



NEWS RELEASE

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NTU Singapore spin-off EtaVolt develops new technology that rejuvenates solar panels and protects them from degradation

Using an innovative device that can energise old solar cells with multiple times the intensity of sunlight, scientists from **EtaVolt**, a spin-off from **Nanyang Technological University, Singapore (NTU Singapore)** can rejuvenate old solar panels quickly and affordably.

It can also be used to protect both new and old solar panels from performance degradation caused by light and heat.

The underlying science behind this cutting-edge technology was developed at the **Energy Research Institute @ NTU (ERI@N)** and has been exclusively licensed to EtaVolt for commercialisation and scale-up.

EtaVolt's proprietary technology is a game-changer in the solar energy industry, particularly in tropical regions like Singapore, where solar panels are subject to rapid deterioration due to constant exposure to intense sunlight, heat, humidity and frequent thunderstorms.

Typically, solar panels begin to lose efficiency just hours after installation, especially in the first year as they face harsh environmental conditions. The drop in performance can be up to 10 per cent or more across the lifespan of the solar panels, which translates to an estimated US\$2 billion in energy loss globally (based on the global 1-terawatt solar power capacity).

The conventional way of maintaining the performance of solar panels is to clean the top glass layer or to replace the entire solar panel module, but there is currently no commercially-available cost-effective way to easily restore its performance in the field or onsite.

Executive Director of ERI@N, Professor Madhavi Srinivasan, said the pursuit of sustainability through renewable energy will only make sense if the renewable energy systems themselves are sustainable and efficient.

“We have known for a long time that while harvesting sunlight gives us an almost inexhaustible source of energy, producing solar panels requires a lot of energy and generates a high carbon footprint. While this carbon emission can be offset by the theoretical long service life of the solar panels, estimated at 25 years, the reality is that solar panels in tropical countries face harsher conditions and there has been no real solution to restore and recycle the silicon cells – the core technology of solar panels,” says Prof Madhavi, who is also the Executive Director of NTU’s Sustainability Office.

“What NTU is doing through research and innovation is to find scientific solutions that can tackle some of humanity’s greatest challenges, such as climate change and sustainable development. Having a way to renew and eventually recycle solar panels is a key research programme at ERI@N, in addition to developing new renewable energy systems.”

EtaVolt’s innovation represents a significant stride in sustainable energy practices, and the start-up is believed to be the first in the world to offer a solution that can extend the operational lifespan of solar panels.

Co-founder of EtaVolt Dr Stanley Wang highlighted the benefit of the circular economy, emphasising that their patented technology not only enhances the efficiency and reliability of solar energy systems but also promises to reduce e-waste and the need for frequent panel replacements, making it a win-win for both the environment and the industry.

“Our solar rejuvenation method has not only been rigorously tested and validated but has shown field-proven results in various commercial applications. The technology has been successfully implemented in projects with major partners in the solar industry, such as renewable energy solutions firm Vector Green, demonstrating its effectiveness and potential for widespread adoption,” explained Dr Wang, who is also a Project Manager at ERI@N.

Mr Ben Teng, Managing Director of Vector Green, a Singapore sustainability and solar photovoltaic (PV) solutions company, said: “EtaVolt’s patented and cutting-edge technologies in the assessment, regeneration, and recycling of PV systems provide solutions for our clients to enhance their investments through improved asset utilisation and performance. This ensures seamless abilities to assess, install, optimise, displace, and replace in a sustainable manner. These efforts align with Vector Green’s goal of providing truly sustainable lifecycle solutions for our planet while unlocking profit value through technology.”

How solar cell rejuvenation works

Known as **Advanced Regeneration Technology**, the innovation by EtaVolt works for the majority of silicon solar cells in the market (over 90 per cent), including those that contain boron, oxygen, defects and other impurities.

When intense light and controlled temperature are applied precisely to solar cells, they excite and cause the material molecules to move quickly, thereby changing their arrangement and patching up the 'holes' caused by light and heat damage.

The process is akin to patching holes in a bucket; it repairs solar panels to prevent energy leakage, ensuring optimal light energy collection.

The new device can automatically roll itself over solar panels that are up to 2.3 metres in length. The process takes less than five minutes and can help treated solar panels recover up to 5 per cent of their lost field performance.

Most importantly, it can prevent and minimise further degradation of the solar cells for up to five years, depending on the type of solar panels. It can also be used indoors and deployed on-site for outdoor solar farms.

In addition to the solar panel rejuvenation services, EtaVolt also provides smart recycling services for solar panels with full automation, where they dismantle and recover useful materials and resources like silicon from waste solar panels and reuse them for other purposes.

These technologies developed at NTU have been patented through NTUitive, the University's innovation and enterprise company and are licensed to EtaVolt.

EtaVolt was founded in 2019 by Dr Wang and Dr Andy So, and is incubated by **EcoLabs Centre of Innovation for Energy**, a national platform hosted by ERI@N aimed at accelerating deep-tech energy innovation capabilities in Singapore to support the nation's future energy transition.

As NTU continues to lead in technological advancements for renewable energy, EtaVolt's solution underscores the university's commitment to fostering innovation and translating research into practical solutions that benefit society and the economy, as part of its **NTU 2025 Strategic Plan**.

The technological development also supports Singapore's vision of becoming a knowledge-based, innovation-driven society and its efforts to promote sustainable energy sources and become carbon neutral by 2050.

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About Nanyang Technological University, Singapore

A research-intensive public university, Nanyang Technological University, Singapore (NTU Singapore) has 33,000 undergraduate and postgraduate students in the Engineering, Business, Science, Medicine, Humanities, Arts, & Social Sciences, and Graduate colleges.

NTU is also home to world-renowned autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies and Singapore Centre for Environmental Life Sciences Engineering – and various leading research centres such as the Earth Observatory of Singapore, Nanyang Environment & Water Research Institute and Energy Research Institute @ NTU (ERI@N).

Under the NTU Smart Campus vision, the University harnesses the power of digital technology and tech-enabled solutions to support better learning and living experiences, the discovery of new knowledge, and the sustainability of resources.

Ranked amongst the world's top universities, the University's main campus is also frequently listed among the world's most beautiful. Known for its sustainability, NTU has achieved 100% Green Mark Platinum certification for all its eligible building projects. Apart from its main campus, NTU also has a medical campus in Novena, Singapore's healthcare district.

For more information, visit www.ntu.edu.sg