

ISSUE ONE
A BI-ANNUAL NEA PUBLICATION

envision

PROFESSIONAL SHARING SERIES

WASTE AS A RESOURCE: POTENTIALS AND LIMITS

Professor Rainer Stegmann reveals the hidden truths of waste as a resource

THE CHANGE TO EURO 5

Technological evolutions improve health

AN EXCLUSIVE INTERVIEW: MR LEE EK TIENG

THE SINGAPORE RIVER STORY

A dialogue session with one of the key minds behind the Singapore River clean-up



Our Environment - Sustain and Enjoy

GROWING RECYCLING OF CONSTRUCTION AND DEMOLITION WASTE

Construction and Demolition (C&D) waste is derived from the building and construction industry. It consists mainly of concrete, bricks, tiles, reinforcement bars, drywall, wood, plastic, glass, scrap iron and other metals. Around 99 per cent of this is currently recycled. Instead of sending the waste to the landfill and paying a disposal fee, the waste is converted into secondary building materials. This helps to reduce the import of raw materials.

Effective recycling of C&D waste starts from on-site segregation. Reinforcement bars and scrap metals have long had high recycling rates due to their residual economic value. Nowadays, various constituents of C&D waste have attracted recycling efforts focused on creating new value, including Recycled Concrete Aggregate (RCA).

RCA is reclaimed from waste concrete made with natural aggregates. With the introduction of performance-based standards like SS EN 12620: Specification for Aggregates for Concrete, recycled and manufactured aggregates can now be adopted for a range of structural and non-structural applications.

The main difference between RCA and natural aggregates is that RCA has a thin layer of remaining cement paste adhering to it after processing. Because of this, the water absorption rate is three to five times higher than natural aggregates; otherwise the density and other physical properties are similar to natural aggregates.

Processed RCA can ultimately be used for structural works as a partial replacement of natural aggregates, as approved by the Building and Construction Authority (BCA), or non-structural works such as non-load-bearing walls, footpaths, lean concrete and sub-base material for road construction.

In 1995, to help expand the recycling of C&D waste, NEA converted part of Lim Chu Kang Dumping Ground (LCKDG) — a sanitary landfill from 1976 to 1992 — into Sarimbun Recycling Park (SRP). C&D waste recycling was one of the initial activities identified as it requires a large area of land to operate. Other industries include the recycling of horticultural and wood waste, plastic, street cleansing and tyre waste. SRP has since been leased to several recycling companies, six out of 13 of which recycle C&D waste.

RECLAIMING RCA



Stage 1: Initial crushing is done by jaw crushers.



Stage 2: Ferrous metals are removed using magnetic separators.



Stage 3: Foreign materials such as bricks, plastics and asphalt are screened and removed.



Stage 4: Secondary crushing is carried out.



Stage 5: RCA is filtered into different size groupings for different uses. An example would be pre-cast kerbs.

OUTSTANDING COMPANIES

Increasingly, innovation has helped to transform waste into new materials in the construction industry.

One C&D waste recycling company located in Sarimbun, M/s Hock Chuan Hong Waste Management Pte Ltd, sees C&D waste as a resource to produce new construction materials. It has successfully carried out research work to use RCA to produce drain channels and road kerbs, supplying them to various drainage and road projects.

Another civil engineering and building material company, Samwoh Corporation Pte Ltd, launched Samwoh Eco-Green Park in 2010. This park will provide the industry with more sources of sustainable construction materials such as recycled paving materials from Samwoh's new asphalt recycling plant and eco-concrete from its concrete batching plant. The park will also house an eco-green building, the result of applied research and development (R&D) in concrete technology.

The three-storey eco-green building is the first in Singapore and South-east Asia to use concrete made from 100 per cent RCA for the construction of its top level. Embedded within the building's columns are sensors that facilitate further research into the performance of concrete made from RCA.

Recycled materials from C&D waste have improved in quality over the years as a result of constant innovation and R&D. NEA hopes that the work these companies have done will inspire more developers to use RCA and other recycled materials for their building projects.

With limited natural resources and land for the disposal of waste, it is imperative that Singapore change its view of waste as a disposal liability to one of it as an actual resource (see the article, Far From Wasted).

The government has taken a bold step, having invested heavily in R&D centres such as the Residues and Resource Reclamation Centre at Nanyang Technological University in an attempt to help solve some of the country's outstanding waste-related issues.

By using recycled materials, reliance on imported materials is reduced which in turn will help extend the lifespan of Singapore's current offshore landfill, freeing up vital land space on the mainland for other development purposes.



1. Application of RCA: Pre-cast drains
2. Bird's eye view of Samwoh Eco-Green Park
3. Samwoh Eco-Green Park
4. Asphalt recycling plant and trucks

