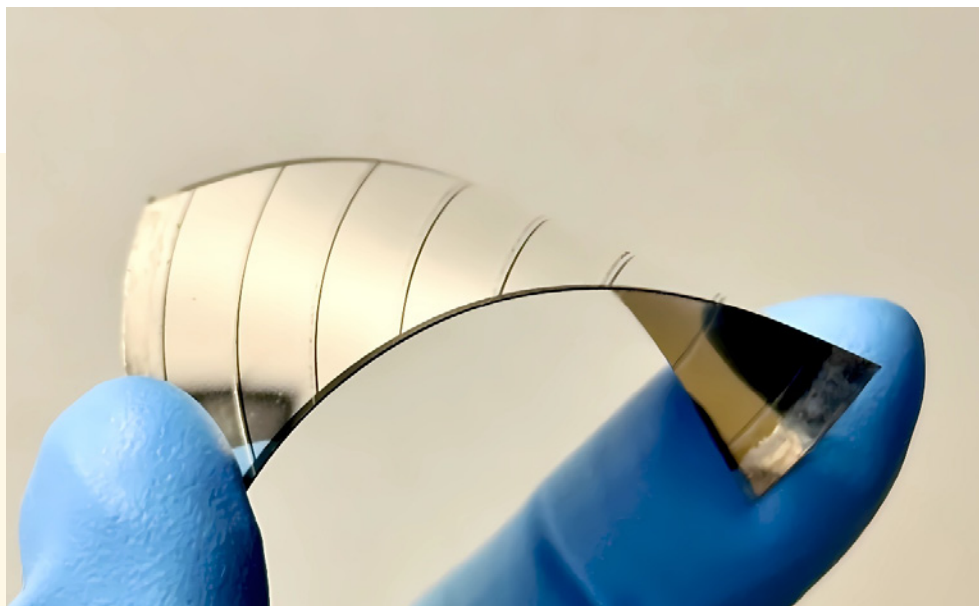


Research & Innovation



Transforming Energy Access with Innovative Solar Module Design

Researchers from the Department of Applied Physics and the Research Institute for Intelligent Wearable Systems under the PolyU Academy for Interdisciplinary Research, have developed a flexible perovskite solar module that combines high efficiency with exceptional versatility. Adopting advanced surface reconstruction technology, the invention enhances the stability and performance of perovskite materials, significantly improving the durability and power conversion efficiency of the solar module to a level comparable with traditional solar cells.

This lightweight, thin, and adaptable module is capable of conforming to a wide variety of surfaces and shapes, which enables integration into clothing, backpacks, vehicles, and the curved exteriors of

buildings. These features make it suitable for diverse applications across industries, supporting more widespread adoption of renewable energy. Beyond technical performance, the invention also contributes to reducing manufacturing costs and increasing accessibility, accelerating the transition towards a sustainable energy future.

In addition to its role in advancing clean energy, the invention, which won a **Gold Medal at the 49th International Exhibition of Inventions Geneva**, also contributes to Responsible Consumption and Production (SDG12) by promoting cost-effective, resource-efficient solar module manufacturing.

7 AFFORDABLE AND CLEAN ENERGY



Spearheading Sustainable Energy Innovations with Cross-Border Collaboration

To tackle the surging power demand brought by extreme weather events, ageing power networks, and the rapid integration of renewable energy systems, PolyU has established the Research Centre for Grid Modernisation (RCGM). The Centre serves as an international platform to advance research, development, and knowledge transfer on sustainable energy systems, fostering collaborations with academia, industry, and governments worldwide.

At its launch ceremony, RCGM announced the establishment of the "PolyU-Autosun Joint Laboratory for Sustainable PowerTech Research in Modern Grid" in collaboration with Shenzhen Auto Electric Power Plant Company Limited, with a focus on electric vehicle charging technology, smart microgrids, advanced energy storage systems, and health monitoring of power equipment.

By harnessing emerging technologies such as sensors, 5G/6G communications, artificial intelligence, and big data analytics, RCGM aims to spearhead innovations in power grid modernisation, enabling the development of secure, sustainable, and affordable energy systems. This initiative supports the carbon neutrality goals of Hong Kong and Chinese Mainland, while contributing to Climate Action (SDG13) by addressing energy transition and climate resilience.





Teaching & Learning

Creating Sustainable Impact in Rwandan Off-Grid Communities

PolyU continued its commitment to global citizenship and sustainable development through the "Wong Tit Shing Sustainability Education Project: Habitat Green in East Africa". Jointly coordinated by the Department of Electrical and Electronic Engineering, the Department of Computing, and the Service-Learning and Leadership Office, this service-learning project sent students to Rwanda to install solar power systems in underserved villages, during which they were presented with significant logistical and personal challenges.

It was apparent that delivering solar energy solutions to remote villages in the Rwamagana district proved physically demanding; students had to navigate

difficult terrain and intense weather conditions, often carrying heavy equipment over long distances to access hillside homes that were lacking electricity. Besides, unfamiliarity with the culture, language, environment, and customs further tested their adaptability and resilience.

Despite these obstacles, the project achieved a substantial impact: **more than 400 underprivileged families** now benefit from stable electricity for lighting, communication, and daily activities. In addition to system installation, students provided technical training to local youth, promoting long-term community self-reliance and sustainable energy use. Concurrently, it also contributes to building

Sustainable Cities and Communities (SDG11) by improving access to essential infrastructure and clean energy.

This initiative exemplifies the University's pioneering integrated approach to education, combining academic knowledge with civic responsibility. The experience strengthened students' intercultural competence and leadership skills, while advancing the University's mission to nurture socially responsible professionals and leaders with a global perspective.

External Engagement

Strengthening Belt and Road Sustainable Energy Collaboration

As a founding member of the University Alliance of the Silk Road, PolyU co-organises the annual “Belt and Road Advanced Programme in Power and Energy” with Xi’an Jiaotong University, the State Grid Corporation of China, and The Hongkong Electric Company Limited. The Programme fosters international knowledge exchange and collaborative initiatives to accelerate green energy development, so contributing to global energy sustainability. This year’s theme, “Low Carbon Transition: Latest Development of Green Energy”, brought together **nearly 30 engineers, researchers, and managers** from around ten Belt and Road countries and regions to discuss strategies for co-creating a new digital grid to support a sustainable future.

Participants engaged in lectures, seminars, and field trips in Chinese Mainland and Hong Kong, exploring the latest green energy technologies and management practices. They examined how integrating energy, transport, and digital networks could address sustainability challenges and advance the transition to the fifth industrial revolution. The Programme also highlighted innovations like an AI-powered cable fault prediction model co-developed by Hongkong Electric and PolyU, which has reduced cable-related incidents by 40%. **With over 830 participants** from nearly 50 countries and regions and 10,000 contact hours since its inception, the Programme is a flagship Belt and Road initiative, with plans to expand it into a decade-long collaboration for a smarter, greener energy future.



Micro Flow and Interfacial Phenomena Conference 2024

Distinguished Lecture and Conference Series on Energy and Smart Technology

The PolyU Academy for Interdisciplinary Research (PAIR) has hosted a series of distinguished lectures and conferences on energy, bringing international academic, research, and industry communities together for interdisciplinary knowledge exchange. Overall, these three events brought together **over 630 in-person participants and approximately 50,000 online viewers**, underscoring PolyU’s commitment to driving interdisciplinary innovation in energy and smart technology.

The lecture “New Journey of Energy Revolution and Automotive Revolution”, which was delivered by a renowned pioneer in electric vehicles, emphasised the need to integrate energy, mobility, information, and humanity to achieve sustainable human–nature development, and explored key technologies such as electric vehicle powertrain, batteries, and the Internet of Vehicles. Meanwhile, the lecture “Battery Fast Charging for Sustainable Electrification” provided a platform for discussions on fast-charging and high-temperature-stable technologies, reinforcing the vision and underlying research opportunities for

affordable and reliable mobile energy storage that is essential for propelling sustainable electrification in electric vehicles.

PAIR and Chemical and Biological Microsystems Society also co-organised the “Micro Flow and Interfacial Phenomena Conference 2024”, which gathered leading experts in thermodynamics, microfluidics, and biomedical engineering. The Conference fostered interdisciplinary exchange with a focus on energy applications involving microchannel flow or microscale surface phenomena.

Governance & Operations

Championing a Sustainable Culture of Environmental Excellence

PolyU pushes forward with demonstrating its strong commitment to sustainability and climate action through a range of energy conservation initiatives and recognised achievements. As a long-standing supporter of the Energy Saving Charter, the University actively promotes energy efficiency across campus by encouraging the community to adopt simple yet impactful practices such as maintaining indoor temperatures between 24°C and 26°C in summer, switching off unused electrical appliances, and choosing energy-efficient systems, reinforcing a culture of collective environmental responsibility.

In recognition of its continued excellence, PolyU has received multiple sustainability accolades. The University was awarded the **Platinum Award under**

the Charter on External Lighting launched by the Environment and Ecology Bureau, acknowledging responsible lighting practices that minimise light pollution and support a greener urban environment. In addition, PolyU has achieved the **Excellent Level in the Energywise Certificate**, granted under the Hong Kong Green Organisation Certification scheme. Furthermore, the University has also retained its designation as a **Hong Kong Green Organisation**, a status it has consistently held since 2016.

All these achievements reflect PolyU's deep-rooted commitment to energy conservation and sustainable development, while inspiring members of the University community to take meaningful actions that support long-term environmental goals.



Optimising Energy Use with Smart Technology

PolyU deepens its focus on embracing smart technology in its sustainability efforts, with the launch of the Energy Smart Platform to support energy efficiency across campus. This platform is powered by a smart electric metering system installed on electrical circuits and distribution boxes of participating units, enabling real-time monitoring and analysis of electricity usage. Through this system, departments and offices can gain valuable insights into their energy consumption patterns for facilities such as lighting, computer equipment, and laboratory systems round the clock every day. Such a data-driven approach allows them to identify areas for operational efficiency, verify the effectiveness of implemented energy-saving measures, and track their own performance over time.

The Energy Smart Platform plays a vital role in promoting behavioural change on the demand side. By empowering users with accessible and actionable information, it motivates them to adopt more sustainable practices and reduce overall energy use. The initiative also supports the University's broader sustainability goals by implementing energy-smart campus management and engaging the campus community in a joint effort to lower its environmental impact.