MEDIA RELEASE

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FIVE PROJECTS AWARDED $10 MILLION FOR THE INAUGURAL SMART ENERGY CHALLENGE

The Energy Market Authority (EMA) awarded five Singapore-based consortia a total of up to $10 million in funding as part of the first Smart Energy Challenge (SEC). Launched last November, the SEC seeks to support the development of new technologies and solutions which will strengthen Singapore's energy competitiveness, efficiency and security. This inaugural SEC focused on three areas - Power Generation, Energy for Transport and Energy Efficiency for Industry.

2 The five projects receiving funding are:

	Projects	Focus Area	Fund Recipient / Partners
1	A 20 MW Distributed Virtual Power Plant (Demand Response System)	Power Generation	CPower vTrium (CPvT) Pte Ltd
2	Development of a high-rate anaerobic process and reactor that is suitable for the "waste-to-energy" industry	Power Generation	Nanyang Technological University (NTU) with IUT Global Pte Ltd
3	Development of an Intelligent High-Performance Battery System for Electric Vehicles	Energy for Transport	National University of Singapore (NUS) with ST Kinetics
4	Cyber Security and Secure Intelligent Electronics Devices for EV Ecosystem in the Smart Grid	Energy for Transport	Institute for Infocomm Research, A*STAR with SP PowerGrid & AddValue Technologies
5	A Unity Power Factor Adjustable Speed Drive For Industry Energy Efficiency	Energy Efficiency for Industry	Nanyang Technological University (NTU)

(Further details of the five projects and their principal investigators are at the **Annex**).

3 On the five projects, Mr Lawrence Wong, Chief Executive of EMA, said, "The SEC will harness the development capabilities of our tertiary institutions and industry players to bridge the commercialisation gap and bring new inventions to market. We

hope to see more innovative Singapore-based energy solutions coming out as a result of this initiative, not only to address Singapore's energy needs but also to capture regional and global opportunities."

4 Dr Zhou Jianying from Institute for Infocomm Research (A*STAR), one of the fund recipients, said, "Our project aims to develop a security architecture blueprint for strengthening the power grid infrastructure. We look forward to working with SP PowerGrid who is well-known for its world-class grid network performance. Besides the blueprint, the SEC award will also enable us to develop tamper resistant devices that can be connected safely to the grid."

5 Prof. Ali Masood from NTU, another SEC winner, said, "Today, motors used to power hoist/cranes, air conditioners and lifts are highly energy inefficient. The grant will help us develop a more efficient adjustable speed drive that can be used in almost 85% of all industrial motors and reduce energy wastage in the order of 5% to 20%."

6 The inaugural SEC attracted 88 proposals from tertiary institutions, research entities and companies. All proposals were reviewed by an inter-agency technical expert evaluation panel and an advisory committee. Prof. Barry Halliwell, Deputy President (Research and Technology), NUS and a member of EMA's advisory committee said: "We received many innovative and highly-competitive proposals submitted to the SEC. After putting them through a rigorous evaluation process, we are confident of the technical and commercial feasibility of these selected proposals."

7 Funding under the Smart Energy Challenge is made available from EMA's $25 million Energy Research Development Fund. This fund provides financial support for the implementation of new and innovative energy solutions which can help to:

i. Diversify Singapore's energy sources and improve our energy security;
ii. Achieve Singapore's energy intensity reduction targets; and
iii. Develop Singapore's energy industry.

-- End --

About the Energy Market Authority

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

Annex

Smart Energy Challenge Projects

1. A 20 MW Distributed Virtual Power Plant (Demand Response System)

Focus Area: Power Generation

Fund Recipient: CPower vTrium Pte Ltd

Project Summary

Currently, growth in electricity demand and peak load can only be managed by ensuring that there is sufficient power generation capacity at the supply end. This proposal aims to address peak load management through demand reduction rather than new power plants.

This is achieved through a centrally-controlled 20 MW "virtual power plant". The concept behind this virtual power plant is to aggregate a group of medium-to-large energy consumers who are able to rapidly reduce overall electricity demand by curtailing their energy usage in a pre-planned way.

Outcome and Benefits

The success of this project will demonstrate that with proper incentives to curtail energy usage, demand response from middle-to-large energy customers can lead to better peak load management. This will in turn delay the need for new power generation planting, thereby leading to other advantages such as reduction in power generation emission, reduction in energy waste, better energy density and efficiency.

Over the longer term, this project presents an opportunity for Singapore to be the regional electricity demand response hub.

Biography of Principal Investigator

Vijay Sirse is the Director and COO of CPvT Pte. Ltd. He is a power sector professional with 30 years experience in business development, project financing, project implementation and operations. Vijay is also the Chairman and CEO of vTrium Energy Singapore.

2. Development of a high-rate anaerobic process and reactor that is suitable for the "waste-to-energy" industry

Focus Area: Power Generation

Fund Recipient: Nanyang Technological University (NTU)

Industry Partner: IUT Global Pte Ltd

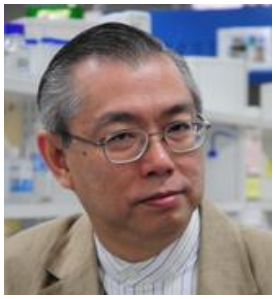
Project Summary

The "waste-to-energy" conversion process involves generation of bio-gas from organic residues such as food waste that is subsequently combusted in a gas engine to generate electricity. However, the bioprocess can be hindered by the presence of process by-products and other inhibitors resulting in non-optimal performance. This reduces the amount of bio-gas generated and impacts the business viability of the process in energy generation. This project seeks to address the highlighted issues and aims to develop a reactor embodying a high-rate process that may potentially increase bio-gas generation by 50%.

Outcome and Benefits

If successful, a significant improvement in biogas production from food waste processing will boost the process's power generation capacity and make it a viable business model. The reactor with improved kinetics is also expected to reduce the plant size by half, leading to significant land savings.

Biography of Principal Investigator



Prof Ng Wun Jern is the Executive Director of NTU's Nanyang Environment and Water Research Institute (NEWRI). He has considerable industry experience, having designed and seen installation of some 120 full-scale facilities, many of which include anaerobic reactors. His research interests are largely on water and wastewater management with focus on investigations into water quality, treatment science, and development of treatment technologies.

3. Development of an Intelligent High-Performance Battery System for Electric Vehicles

Focus Area: Energy for Transport

Fund Recipient: National University of Singapore (NUS)

Industry Partner: ST Kinetics

Project Summary

This project aims to develop an intelligent high-performance battery system that will significantly reduce charging time. The current average time required for fast charging of the Li-ion battery pack of an electric vehicle (EV) is presently about 30 minutes. This system aims to complete a full charge in a matter of minutes.

This is achieved through the use of modified cathode materials, which can be charged or discharged at high current density efficiently without losing significant retention capacity. Besides achieving a much faster charging rate, the new battery system has longer life, higher capacity, higher electric conductivity and higher energy density. Furthermore, computer simulations will be used to optimise the packaging design for better battery performance and effective thermal management of the battery pack.

Outcome and Benefits

If successful, this will enable EV owners to charge-up their EVs in about the same time required to refuel petrol cars. This can encourage the switch from petrol vehicles to EVs. In addition, the high performance batteries will reduce the need to construct numerous charging points at public car parks in HDB housing estates, office blocks and shopping centres thereby reducing the cost associated with the infrastructure roll-out.

Biography of Principal Investigator

Prof Andrew Tay has been involved in the R&D of relevant areas such as electronics packaging, thermo-mechanical reliability and thermal management of microelectronics systems for more than 25 years. He was awarded a few grants for research in the area of electronics packaging and was the local Principal Investigator for a S$5M A*STAR grant on Nano Wafer Level Packaging. He is a Fellow of the American Society of Mechanical Engineers (ASME) and a member of the Institute of Electrical and Electronics Engineers (IEEE).

4. Cyber Security and Secure Intelligent Electronics Devices for EV Ecosystem in the Smart Grid

Focus Area: Energy for Transport

*Fund Recipient: Institute for Infocomm Research / A*STAR*

Industry Partners: SP PowerGrid and AddValue Technologies

Project Summary

The smart grid is an emerging area whereby the existing power grid system will be enhanced with analysis, control and communication capabilities through the use of information and communications technologies (ICT). However, the application of ICT and the future use of Intelligent Electronic Devices (IED) will render the grid more vulnerable to cyber-attacks.

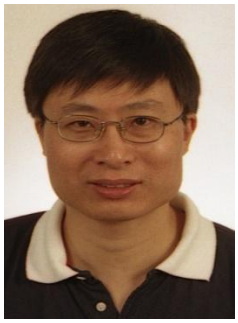
The Institute for Infocomm Research, in collaboration with SP PowerGrid and AddValue Technologies, will carry out a systematic risk assessment of the power grid and develop a Security System Architecture blueprint that is relevant to Singapore's context. Furthermore, development efforts will be carried out to design tamper resistant IEDs.

Outcome and Benefits

The Security System Architecture blueprint can help strengthen the power grid's infrastructure and mitigate risks associated with the connection of distributed IEDs to the power grid. The research and development of the temper resistant IEDs can also be used as a reference design for many future applications, such as electric vehicle (EV) charging infrastructure, EV in-vehicle module, logistics management and tracking system.

Given the nascent development of this field, the result of this study can also contribute to international standardisation efforts on smart grid security.

Biography of Principal Investigator



Dr. Zhou Jianying has more than 10 years of research and project management experience in computer and network security. He is a Senior Scientist and Head of Network Security Group at the Institute for Infocomm Research. He has been Principal Investigator (PI)/Co-PI/project manager of many information security projects. He has published over 130 referred papers at international conferences and journals, of which the top 10 publications received over 1000 citations.

5. A Unity Power Factor Adjustable Speed Drive for Industry Energy Efficiency

Focus Area: Energy Efficiency for Industry

Fund Recipient: Nanyang Technological University (NTU)

Project Summary

It is estimated that 62% of industrial power is consumed by hoist/cranes, air conditioners and lifts, which essentially make use of alternating current (AC) motor.

An important driving force behind such AC motor is the adjustable speed AC drive (ASD). Currently, many commercially available ASDs have a power factor (PF) of about 0.72, which translates to an inefficient mode of power extraction from the utility. This proposal aims to develop an ASD with a very high PF of 0.99, which is expected to extract utility power most efficiency through a combination of high PF and ASD efficiency.

Outcome and Benefits

The success of this project will significantly improve system efficiency. Based on initial estimation, the new ASD can generate cost savings of approximately S$8,000 per year for a 10 horsepower (hp) motor over a period of 1 year.

Biography of Principal Investigator

Associate Prof Ali I. Maswood has extensive experience in the areas of Power Electronics, Advanced Converters, Drives, Advanced Pulse Width Modulation for Inverters, Power Quality, Maximum Power Point Tracker from Photovoltaics, Wind and Marine Sources. He is a senior member of IEEE, IET-PEL editorial board member, and is the author of nearly 100 IEEE, Institution of Engineering and Technology (IET) Journal and conference publications.