MEDIA RELEASE

26 October 2020

$49 Million Research Fund For Low-Carbon Energy Solutions

The Government today announced a $49 million Low-Carbon Energy Research Funding Initiative at the Singapore International Energy Week 2020. It will support research, development and demonstration projects in low-carbon energy technologies such as hydrogen; and carbon capture, utilisation and storage (CCUS) over the next five years. These efforts aim to accelerate the technical and economic viability of such emerging technologies to reduce Singapore's carbon emissions, particularly for emissions intensive areas like the power and industrial sectors.

2 Minister for Trade and Industry Mr Chan Chun Sing said, "Hydrogen, and carbon capture, utilisation and storage, are promising technologies that have the potential to transform Singapore's energy landscape and help us achieve our long-term emissions reduction goals. This new funding initiative strengthens our current efforts, and will accelerate our transition towards a cleaner and more sustainable energy future."

3 Research projects could include technologies that enable the effective capture of carbon dioxide (CO_2) from low-concentration emission sources in the industrial and power sectors, and to convert the CO_2 into useful products such as building materials, reclamation sand and synthetic fuels. Test-beds for emerging technologies, such as the blending of low-carbon hydrogen with natural gas in combined cycle gas turbines, will reduce carbon emissions from electricity generation. These test-beds could yield insights in applying low carbon technologies in Singapore's context, and facilitate future deployment.

4 This funding initiative is a multi-agency involving the Agency for Science, Technology and Research (A*STAR), the Economic Development Board (EDB), the Energy Market Authority (EMA), the National Climate Change Secretariat (NCCS) and the National Research Foundation (NRF). It will be co-driven by EDB and EMA to ensure projects are relevant to the industrial and power sectors, with A*STAR as the implementing agency on behalf of the Government.

5 As part of the Singapore Energy Story, this initiative seeks to build a more sustainable energy future by harnessing the four switches of energy supply, one of which is the use of low-carbon alternatives. It supports Singapore's vision for a low-carbon and climate-resilient future. More information on the Singapore Energy Story and Long-Term Low-Emissions Development Strategy is found in the Annex.

ANNEX A: Factsheet for Singapore's Energy Story
ANNEX B: Factsheet for Exploring Emerging Energy Technologies
ANNEX C: Factsheet for Singapore's Long-Term Low-Emissions Development Strategy

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About the Agency for Science, Technology and Research

The Agency for Science, Technology and Research (A*STAR) is Singapore's lead public sector R&D agency. Through open innovation, we collaborate with our partners in both the public and private sectors to benefit the economy and society. As a Science and Technology Organisation, A*STAR bridges the gap between academia and industry. Our research creates economic growth and jobs for Singapore, and enhances lives by improving societal outcomes in healthcare, urban living, and sustainability. A*STAR plays a key role in nurturing scientific talent and leaders for the wider research community and industry. A*STAR's R&D activities span biomedical sciences to physical sciences and engineering, with research entities primarily located in Biopolis and Fusionopolis. For ongoing news, visit www.a-star.edu.sg.

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About the Singapore Economic Development Board

The Singapore Economic Development Board (EDB), a government agency under the Ministry of Trade and Industry, is responsible for strategies that enhance Singapore's position as a global centre for business, innovation, and talent. We undertake investment promotion and industry development, and work with international businesses, both foreign and local, by providing information, connection to partners and access to government incentives for their investments. Our mission is to create sustainable economic growth, with vibrant business and good job opportunities for Singapore.

For more information on EDB, please visit www.edb.gov.sg.

About the Energy Market Authority

The Energy Market Authority (EMA) is a statutory board under the Ministry of Trade and Industry. Our main goals are to ensure a reliable and secure energy supply, promote effective competition in the energy market and develop a dynamic energy sector in Singapore. Through our work, EMA seeks to forge a progressive energy landscape for sustained growth.

Website: www.ema.gov.sg | Follow us: Instagram: @EMA_Singapore | Facebook: facebook.com/EnergyMarketAuthority | Twitter: @EMA_sg

About the National Climate Change Secretariat

The National Climate Change Secretariat (NCCS) is part of the Strategy Group under the Prime Minister's Office, which develops and implements Singapore's domestic and international policies and strategies to tackle climate change. NCCS achieves this by adopting a Whole-of-Government approach and working with the people and private sectors to mitigate carbon emissions in all sectors, helping Singapore adapt to the effects of climate change, harnessing economic and green growth opportunities arising from climate change, and encouraging public awareness and action on climate change. For more information, please visit www.nccs.gov.sg.

About the National Research Foundation Singapore

The National Research Foundation (NRF) is a department within the Prime Minister's Office. NRF sets the national direction for research and development (R&D) by developing policies, plans and strategies for research, innovation and enterprise. It also funds strategic initiatives and builds up R&D capabilities by nurturing research talent. The NRF aims to transform Singapore into a vibrant R&D hub that contributes towards a knowledge-intensive, innovative and entrepreneurial economy; and make Singapore a magnet for excellence in science and innovation.

ANNEX A

FACTSHEET FOR SINGAPORE'S ENERGY STORY

To tackle climate change concerns, Singapore has to change the way we consume and produce energy. Minister for Trade and Industry Mr Chan Chun Sing launched Singapore's Energy Story at the Singapore International Energy Week (SIEW) in October 2019 to map our efforts towards a cleaner, more reliable and affordable energy future.

2 Singapore's Energy Story sets the vision for how Singapore can power our future through four switches (Natural Gas, Solar, Regional Power Grids and Emerging Low-Carbon Alternatives), supported by efforts to improve energy efficiency across all sectors.

1st Switch: Natural Gas

Natural gas is the cleanest form of fossil fuel and will continue to be a dominant fuel for Singapore's electricity in the near future. EMA will continue to diversify our gas sources and work with our power generation companies to improve the efficiency of their power plants.

2nd Switch: Solar

Solar is the most promising renewable energy source for Singapore. Energy storage systems are also vital as it helps us counter the intermittency of renewable energy sources. Singapore is working towards meeting a new solar target of at least 2 gigawatt-peak by 2030, and an energy storage deployment target of 200 megawatts beyond 2025.

3rd Switch: Regional Power Grids

We are studying ways to leverage on regional power grids for cost-competitive energy. This could be realised through bilateral cooperation or regional initiatives.

4th Switch: Emerging Low-Carbon Alternatives

We are exploring emerging low-carbon solutions (e.g. carbon capture, utilisation and storage technologies, low-carbon hydrogen) that can help reduce Singapore's carbon footprint.

We will continue to improve our energy efficiency in the various sectors. We will also empower our households with more information to help them better manage their electricity consumption.

Visit www.beyondthecurrent.gov.sg for more information on Singapore's Energy Story.

ANNEX B

FACTSHEET FOR EXPLORING EMERGING ENERGY TECHNOLOGIES

Emerging technologies such as hydrogen and carbon capture, utilisation and storage (CCUS) have the potential to enable further decarbonisation for Singapore in the longer-term.

Hydrogen

2 Hydrogen is a versatile energy carrier and a commonly used industrial feedstock. It also has the potential to diversify our fuel mix across a number of applications, such as electricity generation and transport (e.g. in vehicles and ships). If produced from renewable energy sources, it has the potential to decarbonise power generation and emissions-heavy sectors.

3 However, there are challenges that need to be overcome before hydrogen can be more widely adopted in our economy. For instance, a global and diverse supply chain for hydrogen has yet to be established. The cost of producing and importing low-carbon hydrogen is also high at the moment. In addition, extensive infrastructure (e.g. for hydrogen transportation, storage and utilisation) also needs to be in place to support a hydrogen economy.

4 The Hydrogen Feasibility Study by the National Climate Change Secretariat, Economic Development Board and Energy Market Authority is currently ongoing and is expected to be completed by end-2020. We will provide updates on the study subsequently.

Carbon Capture, Utilisation and Storage

5 CCUS has the potential to reduce emissions by capturing and converting Carbon Dioxide (CO_2) from the emissions of power plants and industrial facilities into useful products (e.g. building materials, reclamation sand and synthetic fuels). Captured CO_2 can also be stored in natural sub-surface underground geological formations. This prevents CO_2 from being emitted into the atmosphere.

6 Singapore is currently studying the potential for CCUS pathways to reduce Singapore's carbon emissions. Carbon capture costs for low-concentration of CO_2 streams, such as the emissions from natural gas power plants, are high at the moment. In addition, the manufacture of fuel and chemicals from CO_2 requires additional inputs of low-carbon hydrogen which is currently more energy-intensive and expensive than conventional processes.

7 The funding initiative for Low-Carbon Energy Research will explore R&D initiatives and testbeds to accelerate the technical and economic viability of promising low-carbon hydrogen and CCUS solutions.

ANNEX C

FACTSHEET FOR SINGAPORE'S LONG-TERM LOW-EMISSIONS DEVELOPMENT STRATEGY

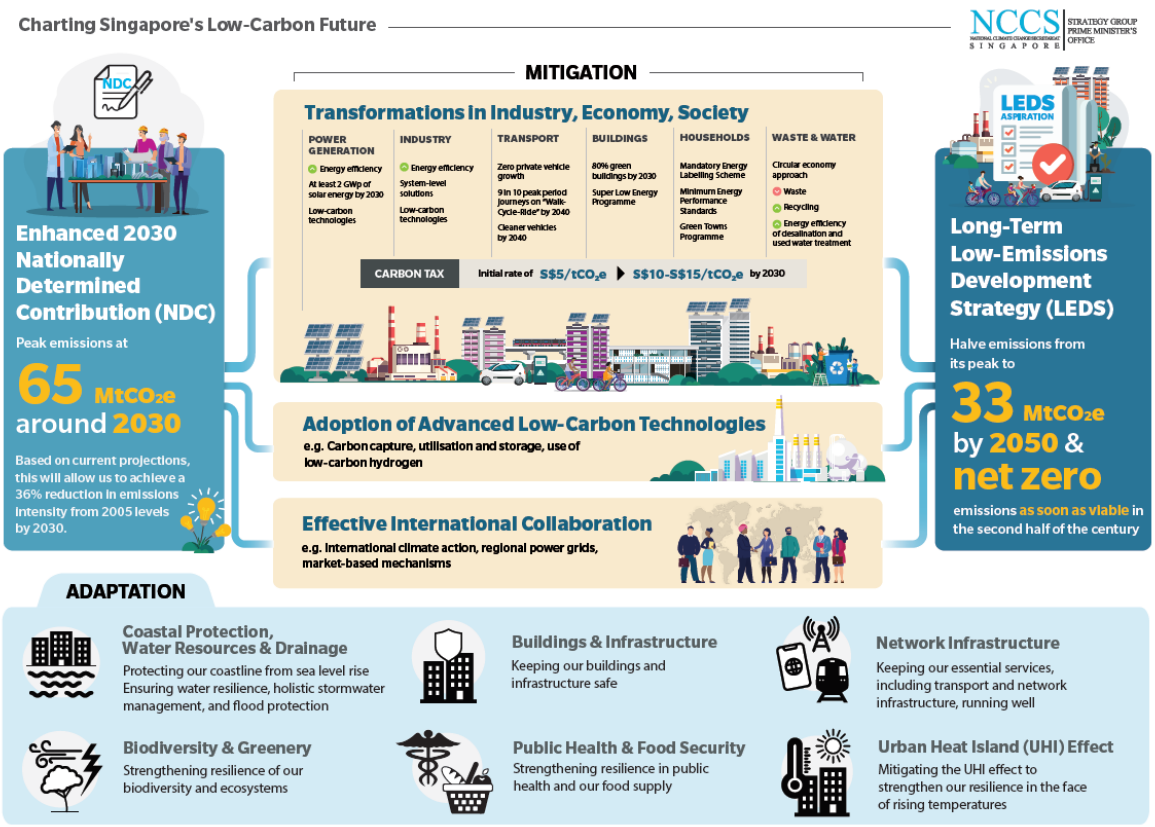
On 31 March 2020, Singapore submitted its Long-Term Low-Emissions Development Strategy (LEDS) to the United Nations Framework Convention on Climate Change (UNFCCC).

Singapore's LEDS sets out our aspiration to halve our emissions from its peak to 33MtCO_2e by 2050, with a view to achieving net zero emissions as soon as viable in the second half of the century.

Singapore will take concrete actions across all sectors to facilitate the low-carbon transition, building on our long-standing emphasis on sustainable development. The Government's strategy to achieve our LEDS aspiration will have three thrusts.

a. Transformations in industry, economy and society, e.g. more renewable energy, greater energy efficiency, reducing energy consumption;
b. Adoption of advanced low-carbon technologies, e.g. carbon capture, utilisation and storage (CCUS), use of low-carbon hydrogen; and
c. Effective international collaboration, e.g. international climate action, regional power grids, market-based mechanisms.

The funding initiative for Low-Carbon Energy Research will support the second thrust in particular, by accelerating the adoption of such technologies in Singapore and enabling our low-carbon transition.



Infographic: Charting Singapore's Low-Carbon Future

For more details, please refer to: https://www.nccs.gov.sg/media/press-release/submission-of-singapores-enhanced-nationally-determined-contribution-and-long-term-low-emissions-development-strategy