

Four-in-one utilities plant for the tropics

NUS team generates cheaper and greener way to produce power

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Local researchers have come up with what they describe as a greener and cheaper way to produce electricity, water, air-conditioning and heat, custom-made for the tropics.

The smart quad-generation plant produces all four key utilities simultaneously using a single, integrated system.

Associate Professor Ernest Chua of the department of mechanical engineering at the National University of Singapore (NUS), who led the research, said the plant offers greater energy and cost savings,

and can shave carbon dioxide emissions by one-third.

Said Prof Chua: "Running four independent processes also results in extensive energy wastage, and such systems take up a huge floor area. With our smart plant, these processes are carefully integrated such that waste energy can be harvested for useful output."

The novel approach could lower energy usage by 25 to 30 per cent, and cut carbon emission by 2 to 4 per cent at business-as-usual levels, he added.

The plant uses natural gas to power micro turbines to produce electricity.

It is, however, also able to recover waste energy. Waste heat generated from exhaust gas in the process is channelled back to power chillers to produce chilled water, which is then used to cool

and dry air for air-conditioning.

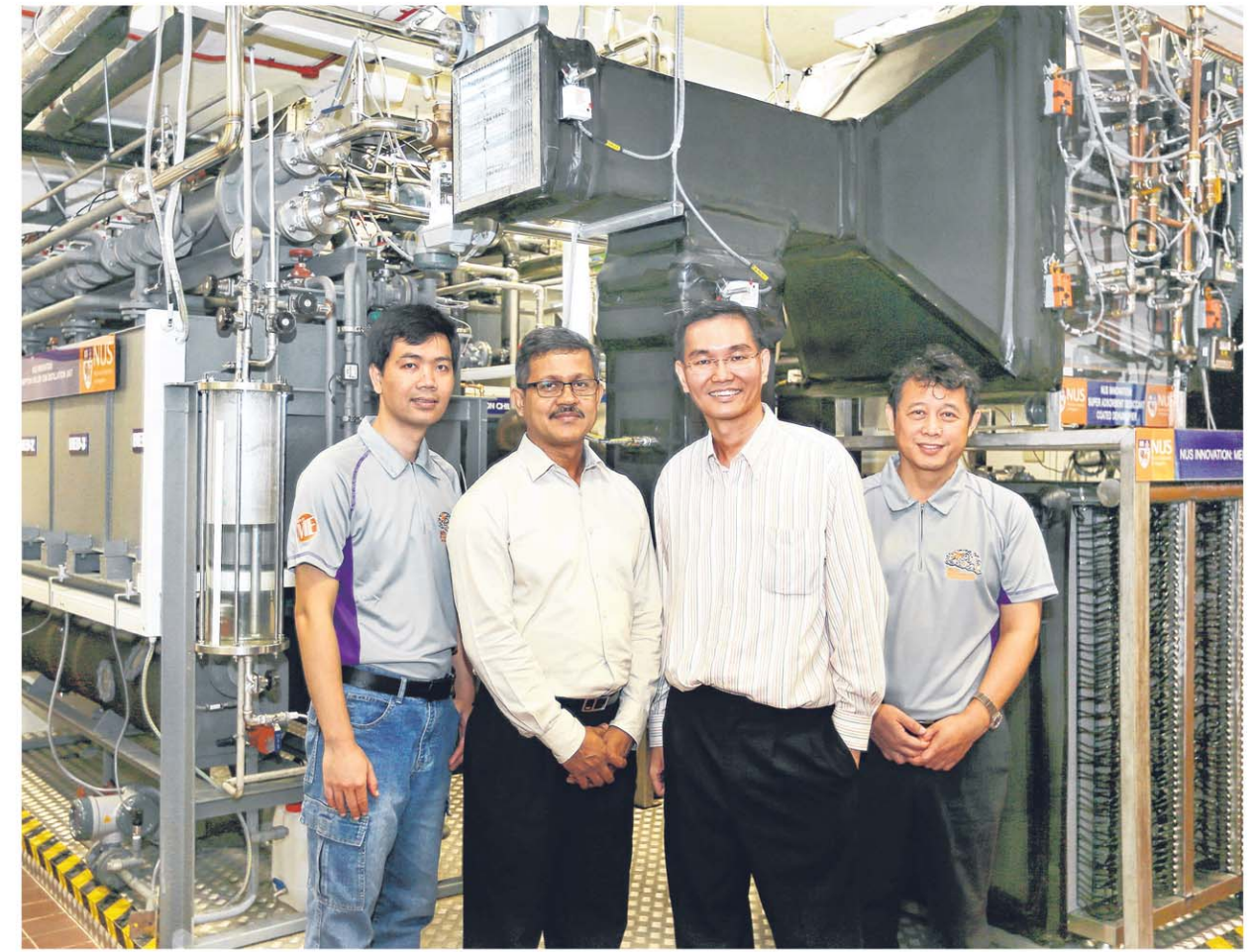
The plant also recycles non-potable water, such as rain water and water discharged from showers and wash basins, to produce drinking water, and uses waste heat to produce hot water or steam.

Prof Chua said the four-in-one system is particularly suitable for clusters of buildings as well as underground cities, where key resources can be shared to reap economies of scale.

It could even serve a small shopping mall.

Within the plant is also a dual-dehumidification system, which removes up to 50 to 60 per cent of moisture from air using super absorbent materials and membranes, allowing cooling to take place faster in hot and humid conditions.

This system cools air with water to just 13 to 18 deg C instead of the



Members of the NUS engineering team behind the quad-generation plant (from left) Dr Bui Duc Thuan, research fellow; Dr Md Raisul Islam, senior lecturer; Associate Professor Ernest Chua; and Dr M Kum Ja, senior research fellow. ST PHOTO: JONATHAN CHOO

usual 4 to 7 deg C, which can bring about energy savings of about 3.5 to 4 per cent, Prof Chua said.

The NUS team also incorporated smart features into the plant, such as real-time tracking of power consumption, and remote control of

valves and pumps.

The team is looking to commercialise and test-bed some of the patented technologies developed through the project.

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