

Republic makes \$118m push to manufacture materials from living organisms under bioeconomy initiative

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Singapore wants to harness nature's living "factories" and produce enzymes, chemicals and materials – some of which can replace fossil fuels – with a \$118 million push to grow its bioeconomy sector.

Such products include sustainable aviation fuel, which can replace petroleum-based jet fuel.

Polymers made from castor oil can be substituted for plastics made from crude oil, while using biomethane for energy can reduce the need to burn fossil-based natural gas.

The Bioeconomy Funding Initiative was announced on Oct 5 by Education Minister Desmond Lee at the launch of the National Centre for Engineering Biology.

The Economic Development Board (EDB) and A*STAR are driving the effort. Its launch comes amid projections that the global market for such materials and chemicals could exceed US\$200 billion (\$256 billion) by 2030.

The effort is Singapore's largest funding tranche for developing the bioeconomy sector, according to the government agencies.



Launched on Oct 5, the National Centre for Engineering Biology at NUS will focus on building knowledge and technologies in engineering biology for the sustainable biomanufacturing of speciality chemicals. ST PHOTO: NG SOR LUAN

The initiative joins existing funding of about \$82 million and contributes to a total commitment of some \$200 million for bioeco-

nomy-related projects over the next five years.

EDB's managing director Jermaine Loy said at the launch event

at the National University of Singapore (NUS) that the promising outlook for the bioeconomy is driven in part by the roll-out of regula-

tions spurring firms to look for alternatives to raw materials dependent on fossil fuels.

Biological sciences are increasingly used to make products that outperform existing ones in areas such as agricultural crop protection and consumer care, he added.

Against this backdrop, the fund will build research capabilities in areas where Singapore has an advantage to tackle challenges flagged by local companies, start-ups and investors, including its position in South-east Asia, where most of the world's palm oil is produced.

"Our ambition is for the bioeconomy to become a new source of growth for Singapore," said Loy.

He said the bioeconomy could spark new business opportunities in the development of speciality chemicals and advanced materials, and create good jobs and new career pathways for Singaporeans.

EDB said this emerging area could also strengthen Singapore's energy and chemical sector, which today accounts for about 20% of the country's total manufacturing output.

EDB vice-president for chemicals and materials Kelly Lai said Singapore's strong energy and chemicals sector, as well as expertise in synthetic biology and re-

search and innovation, will enable the country to better tap opportunities in the bioeconomy.

Said Lai: "Home to a diverse range of companies – from global majors to specialised players – with a long-term presence here to serve demand across Asia, (the sector) has the depth and scale to pursue new growth pathways.

"The bioeconomy gives these companies new tools to diversify raw material sources, develop novel high-value products and produce more sustainable chemicals and materials, supporting Singapore's broader push into speciality chemicals and advanced materials."

For instance, researchers at the HH@NUS SINERGY Laboratory – a partnership between NUS and industrial polymer firm Huahao Chemical – have found a way to use living cells as factories to make building blocks for a polymer in fibres and fabrics.

The initiative will focus on four areas.

The first aims to transform underused agricultural waste from the production of biodegradable fuels – such as crude glycerol from

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New office to help promising innovations reach adoption

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palm residue – into cheaper, sustainable raw materials.

The second seeks to engineer microbes and enzymes using advanced tools, including artificial intelligence.

The third looks at improving industrial-scale processes using smart monitoring and digital technologies to reduce waste and lower costs.

The final area will identify the most effective ways to produce commercially relevant products, such as high-grade synthetic rubber and cosmetic ingredients.

Projects under the initiative will be managed by the new Bioeconomy Innovation Office in A*STAR, which will help promising innovations reach adoption and commercialisation.

A*STAR's interim programme director for the Bioeconomy Innovation Office Wong Min Hao said the fund will help boost the resilience of supply chains by finding materials to reduce reliance on petrochemicals.

He cited the region's unique waste streams of palm oil, cassava, tapioca and rice as areas Singapore could look into.

If successful, this could mean using dyes made of such materials instead of petrochemicals, he added.

Ultimately, the fund aims to push for more commercial outcomes at the end of five years, said Wong.

NEW CENTRE FOR ENGINEERING BIOLOGY

Meanwhile, the National Centre for Engineering Biology – hosted at NUS – will nurture scientists and innovators who will shape the field that programmes and harnesses living cells, said Lee.

He was speaking at the opening of the inaugural Singapore Engineering Biology Week, which brings together those in the field.

He added: "Students and researchers will work across disciplines and institutions, and engage industry on real-world needs. In doing so, they will deepen their expertise and make an impact."

Officially opened on Oct 5, the centre is supported by a National Research Foundation grant of nearly \$50 million, awarded over seven years starting in 2023.

It brings together Singapore's institutes of higher learning, including NUS, Nanyang Technological University and the Singapore Institute of Technology.

The centre will focus on building knowledge and technologies in engineering biology for the sustainable biomanufacturing of specialty chemicals, such as flavour and fragrance compounds.

Its ongoing flagship project, led by NUS, focuses on AI-guided engineering biology for sustainable specialty chemicals.

It aims to engineer microbes and enzymes that can convert renewable feedstocks – organic materials used to create fuels and other chemicals – into specialty chemicals.

Said the centre's executive director Matthew Chang: "Our goal is to enable more sustainable ways of making products that society depends on, using renewable feedstocks and cleaner manufacturing processes."

More than 150 researchers, students and professional staff contribute to the centre's work across partner institutions.

Recruitment is ongoing for about 50 more roles, the centre's institutes of higher learning said in a statement.

These positions include principal investigators, postdoctoral researchers and graduate students, as well as technical, engineering, laboratory support and centre management staff.

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