

# The road to recycling could well be paved with plastic waste

Construction firm works with SP team to develop plastic pellets for use in road building

Timothy Goh

Local construction company Samwoh has teamed up with researchers and students from Singapore Polytechnic to turn plastic waste into a material which can be used to build more durable road surfaces.

Singapore has been looking for new ways to manage its waste as its sole landfill, Semakau Landfill, is rapidly filling up, and is projected to be completely full by 2035 – 10 years earlier than planned.

Plastic waste in particular has been difficult to manage, with 949,300 tonnes generated in 2018 but just 40,700 tonnes – or around 4 per cent – recycled.

With this in mind, Samwoh decided to see if it could use plastic waste as a component in its asphalt.

Dr Kelvin Lee, senior technical manager at Samwoh Innovation Centre, told The Straits Times: "We realised that... countries like Australia, India and the United Kingdom have done studies on this and tried (using such asphalt) out on their roads."

Dr Lee said asphalt, which is used to pave roads, is typically made of a mixture of stones and bitumen, a byproduct of petroleum, which is created by processing crude oil.

In certain cases, such as when paving expressways, the mixture is enhanced with additives like polymers to strengthen it.

Samwoh wanted to see if plastic waste could be used as a partial substitute for bitumen.

Dr Lee said the firm initially considered using unprocessed plastic waste, as is the practice in some parts of India, but decided against it due to concerns about contamina-

tion and chemical leaching.

Samwoh is using processed plastic pellets, the result of part of the plastic recycling process, which it obtained from recycling firms here.

This is the first time such pellets have been used in creating asphalt in Singapore.

Samwoh also tapped the expertise of Singapore Polytechnic (SP) to test the suitability of the pellets.

Research scientist Lim Zheng Bang and research engineer Estee Tan of SP's Advanced Materials Technology Centre, and Dr Handoyo Djati Utomo and Dr Chan Chin Loong, lecturers at the School of Architecture and the Built Environ-

ment, worked with two groups of students to test the asphalt made with the plastic pellets.

The pellets replaced a portion of the bitumen that usually goes into the mixture for asphalt.

The optimum proportion is still being determined, but the researchers are replacing 10 per cent of the bitumen with plastic.

Led by students Justine Lam and Emdrey Oo, both 21, the teams found that asphalt made from plastic waste could last at least 20 per cent longer than regular asphalt, and had levels of chemical leaching that were within official guidelines.

Ms Oo said if all of Singapore's roads were to be re-laid with the new asphalt, about 20,000 tonnes of plastic waste could be reused.

Dr Lee said the new asphalt would be cheaper than the rein-



Singapore Polytechnic student Tan Li Yan with a sample of the asphalt material made from plastic waste that could last at least 20 per cent longer than regular asphalt. ST PHOTO: MARCELLIN LOPEZ

forced asphalt used on expressways, and that because it could be more durable, it may also be more cost-effective than regular asphalt.

The team will continue its research, and hopes to test its product on a stretch of road soon.

"We hope to collect more data and showcase it to the various agencies," said SP's Dr Lim, the project's principal investigator.

He added that there may be other applications of plastic waste as a bitumen substitute, such as a water-

proof coating on rooftops.

Dr Lee said: "We are hopeful that this research can help to promote sustainable construction through the recycling of plastic waste."

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