

# Hong Kong startup wins US\$1-million top prize at second TERA-Award with “electricity-free cooling technology”

The results of the second TERA-Award Smart Energy Innovation Competition, co-organised by The Hong Kong and China Gas Company Limited (“Towngas”) and the State Power Investment Corporation Limited (“SPIC”), have been announced. The Hong Kong startup company i2Cool won the Gold Award with their “electricity-free cooling technology”, receiving prize money of US\$1 million.

The Silver Award went to the SPIC Research Institute of Smart Energy Company Limited, the State Key Laboratory of Clean Energy Utilisation of Zhejiang University, and the Key Laboratory of Low-grade Energy Utilisation Technologies & Systems of the Ministry of Education of Chongqing University, for their efforts in the “CO<sub>2</sub> reduction with microalgae from coal-fired flue gas” project. HydroPro New Energy Corporation was given the Bronze Award in recognition of their “HydroPro” project. The two teams were awarded US\$100,000 and US\$50,000 respectively.

The second TERA-Award Award Presentation Ceremony was held in a physical format on 28 March. i2Cool, a Hong Kong startup company, stood out among 275 entries from 41 countries and regions and emerged as the winner. Their “electricity-free cooling technology” is a zero-energy cooling/heat-dissipating paint that can be applied to architectural coatings, wall tiles and even fabrics. Experiments have shown that the roofs surface temperature of buildings in Hong Kong can be reduced from 60°C to 30°C during the daytime when the paint is applied, and it is estimated that all buildings in Hong Kong could reduce carbon emissions by 600,000 tonnes every year by applying this paint.

Dr Martin Zhu, the co-founder of i2Cool, said that their research was inspired by a species of African silver ants that can survive in the desert at a temperature as high as 60°C. Its hair structure has a unique triangular shape that reflects most of the sunlight and dissipates heat like a mirror. The i2Cool team has imitated the hair structure of the silver ants by using a mixture of nanoparticles to produce an external wall coating with a solar heat reflectivity of 95%. The coating also emits indoor heat with a 95% mid-infrared emissivity, thus greatly reducing the power consumption of air conditioners.

Dr Zhu thanked the Competition organisers for the Gold Award, which he considered a great support to the popularisation of their research results. i2Cool plans to invest in a factory for the “one-



**Rooftops coated with “electricity-free cooling technology” paint, the Gold Award-winning project, can significantly reflect heat and reduce the energy consumption of the buildings for cooling.**



**Guests including Dr Lee Ka-kit (7th from right, front row), Chairman of Towngas; Mr Qian Zhimin (6th from left, front row), Chairman of SPIC; Professor Cui Yi (6th from right, front row), Chief Judge of TERA-Award 2022; Mr Peter Wong Wai-ye (5th from left, front row), Managing Director of Towngas; Mr John Ho Hon-ming (5th from right, front row), Executive Director, Chief Financial Officer and Company Secretary of Towngas, in a group photo with the award winners.**

stop” production of related products so that the results can be widely applied among the public.

The Silver Award-winning project uses microalgae for carbon reduction. This project converts carbon dioxide into economically valuable biomass by improving algae strains and using highly efficient photobioreactors. With the new technology, carbon sequestration and algal powder production are five to ten times higher than with the old technology. The carbon sequestered biomass can be used to produce nutritional foods, functional feeds and organic fertilisers, bringing significant economic, environmental and social benefits.

The Bronze Award-winning project, HydroPro, is a next-generation hydrogen generation system with a higher efficiency than existing green hydrogen technology. It boasts an electricity-to-hydrogen conversion efficiency of over 80% and a significantly lower cost, which can help accelerate the application of green hydrogen, a clean energy source, in a wide range of industries.

Dr Lee Ka-kit, the Chairman of Towngas, revealed that this year’s participating teams came from 18 more countries and regions than the previous edition, an increase of nearly 80%, showing that the impact and global reach of the Competition have reached new heights. “The winner will not only receive investment from Towngas, but will also have the opportunity to receive support in its zero-carbon smart industrial parks as an energy storage application scenario. The inclusion of application scenarios is what sets the TERA-Award Competition apart from the rest and what entrepreneurs are lacking most.” He added that Towngas would also launch the third edition of the Competition in collaboration with the SPIC, and look forward to more entrepreneurs and scientists joining forces to protect the planet.

Mr Qian Zhimin, the Chairman of the SPIC, congratulated the Competition on the new breakthroughs achieved. He said that in the transition from fossil to non-fossil energy sources, the power of technological innovation has a profound impact on the ability to develop and utilise renewable energy sources, and it has become a key point in the energy transition of all the countries. He added that the SPIC is willing to work closely with industry leaders such as Towngas in various areas of innovation, providing an abundance of application scenarios for the award-winning projects, accelerating the application of innovations, and jointly contributing to the achievement of China’s “30-60” goals.



**Dr Lee Ka-kit (2nd from left), Chairman of Towngas, and Mr Qian Zhimin (1st from right), Chairman of SPIC, present the Gold Award to the representatives of i2Cool Limited.**

In his speech, the Secretary for Environment and Ecology, Mr Tse Chin-wan, mentioned, “To combat the adverse impacts of climate change, the Government has set out four major decarbonisation strategies, namely net-zero electricity generation, energy saving and green buildings, green transport and waste reduction, under Hong Kong’s Climate Action Plan 2050 to tackle major sources of carbon emissions and achieve carbon neutrality. I am thankful that all the participants of the Towngas TERA-Award Competition have devised innovative smart energy breakthroughs with a view to discovering visionary technology and solutions to drive the development of the energy industry and the construction of smart cities, which are of paramount importance to meet the carbon neutrality target.”

A new award category, Rising Star, and a Pioneer Award were introduced at the second TERA-Award to encourage more innovative submissions. Towngas will provide strategic investment or application scenarios with resource-matching services for all award-winning projects to accelerate their implementation.

The second TERA-Award Smart Energy Innovation Competition continued with the theme of “Exploring Zero-Carbon Innovations for the Future” to discover innovative technologies and solutions for smart energy around the world and to contribute to the country’s “30-60” dual carbon goals.

## Winners List of the 2nd TERA-Award Smart Energy Innovation Competition

Project	Company/Organisation	Country/Region
<b>Gold Award</b>		
Electricity-free cooling technology	i2Cool Limited	Hong Kong
<b>Silver Award</b>		
CO <sub>2</sub> reduction with microalgae from coal-fired flue gas	The SPIC Research Institute of Smart Energy Company Limited	China
	The State Key Laboratory of Clean Energy Utilisation of Zhejiang University	
	The Key Laboratory of Low-grade Energy Utilisation Technologies & Systems of the Ministry of Education of Chongqing	
<b>Bronze Award</b>		
HydroPro	HydroPro New Energy Corporation	China
<b>Pioneer Award</b>		
The world’s leading provider of total calcium-titanium ore solar cells solutions	Jingbi You Research Team of Institute of Semiconductors, Chinese Academy of Sciences	China
Next-Generation Printed Solar Energy	HKTech Solar, Ltd	Hong Kong
OceanHydro Omni	Hydro Wind Energy, Inc.	United Arab Emirates
<b>Rising Star</b>		
Precise separation and high-value utilisation of spent lithium-ion batteries	Tsinghua Shenzhen International Graduate School	China
New carbon capture industrial environmental treatment technology	Tianjin Hermos Technology Co., Ltd.	China
<b>Merit</b>		
Solid Oxide Cell Technology Toward Dual Carbon Strategy	H2-Bank	China
The research development and real world applications of key components of the proton exchange membrane fuel cells	Hytekocean / Institute of New Energy of Shanghai Academy of Science & Technology	China
Solid oxide electrolysis cells (SOEC) hydrogen production system which also supports carbon utilisation	Swift New Energy	China
High-safety aqueous zinc-based battery	Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences	China
Low-Cost Photosynthetic 1-Butanol Production From Carbon Dioxide Emissions	Phytonix Corporation	United States
Next-Ion	Next-Ion	United States
Cambrian Batteries - Biofuel Carbon Battery that can charge 10 x faster and last for more than 30 years	PJP Eye LTD.	Japan
Digital Metallisation of Solar Cells	PV Nano Cell	Israel