

Solar Architecture towards Sustainable Cities

2019

Building Integrated PV Conference & Exhibition

Kent Ridge Guild House, National University of Singapore, Singapore

A large, abstract graphic consisting of multiple overlapping, wavy lines in shades of blue and green, flowing from the bottom left towards the top right, creating a sense of movement and energy.

**POST EVENT
REPORT**

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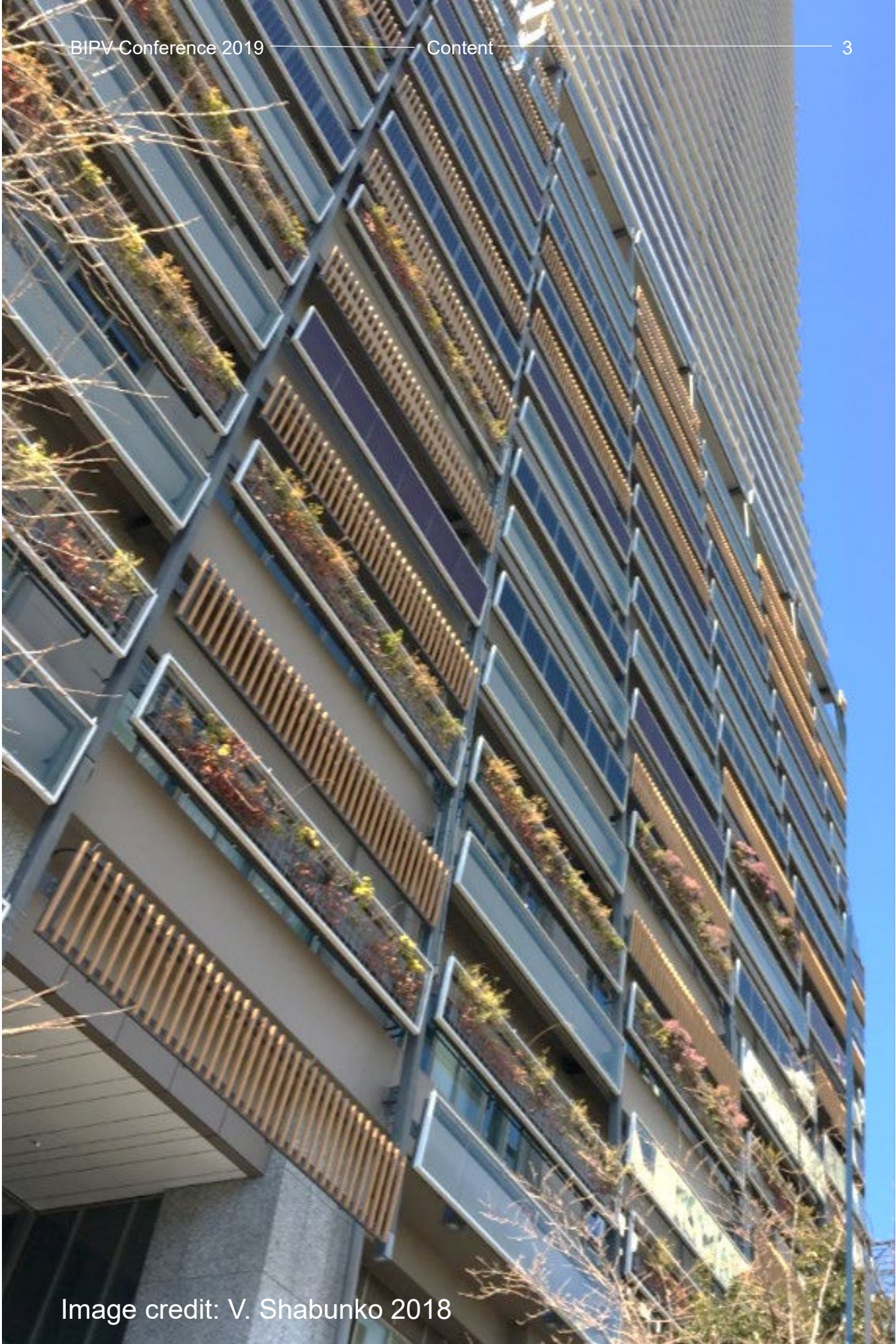


Image credit: V. Shabunko 2018



ABOUT

The Building Integrated PV Conference 2019

The BIPV Conference 2019 with the theme “Solar Architecture towards Sustainable Cities”, organized by SERIS, was held from 25 to 26 July 2019 at the Kent Ridge Guild House on the campus of the National University of Singapore (NUS). The event complemented the 5th “Urban Sustainability R&D Congress”, co-organized by the Ministry of National Development (MND) and various government agencies. BIPV is a key enabler to achieve urban sustainability.

To overcome the space constraints and competing uses for roof-tops, building-integrated PV (BIPV) or building-added PV (BAPV) are highly relevant for Singapore. BIPV could also become a key enabler for achieving BCA's green building agenda towards Super Low Energy high-rise (SLEB), Zero-Energy medium-rise (ZEB) and Plus Energy low-rise (PEB) buildings. Adding BIPV to the facades not only allows for on-site energy generation, but possibly also leads to a reduction in solar heat gain into the building. In many future building designs and retrofits of existing buildings, BIPV and BAPV will be part of the considerations.

Against this backdrop, it was the right time to bring together – for the first time in Singapore - BIPV industry players, innovators, building developers and private and public sector representatives to exchange information about the latest BIPV technologies, global success stories, façade integration, retrofits, advanced modelling tools, economic viability and BIPV standards.

The BIPV Conference & Exhibition 2019 attracted more than 200 attendees, including national and international experts, architects, engineers, building professionals, building developers and various stakeholders from private and public sectors.

The Building Integrated PV Conference 2019

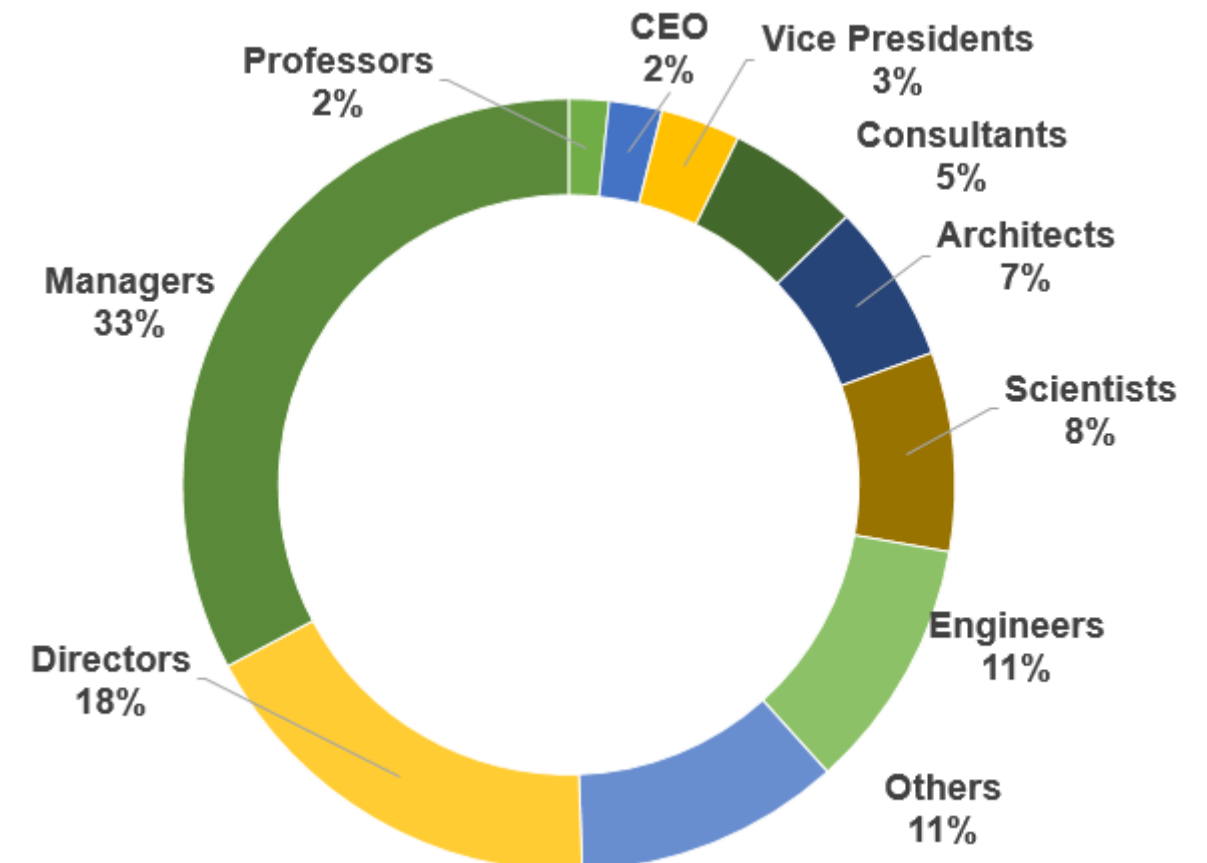
Selected highlights from expert sessions include:

- Latest BIPV module technologies session:**
 International experts, developers and BIPV/PV manufacturers shared information about latest innovative solar technologies, and trends in the clean energy industry. A wide variety of BIPV products was discussed, ranging from high-efficient, superlight-weight and flexible, homogeneously coloured, to transparent and even white BIPV modules.
- Façade-and system integration of BIPV session:**
 The importance of BIPV system designs, engineering solutions, innovative façade integration techniques and compliance with standards and regulations was highlighted, with a particular focus on the adoption of BIPV/BAPV facades in Singapore.
- Implementation of BIPV projects session:**
 Experts exchanged best practices worldwide and successful retrofits with BIPV/BAPV façade solutions. Financial aspects and the economic viability of innovative BIPV technologies were discussed, based on real world test-bedding results of BIPV facades.
- Panel discussion:**
 International experts and BIPV professionals shared their views on “What would it take to accelerate BIPV in Singapore?” The panel covered Singapore’s efforts towards the accelerated adoption of BIPV, compared the aesthetics aspects and efficiencies of coloured BIPV vs. conventional PV modules, highlighted the importance of building information modelling (BIM), and ended with the call for a holistic approach to work with relevant stakeholders across the private and public sectors.



KEY FIGURES BIPV CONFERENCE 2019

The BIPV Conference 2019 attracted more than 200 participants with over 40% comprising of high-level and senior management. Invited participants, keynote speakers and international experts came from Switzerland, China, Canada, Japan and Cuba.



CONFERENCE OVERVIEW

Conference Opening & Keynote Sessions



The BIPV conference 2019 started with a short address by Chairperson, Dr Veronika Shabunko, who welcomed all international experts, invited speakers and delegates to this first BIPV Conference in Singapore, with the theme “Solar Architecture towards Sustainable Cities”.

She further highlighted the need for more awareness amongst architects, developers and building professionals, as a pre-requisite for the accelerated adoption of BIPV in Singapore and beyond. This BIPV conference should therefore act as a first step towards a broader dialogue on BIPV in Singapore.

The densely built-up environment here with its large number of vertical surfaces opens up enormous opportunities to adopt latest BIPV technologies that come in a broad variety of colours, transparencies and flexibility. Solar Architecture and BIPV have the potential to become key enablers to achieve urban sustainability.

Dr Shabunko also expressed her gratitude to the industry sponsors and supporting organisations for their effortless support and for making the new BIPV movement happen.

Keynote Sessions



Prof Armin Aberle, CEO of SERIS, highlighted the needs for accelerated adoption of urban solar, especially BIPV, to support the decarbonisation of Singapore to fulfill the national commitments towards the Paris Agreement.



Prof Seeram Ramakrishna, Chair of Circular Economy Taskforce, called for “BIPV as a paradigm shift towards sustainable buildings and decarbonisation”. He also envisioned opportunities for BIPV/BAPV to be combined with energy storage systems to move towards self-sustainable buildings.



Tjerk Reijenga, Principal and Chief Architect at BEAR-iD and international expert of the IEA PVPS Task 15 for BIPV, shared his journey over the past 30 years as one of the leading experts in building-integrated solar architecture.



Ang Kian Seng, Director of the Environmental Sustainability Group at BCA, related BIPV to the ambitions of the Singapore government to “greening the building sector”, and how PV and BIPV can play a critical role under the Super Low Energy Building (SLEB) Technology Roadmap.

Latest BIPV module technologies

Representatives from the PV/BIPV industry shared their experiences and projects using latest BIPV technologies around the world. They also highlighted the need in the building sector to achieve self-sustainability, which could become the key driver for BIPV in the future.



Speakers: Liong Hang Cek (PvFoundry), Henry Eu (REC Solar), Peter Roethlisberger (Solaxess), Karthik Pilai (AGC), Dr Zhengrong Shi (Sunman), Philip Kwang (Façade Global Master).

Façade-and system integration of BIPV

International experts, architects, and engineers shared success stories of BIPV adoption, showed examples of façade integration for new and existing buildings, introduced advanced modelling tools for the economic viability of BIPV, provided insights on opportunities and barriers for BIPV, and shared relevant BIPV standards.



Speakers: Eric Langenskiold (Basler & Hofmann), Dr Khoo Yong Sheng (SERIS), A/Prof Abel Tablada (Technological University of Havana), A/Prof Patrick Janssen (NUS, SDE), Brandon Lye (HDB), Dr Mauro Pravettoni (SERIS), Tjerk Reijenga (BEAR-iD), Dr Veronika Shabunko (SERIS).

PANEL DISCUSSION:

What would it take to accelerate BIPV in Singapore?

The discussion was led by Dr Thomas Reindl, Deputy CEO of SERIS, who critically questioned the panelists on “what is missing” for the greater BIPV adoption in Singapore and “why it hasn’t happened until now”. The resulting discussion highlighted promising emerging technologies, the importance of standards and local regulations, but also called for better BIPV simulation tools that are inter-connected with architectural and building engineering software. Also, the expected payback time by developers often does not take the long-term benefits into account. There was consensus that it takes a “whole of government and industry” approach to really make a difference and promote BIPV in Singapore in a big scale.



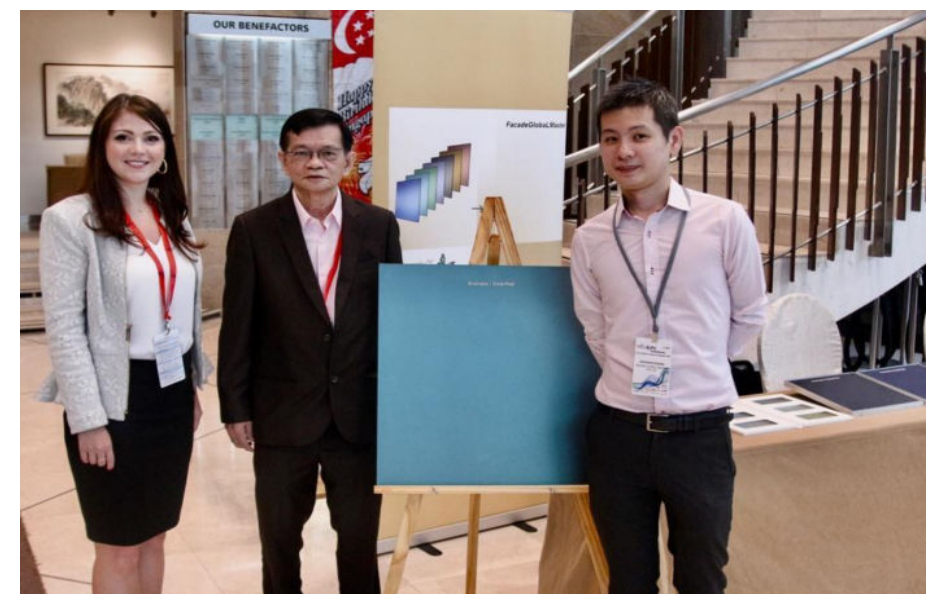
Speakers: Dr Thomas Reindl (SERIS), Eric Langenskiold (Basler & Hofmann), Philip Kwang (Façade Global Master), Tjerk Reijenga (BEAR-ID), Liong Hang Cek (PvFoundry).



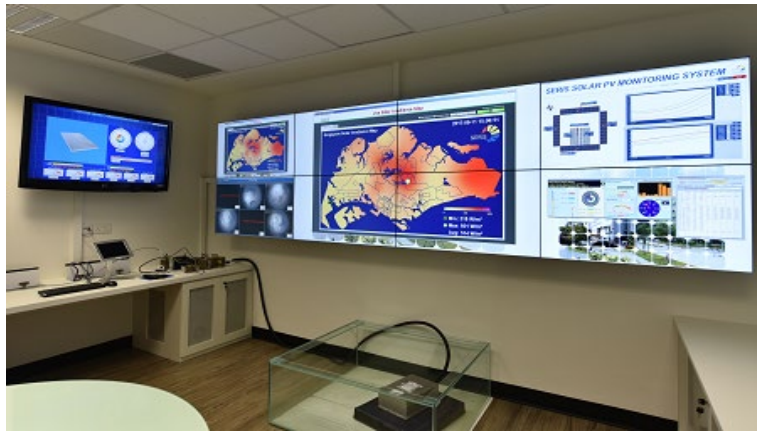
Exhibition

In many future building designs and retrofits of existing buildings, BIPV and BAPV will be part of the considerations. Therefore, the BIPV Exhibition 2019 aimed to share information on latest technologies, success stories and best practices from around the world, but also to openly discuss challenges and barriers for a larger adoption of a future “Solar Architecture” in Singapore.

The Exhibition combined novel BIPV product suppliers, as well as engineering and consultancy companies, showcasing the latest developments in solar building applications.



Lab Tours & Site Visits to BIPV Façade Testbed



SERIS' PV System Monitoring Laboratory



SERIS' Calorimeter Laboratory



BIPV Testbed at the T2 Lab, NUS campus



BIPV SG Workshop

The **BIPV SG Workshop** aimed to bring together early adopters, various governmental and regulatory bodies and relevant stakeholders from private and public sector to take on a leadership role in advancing and promoting BIPV in Singapore.

BIPV SG is an interactive platform to address barriers and find innovative solutions to overcome them in an inter-disciplinary manner, covering the full value chain from design, component selection, construction, installation to operation & maintenance of novel, solar-powered BIPV- and BAPV solutions.



BIPV SG Workshop

Speakers



Tjerk Reijenga,
Principal & Chief Architect,
BEAR-iD,
China



Prof. Seeram Ramakrishna,
Chair, Circular Economy
Taskforce, National
University of Singapore



Ang Kian Seng,
Group Director,
Environmental Sustainability,
BCA, Singapore



Dr Zhengrong Shi,
Founder & Chairman,
SunMan Energy,
China



Philip Kwang
Director, Façade Global
Master, Singapore



Peter Roethlisberger,
COO, SOLAXESS White
Technology, Switzerland



Henry Eu,
Country Manager,
REC Solar, Singapore



Karthik Pillai,
Façade Engineer, AGC Asia
Pacific, Singapore



Eric Langenskiöld,
Technical Director
Photovoltaics, Basler &
Hofmann, Switzerland



Liong Hang Cek,
Founder & CEO,
PvFoundry,
Singapore



Assoc Prof Patrick Janssen
Department of Architecture,
National University of
Singapore



Dr Khoo Yong Sheng
Head, PV Module Group &
BIPV Innovations, SERIS,
Singapore



Dr Veronika Shabunko,
Head, BIPV Centre of
Excellence, SERIS,
Singapore



Asst Prof Abel Tablada,
Faculty of Architecture,
Technological University of
Havana, Cuba

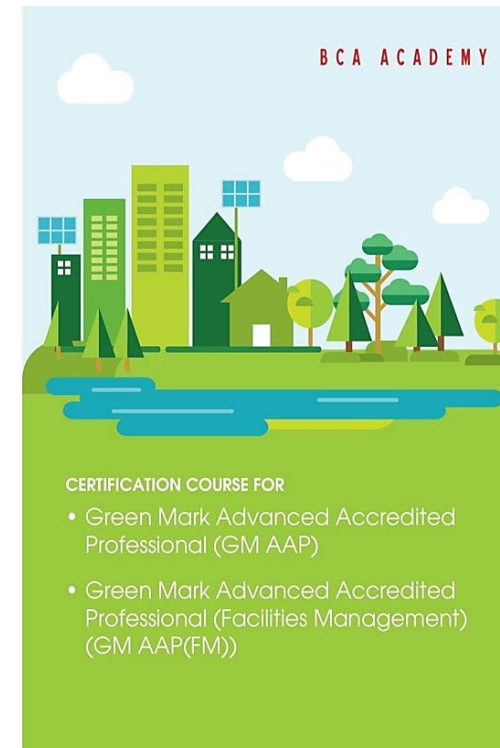


Brandon Lye,
Senior Engineer,
Building & Research Institute,
HDB, Singapore



Dr Mauro Pravettoni,
Team Leader, PV Module
Characterisation, SERIS,
Singapore

Upcoming trainings



BIPV information resources

One-stop shop portal:

www.bipv.sg

Life-cycle cost calculator for BIPV:

<https://www.solar-repository.sg/lcc-calculator>

BIPV service brochure:

http://www.seris.nus.edu.sg/doc/services/SERIS-Brochures/BIPV%20Brochure_2020%20V2.pdf

Presentations are available at

<https://bipv.sg/presentations>

Annex - Conference Programme

THURSDAY	
25 July	Building Integrated PV Conference 2019
Time	Venue: Kent Ridge Guild House, National University of Singapore (NUS)
08:30 – 9:00	Registration
09:00 – 10:30	Conference Opening & Keynote Sessions
09:00 – 09:05	Opening & Welcome Remarks “BIPV Conference 2019”
09:05 – 09:20	<u>GoH speech</u>
09:20 – 09:40	<u>Keynote #1</u> : “ BIPV as a paradigm shift towards Sustainable Cities ”, Prof Seeram RAMAKRISHNA, Chair of Circular Economy Taskforce, NUS
09:40 – 10:10	<u>Keynote #2</u> : “ 30 Years of Building Integrated Solar Architecture ”, Tjerk REIJENGA, Principal and Chief Architect, BEAR-ID, China
10:10 – 10:30	<u>Keynote #3</u> : “ Super Low Energy (SLE) Roadmap – Critical role of rooftop PV and BIPV ”, ANG Kian Seng, Group Director, Environmental Sustainability, BCA, Singapore
10:30 – 11:00	Exhibition Opening & Networking coffee break
11:00 – 13:00	Session 1: Latest BIPV module technologies
11:00 – 11:20	“ Super-light-weight PV modules for BIPV ”, Dr SHI Zhengrong, Founder & Chairman, SunMan Energy, China
11:20 – 11:40	“ Façades with Smart Power generation solutions ”, Karthik PILLAI, Façade Engineer, AGC Pacific, Japan / Singapore
11:40 – 12:00	“ Why and how buildings should not change their aesthetics while becoming energy producers ”, Peter ROETHLISBERGER, COO, SOLAXESS White Technology, Switzerland
12:00 – 12:20	“ BIPV and Solar Architecture - Colour Is The New Black ”, Philip KWANG, Director, Façade Global Master, Singapore
12:20 – 12:40	“ PV Quality Beyond Expectations ”, Henry EU, Country Manager, REC Solar, Singapore
12:40 – 13:00	“ Smart Module for BIPV System Application ”, Liang Hang Cek, Founder & CEO, PvFoundry, Singapore
13:00 – 14:00	Networking lunch

Annex - Conference Programme

THURSDAY	
25 July	Building Integrated PV Conference 2019
Time	Venue: Kent Ridge Guild House, National University of Singapore
14:00 – 16:00	Session 2: Façade-and system integration of BIPV
14:00 – 14:30	“ BIPV – The Perfect Combination in Design & Energy ”, Eric LANGENSKIOLD, Technical Director Photovoltaics, Basler & Hofmann, Switzerland
14:30 – 14:45	“ BIPV in HDB estates ”, Brandon LYE, Senior Engineer, Building & Research Institute, HDB, Singapore
14:45 – 15:00	“ Pre-fabrication technologies for innovative façade integration of BIPV modules ”, Dr KHOO Yong Sheng, Head PV Module Development & BIPV Innovations, SERIS, Singapore
15:00 – 15:15	“ 3D modelling of facades for assessing BIPV potential ”, A/Prof Patrick JANNSEN, NUS School of Design and Environment, Singapore
15:15 – 15:30	“ International standards for BIPV: overview and current status ”, Dr Mauro PRAVETTONI, Team Leader PV Module Characterisation, SERIS, Singapore
15:30 – 15:45	“ T2 lab: Harmony of solar and greenery ”, A/Prof Abel TABLADA, Technological University of Havana, Cuba
15:45 – 16:00	TBA.
16:00 – 16:30	Networking coffee break
16:30 – 18:00	Session 3: Implementation of BIPV projects
16:30 – 16:50	“ Successful retrofit BIPV projects ”, Tjerk REIJENGA, Principal & Chief Architect, Bear-ID, China
16:50 – 17:10	“ Financial assessment of BIPV façades in Singapore ”, Dr Veronika SHABUNKO, Head of BIPV Centre of Excellence, SERIS, Singapore
17:10 – 17:55	PANEL DISCUSSION : “What would it take to accelerate BIPV in Singapore?” Tjerk REIJENGA, Principal & Chief Architect, BEAR-ID, China ANG Kian Seng, Group Director, Environmental Sustainability, BCA, Singapore Philip KWANG, Director, Façade Global Master, Singapore Eric LANGENSKIOLD, Technical Director PV, Basler & Hofmann, Switzerland
17:55 – 18:00	Summary of BIPV Seminar and Outlook to Friday
18:00 onwards	BIPV Seminar 2019 Reception

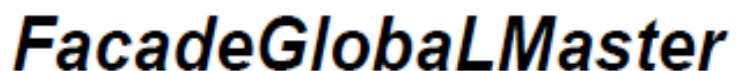
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Sponsors:



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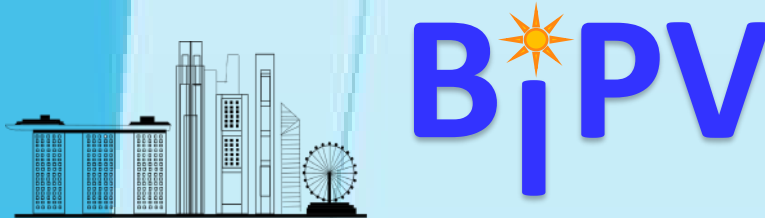
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We look forward to welcoming you at



Solar Architecture towards Sustainable Cities 2020

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