Holistic lens for China's low-carbon transition

The Institute of Environment and Ecology (iEE) at Tsinghua Shenzhen International Graduate School (SIGS) pursues comprehensive assessments and solutions for CARBON NEUTRALITY AND POLLUTION CONTROL.

China's strategies to hit peak carbon dioxide emission before 2030 and carbon neutrality by 2060 have created a positive ripple effect, accelerating academic innovations at the iEE. These innovations draw on research in a variety of disciplines including climate change, atmospheric pollution, waste treatment, ecology, marine science, and environmental management and policy, according to Kebin He, a member of the Chinese Academy of Engineering and dean of iEE.

CUTTING-EDGE RESEARCH

He, who is also dean of Tsinghua University's Institute for Carbon Neutrality, is widely regarded as one of China's top experts in the field of air quality. He has established an international leading team at Tsinghua in the field of high-resolution dynamic emission inventories, including both carbon dioxide and atmospheric pollutants.

"An accurate and detailed emission accounting and monitoring system is important to coordinate the reduction of atmospheric pollution and carbon emissions," says Bo Zheng, a Tsinghua alumnus who returned from France as a SIGS professor and a member of the iEE team.

Zheng specializes in the carbon cycle, atmospheric modelling, air pollution, and climate change mitigation policies. Zheng and his collaborators have estimated trends in China's anthropogenic emissions since 2010 as the consequence of clean air actions. A 2020 *Science Advances* paper by Zheng and his collaborators integrated satellite observations and bottom-up inventories to track the decline and rebound in China's carbon emissions and atmospheric pollutants during the COVID-19 pandemic. He has been recognized by Clarivate as a highly cited researcher for the past two years.

Another researcher receiving international recognition is Chaopeng Hong, who returned from University of California as a SIGS professor at iEE. A *Nature* paper published in 2021 by Hong and his collaborators detailed global and regional drivers of land-use emissions to prioritize mitigation efforts, revealing the need for drastic changes in agriculture to contribute to carbon neutrality targets.

Focused on linked human-environment systems such as climate change, air quality, agriculture, and health, Hong's research delves into agri-food production and land use processes. "These generate a large amount of greenhouse gases and atmospheric pollutants, but less attention has been paid to these emissions compared to fossil fuel emissions," he says.

Reviewing existing gaps in food production can be revealing, as Huan Li, another iEE professor specializing in anaerobic digestion and electro-fermentation, shows. His team has been assessing carbon emissions from a variety of food waste treatments, most recently investigating how to recover lactic acid, a key organic acid widely used in industry, from food waste fermentation.

"We position ourselves at the forefront of climate change and carbon neutrality research to support realization of sustainable development in China and globally, as well as in the Guangdong-Hong Kong-Macau Greater Bay Area where SIGS is based," says Jian'e Zuo, executive associate dean of iEE. "We are seeking excellent international researchers to join our institute." ■

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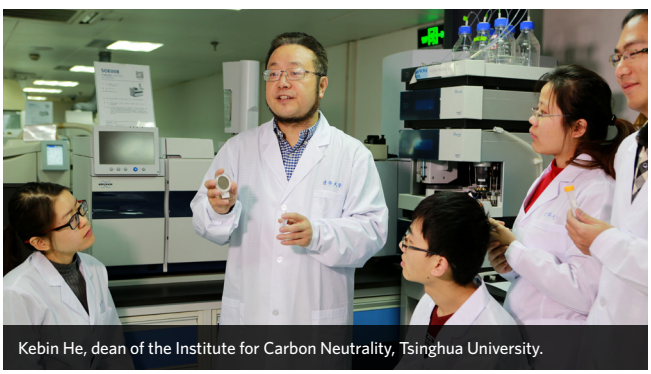

Kebin He, dean of the Institute for Carbon Neutrality, Tsinghua University.

Human uses of fossil fuels and land have added prodigious quantities of greenhouse gases and pollutants to the atmosphere.

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