Leadership in Environmental Sustainability
CMU-BCA Executive Development Program 2011
The CMU-BCA Executive Development Program in Environmental Sustainability aims to accelerate the development of executives in green stewardship roles that will steer Singapore’s built environment towards the next level of environmental sustainability. This collaboration between Carnegie Mellon University and the Building and Construction Authority of Singapore offers industry leaders and senior management a global perspective of the sustainability movement by comparing geo-political and socio-economical policies as they relate to and influence the development of the built environment.

**Learning Objectives**

- Be able to present and manage the difficult trade-off between business goals and environmental goals.
- Find the appropriate integrated solutions for higher energy efficient building design, construction and management.
- Be exposed to state-of-the-art energy-saving technology, design and management support tools and best practices for project and business decisions.

"Sustainable design is a collective process whereby the built environment achieves new levels of ecological balance through new and retrofit construction, towards the long term viability and humanization of architecture." - SoArch, CMU
BUSINESS STRATEGIES – BEST PRACTICES, CHALLENGES AND IMPLEMENTATION ISSUES OF US FIRMS
This program will provide a comparison of selected and prevalent sustainable design-benchmarking processes in the USA, Europe and Asia. A Building Investment Decision Support (BIDS) system, developed by the Center for Building Performance and Diagnostics (CBPD) of CMU, will be introduced to demonstrate the business case for investing in sustainable design.

INNOVATIVE DESIGN SOLUTIONS THAT CONSTANTLY OPTIMIZE BUILDING SETTINGS FOR EFFICIENCY & COMFORT
Based on case-studies and real project discussions, this program showcases how modeling tools and technology can accurately simulate actual consumptions and conditions. This would enable a building to be designed for optimal energy efficiency and environmental sustainability.

INTELLIGENT, HIGH-PERFORMANCE BUILDINGS WHICH IMPROVES ENERGY EFFICIENCY
A holistic approach is advocated to address the supply and demand sides of energy management and to promote the usage of renewable energy sources while minimizing energy consumption and maximizing health and comfort through innovative design and application of advanced building technology.

LATEST TECHNIQUES TO RETROFIT EXISTING BUILDINGS FOR SIGNIFICANT ENHANCEMENT
This segment discusses financially feasible options of green retrofits, including materials, methods and technology which can be employed.

PROJECT VISITS TO LEED CERTIFIED BUILDINGS
Participants will have an opportunity to visit some exemplary projects in Pittsburgh and Philadelphia as part of the course program and hear directly from the building owners, design teams and facilities managers.
Project Visits

PITTSBURGH
- Roger L Preger Intelligent Workplace is a “living” laboratory at CMU. Constructed on the roof of an existing building, the 7000 square-foot structure is used for the test-bed for innovation in information technology, product performance, integration in materials, components and systems, and sensing and actuation of instrumentation to evaluate operational performance of building components and user comfort.

- David L Lawrence Convention Center is the largest Gold LEED certified green convention centre in the USA and the first of its kind in the world. The centre makes use of natural ventilation & natural lighting, flexible space and energy efficient technology for its exhibition halls and meeting rooms.

- Phipps Conservatory is the first LEED certified visitor centre in a public garden. The centre was added as an 11,000 square foot extension to the historical conservatory built in 1837, serving as a leading environmental education centre and horticultural research facility.

PHILADELPHIA
- Greater Philadelphia Innovation Cluster (GPIC) is a U.S. DOE Energy Hub for efficient buildings. Located at The Navy Yard in Philadelphia, the goals of the GPIC/HUB are to improve energy efficiency and operability, reduce carbon emissions of new and existing buildings; and to stimulate private investment and quality job creation in the Greater Philadelphia region. The GPIC will focus on new and full spectrum retrofit of existing average size commercial and multi-family residential buildings.

Program Outline

FIRST DAY
Monday 18 Apr
- Welcome and Introduction to the Program
  Discussion on Critical Common Elements of International Sustainable Design Performance Benchmarking Schemes - USA, Europe and Asia.
  Welcome Dinner at The Grand Concourse, Station Square, Pittsburgh

SECOND DAY
Tuesday 19 Apr
- Sustainable Developments in Pittsburgh: David L Lawrence Convention Center (first and largest LEED Gold certified convention center in the world) – now going for further green retrofit (LEED EB)
  Phipps Conservatory (first green conservatory in the world), and the Center for Sustainable Landscape (Living Building Challenge)
  Visit and lunch at the Phipps Conservatory
  Visit David L Lawrence Convention Center
THIRD DAY
Wednesday 20 Apr

The Business Case for Greening Existing Buildings – Lecture and project exercise.

Building Investment Decision Support (BIDS) System.

Significant Energy and Environmental Impact Associated with Novel Desiccant Based Dedicated Outdoor Air Systems and Active Chilled Beams when Applied in a Tropical Climate.

Panel Discussion (Developers, Architects, Engineers, Facilities Managers, Contractors)

Visit to the Gates Hillman Centers, CMU.

FOURTH DAY
Thursday 21 Apr

The Solar Decathlon International Competition.

Solar Decathlon House tour

Integrated Design Concept – Total Building Performance & Diagnostics.

Case studies – tentatively, e.g., the CBPD “Robert L Preger Intelligent Workplace”, the proposed “Building As Power Plant” at CMU, the National Library Building, Singapore, proposed Koo Foundation Sun Yat-Sen Cancer Center Taipei, Green School, Sichuan Earthquake Reconstruction Projects, Tianjin Eco-City Residential Development.

Building Information Modeling (BIM) and Integrated Design Performance Simulation and Management Tools.

Information Technology Enabled Sustainability Test-bed (ITEST).

Flight from Pittsburgh to Philadelphia (evening). Check in to Hotel.

FIFTH DAY
Friday 22 Apr


SIXTH DAY
Saturday 23 Apr

Continue Building Visit in Philadelphia.

Lunch at Hotel.

Concluding remarks, Q & A, and feedback on the program.

Return to Singapore.

*Optional Site Visit to Fallingwater & Kentuck Knob by Frank Lloyd Wright on 17 April 2011.

Carnegie Mellon University and BCA Academy reserve the right to amend the program without prior notice.
UNITED NATIONS ENVIRONMENT PROGRAM SUSTAINABLE BUILDING CLIMATE INITIATIVE
Participants will be engaged in a macro level discussion on the roles that the built environment would play in energy and environmental effectiveness, human health, organizational productivity improvements, climate mitigation, job creation and energy security. This would be accomplished by presenting the updated results of our case studies of global best practices, LEED-rated buildings in the US, as well as references to policies in Germany and France.

The framework of best practices includes references to practices by which buildings engage the sun, air, water and soil in regenerative processes. The discussion will focus on how these best practices influence present policies and future opportunities in Singapore.

INTERNATIONAL SUSTAINABLE DESIGN PERFORMANCE BENCHMARKING SCHEMES
A comparative analysis of the critical common elements used in benchmarking sustainable design performance will be discussed. References to LEED in US, the European Directive on Energy Performance of Buildings, CASBEE in Japan, the Green Building Evaluation Standard of China, EEWH of Taiwan and the Green Mark Scheme of Singapore will be made.

BUILDING INVESTMENT DECISION SUPPORT (BIDS) SYSTEM
This lecture will introduce the “life cycle economic arguments” for sustainable, high performance building systems and the basis of “triple bottom line” decisionmaking. BIDS will be introduced to support investments in advanced and innovative building systems that improve environmental quality, health and productivity in buildings.

The BIDS and public e-Bids efforts are directing decisionmakers to incorporate high performance systems which will benefit the “triple bottom line” - profit, planet and people.

INTEGRATED DESIGN CONCEPT – TOTAL BUILDING PERFORMANCE & DIAGNOSTICS
The Total Building Performance & Diagnostics (TBPD) concept was originally advocated in the early 1980s by a team at Carnegie Mellon University. It has since been applied to several projects in North America, Europe and Asia over the past two decades. TBPD seeks to rationally and systematically utilize the synergy of various types of technology and management expertise to produce desirable building performance at a reasonable cost.

The “universal” applicability of the concept will be comprehensively illustrated with in-depth case studies of
- the Intelligent Workplace at CMU
- the proposed “Building as Power Plant” project
- the National Library Building Project in Singapore
BUILDING INFORMATION MODELING (BIM) AND INTEGRATED DESIGN PERFORMANCE SIMULATION AND MANAGEMENT TOOLS
This lecture will discuss the latest developments and applications of the BIM framework, particularly in sustainable design projects based in the US. By leveraging on existing IT networking infrastructure, this lecture provides a preview of the potential cost-effective opportunities for “continuous commissioning” throughout the life cycle of sustainable buildings.

THE INTERNATIONAL SOLAR DECATHLON COMPETITION
"The Solar Decathlon brings attention to one of the biggest challenges we face—an ever-increasing need for energy. As an internationally recognized event, it offers powerful solutions—using energy more efficiently and using energy from renewable sources.” - Professor Stephen Lee has led the CMU teams over the past three competitions since the inauguration of the event in 2002.

THE BUSINESS CASE FOR GREEN BUILDING
In the U.S., the action in green building has clearly switched to the greening of existing buildings. This trend is showing signs of becoming a wave, as evidenced by more than 700 projects already certified (33 million sq.m.) under the LEED-EBOM system, with 4000 more in the pipeline, totaling more than 100 million sq.m. With this much action, it’s reasonable to ask: What is the primary driver of the rapid growth of green building retrofits? The answer: A solid business case.

Through the use of the latest research findings and documented case studies, this session will equip participants to present the business case for greening existing buildings in a variety of contexts: public sector building, privately-owned real estate and the growing interest of universities and schools in green building certifications.

DESICCANT BASED DEDICATED OUTDOOR AIR SYSTEMS AND ACTIVE CHILLED BEAMS WHEN APPLIED IN A TROPICAL CLIMATE
Recent market analyses, energy modeling and actual project design assessments have shown that the incorporation of effective desiccant based total energy recovery systems, dedicated outdoor air systems and active chilled beam technologies can dramatically reduce the energy consumption and carbon emissions from buildings located in hot and humid climates. This lecture will share case studies for actual projects under design in Singapore to highlight the magnitude of energy, cooling tower and carbon emission reductions.
PARTICIPANTS’ PROFILE

Leaders and decision makers in the public and private sectors, e.g., business executives, developers, architects, engineers, consultants, contractors, facilities managers, who have an interest in and play a significant role in influencing and leading sustainable development initiatives.

A certificate of participation will be issued at the end of the program.

Course Duration: 18 - 23 April 2011
Program Fee: SGD3,800 (GST is not applicable)
“Early Bird” Fee: SGD3,420 (Payment received before 15 March 2011)
Group Discount Fee: SGD3,420 (min 3 per group in the same organisation)
Discount Fee: SGD3,420 (BCA Young Leaders, GMM and GMP graduates)

Fee includes course materials, meals at CMU (breakfasts, lunches and refreshments), Welcome and Farewell dinners, as well as local ground transportation between the hotel and CMU, and for all site visits in Pittsburgh and Philadelphia. The program fee does not include accommodation and airfare.

ACCREDITATION

PEB : 35 PDUs  BOA-SIA: Pending

With two often-cited books under his belt - “Developing Green: Strategies for Success” and “Marketing Green Building” and having trained nearly 3,000 people in the LEED rating system, Jerry Yudelson will share his views on Environmental Sustainability
Application for Leadership in Environmental Sustainability Executive Development Program 2011

Name (Dr/Mr/Ms)*

NRIC

Designation

Organization

Address

Email

Nationality

Phone (office-mobile)

Fax

* Please delete accordingly

AIRFARE AND ACCOMMODATION RESERVATIONS
Participants are encouraged to book their accommodation and air tickets through BCA Academy.

PLEASE RESERVE A HOTEL ROOM AT PITTSBURGH & PHILADELPHIA
☐ Marriott hotel or equivalent
The estimated room rates are about USD$110 per day
Hotel room rates quoted are exclusives of taxes and subjected to confirmation

PLEASE BOOK AN AIR TICKET
☐ SIA Economy class
☐ SIA Business class
Please tick accordingly Booking of air tickets is subject to availability, Visa requirements to USA also applies.

PAYMENT
Cheques should be crossed ‘A/C payee only’ and made payable to ‘BCA’. Please indicate ‘CMU-BCA Executive Development Program 2011’ at the back of the cheque.

Please mail the cheque, together with the application form to Ms Wong Mee York, BCA Academy, 200 Braddell Road, Singapore 579700. Please indicate the attached cheque number.

REGISTRATION CLOSES ON 5th APRIL 2011
Withdrawals received in writing on or before 30th March 2011 will be refunded, less 10% administration fee. There will be no refund if the notice of withdrawal is received after 30th March 2011. BCA Academy reserves the right to cancel the program or amend the program structure without prior notice.

FOR ENQUIRIES ON ADMINISTRATION AND LOGISTIC MATTERS
Please contact Ms Wong Mee York at 6248 9894.
Alternatively, you can email her at wong_mee_york@bca.gov.sg

FOR ENQUIRIES ON COURSE DETAILS
Please contact Mr Yong Siew Hwa at 6248 9880.
Alternatively, you can email him at yong_siew_hwa@bca.gov.sg

Carnegie Mellon University and BCA Academy reserve the right to amend the program without prior notice.
Carnegie Mellon University has established a global reputation as a leading institution in the area of environmental sustainability. Recognized for its world-class engineering and technology programs, collaborations across disciplines and innovative leadership in education, CMU is consistently ranked among the top universities in the world. The Center for Building Performance and Diagnostics (CPBD) of the School of Architecture at CMU conducts research, demonstrations and teaching in relation to the performance of advanced building systems and technology. In 2008, the DesignIntelligence Magazine ranked CMU 7th in its undergraduate programs and first in Sustainable Design Practices & Principles.

“The business case for green buildings paints a very detailed picture of cost replication when developing green buildings. The intelligent workplace and how it is integrated with the usage provides validation for sustainable design when applied out of the classroom. - Alumni
The BCA Academy of the Built Environment is the education and research arm of the Building and Construction Authority, Singapore. Founded in 1984, the Academy offers a wide range of training and education programmes tailored to the needs of the building and construction industry. These programmes include programmes for professionals, management and executive personnel, and technical specialists.

In support of the national effort to transform Singapore into a green and sustainable global city, the Academy has initiated several training programmes to nurture and develop managerial and technical capability in such niche areas as green building design and technology, renewable energy, and sustainable facility and environment management. To enable our industry leaders and practitioners to learn from the experience and knowledge of leading experts, the Academy collaborates with established tertiary institutions (such as Carnegie Mellon University, Singapore Management University, UniSIM, University College London, Nottingham University and Stuttgart University of Applied Sciences) to conduct degree and post-graduate degree programmes, and executive programmes.
PAST PARTICIPANTS

JTC Corporation
National Parks Board
Building & Construction Authority
Housing & Development Board
Squire Mech Pte Ltd
Tiong Seng Contractors Pte Ltd
Hexacon Construction Pte Ltd
DP Architects Pte Ltd
Keppel Land International Ltd
RSP Architects Planners & Engineers (Pte) Ltd
CPG Consultants Pte Ltd
JTC Corporation
Ministry of Education
Ibase Technology Pte Ltd
Green Dot Consulting Pte Ltd Consultant
MKPL Architects Pte Ltd
Singapore Health Services Pte Ltd
Temasek Polytechnic
Ministry of Community Development
Davis Langdon & Seah Singapore Pte Ltd