

PILLARS

We shape a **safe**, **high quality**, **sustainable** and **friendly** built environment | MARCH 2015



THE NEW FACE OF THE BUILT ENVIRONMENT SECTOR

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DEAR READERS,

As Singapore celebrates 50 years of independence, it is timely for us to reflect. BCA as an organisation may be just 15 years old, but our contribution towards nation-building actually began in 1946 with the Public Works Department, which oversaw landmark national projects such as Singapore Changi Airport, Singapore General Hospital, the PIE and CTE, schools and many other key infrastructure projects. All of these were an important part of Singapore's nation-building process.

Our other predecessor, the Construction Industry Development Board (CIDB), was formed in 1984 to champion the development and improvement of the construction industry, and pioneered many world-class schemes such as the Contractors Registration System (CRS) and BCA Green Mark scheme, which are today an integral part of our built environment industry landscape, and highly regarded in many countries.

Besides these achievements by our predecessors, we are proud that BCA has also accomplished much in its short history. We have achieved many world firsts, such as our Green Mark scheme, the first green building rating system in the tropics. Our successive Green Building Masterplans have also effectively placed us in the position of being a global leader in green building.

The list is long, but suffice to say that we've come a long way, and have made a very significant contribution to the growth and success of our nation by shaping a safe, high-quality, sustainable and friendly built environment.

As we look forward to the next 50 years, our key priorities for BCA are clear: it is our duty as

Singapore's champion of the built environment to look beyond the horizon and shape the future that we want for our children and for the generations to come.

How do we meet these priorities? By leveraging on technology. We will use productive technologies such as Building Information Modelling and Design for Manufacture and Assembly to build our buildings so that they are built faster and cleaner.

Over at our Geological Office, engineers are developing a 3D geological model to help identify and evaluate various land uses for potential underground developments in Singapore.

Our Universal Design team has also developed an online search application for user-friendly buildings in Singapore to enable people, including the mobility-challenged, to find the most accessible routes between their homes, public spaces, amenities and buildings.

To manage emerging and long-term challenges of an ageing population, BCA will continue to actively push for accessibility upgrading for existing buildings and encourage building professionals and developers to incorporate UD as a key component in their building design considerations.

In this issue of PILLARS, you will read about some of these initiatives, as well as about individuals, organisations, professions and events which together form the matrix that shapes Singapore's built environment. Happy reading!

Dr John Keung
Chief Executive Officer



RIDING ON A STRONG MOMENTUM

Following on a record-breaking construction year in 2014, this year's rich pipeline of public projects promises to sustain the drive.

“

...we will need to make sure that our workers are trained..., know what to do onsite, do their best and achieve the high quality of finished work.

”

Mr Lee Yi Shyan,
Senior Minister of State for Trade and Industry, and National Development

Construction demand hit a record of \$38 billion last year. Among the major contracts awarded in 2014 were those for the construction of the Thomson-East Coast MRT Line and land preparation works for the upcoming airport development. These pushed total public civil engineering construction demand to a new high of \$8.8 billion.

For 2015, BCA has projected up to \$36 billion worth of contracts to be awarded. While slightly lower than 2014, all signs point to sustained performance of the industry, said Mr Lee Yi Shyan, Senior Minister of State for Trade and Industry, and National Development. He was speaking at the 2015 *Built Environment and Property Prospects Seminar* organised jointly by BCA and REDAS, which was held on 8 January at the Grand Copthorne Waterfront Hotel. Attended by 400 people

from the built environment and banking sectors, the seminar covered key growth areas and business opportunities in construction, as well as construction cost trends in Singapore and the region.

Also on the upside, it was revealed that various initiatives rolled out since the first Construction Productivity Roadmap was launched in 2011 was bearing fruit.

For instance, the minimum standards for buildable design and acceptance of labour-saving technologies saw a spike in site productivity of about 1.2% per year from 2010 to 2013. Improvements in technology adoption also led to greater efficiency, with half of all new residential non-landed projects using drywalls in 2014 compared to only one-quarter in 2010.

In such a positive scenario, it is important to keep the momentum going, said Mr Lee. One of the ways to do this, he said, is for the industry to orientate itself towards Design for Manufacturing and Assembly (DfMA) to achieve higher manpower savings while improving the quality of the finishing components. BCA, he revealed, is working with the industry on the second Construction Productivity Roadmap to “bring the industry to the next level of excellence”.

Not surprisingly, one of the key focus areas is workforce training and development, to keep workers up to speed with new materials, technologies and methods of construction.



The key speakers at the seminar were Mr Song Seng Wun, Director and Regional Economist of CIMB Research Pte Ltd; Ms Lo Yen Lee, Director, Economic Research Department, Business Development Group, BCA; and Mr Stephen Wong, Managing Director, Davis Langdon KPK (Singapore) Pte Ltd.

In her update on the industry, Ms Lo talked about a structural shift towards civil engineering projects which would surpass that of 2014.

According to Ms Lo, "barring any unforeseen circumstances, total construction demand in 2015 could potentially reach a sustained firm demand at \$36 billion backed by a rich pipeline of public sector projects... total public sector construction demand is projected to stay strong and reach between \$18 billion and \$21 billion, contributing about 60 per cent to the industry demand."

"Construction demand from the private sector is expected to

continue to soften to between \$11 billion and \$15 billion in 2015, as developers take on a more cautious stance amid the weakening property market sentiments and continued global economic uncertainties," she said. But public sector construction demand – the key demand driver – would partially cushion the anticipated slowdown in the private sector building demand due to weak property market sentiments.

Turning the spotlight on the regional and global situation, Mr Wong pointed out the "slowing growth in China as the structural transformation of the economy continues", while Europe, too, is experiencing a "sluggish and feeble recovery." On the upside, he said, the US is "gaining a positive momentum", Asia is "continuing along a stable growth path amid a tighter global liquidity environment" and India is looking up as its new leadership sets expectations for more job creation to support economic growth recovery.

With regard to the Singapore construction market, Mr Wong noted that tender prices of construction projects remain

generally competitive as contractors' tendering margins and preliminary costs have been reduced to offset increased labour and regulatory costs. Commodity and material prices are relatively stable, he said, except for a drastic fall in crude oil prices.

Total construction workload in Singapore is likely to be maintained at a sustainable and manageable level, he predicted, as construction activities are mainly driven by public sector and infrastructural works. "Construction demand, crude oil prices and a strong Singapore dollar are the indicators to watch," he said.



“
Besides focusing on the hardware of greening buildings through the adoption of technologies and energy efficient designs, BCA launched the third Green Building Masterplan last year to create greater emphasis on the 'software' or eco-centric behaviour in building occupants.



Dr John Keung,
CEO, BCA



OPEN DOORS

At the recent BCA Academy Open House, students discovered that there is more to the built environment industry than meets the eye.

It was a day of discovery like never before. Students enjoyed a rare opportunity to understand the built environment better with hands-on experiences of its many facets, from high points and discoveries to physical and intellectual challenges.

Among the experiences were entering a booth to hear, at actual volume, construction noises, and trying out different hearing protection devices like earplugs and earmuffs, and climbing onto a building's scaffolding frame to experience how different kinds of fall protection equipment – such as body harnesses, connectors and rope grabs – actually feel like and function.

All this took place at the academy's Workplace Safety and Health gallery, where workplace hazards were highlighted and students experienced the spectrum of noise levels that begins with normal speech volume and hits the boom of an aircraft taking off.

The event provided students with more options in the choice of a career and the opportunity



Students were given a rare glimpse into facets of the built environment, from workplace health and safety to zero energy possibilities to testing the strength of a building model.



to study at a smart campus. Some 600 secondary and ITE students attended the annual Open House held on 16 January to tour the facilities and learn about the diploma and degree courses offered by the academy.

As one of the students put it, "I didn't realise there were so many aspects to construction, like engineering, accounting and surveying."

Campus of the Future

First-time and eye-opening experiences aside, this was also about finding out about career options, as Mr Charlie Ho, Head of Academic Programmes, School of Building and Development, gave the students an overview of the academy and its role as the education arm of the BCA.

Not only are there many diverse course options that will offer great career prospects in the built environment industry, the Academy

also offers a pre-diploma foundation course for those who do not qualify for the diploma courses. This is to prepare them for the diploma courses. Students were also given a heads up about plans to develop BCA Academy into a smart campus over the next five years.

To kick off the introduction to a whole new industry that taps on technology for sustainability, they were introduced to the news-making Zero Energy Building on campus.

Fun at the Bazaar

To complete the Open House experience, existing BCA Academy students managed co-curricular booths and a mini bazaar at the cafeteria, giving their younger visitors a chance to interact with them.



“
Attending the open house has revealed more options to me although my interest is in design.

”
Gu Langsha, 20



An important part of the event was the opportunity to hear about BCA Academy's wide range of diploma courses and career options in the built environment sector.

“
The campus is really impressive and the Open House was an eye-opener. I am interested in pursuing a diploma in mechanical engineering and there is a high chance that I might consider coming here to do it.

”
Muhammad Adli, 19

BREATHING EASY

Better well-being is the order of the day in BCA's new green office



Green offices don't just save energy, they also improve air quality and promote better health.

BCA's new headquarters at 52 Jurong Gateway Road (above Jem) is a Green Mark Platinum-certified office that has incorporated many energy-efficient and health-promoting features. Among them are light motion sensors to sense movement and automatically switch off lights when not in use, the use of recycled furniture and the installation of a video-conferencing system to reduce work-related travel and corresponding carbon footprints.



A specially-installed internal staircase reduces the unnecessary use of lifts in the building and provides opportunities for exercise.

Other green features in this office – located in a Green Mark Platinum-rated building – include recycling bins and awaste bin placed outside the office rather than personal bins for every staff.

OF SLIPPERY SLOPES AND TUMBLING WALLS

BCA adopts a multi-pronged approach in taking care of slopes and retaining walls in landed properties. One of the ways is to engage residents of landed property and get them involved in solving problems related to their property. BCA organises dialogue sessions with them and one session was held in November 2014 at Tanglin Community Centre with residents of Dunearn landed estate.

BCA shared examples of slopes and retaining walls which had become unsafe over the years. It was an eye-opener for most residents,

which made them realise that they had to take charge of ensuring the safety of their own slopes and retaining walls.

Dr Aaron Sham, an engineer with the BCA's Enforcement & Structural Engineering Department, shared with the residents the tell-tale signs of slope and retaining wall failure, such as cracks, and shared some good practices on the maintenance of these structures, which include ensuring proper drainage above the slope or retaining wall. He also highlighted the roles and responsibilities of property owners and professional engineers who are appointed for inspection or investigation.

Residents learnt the importance of ensuring regular inspections of slopes and retaining walls, and preventive maintenance. "The key issues faced by the residents were on the establishment of ownership of the neighbouring slopes/retaining walls and on communication between neighbours

who jointly own the slopes/retaining walls," said Thanabal Kaliannan, Acting Group Director, Special Functions Group. While encouraging the residents to approach their neighbours regarding these issues, he also assured them that BCA would be able to assist should they encounter difficulties in communicating with their neighbours, or if they spotted tell-tale signs of defects on the slopes or retaining walls.



BCA engineers provided pointers to residents of Dunearn estate on issues such as defective retaining walls.

TEACHERS AS BUILT ENVIRONMENT CAREER AMBASSADORS

Engaging teachers is part of BCA's strategic plan to change perceptions and inspire.

As BCA embarks on a five-year Industry Rebranding Roadmap to reach out and educate the students as well as the public on the new face of the built environment sector, it is also actively engaging with different groups of stakeholders. One of these groups is the teachers, who are in a unique position to inspire and influence young people in their career choices.

The Teachers' Attachment Programme (TAP), organised by BCA, aims to turn lecturers at the Institutes of Higher Learning (IHLs) and junior colleges into "career promotion ambassadors" by providing them with a better understanding of the built environment sector and its career options, while keeping them in the know about the sector's latest developments and in-demand skill sets.

BCA launched the first run of the TAP last December, a two-day programme tailor-made for 22 lecturers from the Institute of Technical Education (ITE) and Singapore Polytechnic (SP), most of whom are from the Mechanical & Electrical (M&E) and Facilities Management departments.

As part of the TAP, the lecturers got to visit firms such as Lend Lease, Industrial Links International Pte Ltd, Arup Pte Ltd and G-Energy Global Pte Ltd. During these visits, they picked up insights on green building systems at Somerset 313 (a Green Mark Platinum building), watched demonstrations of how a prefabricated air condition

duct is fabricated, learnt about the bowl cooling system that creates and distributes cool air around the Sports Hub, and also the remote energy monitoring system.

In addition, there were sharing sessions by BCA on its 3rd Green Building Masterplan, Building Information Modelling (BIM) Roadmap and suite of scholarship, sponsorship and apprenticeship programmes. The lecturers also got to interact with industry partners, BCA Academy lecturers and BCA officers through networking sessions.

The programme received positive feedback from the lecturers and the industry partners, and will continue, so that more lecturers can bring the knowledge and insights back to the classrooms to inspire their students on built environment career options.



Participants in a discussion with Mr Choong Chow Neng, Director (Business & Operations) of G-Energy Global Pte Ltd.



Participants in the pilot run of the TAP at Somerset 313.

CAMPUS OF THE FUTURE

As the built environment grows in importance in Singapore, BCA Academy is all revved up to offer the richest learning experience to students seeking to enter the industry.

BCA Academy's goal is to become a smart campus so that its students don't just learn about the characteristics of smart buildings from books, but have the experience of studying in one.

When the Academy's new extension is completed in the second quarter of this year, students will have direct experience of learning in a future-ready living lab for built environment disciplines and professions. They will get to directly experience the latest building technologies, equipment and methods and will also experience how a building "lives", "breathes", "functions" and "interacts" with its occupants.

Advanced technologies were used to construct the new wing, including BIM and pre-cast, which saw 88% of the new extension cast into form before being transported to its site, one of the highest amounts ever in Singapore.



WHAT'S IN THE NEW WING?

- Asia's first Rotatable Laboratory (see facing page).
- Energy-efficient classrooms which will showcase different chilling systems and how they work under various conditions, with viewing screens capturing energy efficiency performances in real time.
- Many green building features and extensive Universal Design features so that people of different abilities and needs can learn in an inclusive and user-friendly campus.
- Exposed mechanical and engineering services so students can better appreciate the design and arrangement of the energy saving services' system.
- A rooftop education deck with a chiller plant and a green lab:
 - The chiller plant is designed as a spacious room so students can see how an efficient chiller plant is designed.
 - A green lab will see students growing different types of vegetables and plants on rooftops.

DESIGNING WITH BIM

Used in the design and construction of the BCA Academy's extension, BIM is a 3D modelling technology that enables a building to be designed and built virtually, with every component and consideration included. It also enables all parties in the built environment construction value chain – such as the contractors, architects, quantity surveyors and engineers – to work together to review the design in a single virtual model.

This means that calculation errors and design conflicts can be identified almost instantaneously. Every adjustment, from the tiniest to the most significant, is captured, and its effects on every other aspect of the project calculated, captured and presented.

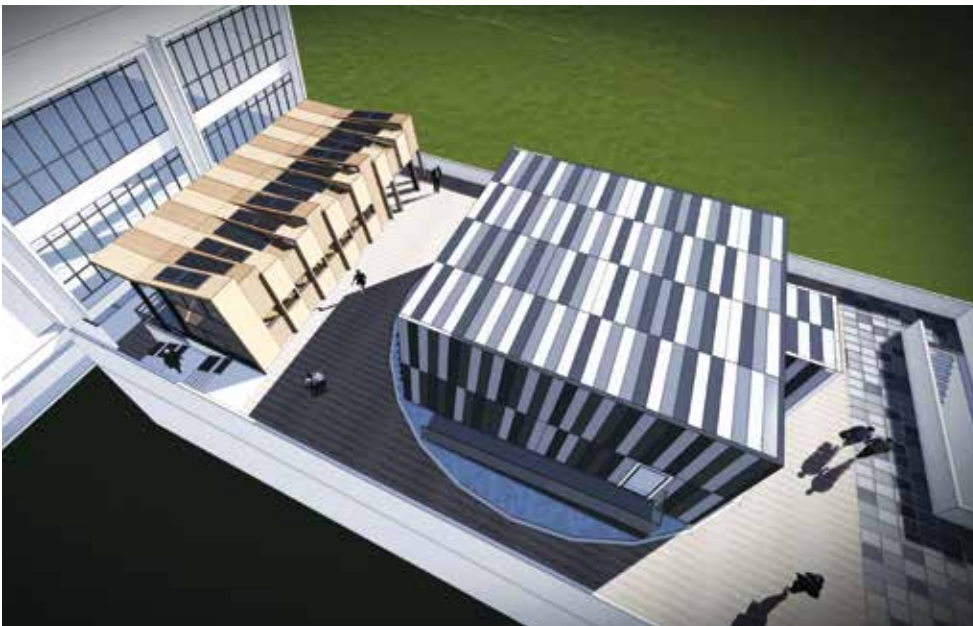
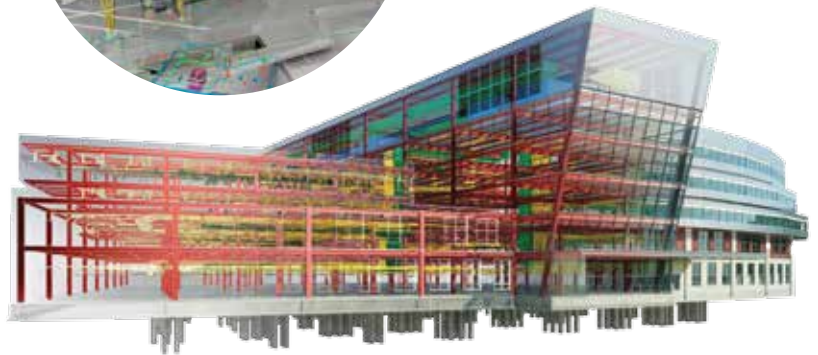
In Singapore, BIM has been used in the design and construction of many structures, including the Helix, the ArtScience Museum and some HDB estates. The information that has been captured by BIM in the building of BCA Academy's extension will be used in facilities management, and the Academy plans to demonstrate how this can be done.

What's cool about BIM?

- It saves time, reduces the margin of error and requires all parties to be responsive and proactive;



- It can present more design variations;
- Engineers can create a larger number of complex forms within a shorter time frame;
- Quantity surveyors can use it to measure the materials, equipment and objects that need to go into a building;
- Architects can use it to assess if the building comes together according to their artistic vision.
- Creates better communication, collaboration, and risk and material management.



PROMOTING GROUND-BREAKING RESEARCH

The User Test-bed Facility (UTBF) at BCA Academy is Asia's first rotatable lab, and will be set on the roof of the new extension.

A collaboration between Lawrence Berkeley National Laboratory in the US and BCA, the Lab will allow professionals and researchers to test and monitor the effectiveness and weather-worthiness of building materials, parts and systems.

Given Singapore's highly changeable weather patterns, this facility will contribute greatly toward creating more energy- and resource-efficient buildings, and position Singapore as a leader in research and capability.

A HUNDRED AND TWENTY-TWO INSPIRING STORIES

That's the number of 2015 BCA Built Environment ITE Scholars, all with a passion and a commitment to contribute to Singapore's nation-building.



Ms Rajah also highlighted some new developments that will impact favourably on the scholars.

The current ITE Scholarship scheme will be enhanced to provide more opportunities for ITE graduates to deepen their skills, through the SkillsFuture movement. A post-ITE development programme, SkillsFuture provides structured on-the-job training under mentorship with sponsoring firms and part-time industry-recognised training in areas such as BIM, design or construction supervision. Graduates will acquire valuable work experience and eventually be able to take on greater roles such as CoreTrade Supervisors or BIM Specialists, with higher remuneration and better job prospects.

Good news indeed...the kind of news to spur on a vision.

GROWING THE TALENT POOL

The BCA Built Environment ITE Scholarship was launched in 2014 and covers a student's course fees plus a monthly \$500 allowance during their course. On completion, they will serve a two-year bond in the built environment sector.



Whether it was an interest sparked by a father, a friend or sheer gutsiness, these young people are already on pathways to careers in the built environment sector. Winning the scholarship has certainly been a boost for each of them, as it is an official recognition of their consistent efforts, results and belief in their potential for success. It eases their financial burdens, while providing the certainty of career paths in an industry much in need of talent.

The scholars, mostly aged between 17 and 20, are currently pursuing built environment courses at ITE. Among them are diploma courses in Space Design (Architecture), Civil & Structural Engineering Design and Mechanical Engineering.

Adding an inspirational note at the scholarship award ceremony was

Guest of Honour, Senior Minister of State for Law and Education, Ms Indraneel Rajah. In her speech, she urged the ITE scholars to "stay open to exploring...seize opportunities, and keep up with trends and in-demand skill sets for the Built Environment."

She said: "It also boils down to being aware of what interests you and what you think you do best. A career in the Built Environment sector may be right for those whose aptitude lies in being creative, problem-solving, and if you enjoy design, technology, rising to challenges, contributing to making the world a better place and are computer-savvy...The strong skills...you acquire will put you in high demand from employers, in Singapore and potentially elsewhere also."



INFLUENCERS & SUPPORTERS

Venson Teo, 20, was inspired by his father. "My dad used to bring me to his worksite when I was young so that I could understand what he did. It was financial struggle that led him to start his own construction company, and he made it succeed. With my training, I would like to eventually work with him."

This early exposure inspired him to study architecture and then civil and structural engineering design. Over and above the good career prospects, he says that he has also become closer to his dad; he now understands much more about the profession. "With buildings getting more complex, taller and deeper, I'm looking forward to playing a role in achieving greater engineering feats, creating a lasting legacy in the built environment." Venson is currently pursuing Higher Nitec in Civil & Structural Engineering Design, Year 2, at ITE College Central.

“
My dad used to bring me to his worksite when I was young so I could understand what he did.
”



Venson Teo, 20

“
Playing with Lego bricks ignited my passion for design. I like doing drawings of buildings and coming up with new ideas.
”



Lim Yun Ling, 17

For Lim Yun Ling, an interest in built structures came naturally. Her father is in the construction business, which was passed down from Yun Ling's grandfather. "As a child, I used to play with Lego sets instead of Barbie dolls. This ignited my passion for design. I like drawing buildings and coming up with new ideas, and was further inspired by a friend who studied landscape architecture. What I like about architecture is the sense of achievement after you've completed a design."

Says her father, Lim Loo Teck, "I am in the demolition business. I asked Yun Ling if she was sure she wanted to go into the industry as it can be quite stressful. Later I realised that she was quite passionate about architecture and encouraged her to follow her interest." Yun Ling is currently pursuing Nitec in Space Design (Architecture), Year 2, at ITE College Central.

For Maisurah Bte Mohammed Ali, 20, it was an obvious choice. "I like using my hands and fixing things. From repairs like fixing lights and plugs, to figuring out codes, it is very satisfying. This scholarship will help to relieve my family's financial burden and pave the way for my career in the built environment sector. As for working on construction sites, I welcome the challenge of handling work on-site and look forward to the satisfaction of completing a building project." She credits her mother for being her biggest source of inspiration and strength throughout the challenges she faced growing up. Says her mother, Khairiah: "I do wonder about how she is going to cope in the construction industry as it can be physically taxing, but she is very interested and enjoys being hands-on, so I think she should do well. I am very proud of her." Maisurah is currently pursuing Higher Nitec in Mechanical Engineering, Year 2, at ITE College East.

“
I welcome the challenge of handling work on-site and look forward to the satisfaction of completing a building project.
”



Maisurah Bte Mohammed Ali, 20

FIRED UP ON SUSTAINABILITY

A desire to promote eco-consciousness among her students motivated Catherine Thoo to pursue a postgraduate degree in Facility and Environment Management.

Ngee Ann Polytechnic lecturer Catherine Thoo topped her class despite a rocky start in the first year of her postgraduate degree in Facility and Environment Management (FEM). When asked what fanned her interest in a Master's degree in FEM in spite of having little prior knowledge of this specialist area, she explained that it had been her deep interest in, and desire to promote, eco-consciousness among her students.

Reading the *Sustainable Singapore Blueprint* report was the clincher for her. The report focuses on formulating a national strategy towards Singapore's sustainable building management, and she knew she wanted to be part of that cause. Organised by University College London (UCL) and BCA Academy, the course's emphasis on sustainability was a perfect fit.

A Land Economics graduate who used to be an Assistant Vice President with Cambridge Industrial Property Management before she switched to teaching, Catherine says, "I did not know whether I could pull through."

She credits her success to a few "amazing classmates" who motivated her, a supportive boss who adjusted her teaching loads and allowed her to leave in time to attend classes, and her faith, which gave her the strength and perseverance to complete the two-year part-time course with flying colours.

As a lecturer, she had an additional motivation. "I was very excited at the huge potential of



adding value to my work in Ngee Ann Polytechnic by transferring the quality knowledge I gained in sustainability to my students,” says Catherine, who took up the course in 2012.

The course delivered on its promise, equipping her with in-depth knowledge of sustainability, Green Mark, environment management, climate change and global warming. A Facilities Manager has an important role to play in the built environment value chain, she reveals.

“Essentially, a Facilities Manager’s role is to support and improve the effectiveness of an organisation’s core activities by ensuring functionality of the built environment by integrating people, place, process and technology,” says Catherine.

In other words, he/she comes up with strategic ways to influence the core business positively and create added value through many channels such as saving energy, reducing costs and supporting productivity, to name a few.

A lecturer for the past six years, Catherine teaches two diploma courses at the polytechnic’s School of Design & Environment – Diploma in Real Estate Business and Diploma in Hotel and Leisure Facilities Management.

When it comes to Facilities Management, one of the main points she tries to bring across to her students is ensuring the functionality of what she calls the 3 ‘P’s: the need to integrate place, people and process.

One of the changes she has made since taking up her postgraduate degree is getting her students to incorporate green initiatives such as energy-saving bulbs and solar panels into models of an imaginary shopping mall, created for the shopping mall management module, to enhance its value. In the same vein, she also encouraged them to participate in a design challenge organised by BCA and Ngee Ann Polytechnic where a Modular Lamp was “re-designed and re-purposed to impact sustainability in daily living”.

In fact, her attempts at inculcating the importance of sustainability in her students has borne fruit with a number of her graduating students from last year – “including the gold medallist,” she proudly reveals – choosing to pursue a Bachelor of Science degree in Project and Facilities Management at the National University of Singapore.

In a country as small and densely populated as Singapore, the way to achieve sustainability is through education and creating greater awareness, points out the fervent green advocate. “The Ministry of Education is doing a good job in inculcating awareness of sustainability at primary and secondary schools. I think it’s good to get students thinking about sustainability from a young age, and [for polytechnics and universities] to continue what the schools have been doing.”



Beyond taking her own place in the drive for sustainable building management, Catherine has her sights on inspiring and enabling her students as well.



“
I was very excited at the potential of adding value to my work in Ngee Ann Polytechnic by transferring the quality knowledge I gained in sustainability to my students.
”

Catherine Thoo

PROTECTORS OF THRILL SEEKERS

Thanks to BCA's amusement ride safety officers such as Louis Ang (left) and Robbin Poh (right), we can have fun without fear. Here's what they do.

Daredevils, say hello to your guardians.

Louis Ang and Robbin Poh are Executive Engineers from the Amusement Rides Safety Department at the BCA. Their mission is to protect you.

Working in pairs, they make sure that the heart-stopping rollercoasters or kiddy choo-choo trains we take don't rip off a limb, electrocute us or break our necks.

Sounds morbid? The fact is, bad accidents do occur in happy places worldwide, which makes these officers' jobs more important than most realise.

The 17-person department regulates more than 90 amusement rides in Singapore. Working in pairs, they conduct thorough inspections and smaller-scale checks throughout the year on their assigned rides, making them familiar faces to the ride operators. To avoid detection, they swap rides with their colleagues when they carry out "mystery shopper" visits.

The officers are out of the office once or twice a week to conduct ride inspections that include physical checks and audits of both operation and maintenance records. Even the tiniest details are not missed.

During one of the inspections at the Skyline Sentosa Luge, Louis stops by a railing and sticks his fist through a gap to check if little children would be able to stick their heads through it. At the visitor counter, Robbin spots a photograph of a Luge rider; he points out that "the helmet should not be worn this way" and cautions the ride operator to ensure safety in future.

Once they're done, it's back to the office for administrative work. They also review designs for new rides, perform risk assessments, and interview key witnesses when accidents happen, among other tasks.

As one of the first to join the Department when it was set up in 2011, Louis has inspected all the



most exhilarating attractions, like the Transformers ride at Universal Studios Singapore. All officers go on the rides to spot potential problems as well as to gain a user's perspective.

"Even if you have a fear of heights, you just have to manage it. Imagine it's you and your partner in the ride – you cannot scream. It would be embarrassing," he says with a laugh.

A year and a half into the job, Robbin, a former materials science researcher, says, "Things are never dull around here."

But the job does come with some sacrifices. "I cannot enjoy a normal amusement ride anymore!" he quips. "I just keep on thinking about safety now."

And some stress is inevitable. "It's ... knowing how serious it would be [if we didn't do our job right], and feeling the responsibility," says Louis.

This article first appeared in the Nov/Dec 2014 issue of Challenge magazine.

“
Even if you have
a fear of heights,
you just have to
manage it.

”
Louis Ang (above left)
*Executive Engineer,
Amusement Rides Safety
Department, speaking about one
of the challenges of the job.*

WHAT WILL GREEN BUILDINGS LOOK LIKE BY 2050?

The answer to this and many more “green” questions will be revealed at this year’s International Green Building Conference 2015 (IGBC).

Complementing Singapore’s Smart Nation vision, IGBC’s theme *Build Green and Live Smart* calls for both the buildings and their users to go ‘green’ and ‘smart’. Much research is being done all over the world to come up with solutions to smart and sustainable living, and the conference, now in its seventh run, will see international green building experts and stakeholders coming together for a sharing of ideas, collaborations and exchanges.

Among them will be policy-makers, senior government officials, thought leaders, academics, built environment experts, real estate developers, urban planners, architects, engineers, builders and other industry professionals.

The three-day event will be packed with talks, forums, plenary sessions, networking opportunities and presentations. Expect to hear challenges to established approaches, bold new ideas, findings from the latest research in green building development, public sector perspectives and challenges, and renewed calls for information-sharing across the globe and accountability from all parties across the value chain.

Among the many topics that will be discussed are the future of green buildings, the regional green building movement, smart green buildings and sustainable and smart living.

Held alongside IGBC is Build Eco Xpo Asia (or BEX Asia). BEX Asia is Southeast Asia’s largest business exhibition for the green building industry. Participants will have even more to look forward to this year with the

inaugural edition of the Mostra Convegno Expocomfort (MCE Asia) in Singapore.

A timely and relevant addition to the programme, MCE is Europe’s largest and leading event for Cooling, Water and Renewable Energy.

These two dedicated exhibitions will offer product demonstrations, launch receptions, technology sourcing and business lead generation opportunities.

IGBC is the anchor event for the Singapore Green Building Week, and will take place from 2-4 September 2015 at Marina Bay Sands, Singapore. It is organised by BCA and the Singapore Green Building Council while Reed Exhibitions will be staging BEX Asia and MCE.

For more information, log on to www.sgbw.com.sg

IMAGINE THE FUTURE

If you are challenged to imagine that far ahead, BCA's Zero Energy Building (below), fondly called ZEB, could yield some ideas. It is a retro-fitted building which requires, literally, zero energy to operate, thanks to creative and cutting-edge energy-saving technology. Within ZEB are several other

technologies which are being test-bedded.

Among them:

- a system of air-conditioning that works without fans
- a system that can remotely sense and gather information on building facades and indoor environment quality
- a lighting system powered

by data cables and sensors

- a kind of film which redirects external daylight upwards, reducing glare to occupants

Are you beginning to get the idea?



International
Green Building
Conference 2015
Singapore

BUILD GREEN, LIVE SMART

2-4 SEPTEMBER 2015
MARINA BAY SANDS
SANDS EXPO & CONVENTION
SINGAPORE



10 YEARS OF GREEN MARK

It's one thing to talk about building environment-friendly buildings; and it's quite another thing to put in the hard slog to turn that vision into reality.

From setting standards, protocols and benchmarks, to public education, persuasion and concrete assistance and incentives, Green Mark has certainly propelled the cause of sustainability in the built environment sector and raised environmental awareness among developers, designers and builders. And it begins from the very start, at project conceptualisation and design stage, and continues throughout the process.

Today, 10 years since the inception of this benchmarking scheme, there are close to 2,300 Green Mark-certified buildings in Singapore. This means there are that many buildings in which the green cause is being taken very seriously in all the important areas: energy efficiency, water efficiency, environmental protection, indoor environmental quality, and other green features and innovations. Green Mark incorporates internationally recognised best practices in environmental design and performance, and the scheme is applicable to buildings of all kinds.

Besides the obvious benefits to owners of Green Mark-certified buildings – such as a positive effect on corporate image, leasing and resale value – the benefits also include reduced water and energy bills, reduced potential environmental impact, improvement in the quality of the indoor environment and clear direction for continual improvement.

For information about application for BCA Green Mark, log on to: www.bca.gov.sg/GreenMark/green_mark_criteria.html



BCA GREEN MARK

GREEN MARK CHAMPS

Eight building owners have been recognised as BCA Green Mark Champions, for their strong commitment to social responsibility and outstanding achievements in environmental sustainability. Between them, they have a substantial number of Green Mark Buildings certified at the highest levels. Projects undertaken by the Green Mark Champions represent more than 13% of all Green Mark projects and more than 37% of all Green Mark Platinum projects.



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*Terms and Conditions apply; Limited to one Panasonic LED bulb per person (Model no. LDAHV10D65H2AP). While stocks last.

MARCH 2015**19, 20, 26 & 27 Mar**Develop a Workplace Safety and Health Management System Implementation Plan (7th Run)**19, 20, 23, 24 Mar**(Assessment on 2 Apr)
Certification Course for Green Mark Facilities Manager (21st Run; core module of GMFP)**23, 26 & 30 Mar**Workshop on Site Management of Precast Concrete Construction (17th Run)**24, 26, 31 Mar, 2 & 7 Apr**Workshop on Geotechnical Design using Eurocode 7 (9th Run)**25 Mar**

Workshop on Introduction to Parametric Design for Architecture: Its Application, Workflow and Integration with BIM (NEW)

26 & 27 MarBMSMA for Building Management Personnel (11th Run)**26, 27, 30, 31 Mar & 10 Apr**

Certification Course for Green Mark Manager (GMM; core module of GMP)

27 MarRequirements for Environmental Sustainability in Buildings and The Green Mark Scheme (32nd Run)**30 & 31 Mar**Workshop on Managing Project Teams Effectively (9th Run)**APRIL 2015****1 & 2 Apr**Good Governance for Management Corporation (2nd Run; with enhancement)**7 Apr**

1-day ASHRAE Distinguished Lecturer Programme on Integrated Design Modelling and Emerging ACMV Technologies for Energy Efficient Healthy Buildings (NEW)

7 - 9 AprManagement of Water and Environmental Services for Estate Managers (6th Run)**9 Apr**Workshop on Preparing and Defending Loss and Expense Claims (18th Run)**13 - 15 Apr**Essential Knowledge in Local Regulations and Construction Practices (23rd Run)**17 & 20 Apr**Advanced Concrete Design using Eurocode 2 (4th Run)**20 - 24 Apr**Application closing date: 2 April 2015
TU Braunschweig-BCA Executive Development Programme 2015

on Innovations in Sustainable Design and Technologies (Conducted in Germany)

21, 23, 28 & 30 AprPile Foundations Design and Construction for Engineers (27th Run)**21, 23, 28 & 30 Apr**Essential Knowledge in Building Legislation & Procedures for Building Plan Submission (10th Run)**22 Apr**Workshop on Seismic Design of Building Eurocode 8 (5th Run)**27 & 28 Apr**BIM Planning Course (Building Developers and Facility Managers) (14th Run)**27 & 28 Apr**Sustainable Facility Management Solutions (9th Run)**28 Apr**Opportunities and Pitfalls of Tendering for MRT Projects and Other Major Infrastructure Projects (5th Run)**Contact**BCA Academy
Marketing & Business Development
DID: 6730 4503/6248 9824
Email: bca_academy@bca.gov.sg**APRIL/MAY 2015****10 Apr - 23 May**BCA-SMU Advanced Management Programme on Productivity and Leadership Development (6th Intake)**Contact****Mr Tan Kim Guan** Tel: 68281966
email: kgtan@smu.edu.sg**Ms Serene Chua** Tel: 68085361
email: serencechua@smu.edu.sg**AUGUST 2015****Sep 2015 - Aug 2017 (Part-time)**Application closing date: 17 April 2015
Master of Science in Facility & Environment Management 2015 Intake (awarded by UCL, UK)**Contact****Mr Yong Wee Hau** Tel: 6248 9848
email: yong_wei_hau@bca.gov.sg**Ms Lim Siew Peng** Tel: 6248 9970
email: lim_siew_peng@bca.gov.sg**SEPTEMBER 2015****Sep 2015 - Aug 2017 (Part-time)**Application closing date: 30 April 2015
Master of Science in Sustainable Building Design 2015 Intake (awarded by University of Nottingham, UK)**Contact****Mr Yong Wee Hau** Tel: 6248 9848
email: yong_wei_hau@bca.gov.sg**Ms Fereen Lim** Tel: 6730 4536
email: fereen_lim@bca.gov.sg



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Visit www.bcaa.edu.sg/BCM.aspx

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6th Intake starting in September 2015 / Application closing: 30 April 2015



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- Expose participants to solar cooling and passive house concepts with the use of efficient building envelopes to achieve ultra-low energy building design

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