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Sembcorp and NUS establish Corporate Lab for sustainable energy, water and waste-to-resource technologies

- *This R&D partnership will develop new solutions that reduce emissions, enhance water and wastewater treatment systems and extract resources from waste*
- *Strengthens partnership between academia and industry to promote a more sustainable future for Singapore*

Singapore, 20 April 2016 – Leading energy and water company Sembcorp Industries (Sembcorp) and the National University of Singapore (NUS) today established the Sembcorp-NUS Corporate Laboratory to develop new, competitive and sustainable solutions in the areas of energy, water and waste-to-resource. Set up with a jointly-funded investment of S\$60 million, the new corporate laboratory is supported by the National Research Foundation (NRF) Singapore under its Corporate Laboratory@University Scheme, which supports the setting up of key corporate laboratories via public-private partnerships.

Mr Teo Chee Hean, Deputy Prime Minister and Coordinating Minister for National Security, and Chairman of NRF Singapore, was the Guest-of-Honour at the launch event.

Based at the NUS Faculty of Engineering, the new Corporate Laboratory will harness the combined expertise of 45 researchers from NUS and 35 engineers from Sembcorp. It aims to generate new scientific and engineering knowledge and develop competitive and sustainable solutions for power generation, industrial wastewater treatment and water reuse, as well as the transformation of waste into useful and high-value products such as ultra-light composites for modular construction.

Research activities will include:

- The development of predictive maintenance systems that will optimise and enhance the efficiency of energy generation operations, while reducing emissions and waste residue.

- The development of cost-effective solutions to meet stringent chemical oxygen demand (COD) discharge standards, as well as comprehensive biological models to optimise plant performance and reduce liquid discharge.
- The conversion of solid residue from power plants and incineration facilities into useful and high-value products, and utilisation of combustion ash and solid residue to produce ultra-light composites for modular construction.

The projects will involve laboratory and pilot studies, as well as research conducted using full-scale facilities, with the final aim of full-scale implementation.

Sembcorp, which develops, owns and operates energy and water facilities across 15 countries worldwide, has a long history of investing in and using technology and innovation to provide its customers the best solutions, build its competitive advantage and support sustainable growth. The company has applied innovations that have helped to build a cleaner, more efficient energy industry in Singapore. This includes pioneering cogeneration using combined-cycle gas turbine technology here, introducing the sale of natural gas to the market as a more environmentally-friendly energy source for power plants in place of fuel oil, and also applying low-carbon and renewable power and steam technologies such as energy-from-waste and biomass steam generation. In addition, Sembcorp is a world leader in advanced water and wastewater solutions for industries and water-stressed regions, and has successfully exported advanced water solutions to key industrial parks in China. It has well-established capabilities in water reuse, and was the first to reclaim water in Singapore from treated municipal and industrial effluent.

Leveraging on Sembcorp's capabilities in the areas of energy, water and waste-to-resource, as well as NUS' strong expertise in a broad range of disciplines such as Chemical and Biomolecular Engineering, Civil and Environmental Engineering, Electrical and Computer Engineering, Industrial and System Engineering, Mechanical Engineering and other related fields, the Sembcorp-NUS Corporate Laboratory will deepen collaboration between industry and academia and pioneer green technologies in its three core areas to promote sustainable development in Singapore.

The Corporate Laboratory will work closely with NUS' research centres, such as the Centre for Water Research and Centre for Advanced Materials and Structures which are based in NUS Engineering. It will also provide an important platform for NUS students and researchers to gain experience in industrial R&D and promote interaction and exchange of ideas with engineers from Sembcorp.

NUS President Professor Tan Chorh Chuan said, "NUS is pleased to partner Sembcorp and NRF in setting up the Sembcorp-NUS Corporate Laboratory, which will strengthen the synergy between industry and the academia. We are very excited to have this opportunity to contribute NUS' expertise in basic and applied engineering research to create knowledge and novel technologies that will enhance the long-term competitiveness of Singapore and our industries, and at the same time improve environmental sustainability. We look forward to working closely with researchers from Sembcorp to develop innovative and sustainable solutions in the areas of energy, water and waste-to-resource."

Mr Tang Kin Fei, Sembcorp Industries Group President & CEO said, "Sembcorp strongly believes in technology and innovation. Staying at the forefront of advancements in energy, water and waste-to-resource allows us to offer our customers the best solutions, sharpen our competitive advantage and promote sustainable development. The Sembcorp-NUS Corporate Lab will look at cutting edge solutions that are highly relevant to industry. These have the potential to help us increase efficiency, lower costs, make better use of scarce resources and improve productivity. In addition, they can also help us improve safety performance and reduce our environmental impact."

The Corporate Laboratory@University Scheme seeks to strengthen Singapore's innovation system by encouraging public-private research and development collaboration between universities and companies. It ensures that universities achieve impact by developing cutting edge solutions for problems faced by the industries. The collaboration creates employment opportunities and trains a pool of industry-ready research manpower.

Please refer to the [Annex](#) for details on the core research areas of the Sembcorp-NUS Corporate Laboratory.

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About National University of Singapore (NUS)

A leading global university centred in Asia, the National University of Singapore (NUS) is Singapore's flagship university, which offers a global approach to education and research, with a focus on Asian perspectives and expertise.

NUS has 17 faculties and schools across three campuses. Its transformative education includes a broad-based curriculum underscored by multi-disciplinary courses and cross-faculty enrichment. Over 38,000 students from 100 countries enrich the community with their diverse social and cultural perspectives.

NUS has three Research Centres of Excellence (RCE) and 26 university-level research institutes and centres. It is also a partner in Singapore's fifth RCE. NUS shares a close affiliation with 16 national-level research institutes and centres. Research activities are strategic and robust, and NUS is well-known for its research strengths in engineering, life sciences and biomedicine, social sciences and natural sciences. It also strives to create a supportive and innovative environment to promote creative enterprise within its community.

For more information on NUS, please visit www.nus.edu.sg.

About Sembcorp Industries

Sembcorp Industries is a leading energy, water and marine group operating across five continents worldwide. With facilities of over 10,600 megawatts of gross power capacity and close to nine million cubic metres of water per day in operation and under development, Sembcorp is a trusted provider of essential energy and water solutions to both industrial and municipal customers. It is also a world leader in marine and offshore engineering, as well as an established brand name in urban development.

The Group has total assets of S\$20 billion and employs over 7,000 employees. Sembcorp is listed on the main board of the Singapore Exchange. It is a component stock of the Straits Times Index, several MSCI and FTSE indices as well as the Dow Jones Sustainability Asia Pacific Index.

For more information, please visit www.sembcorp.com

About National Research Foundation (NRF) Singapore

The National Research Foundation (NRF) is a department within the Prime Minister's Office. The NRF sets the national direction for research, innovation and enterprise (RIE) in Singapore. It seeks to invest in science, technology and engineering, build up the technological capacity of our companies, encourage innovation by industry to exploit new opportunities that drive economic growth, and facilitate public-private partnerships to address national challenges.

Annex: About the Sembcorp-NUS Corporate Laboratory

The Corporate Laboratory will focus on the following three core research areas:

1) *Energy*

This will include the following projects related to power generation:

- **Integrated condition monitoring and advanced predictive maintenance of power plants**

Researchers will look into integrated condition monitoring and predictive maintenance technology that improves the resilience of critical systems through identifying the root causes of issues, evaluating risks and supporting planning of maintenance activities. Such technology would help to save costs and improve energy efficiency.

- **Development of an advanced platform for boilers to improve energy efficiency and lower emissions**

This involves development of an advanced platform aimed at providing an advanced tool for optimisation and risk assessment for existing power plants, so as to improve plant performance and reduce emissions. In addition, the platform would promote design and development of new boilers with lower emissions to achieve energy-efficient and green power generation.

2) *Water*

This will include projects applicable to industrial wastewater treatment and water reuse, like:

- **Development of a cost-effective system to achieve low chemical oxygen demand (COD) in industrial treated effluent**

This involves the use of advanced oxidation processes and filtration techniques to treat industrial wastewater and produce high-quality water. Researchers hope to develop a cost-effective solution for industrial wastewater treatment capable of meeting stringent COD discharge standards. Such a solution would reduce the impact that discharging industrial wastewater and industrial effluent would otherwise have had on the environment, and also help to conserve precious water resources through water reuse.

- **Industrial wastewater treatment process design and optimisation**

Comprehensive biological models will be used to ensure that existing and future wastewater treatment plants are equipped to adapt to variations in wastewater concentration and composition. Researchers will also look into optimisation of current and upcoming wastewater treatment plants to ensure that industrial wastewater is treated effectively to minimise environmental impact.

- **Reduction of liquid discharge for industrial wastewater treatment**

Researchers will work towards developing technologies to reduce liquid discharge from industrial wastewater treatment. Currently, such technology is expensive and energy-intensive. Hence, researchers hope to develop technologies that can help reduce energy consumption and cost for such processes, while maintaining their effectiveness in reducing the amount of effluent discharged.

3) *Waste-to-resource*

This would include projects such as:

- **Upcycling of ash and soot into high-value products**

Researchers will look into converting solid residues from thermal power plants and incineration plants into high-value products, such as ultra-light composites for modular construction, or catalysts, zeolites and/or absorbent materials. This would extract value from waste, and mitigate environmental and health issues associated with the disposal of such residues.