300 kWh low-carbon economy

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With the introduction of the "dual carbon" goal and the continuous promotion of low-carbon development, the integrated energy system (IES) has gradually become an effective way to save energy and reduce emissions. This study proposes a low-carbon economic optimization scheduling model for an IES that considers carbon trading costs.

The ability to capture greenhouse gases generated by energy units reduces the system"s carbon emissions. Based on the IES low carbon economy model, the model is analyzed with examples to analyze the correlation between different carbon trading prices and IES low carbon economy transport.

Carbon pricing instruments, such as emission trading schemes (ETS) and carbon tax, are expected to incentivize the transition toward low-emission energy systems. By 2021, there are 64 carbon pricing instruments in place covering 21.5% of global greenhouse gas emissions, which is a considerable growth.

Recycling, renewables and a reinvigorated domestic energy market will allow China to lead the world in low-carbon development, say Zhu Liu and colleagues.

300 gigawatts (GW) in 2011 was already twice the US capacity for the same year (146 GW). China"s wind turbines and hydropower stations were the world"s most productive in 2011, generating 70 billion kWh and 720 bil - lion kWh, respectively. Yet China is producing more renewable technologies than it can use. In 2012, the

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China is a major force behind anthropogenic carbon emissions and their mitigation. The world"s leading primary energy consumer in 2012, China devoured almost half of all coal produced. The nation accounted for one-quarter of global carbon dioxide emissions in 2011 and 80% of the world"s rise in CO2 emissions since 2008 (ref. 1).

Facing international pressures to curb its CO2 releases, as well as a tight domestic fossil-energy supply and high levels of air pollution, China has implemented a bold national strategy for energy conservation and emissions mitigation. The country plans to reduce its carbon intensity (CO2 per unit of gross domestic product, or GDP) to 55-60% of 2005 levels by 2020.

This can be achieved only if China becomes a low-carbon economy. With powerful regulatory control, we believe that the nation"s energy appetite could drive the development and use of low-carbon technologies, in which China could become a world leader. We identify the major challenges in such a transition, and propose a five-pronged strategy to get China onto this low-carbon pathway.

First, China must move away from coal and boost recycling and renewable energies. Second, emissions-mitigation indicators, such as energy-efficiency targets, should be set relative to physical output (such as tonnes of steel production) rather than to economic growth. Third, regional energy supply and demand must be balanced. Fourth, energy prices should be linked to market mechanisms rather than set centrally by authorities. And fifth, China must reduce air pollutants alongside CO2 emissions.

China has made great progress in cutting carbon emissions in the past decade. In its 11th five-year plan (2006-10), the government set goals to reduce energy intensity (energy consumption per unit of GDP) by 20% on average across all provinces by 2010. Thousands of inefficient power plants and factories were closed to meet the targets2, saving the equivalent of 750 million tonnes of coal and 1.5 billion tonnes of CO2 (5% of global CO2 emissions in 2010).