

Sustainable

A BCA-SIA Publication 2010 • Issue No 1

Architecture

Embracing green in the new year

Year 2009 has been a booming year for the construction industry. We have seen an increasing trend in the adoption of green building technologies, products and sustainable construction methods.

In this very first issue of Sustainable Architecture for the year 2010, we will showcase BCA's flagship R&D project - Zero Energy Building (ZEB). This three-storey institutional building at the BCA Academy is designed to be about 40 to 50 percent more efficient than an office building of a similar layout and is expected to generate as much electricity as it consumes over a typical year.

Another ground breaking project that is highlighted is the Samwoh Eco-Green Building, which is the first building structure in the region that uses concrete with up to 100 percent recycled concrete aggregate (RCA), which is derived from construction and demolition waste. It demonstrated a revolutionary achievement in modern construction and design and set a positive direction for sustainable design for the future.

Following the success of the BCA-NParks Green Mark for Existing Parks, the scheme will be extended to include new parks. The new BCA-NParks Green Mark for New Parks aims to inspire and promote sustainable park design, as well as to identify the best practices in park design, construction, management, and maintenance planning. Both the Dairy Farm Nature Park and the Greenwood Sanctuary @ Admiralty are featured in this issue.

We also look at two buildings that have obtained the Green Mark platinum award. Using a "Whole Building Design Approach", the Woh Hup building created a people-centric high performance commercial office building with highly integrated active and passive design features. The second project is called The Galen and it has one of the most energy efficient chiller plants in Singapore. The "super efficient" chiller plant attained total plant efficiency of 0.56kW/RT.

We also speak with Mr. Lee Chuan Seng, President of the Singapore Green Building Council (SGBC), who shares with us the

Inside this issue:



aims, objectives and mission of the SGBC and the prospects for green building in Singapore.

Wang Lei
Senior Development Officer
Building & Construction Authority

EDITORIAL TEAM:

Building and Construction Authority SIA

ADVISORS: Jeffery Neng, Chia Yen Ling, Lee Jang Young & Wang Lei, Technology Development Division (BCA); Goh Peng Thong, AWP Pte Ltd; Richard Lai, ADDP Architects (SIA) **EDITOR:** Hazel Joanne **GRAPHIC DESIGNER:** Sharifah Amirah

Sustainable Architecture is published twice a year by the Building and Construction Authority (BCA), Singapore Institute of Architects (SIA) and Trade Link Media Pte Ltd (TLM). The editorial team is unable to accept any liability for errors or omissions that may occur, although every effort has been taken to ensure that all information is correct at the time of going to press. No portion of this publication may be reproduced in whole or part without the written permission of BCA. To contact the editorial team, please write to: wang_lei@bca.gov.sg or call Tel: 63255017.

Printed on recycled paper



We shape a **safe, high quality, sustainable** and **friendly** built environment.

Samwoh Eco-Green Park: **A future** where nothing goes to waste

By:
*Dr. Ho Nyok Yong,
Dr. Kelvin Lee Yang Pin,
Mr. Lim Wee Fong*

As a key segment of Singapore's economy, the construction industry plays an important role in providing infrastructure and buildings to support local economic development. Increasingly, the industry will have to play a greater role in shaping a sustainable environment for Singaporeans, both now and in the future.

Under the Sustainable Singapore blueprint, we recognise the need to improve the ways we use our resources, and to expand our renewable resources. This promotes resource-efficient building design and the use of recycled waste materials, which is an important component of our sustainable development journey.

A groundbreaking accomplishment

In response to the government's call, Samwoh Corporation, a leading integrated construction company and green products supplier, has embarked on an ambitious and forward-thinking demonstration project to build the first structure in the region using concrete with up to 100 percent recycled concrete aggregate (RCA), which is derived from construction and demolition (C&D) waste. The building is known as the Samwoh Eco-Green Building, which houses Samwoh's research and development (R&D) centre.



Samwoh Eco-Green Building.

BCA GREEN MARK PLATINUM AWARD 2010

The Samwoh Eco-Green building has marked a significant milestone in sustainable development in Singapore. It is part of the Samwoh Eco-Green Park that was officially opened on 22 March 2010 by Ms. Grace Fu, Senior Minister of State for National Development and Education.

C&D waste constitutes a significant portion of solid waste generated in Singapore. It is estimated that about two million tonnes in C&D waste is produced annually. The disposal of the waste poses a major environmental problem due to limited land space. In the past, when old buildings were demolished, the rubble was either discarded or used for low-value works such as land filling.

But today, through extensive R&D works that were undertaken jointly by Samwoh, Building and Construction Authority (BCA) and Nanyang Technological University (NTU), technologies have been developed to recycle the waste to produce RCA to replace natural aggregate for structural concrete. The project was awarded the MND research fund by the Ministry of National Development Singapore.

The project comprises two stages. The first stage involves extensive laboratory evaluation of the performance of concrete with RCA. The second stage is to construct a three-storey building using concrete that contains RCA, with advanced instrumentation installed in the building to monitor the performance of the structure. The data obtained from the project can be used to update existing building code requirements to allow the use of RCA in all buildings in the future.

Other green features

Together with this achievement, Samwoh has also built two other green premises that are beneficial to environmental

sustainability, namely, an asphalt recycling plant and a ready-mixed green concrete plant.

Asphalt recycling plant

Every year, a large amount of asphalt pavement waste is generated during road maintenance and rehabilitation. The waste is largely used for temporary access roads or as backfill material for the road sub-base, which is very low in economic value. The rising cost of natural materials has triggered a need to use this waste more effectively.

The company has undertaken research studies together with the Land Transport Authority (LTA) and National Environment Agency (NEA) to study the effective use of the asphalt pavement waste for asphalt production in road construction. Both the laboratory and field studies have shown promising results.

Following the success of the study, Samwoh has set up a brand new asphalt recycling plant with processing facilities to recycle asphalt pavement waste into reclaimed asphalt pavement (RAP) which contains mainly aggregate and bitumen that can be reused for asphalt production.

The plant employs state-of-the-art technology to recycle asphalt pavement waste into asphalt mixtures for road construction. This offers an important opportunity to save the use of natural aggregate and bitumen, conserve energy, divert materials from landfills as well as save cost.

The recent announcement by LTA in March 2010 on the approval of the use of RAP in asphalt mixtures for road construction will accelerate the development of sustainable built environment for our future generation.



Asphalt pavement waste.



Asphalt recycling plant.

Green Concrete Plant

The Samwoh Green Concrete plant is capable of producing green concrete which contains recycled materials such as washed copper slag, RCA and green cements for the construction industry. It can also produce high performance concrete and other concrete mixtures.

In addition, the plant has the recycling facility to separate sand and stone from fresh waste concrete which can be reused for the manufacturing of green concrete. In fact, the concrete containing RCA used for construction of Samwoh Eco-Green Building was delivered by this plant.

Conclusion

The accomplishment of Samwoh Eco-Green Park has opened a new chapter in sustainable development in Singapore. The Eco-Green building showcases a breakthrough in construction technology by using concrete with up to 100 percent RCA, a feat that is beyond existing design code limits. The asphalt recycling plant is able to recycle asphalt pavement waste into asphalt mixtures, alleviating waste disposal problems and saving on natural materials needed for road construction. Last but not least, the green concrete plant not only produces green concrete for civil engineering and building construction, it can also reclaim sand and stone from waste concrete, reusing it for green concrete production.

These three facilities have demonstrated a revolutionary achievement in modern construction and design and set a positive direction for sustainable design for the future; a future where nothing goes to waste.

The authors would like to thank the following professionals who have contributed in the R&D works for the Samwoh Eco-Green Building: Er. Chew Keat Chuan, Er. Yvonne Soh, Mr. Low Giau Leong and Er. Punithan Shanmugam from Building and Construction Authority, Mr. Koh Hoon Lye from Samwoh Corporation and Assoc. Prof. Ting Seng Kiong from Nanyang Technological University.



Samwoh's green concrete plant.