Potential pathways to achieve the low-carbon city targets: a scenario analysis using LEAP model

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Abstract

Cities are the key sources of GHG emissions. Energy activities of urban areas account for approximate 70% of global carbon emissions which indicates that cities will play a critical role in mitigating climate change and reducing greenhouse gas emissions. To achieve the green low-carbon city development goals and to accomplish the carbon reduction task dispatched by national government, many cities in China have set a series of detailed emission targets, for instance, carbon intensity for Shanghai is set to be reduced by 20.5% during the period of 2016 and 2020, the cap of total energy consumption is controlled under 125 million tce by 2020. Total carbon emissions as well as carbon emission per capita will peak at 2025, with a 15% reduction of total carbon emissions in 2040 compared with the peaking year. Based on LEAP model, we construct two comprehensive scenarios, named a business-as-usual scenario and a “most-likely” scenario which contains five sub-scenarios of mitigating instruments such as the improvements of energy mix, energy efficiency, industrial structure, building efficiency and demand side management for transportation, to assess the reliability of those targets, and to explore the future potential pathways to achieve the goals. The simulation results indicate the low carbon targets can be realized under the “most-likely” scenario with multiple combinations of sub-scenarios. In addition, system cost are assessed for those policy choices.