles to be considered as part of developing sustainable communities and some hints on how to apply them. They come under the broad headings of 'enhance liveability', 'create opportunities for economic prosperity', 'foster environmental responsibility', 'embrace design excellence', and 'demonstrate visionary leadership and strong governance'.

EnergySmart Buildings spoke with Jeff Robinson from Green Star Communities sponsor company Aurecon, who said there is great interest in building sustainable communities in Australia both on greenfield and brownfield sites. As examples he cited the redevelopment of Dandenong, Melbourne's docklands sustainable precinct, the Coburg initiative, Barangaroo in Sydney, the redevelopment of Gosford in NSW, and two large projects currently being investigated at Aurecon.

The firm also recently analysed more than 50 community rating tools from around the world to see which tools or credits could be incorporated into the Green Star Communities tool.

"I participated in the technical reference group which helped develop the framework that is being used to frame what the new tool will address," said Robinson.

"The big advantage is that we're actually coming after the BREEAM and

LEED tools…I reckon we're going to come up with the best sustainable communities rating tool in the world - we're going to redefine the benchmark for that."

What role for buildings?

If there were three primary ways in which commercial buildings could contribute to the sustainability goals of the communities in which they operate, according to Jeff Robinson, they would be:

- *to minimise the impact of their construction and operation on the environment and avoid designing buildings which make people sick or unhappy;*
- *to make buildings more visually accessible to avoid the smoked glass "zombie" buildings which provide no visual connection for those outside;*
- *to put as much thought into the design of the spaces between the buildings as goes into the buildings themselves to create great and safe places for people.*

One common feature of buildings in sustainable communities or precincts at present is that they support a variety of uses.

"These buildings all have different load profiles which largely minimise the size that the infrastructure has to support. These mixed use communities can provide complementary services which mean that people can lead more sustainable lives," said Robinson.

For instance, if people can live and work study, be entertained and be treated for sickness in the same area then the need for private vehicles can be avoided greatly reducing greenhouse emissions.

At the moment, unless buildings are located in high traffic areas where retail returns are likely to be high, then office buildings tend to be just that, office buildings. Paul Sloman from Arup's building team said there is an argument for changing the mix of uses to contribute more to sustainable outcomes.

"So where you've got a new office building going into a new site…if the surrounding area is void of any social function, so child care or newsagents or pubs or sports centres…sometimes giving up a little bit of commercial space for other uses would be a way of giving back."

Given these decision are made on the rate of commercial return at present, Sloman said it would be difficult to make that model work with existing buildings.

However, there's no disputing the opportunities that these buildings present in carbon abatement in Australia. When considering sustainable community development involving brownfield sites, the refurbishment of building stock can improve sustainability performance.

"Not only is carbon abatement in the building sector the least cost abatement opportunity, but it also delivers a wide range of non-greenhouse social and economic co-benefits, including creation of jobs and innovative business opportunities, improved health, wellbeing and productivity, as well as reduced demand on energy infrastructure. You have to ask who wouldn't support those outcomes?"

– Maria Atkinson, Group Head of Sustainability, Lend Lease

Source: Report of the World Green Building Council

Buildings sharing benefits

Robinson asked, "If I look at buildings in a precinct how is that different to looking at them one-by-one?"

He said the answer lies in "pooling" resources among several buildings in a precinct in order to make various elements more affordable, such as cogeneration or trigeneration plants, or large-scale renewables.

"When you're looking at that kind of central infrastructure it's not just the capital cost you've got to think about who's going to run this and maintain this infrastructure long term."

He said rather than overcoming the potentially competing interests of commercial developers the biggest challenges are around the regulatory environment for the generation of power, particularly embedded generation.

"We've been working on a number of projects in Victoria which are seeking to use cogeneration or trigeneration plants and it's incredibly difficult to connect to the grid at the moment because there needs to be a real investment in certain areas around the CBD."

Robinson said there are also high costs associated with these kinds of connections and challenges when considering the operation of central infrastructure.

"Somebody will need to go into the business of not just selling power but selling power and hot water and cold water… and there are some places in the world where that has happened."

The City of Woking in the United Kingdom has a Combined Heat and Power (CHP) station which is the first commercially operating energy station of its kind in the country. The CHP station provides heat, power and cooling to town centre buildings by distributing electricity via private wire and heat and chilled water services via private pipe networks.

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LANDCOM'S PRECINX WINS OUT

Landcom's PRECINXTM sustainability rating tool for large mixed use developments recently won the President's Award by the Planning Institute of Australia's NSW Planning Excellence Awards.

PRECINX was developed for Landcom by sustainability consultants Kinesis, with Simpson+Wilson and SGS Economics and Planning.

Landcom director of sustainability and policy, Stephen Driscoll, said PRECINX would help planners and developers make a huge leap in planning for sustainable places.

"Many of the opportunities to make significant sustainability gains occur at the neighbourhood scale rather than house by house or building by building," Driscoll said.

PRECINX™ is a mathematical modelling tool to measure the potential sustainability of neighbourhood-scale developments, against key environmental, social and economic performance for new development projects. It comprises six interdependent modules including onsite energy; embodied CO2; potable water; stormwater; housing diversity; and transport.

Since its launch in November last year, Landcom has used the tool in its new projects and has conducted a number of consultations with stakeholders about the prospect of sharing PRECINX with others in the future.

"We are in discussions with organisations in other states about testing the tool in those states," said Driscoll, "depending on how these possible trials go, we would like to be able to make the tool widely available for use in Australia".

THE 'ZERO EMISSIONS' DESIGN MODEL

Architectural practice Woods Bagot and multi-disciplinary engineering consultancy Buro Happold have announced 'Zero Emissions Design' (ZERO-E) - a new model for large-scale sustainable development that significantly advances the construction industry's contribution to realizing a zero carbon economy by 2050.

While current approaches to sustainable development reduce the environmental harm caused by the construction and operation of new buildings, ZERO-E goes beyond reducing the impact of new development to creating buildings that contribute to the healing of compromised human and ecological systems.

The developers believe this represents an emerging, revolutionary approach to sustainable design, and have chosen a typical development in China as their "test case".

The ZERO-E pilot project examines the development potential of an industrial site on the Yangtze River in Chongqing, China. The study scheme proposes a 450,000-square-meter mixed-use development, featuring an 82-storey office and hotel tower, which will continually monitor and react to internal and external climatic conditions for maximum performance. A 'holistic resource system' integrates photovoltaics, solar thermal panels, absorption chillers, a biogas fuel cell and an anaerobic waste digester into a closed-loop system that greatly improves the building's operational performance while minimising resource consumption and waste production. Beyond the technological advancements, ZERO-E's systems approach also encompasses the human dimension of sustainable development, seeking to create socially and economically thriving communities.

"And there are plenty of places like the City of Sydney who are looking at large-scale cogeneration coming in. I think there's a bit of work to do, but there are a number of developers that are certainly in the headspace to think about sustainable precincts," said Robinson.

Sloman said it comes down to whether it's more effective to generate power locally in "small lumps" or in "large lumps" outside of the city. "Power stations require huge amounts of area…and they're better off located outside the city where there's access to a river or sea water and where pollution can be controlled," he said.

Sloman sees cogeneration and waste-to-energy systems as "transition technologies", best done on a precinct or city scale, which make sense in the short to mid-term in reducing the carbon footprint of buildings.

"Really the Australian power grid needs to sort itself out, clean itself up, which it will," he said, "but until that happens the cogeneration plant is a way of helping to clean up the power supply in terms of greenhouse gas emissions."

Sloman favours solutions where technology naturally integrates itself into the built form, such as retrofitting buildings with photovoltaic cells or using renewable energy. "At the point where you can retrofit that to the façade of commercial buildings then that can start to pay something back to the community if you like in terms of a greener form of power production."

In designing new precincts it is possible to include in say central cogeneration infrastructure, a central waste vacuum system taking waste from all buildings to transfer stations for resource recovery.

"If you can set up the central infrastructure in a way, with some kind of government funded model, then I think the developers will come. It's just that if it's all put onto the developer it becomes a bit harder," said Robinson.

Sustainable precincts also require a different approach to planning as they are holistic and seek to gain multiple benefits from each construction element. For example by planning for buildings using good passive design principals, it can minimise the cost of the infrastructure serving the site and can afford to invest more in low carbon and renewable infrastructure, which will future proof the development from higher energy, water and waste costs.

"When you do start with a page being fairly white there's an awful lot of opportunity to create great spaces for people and an awful lot of opportunity to stuff it up…but having worked on a number of precinct projects like Coburg and Gosford there's some fantastic place making work being done," said Robinson.

China attempts to map sustainable future

Over half of the world's new construction in the next decade is expected to occur in Asia alone and a lot of that in China. Chinese officials are hoping to achieve sustainable development, a necessity in a country which has 20 per cent of the world's population but only 5% of its arable land and potable water and soaring demand for energy.

According to a report from global real estate services firm Jones Lang LaSalle, unlike its Western neighbours, China's 'green' shift is not being led by corporate social responsibility or public awareness but by governmental goals.

Faced with unprecedented urbanisation, which is expected to generate more new buildings in the next 15 years than currently exists in all of the United States, the property market is now under scrutiny. Chinese leaders are beginning to set their sights on mechanisms to reduce emissions from the real estate industry, but the consequences of this attention for developers, investors and occupiers are not yet clear, said the report.

China has made sustainable development the second most important governmental priority, just behind creating jobs. After ambitious edicts in the 11th (2006-2010) and 12th (2011-2015) five-year plans, which respectively mandate reductions in energy intensity and CO2 intensity per unit of GDP, Chinese central government has handed much of the responsibility for execution on to its city and provincial leaders.

Some of those officials visited Australia in June at the invitation of the Green Building Council of Australia (GBCA), to meet with building professionals and exchange knowledge.

The GBCA had been in China only a month earlier as part of the Australian Urban Systems and Austrade delegation to World Expo, and then to the Australia China Sustainable Building and Design Forum in Beijing.

Working with the GBCA, business development specialist Lindsay Bevege, told EnergySmart Buildings, "There is very good will toward Australia and interest in using Australian expertise in China. Since Expo, the China Green Building Council has sent a mission to Australia in order to study Australian technologies, practices and Government policies.

"One area in my view we need to do more in is to bring companies together to create turnkey solutions to development in China - from finance through concept development, design, construction and operation. Our major competitors overseas already offer this."

Bevege said China has "pockets" of good capabilities in green building but they are still limited and can't service the growing demand flowing from the increasing government requirements for energy efficiency. "This creates the opportunities for Australian companies. The China Green Building Council (GBC) estimates that already green buildings have penetrated about ten per cent of the new building market - that represents about $100 billion per annum already."

According to Jones Lang LaSalle, dozens of pieces of environmental legislation affecting the real estate industry have been enacted in China, however enforcement is an endemic problem. "Beijing has reaffirmed its intent to achieve its national targets with a new set of centrally administered initiatives," said the report.

They intend to accelerate, amongst others: the improvement of building codes; energy price reform; demand-side energy management regulations; the promotion of energy efficiency technology; and implementation of monitoring programs.

"Most of the early corporate adopters were either bringing to China internal policies established in foreign markets where CSR was more important, or were trying to act on green initiatives in advance of the belief that the real estate industry would in future be more tightly regulated," said the report.

The establishment of the China GBC has had a positive impact on the market for green buildings, according to Bevege.

"It has established a rating tool - the Green Building Design Label and a matching performance-based tool, the Green Building Label," he said. "In its first year it has already rated around 50 buildings and is on track to reach 200 buildings in the next 12 months. China GBC is also establishing chapters in provinces around China and has already some 20 such chapters covering most of the strongest growing regions."

The GBCA has spent several years developing a relationship with China GBC and sees environmental and economic benefits in participating in a market of such scale.

"I think there would be a huge advantage in Australian companies collaborating in getting into the China market - forming alliances between companies with complementary products and expertise," said Bevege.

"We have not been very good at doing that but it is a way of not only sharing costs but also offering significantly enhanced value to Chinese buyers. Generally, the higher value comes from integrated, turnkey solutions rather than sales of individual services."

Victorian tour for green building delegation

In September, a delegation from the China Green Building Council was in Melbourne to view some of Victoria's best green buildings, including The Gauge, Melbourne City Council headquarters, CH2, 500 Collins Street, the Convention Centre, Royal Children's Hospital and the Grocon Pixel building.

The six China GBC members were reportedly interested in examining best practice examples of green building designs and technologies.

China is presently building two billion square metres of new buildings each year. According to the United National Environment Program, UNEP, more than 80 per cent of the construction in China is categorised as high-energy buildings.

The visit took place under a Memorandum of Understanding signed last year between the Green Building Council of Australia and China's Green Building Council, involving collaboration on green building research, skills development and business exchanges.

Industry responses to PM's energy efficiency task group report

The Green Building Council of Australia (GBCA) welcomed the release of the Prime Minister's Task Group on Energy Efficiency report.

"We are delighted to see the report identify some of the opportunities within the built environment - although I emphasise that there are many more opportunities to be embraced than those outlined in the report," said the GBCA's Romilly Madew.

"Energy efficiency schemes and technologies are readily available now – they don't have to be expensive to implement, and they're not complicated to understand."

The GBCA is also pleased with the current multi-partisan discussions about a price on carbon.

"Certainty in the market is important. Australian business, as well as the general public, should be part of the conversation so that they can fully understand the benefits, the value and the long-term significance to the economy, the environment, policy and productivity," Madew said.

On the release of the report the Total Environment Centre (TEC) called for the proposed mandatory energy savings on electricity companies to begin by 2012 at the latest. "The missing link in the Federal Government's climate policy has just been found," said Jeff Angel, TEC director.

This report canvasses five foundation measures that together would provide the basis for a step-change improvement in Australia's energy efficiency performance, as follows:

1. Setting an aspirational national energy efficiency target of improving our primary energy intensity by 30 per cent between now and 2020
2. Establishing a transitional national energy savings initiative that would replace existing and planned state energy efficiency schemes and be phased down as a carbon price matures
3. Resetting the governance framework of energy efficiency so that responsibility for its delivery, coordination and implementation is clear
4. Providing a stronger enabling environment for energy efficiency innovation by improving information, data and analysis – noting that for something to be managed, it must be measured
5. Building an energy efficiency culture in Australia through a long-term, nationally integrated strategy.

"Spiralling energy prices and greenhouse emissions must be reigned in and Australian families must be protected from the coming carbon shocks. The far reaching recommendations will protect Australia's economy and its environment, saving billions of dollars."

The report calls for a 30 per cent energy intensity improvement by 2020 and mandatory energy savings targets on electricity companies and other improvements.

"Total energy consumption must be reduced not just energy intensity, to break the unhealthy link of energy consumption rising with economic growth – which is simply a projection of inefficient energy use," said Angel.

The Report also called for major reform of the energy market, including a new Ministerial Council and Australian Energy Commission.

Rob Murray-Leach from the Energy Efficiency Council (EEC) said that despite the lack of fanfare around the release of the report, it could be a "game changer" in energy policy.

"It's a little known fact that bodies like ABARE predict that energy efficiency could deliver over half of Australia's carbon cuts to 2050. But patchy action, to date, means that we are only realising a fraction of these the opportunities".

Rather than simply looking at energy efficiency as an optional extra, the Task Group has re-framed energy efficiency as a central part of Australia's energy markets.

The Coalition announced that it would be willing to work with the government to respond to the task group's report.

"In the new parliamentary context, this broad support will be critical – and could make the next few months extremely interesting," said Murray-Leach.

"The task group recommended that the government consider over 40 other policies and they are not simply padding. Policies like a national strategy for zero-emission buildings, energy market reform and fuel efficiency standards for cars require serious consideration and will be major planks in our greenhouse response," said Murray-Leach.

"The big question is what the government and parliament choose to do with the Task Group report. Undoubtedly there will be a period for consultation, but many of these recommendations are win-win policies and it is vital that we move to implement them as soon as possible".

BCA 2010
– what it means for glass

Changes to the energy efficiency provisions of the Building Code of Australia (BCA) 2010 represent the first significant shift in stringency since the BCA 2006. The 2010 revision was introduced in May 2010, and is to be fully implemented in all states and territories by May 2011. Ivan Donaldson, Australian Building Codes Board general manager, and Wade Bosse, commercial channel manager (Australia & New Zealand) for glass manufacturer, Viridian, discuss the new BCA and, in particular, how architects and building designers can use glass to achieve compliance with the new code.

Wade Bosse, commercial channel manager (Australia & New Zealand) for glass manufacturer, Viridian

"The BCA 2010's more stringent performance requirements have resulted in significant changes when it comes to glazing," explains Ivan Donaldson.

"Translating these requirements into the BCA's Deemed-to-Satisfy (DTS) provisions has brought about changes to both glazing assessment methods and their targets."

In Volume One, which applies to Class 2-9 buildings, a star rating approach has replaced several former DTS measures for apartments and the like. The glazing assessment method previously dedicated to these situations has been removed from the BCA and glazing is now evaluated as part of the house energy rating. The surviving DTS glazing method in Volume One can be used for the common areas of residential buildings and for the other classes of buildings covered by Volume One.

Behind the apparent complexity of the DTS glazing calculations there is a simple proposition: glazing area and glazing thermal performance are interchangeable. The calculations ensure that better thermal performance provides for larger areas of glazing.

"This offers designers flexibility in configuring glazing to resolve potentially competing demands for daylighting, views and energy efficiency," said Donaldson.

"While the higher targets call for better glazing outcomes, there are numerous combinations of glazing quality, glazing placement and shading which contribute to the calculated results. Within this diversity of solutions it is expected that the overall standard of glazing installations will improve," he said.

According to Bosse, the range of modern glass technologies available means commercial buildings can feature extensive glazing and greatly reduce energy use at the same time.

"The increased stringency of the BCA 2010 should not automatically be equated with reduced use of glass and windows. By using the latest performance glass products it isn't necessary to reduce glazed areas or to use excessive shading in order to comply with BCA's energy efficiency provisions," he said.

"Designers and cost planners should also keep in mind that, in many cases, the extra cost incurred by specifying performance glass can be offset. Decreased heating and cooling loads made possible by improved thermal performance means there is the potential to downsize mechanical plant requirements."

Bosse said many projects around Australia have demonstrated that using performance glass has actually reduced project construction costs after the savings associated with down scaling the HVAC system have been added in.

"Considering these upfront savings and the ongoing payback from heating and cooling related energy savings, the performance glass is actually paying for itself. It really is a win for the builder, their client and also the environment," said Bosse.

Following a major upgrade to Viridian's glass making plant in Dandenong, Victoria, last year, the CSR owned glass manufacturer now has one of the most advanced and sustainable glass making plants in the world. The online pyrolytic Low E (Low Emissivity) coating line installed at Dandenong in 2009 as part of the upgrade represents a huge investment in the Australian glass market and will produce significant volumes of higher performing glass to supply the Australian market with glazing products capable of achieving compliance with the BCA.

"It's fantastic to see projects that were single glazed are now being double glazed and others that would have previously used ordinary clear glass are now using a Low E glass instead. However this is really only the tip of the iceberg when it comes to the range of performance glass products available," said Bosse.

Triple silvering coating technology used on certain double glazed units reduces heat gain by 74 per cent through the glass and achieves U-Values that exceed standard triple glazing.

"These kinds of thermal performance improvements ensure that building users can continue to benefit from natural light and connectivity to the outside world, both of which are becoming increasingly recognised for their effect on psychological wellbeing, without sacrificing energy efficiency," said Bosse.

"The increased stringency of the BCA 2010 should not automatically be equated with reduced use of glass and windows."

– Wade Bosse

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Greenprint Foundation releases first carbon index

The Greenprint Foundation – a worldwide alliance of real estate owners, investors and financial institutions committed to reducing carbon emissions across the global property industry – announced the release of its first Greenprint Carbon Index™ The index, on October 5th.

The Index measures the carbon footprint of 16 million square metres of property across 36 countries of office, industrial, retail, multi-family and hotel properties containing 35,000 tenants.

Compiled by Jones Lang LaSalle's Energy and Sustainability Services team, the Index establishes a baseline for measuring the carbon footprint of the Greenprint portfolio over time. It quantifies carbon emissions that are produced as a result of building energy use and fugitive emissions from refrigerant leakage. Specifically, the Greenprint Carbon Index aims to:

- establish an industry-wide standard for measuring, benchmarking and tracking operational energy usage and carbon emissions trends, aligned with both the International Greenhouse Gas Protocol and the principles of ISO 14064
- create a reliable and transparent platform that enables collection and analysis of accurate property performance data that is verifiable
- harmonise the Index's methodology with green building accreditation systems.

The first volume of the Greenprint Carbon Index is setting a baseline that will be used to track progress in reducing emissions. But findings of the first report include a trend towards improved energy efficiency in the last decade, which coincides with stricter building codes and improved technology.

The report also found that greenhouse gas emissions are nearly double in the Americas compared to Europe, Middle East and Africa despite a similar number of properties and floor area submitted. And, onsite renewable energy is less than 0.2% and imported electricity certified as renewable is less than 2.9% of the 1.7 billion kWh of energy obtained by Greenprint landlords in 2009.

At the launch of the Index, Julie Hirigoyen, head of energy and sustainability services at Jones Lang LaSalle EMEA, said, "In our view the dialogue between owners and occupiers has moved beyond questioning the effect of the built sector on climate change. Increased government regulation and growing investor and tenant demand for green properties, are driving real estate owners to implement cost effective energy and carbon reduction strategies that simultaneously enhance their properties' long-term value."

For more information, visit: www.greenprintfoundation.org

A monitor on sustainability health – Jones Lang LaSalle

In its Sustainability Health Monitor, global real estate services firm Jones Lang LaSalle, has been tracking a number of indicators following the status of selected countries with regard to their energy and carbon efficiency. It also tracks the number of certified buildings as a measure of a markets response to sustainability in real estate. See how Australia's sustainability performance stacks up.

GLOBAL SUSTAINABILITY HEALTH MONITOR

Indicator	US	UK	Germany	France	Japan	Australia	Brazil	China	India	Russia
Energy Intensity of GDP BTU/USD (2005)	7,766	3,935	4,811	4,996	4,724	8,045	8,872	25,881	17,738	31,891
CO2 Emissions per Capita CO2 eq t/inhabitant	18.4	8.3	9.8	5.7	9.0	18.5	1.9	4.9	1.3	11.2
Renewable Energy (% of electricity production)	9.8	7.0	15.9	14.0	10.5	7.1	84.2	17.4	15.7	16.3
Ecological Footprint Global hectares per person	8.0	4.9	5.1	5.0	4.7	6.8	2.9	2.2	0.9	4.4
Companies reporting to Carbon Disclosure Project – %	66	57	51	58	37	52	76	10	18	13
Certified Green Buildings Number of Certifications (Est)	3,900	2,900	120	410	80	250	20	70	60	10

Sources: Energy Information Administration, International Energy Agency, Carbon Disclosure Project, WWF, Global Footprint Network, BRE/BREEAM, LEED, Jones Lang LaSalle

Note: Renewable Energy includes biomass, waste, geothermal, tide, solar, wind and hydro

"A COMMON METRIC FOR MEASURING CARBON EMISSIONS FROM BUILDINGS WILL ENABLE THE GLOBAL CONSTRUCTION SECTOR TO PARTICIPATE IN CARBON MARKETS AND ATTRACT INVESTMENT THAT MAY NOT OTHERWISE HAVE BEEN AVAILABLE."
– ROMILLY MADEW, GREEN BUILDING COUNCIL OF AUSTRALIA

China's plan to phase out incandescents

China has committed itself to the phase out of incandescent lamps and recently introduced some of the actions it is taking in developing the road map for making this ambitious goal a reality.

The initial work developing the schedule and technical details of the implementation process has begun as part of the 'Phasing-out Incandescent Lamps and Efficient Lamp Promotion Project' (PILESLAMP). When completed, this project alone will result in energy savings conservatively estimated at 20 billion kWh/year – equivalent to the total electricity output of four full sized coal fired power stations according to the PILESLAMP project office.*

However, as China moves to phase-out the use of incandescent lighting this will have a profound impact on the factories and workers that manufacture more than four billion incandescent lamps per year.

The project is an international cooperation between China's National Development and Reform Commission (NDRC), the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF).

The total cost of the PILESLAMP project is US$84 million, of which $14 million is being provided by the GEF but with the majority being funded by private enterprise and Chinese governmental sources.

For more information contact:
Stuart Jeffcott at stuart_jeffcott@eelighting.cn
Visit: http://www.undp.org.cn/projects/00062179.pdf

*Estimated energy savings based on projections in the original project development document. These are deemed to be conservative as they have a 60 per cent uncertainty built in and do not include impacts outside of China of reduced incandescent supply. Quoted coal fired power station equivalent based on a typical 1,000MWpower station generating 4TWh/year.

UN shift could boost green building in developing countries

The United National Environment Programme's Sustainable Buildings & Climate Initiative (UNEP-SBCI) is continuing its work on a Common Carbon Metric for the operational phase of buildings.

Late last year, a framework was released for the common measurement for greenhouse gas emissions from building operations that takes two complementary approaches; one assesses performance at the building level (bottom-up) and the other at the regional or national level (top-down).

The actual reporting is done in weight of carbon dioxide equivalent (kgCO2e) emitted per square metre per year – kgCO2e/m2/year (by building type and by climate region.

At a United Nations meeting held in Shanghai in late October, its Clean Development Mechanism (CDM) representatives discussed a recent shift in the United Nations Framework Convention on Climate Change's (UNFCCC) approach, which would enable CDMs to fully capitalise on the carbon-reduction potential of buildings.

Although the CDM process was designed to promote projects in developing countries that reduce emissions, it has had limited impact to date. However, a new methodology for measuring and reporting on carbon emissions from buildings could help drive the uptake of CDM projects.

"A common metric for measuring carbon emissions from buildings will enable the global construction sector to participate in carbon markets and attract investment that may not otherwise have been available, in turn delivering tangible carbon reductions," the Green Building Council of Australia's Romilly Madew reportedly said.

Stakeholders are continuing to develop the Common Carbon Metric, PROTOCOL, with the implementation of a series of pilot projects in which individual buildings and building stocks will measure emissions from buildings operations over a 12 month period to establish baselines by building type in climate regions.
For more information visit:
http://www.unep.org/sbci/index.asp

Global lighting industry proposes standards for LEDs

In order to accelerate the uptake of LED lighting the world's lighting industry announced, on October 13th, an initiative to co-ordinate and promote the technology at a global level.

At its 4th Meeting in Shenzhen, China, the Global Lighting Forum (GLF) held the inaugural meeting of its LED Working Group, attended by member organisation Lighting Council Australia. Immediate priorities for the GLF include:

- liaising with stakeholders, including governments and international organisations, to ensure that the quality of LED products provide consumers with a good experience – this will include proposing performance requirements attuned to the needs of different markets
- assisting with international standards development and encouraging the harmonisation of standards in different regions of the world
- producing educational material on solid state lighting, including the development of best practice guides and a guide to solid state lighting nomenclature.

For further information contact the secretary general of the Global Lighting Forum, Jürgen Sturm (juergen.sturm@elcfed.org). The Global Lighting Forum is a forum of peak industry lighting organisations from around the world representing more than 5,000 lighting manufacturers and US$50 billion annual sales.

Investa launches Green Buildings Alive

The Investa Sustainability Institute recently launched its Green Buildings Alive tool, an interactive website presenting graphs and data about the energy and carbon emissions of Australia's buildings.

One feature of the site is an interactive "datalyser" made up of charts that draws on eight years of monthly data from over 50 office buildings all around Australia.

Visit:
www.greenbuildingsalive.com/blog/

Australian fund takes green initiatives to the next level

Local Government Super has partnered with CB Richard Ellis and Napier & Blakeley to implement cutting edge green upgrades to its AU$500 million direct property portfolio. The outcomes have future proofed the LGS portfolio and positioned the majority of its office buildings to achieve a world's best practice NABERS Energy rating of 5 Stars.

Tackling the fundamental problem of carbon emissions from older style buildings is one of the key issues for the property industry. However, one Australian fund manager has proved that existing buildings can be upgraded to target a 5 star NABERS energy rating at a fraction of the costs cited by many property analysts.

LGS controls six office buildings in Sydney, all of which have been managed by CBRE for the past eight years. Under its Sustainable Portfolio Program, LGS has significantly improved the energy efficiency of its office assets and, in more recent times, has made some exponential leaps aided by the Federal Government's Green Building Fund (GBF) grants.

Assisted by consultancy firm Napier & Blakeley, LGS has successfully applied for six GBF grants - including one which has allowed it to make a bold and highly visible environmental statement at 2-4 Lyon Park Road, Macquarie Park.

In contemplating how to attract and retain tenants in a highly competitive market, dominated by large IT and high tech companies, the fund has elected to supplement some of the more conventional energy efficiency initiatives around lighting and air conditioning with an unmissable green statement - an $680,000 bank of solar cells on the roof of the building. It is one of the largest ever to be installed on an Australian office property.

The pay back from the solar initiative will be achieved in less than 10 years while giving LGS a significant leg up in regard to the building's branding and tenant retention.

"CBRE has been a big part of this," said LGS' CEO Peter Lambert, "the partnership and way they've approached the process with our tenants has been integral to the delivery and implementation of our green initiatives."

"It's only in recent times that technology has allowed us to take that extra step," he said.

One of these new technologies is the Shaw Method of Air Conditioning (SMAC), which LGS dubs as being the "silver bullet" for older style buildings. LGS was the first building owner to introduce the technology into a NSW office property to control humidity and temperature. In combination with best practice mechanical services engineering these systems will achieve 15 per cent to 49 per cent energy savings.

The next step for LGS will be an exemplar project at 76 Berry Street, North Sydney for which the fund was recently awarded a $2.1 million GBF grant. The grant will contribute to upgrade works to reduce total building emissions by around 80 per cent, with the aim being to deliver the lowest emissions per square metre for an office building in Australia.

This level of emissions will be approximately 70 per cent below that required for a 5 star NABERS rating. For tenants, the works will lead to an estimated one-third reduction in their electricity bills.

"The property in question is a 24-year-old building which will be upgraded to become the most efficient commercial office building in the country, using leading Australian technologies," said Lambert.

Specifically, the project will involve the installation of e1 lighting technology, which will reduce lighting energy by approximately 66 per cent. The project will also involve an upgrade to SMAC

…existing buildings can be upgraded to target a 5 star NABERS energy rating at a fraction of the costs cited by many property analysts.

and the installation of Bennett Clayton tri-generation engine technology to provide on site, low emission electricity, heating and cooling.

Each building in the LGS portfolio now sources 100 per cent of its base building energy from fully accredited green power, reducing emissions by approximately 10,000 tonnes of carbon dioxide per annum. All new leases require tenants to source their power from green energy suppliers.

More importantly, CBRE's Geoff Hilbourne said the GBF grants have allowed LGS to move beyond the use of proven technologies - the "low hanging fruit" - to trial innovations such as SMAC. In the process, LGS has taken its buildings from 3.5-4.5 star NABERS ratings in what is predominantly a 1980s portfolio to be on target for 5 star ratings - a level not being achieved by some new developments."

"Most of these works would have been financially viable without the GBF grants but they wouldn't have been completed within the same time frames and, more importantly, they've given landlords such as LGS the confidence to invest in newer technologies by reducing the risk profile of their investment," says Napier & Blakeley's head of sustainability, Roger Walker.

For LGS, the initiatives are starting to be reflected in capital values and will significantly delay the obsolescence factor within its portfolio. Noteworthy is the cost at which LGS has been able to green its portfolio. Walker points to the fact that LGS has been able to introduce its sustainability initiatives at a cost of $50-$140 a square metre – some 30 per cent below the costs cited by many analysts.

Future-proofing sustainable healthcare

A global leader in cancer therapy and research, Peter MacCallum Cancer Centre (Peter Mac) is Australia's only public hospital solely dedicated to cancer care.

Siemens formed a partnership with AG Coombs to deliver an end-to-end Energy Performance Contracting (EPC) solution for Peter Mac in a joint bid to reduce energy costs, improve patient comfort and reduce emissions.

As a large building with complex needs and varying requirements, Peter Mac identified a significant opportunity to reduce its energy consumption and costs by selecting Siemens and AG Coombs to provide a guaranteed energy reduction through an EPC.

The Siemens-AG Coombs partnership was the only consortium selected to provide an EPC for a public hospital in Victoria, and jointly offer a myriad of experience in delivering end-to-end energy solutions, specifically tailored for sensitive and critical environments such as hospital facilities.

Approximately $70,000 in guaranteed energy savings is expected each year with a return on investment of just over five years In the first month, energy reports demonstrate a saving of over $11,000 in energy costs, far exceeding initial expectations.

Randy Gadient, Siemens energy engineer, and Greg Phillips, operations director – Peter MacCallum Cancer Centre recently completed a building upgrade which is expected to save around $70,000 in energy savings per year, with a return on investment of just five years.

Siemens upgraded the current motors on selected fan systems with high efficiency Variable Frequency Drives (VFD) to improve control and reduce energy use. VFDs have frequency converters which enable them to be operated exactly according to demand, potentially reducing electricity consumption by up to 60 per cent. This counts particularly when operating fans, pumps or compressors.

In order to improve comfort levels and reduce energy consumption within the building, the existing air handling units were refurbished to operate more efficiently. They were programmed to automatically operate according to the building occupancy and environmental demand, with a range of different modes. The control settings behind these air handling units also play an important role in ensuring specific temperature and ventilation requirements are maintained in critically sensitive wards.

Siemens provided isolation dampers to scale down operation during times of reduced energy requirements. This resulted in improved after-hours control of the hospital facility and greater energy efficiency.

The entire upgrade is completely automated and controlled through a Siemens Building Management System (BMS). This saves a significant amount of energy without affecting Peter Mac's operations or levels of patient and staff comfort, as adjustments can now be made from the central computer, instead of on each floor.

Monthly reports are provided to the hospital to help track energy savings and provide valuable information to help plan for future efficiency strategies. These monthly reports detail all the energy savings achieved at Peter Mac, which provides a high level of transparency. Peter Mac can also access this reporting and monitoring system online.

Lighting up with green stars at Batman Street

Even as one of Australia's leading engineering consultancies, converting a derelict West Melbourne factory into its new head office, was a courageous decision, but one that has paid-off with certification under all three Green Star Office rating tools.

When Norman Disney & Young (NDY) was looking for a new location to house its Melbourne and corporate offices in early 2007, one unmovable criterion was that the building must stand as a demonstration of the company's services, in particular, its sustainability initiatives.

For NDY, an engineering consultancy that has an unwavering commitment to excellence in sustainable design, 115 Batman Street would become a two-year exercise in practicing what it preaches.

Green Star accreditation was a priority for this project, and for NDY, it is confirmation of the company's ability to 'walk the talk'. Batman Street has realised a unique trifecta by achieving a 5 Star rating under Office Design and As Built v2 rating tools, as well as a 5 Star Office Interiors v1.1 rating.

"One of the 'non-negotiables' of the brief from NDY was for a 5 Green Star rated building," said Ermin Smrekar, lead architect on the project and design principal for e+architecture.

"It was essential that the lighting was designed correctly in order to achieve the 5 Star GreenStar rating as well as providing the right level of light to all areas of the building to ensure staff comfort and productivity. The lighting is wired to motion detectors that switch the lighting off if a room is unoccupied for a period of time.

"The workstations were positioned to take advantage of as much natural light and external views as possible while the interior walls and ceilings of the building were painted white to reflect as much natural and artificial light into the building as possible," Smrekar said.

On the lower levels it was imperative that the lighting solution delivered a good working environment with minimal energy consumption and was aesthetically acceptable with the exposed installation method. Occupancy and daylight sensors address further energy efficiency initiatives throughout the building.

One of the more intuitive parts of the design is that the "general lighting and services layout is not intrinsically linked to the floor plan," Smrekar said. "No ceilings and minimal full height partitioning enables flexibility in the general floor plan layout and allows modifications of the floor layout to occur without major revisions to the existing services."

The break-out staff area on the first floor contains some of the more visually impressive customised light fittings. Each of the 12 oval shaped pendants is a panoramic photograph of the Royal Botanic Gardens in Melbourne: a clever way of introducing familiar green landscapes into a popular gathering point.

There are also real plants throughout the building, with an average of two succulents per staff member, working away to absorb the CO2 in the air.

Images by Robert Spaulding

Clever design features have been incorporated throughout the base building and the fit out and according to NDY chief executive officer Ian Hopkins, the HVAC systems have played a central role in realising significant energy efficiencies and achieving green star status.

"To ensure our energy efficiency figures were optimised via the passive chilled beam solution (as opposed to the more energy intensive active chilled beams), it was necessary to double glaze all windows and apply fixed one-metre sun shades to the exterior of north-facing windows. Retaining the original brick walls has also provided high thermal inertia," Hopkins said.

"The exposed services weaving overhead - ductwork, fire protection, electrical - were incorporated as a pragmatic display of the company's engineering excellence and expertise. After much discussion between NDY and the architects, it was decided to leave these exposed services unpainted to see them in their raw state thereby maintaining a very clear picture of the inner workings of what contributes to making this a green star rated building."

Hopkins said that in a practical sense, these exposed services serve as a teaching tool for young engineers who can get an instant visual of the operational aspects of these critical facilities.

Associate at NDY and ESD consultant for the project Evalin Ling, said the HVAC system ensures the space is comfortable and operates well in extreme conditions. "During Melbourne's hot spells, where we experienced several 400C plus days in a row, the system coped well and design conditions were maintained in the area."

With the Batman Street project, NDY have delivered a building that is not only environmentally sustainable and commercially viable, but a showcase of the company's commitment to go beyond the building codes to improve environmental performance, and minimise lifecycle environmental impact and cost.

KEY FEATURES OF THE BUILDING

- High performance insulation to underside of ground floor, new facade above existing and new roof
- Passive chilled beam air-conditioning system to ground, first and second floors
- VAV system with economy cycle to Level 3
- Increased fresh air supply to all levels. On the ground, first and second floors fresh air is supplied at 2 litres/m², which is twice the minimum code requirement
- Wetted pad heat rejection system for chiller to optimise energy consumption, minimise water consumption and eliminate legionella risk
- High efficiency gas fired boiler
- Hot water radiators to provide optimum control of heating on ground, first and second floors
- Comprehensive BMCS to facilitate fine tuning and optimisation of energy consumption
- High efficiency luminaries
- Comprehensive lighting control system to ensure lights are off when areas are unoccupied
- Water storage tank under basement slab to capture stormwater and fire test water for re-use in toilet cisterns and for air conditioning system wetted pad condenser
- High efficiency low water consumption fittings throughout
- Solar heated domestic hot water system
- Retention of existing external brick walls to provide high thermal inertia
- High performance double-glazing.

Chadstone Shopping Centre - West Mall

Colonial First State Global Asset Management and the owners of Chadstone Shopping Centre designed the West Mall project with a contemporary, best practice approach to mall design and aesthetics, retail planning and sustainability performance.

The project encompassed; 110 new build tenancies, 116 existing in-centre tenancies including 20 International retailers and the demolishment of 66 tenancies.

Spanning 20,000 square metres of fashion retail over three levels, including 5,000 square metres of high end retail, the West Mall project would successfully reclaim Chadstone's position as the largest shopping centre in the Southern Hemisphere offering 530 stores across 175,000 square metres. And make it the first development in Australia to achieve a 5 Star rating under the Green Building Council of Australia's (GBCA) retail assessment tool.

Essential to the success of the project, was to deliver the Centre's trademark contemporary glass skylight design, providing shoppers with a naturally lit mall environment and reduce the need for artificial lighting.

Behind the scenes

At the time of the project design, the Green Star rating tool was still in development and not yet available to the project team. Colonial First State Global Asset Management worked together with the GBCA to consult at each stage of the project and milestone of the GBCA rating tool development, to ensure the project was on track.

Key results of the West Mall project initiatives and technologies include;

- 61 per cent reduction in greenhouse gas emissions compared to a typical retail development, equating to 3,200 tonnes CO_2/year
- 63 per cent reduction in potable water resulting in 13 million litres of water saved every year compared to a typical retail development
- Rainwater harvesting – 450kL tank connected to 12,000 square metres of catchment, rainwater used for irrigation and toilet flushing
- Improved indoor environment quality through naturally lit mall space
- Ground level of Centre completely naturally lit with the lower level 40 per cent naturally lit (due to large voids)

Given the relatively new status of this project, further data is required to determine the final outcomes. However, based on accepted industry research of Green Star projects and achieved outcomes in the commercial office environment, it can be forecast that the following outcomes be achieved by Chadstone's West Mall project:

- Lower operating costs
- Higher return on investment
- Greater tenant attraction
- Enhanced marketability
- Reduced liability and risk

Specifics on energy

To achieve minimal energy consumption whilst delivering high levels of comfort to building occupants, the developers incorporated the following design features:

- Sealed external shopfront displays to minimise western solar heat load
- High performance skylight complete with thermally broken frame and high performance insulated glazing
- External shading to mall entries
- Insulated facade through double glazing and insulated precast panels
- Efficient heating and cooling system;
  - Hot layer removal and night purging systems
  - Variable volume air handling plant
  - High efficiency central plant
- Low energy artificial lighting system;
  - LED lighting used throughout mall
  - Daylight and occupancy sensed lighting control
- Extensive metering and sub metering to aid the building tuning process.

530 Collins Street, Melbourne

Signing up GPT's Melbourne-based office buildings to the City of Melbourne's 1200 Buildings project made sense because the organisation's goals and views surrounding sustainability aligned with the outcomes of the initiative. And GPT was preparing to replace some of the major mechanical services at its 530 Collins Street. With the help of $500,000 in funding from the Federal Government's Green Building Fund, GPT unveiled the new look address in Melbourne's CBD earlier this year.

Q: Can you provide details of the difference in energy rating, expected energy usage before and after the retrofit and which improvements will provide significant energy savings?

A: 530 Collins Street had a NABERS Energy rating (base building) of 2.5 Stars in 2004, which was improved to 3.0 Stars in 2007. The energy performance contract currently in place with Honeywell is guaranteed to lift the rating to 5 Stars, the highest rating achievable. As the building was approaching 20 years of age, it was time to replace major items of mechanical plant. Making the best use of this planned capital expenditure on the building, GPT installed new high efficiency chillers, cooling towers, variable speed drives and building controls that would take 530 Collins to a 4.5 Star NABERS Energy rating. By adding the onsite cogeneration plant, taking the performance of 530 Collins to the equivalent of 5 Star NABERS Energy rating.

Q: What building management system or lighting control system have you employed in this building and why?

A: A new Honeywell Building Management System (BMS) provides smart control of all plant items while providing the Building Manager with a comprehensive insight into plant operating conditions. The BMS communicates with the new cogeneration system via a high level interface providing comprehensive monitoring of this new and important equipment. The most important feature of the BMS is the Energy Manager package that communicates the buildings performance to all stakeholders. An automated recalculation of the NABERs Energy rating is received by relevant stakeholders on a daily basis.

Live displays in the building management office foyer track the performance of the building providing an interesting way to engage with current and future tenants on the outstanding results of this retrofit project.

On floor works to upgrade lighting to T5 fluorescent technology were undertaken wherever tenant turnover allowed. The new lighting system will reduce the use of energy and save on costs for tenants. The new lighting also results in less heat load on the air conditioning plant adding to the overall efficiency of the building.

Q: What kind of investment was required in the cogeneration facilities and can you provide a brief explanation of how this system works?

A: The cogeneration system was specifically designed to provide the highest cost/benefit to fit within GPT's business case for the services upgrade. The system provides multiple benefits from lower overall energy cost, avoidance of a portion of future carbon cost, reduced peak demand charges, hot water and heating water along with flexibility in fuel supply. A reduction in carbon emissions benefits the environment and is reflected in an improved NABERS Energy rating which enhances the attractiveness of the building to discerning tenants.

The cogeneration system comprises an 800kW MWM reciprocating engine running on natural gas and providing electricity into the building electrical system. Waste heat is recovered from the engine for hot and heating water. The system responds to building load by running only during business hours. The overall efficiency of a power plant of this type significantly surpasses that achieved in a traditional centralised power station.

Bright lights, big shopping centre

BY ROBIN MELLON, EXECUTIVE DIRECTOR – ADVOCACY AND INTERNATIONAL, GREEN BUILDING COUNCIL OF AUSTRALIA

The retail sector is one of the largest energy guzzlers in Australia, consuming 50 per cent of the commercial property sector's share of energy and generating up to 5 per cent of Australia's total greenhouse gas emissions, according to an April 2010 article.

Lighting is responsible for a large portion of this energy consumption. While a comprehensive breakdown of the retail sector in Australia has never been undertaken, a 2002 report commissioned by the UK Government gives an insight, revealing that 18 per cent of all service sector electricity consumption was from the retail sector, with electricity mainly used for lighting. Cooling and air conditioning is likely to be the other largest part of energy use here in Australia.

The size and scale of shopping centres can make sustainability a challenge – with the need to provide fresh air, natural light and temperature control to large spaces resulting in high consumption of electricity and water. However, there has been a recent paradigm shift and we are now beginning to look beyond the negative impact of retail centres, and instead identify their potential as power stations and water harvesters.

Some shopping centre owners have recognised the importance of reducing their environmental impact. We have solid data from the US which demonstrates that shopping centres with higher quantities of fresh air, more connection to outdoor spaces and fewer air pollutants from materials also have lower energy bills and higher sales per square metre. Why? Simply because people like shopping there.

US research company Heschong Mahone, for instance, has found evidence that access to natural light alone can increase sales at the till. A 2003 study found that daylit stores deliver an increase in sales of up to 40 per cent.

"By the most conservative estimate, the profit from increased sales associated with daylight is worth at least 19 times more than the energy savings, and more likely, may be worth 45-100 times more than the energy savings," the report found.

The Green Building Council of Australia (GBCA) has integrated much of this international research into its Green Star - Retail Centre v1 tool, which was released to the market in August 2008 to support the sustainable planning, design and construction of high-performance retail centres.

Green Star, which has been the leading environmental rating tool for buildings since 2003, evaluates the green attributes of building projects based on nine categories, including energy and water efficiency, indoor environment quality and materials.

The tool, which assesses base buildings and services, not tenancy fitouts, considers the unique development requirements and impacts of retail centres. As such, the number of credits within categories and the category weightings vary from other Green Star rating tools. Examples of credits in the tool include: implementing a waste and recycling management plan, addressing car park ventilation and encouraging trip reduction.

Indoor Environment Quality, which affects both customers and employees of retail centres, is an important category, and rewards best practice where it relates to ventilation, comfort and pollutants. For example, Green Star points are available to retail centres with good natural light, with one point awarded where 30 per cent of the nominated area has a Daylight Factor of at least 2.5 per cent.

Lighting retrofits can also make a real difference. Stockland, one of the sponsors of the Green Star tool for retail centres, undertook an energy audit of 19 retail centres in 2008, and as a result implemented initiatives such as installing energy-efficient lighting in car parks and malls. This is expected to result in an approximate reduction of 8 per cent of total base building energy use over a two year period.

Of course, reducing energy consumption in retail centres is best achieved through a combination of good design and good habits. Tenants of retail centres are beginning to recognise their role in reducing energy consumption, and green leases are driving tenants to reduce their carbon footprints and take an active role in supporting the green initiatives of their retail centre.

The Green Star – Retail Centre v1 rating tool can be downloaded from the GBCA's website: www.gbca.org.au

A 2003 STUDY FOUND THAT DAYLIT STORES DELIVER AN INCREASE IN SALES OF UP TO 40 PER CENT.

Case Study:

Home HQ North Shore, Artarmon NSW

TOTAL GROSS LETTABLE AREA RETAIL (GLAR):
Approximately 22,200 square metres

CLIENT:
Charter Hall Group

DEVELOPMENT MANAGER:
Charter Hall

ENVIRONMENTAL RATING:
4 Star Green Star – Retail Centre v1

Charter Hall's new Home HQ in Artarmon is an innovatively and sustainably designed household retail centre that provides Sydney's Lower North Shore with its first fully integrated home and lifestyle centre.

Awarded the first national rating under the Green Star – Retail Centre v1 tool, the Centre achieved a 4 Star Green Star rating representing 'Best Practice' in environmental standards.

The Centre comprises approximately 22,200 square metres of retail space over three levels with 500 car spaces.

The development of Home HQ North Shore involved the adaptive reuse of an existing heritage-listed industrial building, the former Willoughby Council Depot site, to include best practice environmental standards.

The heritage status of the building presented a challenge to design and develop a modern functional household retail Centre within and around the existing structure.

This was achieved through the innovative use of structural and façade design to ensure that the majority of steel work on the site was reused. This approach not only ensured the building retained its heritage features but also reduced the total waste of the project, with 60 per cent of steel used being recycled steel, and allowed the heritage-listed steel gantries cranes and roof trusses to be focal features of the Centre.

Additionally, the internal layout of the Centre was tailored with tenancies configured around the existing column layout to preserve materials and to make best use of the building's unique character.

Capitalising on character

Internally, the building was refurbished and extended to include a central void over three levels. "The central void has been extremely successful both from a tenant's and a customer's perspective", said Charter Hall's Michael Winnem. "It provides an opportunity to showcase the heritage features of the existing building while providing customers with view lines to the centre's retailers."

The common areas of Home HQ are passively ventilated with spill air from the tenancies, which in turn are serviced by a water and energy efficient central air-cooled mechanical system which is controlled by building management. This ensures that consistent and comfortable conditions are provided for shoppers while reducing operational energy requirements. The design has resulted in the centre exceeding Green Star thermal comfort design benchmarks and significantly improved occupant comfort and amenity standards compared to similar existing developments.

Green screens

Home HQ was awarded one Green Star innovation point for the installation of dedicated Ecologically Sustainable Design (ESD) screens in the central information station. The screens help raise awareness of the sustainable design credentials of the centre, as well as providing information to visitors on how they can reduce their own ecological footprints.

In addition, interactive panels with rolling displays show the centre's energy and water consumption. Once Home HQ has been running for 12 months, these rolling displays will be plotted against historical water and energy use data so that visitors can compare current and past usage.

This innovation will provide a valuable educational resource for visitors to Home HQ and will help improve understanding of ESD and its impacts throughout the wider community.

Energy efficiency

To ensure lower energy consumption for the Centre all HVAC refrigerants have an Ozone Depleting Potential (ODP) of zero

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and all thermal insulants avoid the use of ozone depleting substances in both its manufacture and composition.

Building monitoring
Understanding and monitoring the Centre's environmental performance is vital to the ongoing management of the Centre. An electronic Building Management System (BMS) monitors and reports on energy and water consumption and controls building services systems. This information is used to fine tune the building services to minimise power consumption.

Water management
The reduction of water used in the Centre was a key focus, with the development incorporating a number of water efficient initiatives. A 330kL rainwater tank has enabled rainwater harvesting, with water saving fixtures and fittings also being incorporated into the amenities. HQ Home also employs an air cooled mechanical system which runs by filtering air through vents, negating the use for water in the cooling tower.

Other sustainable initiatives include:
- The diversion of 14,000 tonnes of construction waste from landfill
- High indoor air quality through the installation of ventilation systems designed to achieve an air change effectiveness of at least 95% of the nominated area
- Excellent public transport access and 60 bicycle parking spaces with shower facility
- Enhancement of the previous existing state of the native vegetation.

Case Study:

South Wharf Complex, Southbank Victoria

Located on the bank of the Yarra River adjoining Melbourne's Convention Centre, the South Wharf Complex has become one of Victoria's outstanding riverside precincts.

Comprising 150,000 square metres of mixed-use building space, the $350 million project includes eateries, retail and bulky goods tenancies, a 12-level commercial office tower, 28 townhouses and more than 3,000 car parks.

This new build, undertaken by Contexx Pty Ltd, required a complete electrical services system, catering for commercial and residential requirements. KLM Group completed the primary design and construct, working in accordance with Lincolne Scott's initial design brief. Power, lighting, C-Bus automation, communications and Master Antenna Television (MATV) system were all part of this solution, which took just under two years to complete at a cost of around $17 million.

Project managed by KLM Group's Adam Wilde, up to 55 KLM staff members were on site at any one time along with representatives from Clipsal.

Super-sized
The facility management team were looking for an energy efficient solution to assist in obtaining a 5-Green Star energy rating. They also required a system which was flexible and covered the needs for both commercial and residential end users.

The large scale of the project meant there were challenges relating to design, procurement and construction of the complete electrical system.

The large floor plate was also a challenge in the

installation of a full MATV system. This was further complicated by low free to air reception in the area and requirements for all commercial, retail and residential spaces to be Foxtel compliant. This problem was overcome through KLM's ability to work with Clipsal and their own MATV expertise.

Underground infrastructure works were also a challenge due to the close proximity of the complex to the Yarra River and existing services. Concerns associated with installing the conduit in adverse soil conditions were overcome by bedding the conduit in a combination of sand and cement. This also enabled compliance to CitiPower's specifications.

The retail area of the complex has a full embedded Schneider Electricity Metering System to over 100 shops which was challenging to manage. KLM Group's task was the full management of installation, inspections and meter installation to all individual shops. Daily toolbox meetings were held to continually manage the work across the vast number of locations in the one installation.

Sensing efficiency

The size and nature of the South Wharf Complex dictated various factors be taken into account when designing the system's network architecture. These considerations included network route lengths, positioning of the control equipment, and electrical circuiting to enable the system to function in various modes. The system was also divided into numerous lighting areas including: car park; lift lobbies; toilets; mall areas; stairwells; office space; and external lighting, allowing the user to control and monitor areas at the click of a button.

The power system on site consists of 3 x 2,000KVA substations and nine main switch boards located throughout the building. The commercial tower is also backed up by a 900 KVA generator set located in the level 13 plant room.

KLM designed a power solution for all sub mains, distribution boards and metering systems from the consumers' mains through to the end users distribution boards, as well as all sub mains supplies to the mechanical plant.

The C-Bus DSI lighting system is a combination of local, remote and automated control to create a fully flexible lighting control solution. The solution includes light fitting arrangement, lighting control and a fully monitored exit and emergency lighting system throughout the entire complex.

To maintain energy efficiency, the lighting control to the commercial building works in conjunction with light level sensors attached to all perimeter light fittings for dimming control. After hours reset panels are located throughout the floors, ensuring users can control the lighting in their zone outside of business hours. The tower is also fitted with energy consumption check meters which are installed in all tenant distribution boards. This allows tenants to measure and monitor their power usage.

Clipsal C-Bus lighting control system is used throughout the retail complex, public areas, road way and car park areas. This

system is controlled through time control, motion sensors and C-Bus photoelectric cells.

C-Bus facilitates a combination of local, remote and automated controls to create a fully flexible lighting control solution. The system consists of ten C-Bus networks linked via an Ethernet backbone to a computer housed in the main security room. The system interconnects both the retail and commercial tower components of the complex, allowing the user to control, monitor and adjust time schedules to suit the client's needs. The computer allows facility management staff to centrally monitor and control all aspects of the system via Clipsal's 'SchedulePlus' software. Building floor plans and site plans have been used to generate a graphical representation of the complex and provide accurate, real-time status of lighting levels. The lighting control system is also interfaced with the security system for simultaneous third party control.

The communications system is a fully designed voice backbone system powered by two main distribution frames. These link to the end user floors with an optical fibre solution installed to all floor distributors throughout the building for future communications infrastructure.

The Clipsal MATV system is a fully designed Foxtel-compliant installation connected to all floor distributors throughout the complex. The town houses in the complex are completely ready for Foxtel connection.

Clipsal accessories have also been used throughout the fit out with 2000 Series Switches used in the retail tenancies area and Black Saturn range used in the commercial foyer area. 56 Series Weatherproof Switches, Socket Outlets and Isolators are also located throughout the complex.

Scheme to divert **mercury-containing lamps** from landfill

*Bryan Douglas is chief executive officer of Lighting Council Australia

BY BRYAN DOUGLAS*

FluoroCycle is a national, voluntary scheme to increase the recycling of mercury containing lamps. The scheme was launched by the former Minister for Environment Protection, Heritage and the Arts, the Peter Garrett, on July 21st. Lighting Council Australia has been appointed to administer the scheme and it has been busy recruiting Foundation Signatories for the scheme.

What are the target groups?
FluoroCycle targets commercial and public lighting which accounts for approximately 90 per cent of all lighting waste. Commercial and public lighting includes:

- streets, roads and parks
- commercial and government buildings such as office blocks and shopping malls
- industrial operations such as mines, industrial facilities and warehouses, and
- institutions such as universities, hospitals, schools and sports venues.

A national scheme for recycling of household lamps containing mercury – for example CFLs (compact fluorescent lamps) – may be considered in the future.

Who can sign up to the scheme?
Signatories to the scheme are businesses and organisations that make a commitment to adhere to the FluoroCycle Guidelines 2010. There are two groups of Signatories – 'Commercial Users' and 'Facilitators'. A signatory can be both a Commercial User and a Facilitator. There is no fee for joining the scheme.

What are Commercial Users and Facilitators?
Commercial Users are businesses or organisations responsible for managing mercury-containing lamps in public lighting, commercial and government buildings, industrial operations and institutions.

Facilitators take steps to encourage Commercial Users to recycle their waste mercury-containing lights. Facilitators belong to one or more of the following categories: collectors; electrical contractors; government; media partners; peak bodies; recycling companies; suppliers (manufacturers, importers, wholesalers and retailers); and trainers.

What are the Signatory commitments?
Commitments apply to all Signatories and are set out in the FluoroCycle Guidelines 2010. To become a Signatory as a Commercial User, a business or organisation needs to be either recycling all of its waste mercury-containing lamps – or to be putting appropriate arrangements in place for such recycling. The different categories of Facilitators have different commitments, depending on their various roles.

All Signatories are required to cooperate with audits carried out by the Administrator.

What are the benefits of becoming a Signatory?
The key benefit is keeping mercury out of the environment, thereby enhancing the Signatory's reputation for being environmentally responsible. A Signatory receives public recognition through:

- listing on the FluoroCycle website, including links to homepages
- a certificate acknowledging Signatory status, and
- use of the FluoroCycle logo and publications.

Is there sufficient capacity to recycle lamps in Australia
Australia has sufficient capacity to recycle all of its waste lamps that contain mercury. The FluoroCycle Outreach Strategy will help to build networks and capacity in the supply and disposal chains. The strategy is supported by communication tools designed to:

- raise awareness of the FluoroCycle scheme and its objectives
- provide practical advice on how to recycle waste mercury-containing lamps, and
- provide ready access to the service providers to make appropriate arrangements for collection and recycling of waste.

How do I apply to become a Signatory?
As a first step, you need to familiarise yourself with the FluoroCycle Guidelines 2010, the Signatory Guide to FluoroCycle Branding and the Signatory Manual. The FluoroCycle publications are available on the scheme's website: http://www.fluorocycle.org.au

You can apply online or by email or mail. Application forms are available on the FluoroCycle website and in the FluoroCycle Guidelines 2010. Alternatively, you can request the publications and application forms by sending an email to administrator@fluorocycle.org.au or writing to:

FluoroCycle Administrator
c/- Lighting Council Australia
PO Box 7077, Yarralumla ACT 2600

FluoroCycle

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3S LIGHTING

2 Wella Way, Somersby NSW 2250 Australia

Tel: +61 2 4340 4300 Fax: +61 2 4340 4343

info@3slighting.com

www.3Slighting.com