

New research centre set to turn landfill trash into treasure

Goal is to unlock valuable materials from residues and toxic waste for industries

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As Singapore's only active landfill on Pulau Semakau runs out of space, the Republic has launched an ambitious research centre to give it a new lease of life.

The aim of the Towards Resource Efficiency And Sustainability for Urban EnvironmentS (TREASURES) centre is to unlock valuable materials for construction and other industries from residues and toxic waste, giving the landfill many more operational years.

The first-of-its-kind national research centre established by the National Environment Agency (NEA) and Nanyang Technological University (NTU) was announced by Senior Minister of State for Sustainability and the Environment Janil Puthucheary on June 17.

"The TREASURES programme

represents a long-term commitment to tackling the waste streams that have, until now, been the most challenging to address," he said, speaking at environmental services event Catalyst at Marina Bay Sands, which drew about 300 industry leaders, global policymakers and other stakeholders in the ecosystem.

"It is aptly named, as these materials cannot easily be recycled, but they do hold significant value to industry when properly recovered and properly managed."

The offshore landfill is projected to hit full capacity by about 2035. This projection will be recalculated as part of a review of Singapore's Zero Waste Masterplan.

The idea is to transform Semakau Landfill by identifying opportunities for recovering resources, as well as developing technologies and standards to repurpose these materials for other uses.

It is supported with \$35 million from the Research, Innovation

and Enterprise 2025 Plan. NTU is the host institute for the centre from Jan 1, 2026, to March 31, 2030.

TREASURES co-director Chu Jian told The Straits Times that the centre could position Singapore as a global leader in sustainable urban development and maximising the use of its materials.

The chair of NTU's School of Civil and Environmental Engineering added: "Singapore is facing a unique challenge that many other countries will not encounter: We will not have space for another landfill once Semakau reaches its full capacity.

"Therefore, we need to develop our own solutions on how to make beneficial use of the waste in the existing landfill and how to reduce the amount of waste sent for disposal to zero or nearly zero."

The dream is to ultimately transform the landfill into a transit storage and processing hub, while extending its lifespan, he added.

TREASURES will also work closely with waste generators and treatment companies to develop solutions and shorten the journey from laboratory research to im-



The dream is to ultimately transform Semakau Landfill (above) into a transit storage and processing hub, said TREASURES co-director Chu Jian. PHOTO: NEA

plementation, he said.

Beyond Singapore's shores, the centre plans to encourage knowledge sharing and exchange through international partnerships.

Said the NEA: "These efforts will support longer-term goals, including the transformation of Semakau Landfill to enable more sustainable and circular approaches to waste and residue management, while reducing reliance on landfilling over time."

The agency told The Straits Times that TREASURES will also focus on reducing what gets taken to Semakau Landfill, with the aim of reducing reliance on disposal.

"TREASURES was established to address this broader challenge (of tackling some of the most challenging waste streams) by bringing together researchers, industry and the Government to develop

science-based solutions across the entire residue and toxic industrial waste value chain," it said.

This comes as the amount of waste thrown away in Singapore hit a record high in 2025, according to the annual waste statistics.

On June 17, the centre launched its first call for proposals for projects that advance practical, scalable solutions for residue and toxic industrial waste management.

The grant call, which closes at 5pm on Aug 17, is open to all institutes of higher learning, research institutes and firms.

To date, NTU has found ways to transform incineration ash and sewage sludge into valuable resources, as well as incorporate residues into construction materials.

NTU associate professor Fei Xunchang envisioned that these ongoing and potential future stud-

ies supported by the centre could turn Semakau Landfill into cells for different storage and processing activities, potentially extending its lifespan by decades.

This approach to waste has the potential to be adopted by other countries that operate or are planning to develop offshore landfills, he added. These include Japan, South Korea and China.

The centre will also partner the National University of Singapore (NUS) and other institutes of higher learning.

Acting head of NUS' Department of Civil and Environmental Engineering Karina Gin said the department has over the past two decades been exploring strategies to detoxify and reuse landfill waste. These include harnessing the reactive components within waste streams and transforming them into sustainable cement-like materials.

The centre will enable many of these research concepts to be turned into practical, scalable solutions, with the long-term vision of prolonging the use of landfill waste, she added.

Also announced on June 17 was a refreshed plan for firms in the cleaning, waste management and pest management sectors to identify and adopt digital tools to address business challenges.

The plan also incorporates artificial intelligence-enabled technologies that can tackle manpower constraints and evolving industry demands.

One example is a toilet-cleaning robot by home-grown robot firm Hivebotics, said Janil. The machine has enabled cleaners at Our Tampines Hub to focus on areas that require human intervention and quality assurance.

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