

1.095 Forecast the shipping emissions and impacts in China.

Presenting Author:

Huan Liu, Tsinghua University, Beijing, China, liu_env@tsinghua.edu.cn

Co-Authors:

Zhaofeng Lv, Tsinghua University, Beijing, China

Zhihang Meng, Tsinghua University, Beijing, China

Abstract:

China established Domestic Emission Control Area (DECA) for sulphur since 2015 to constrain the increasing shipping emissions. However, future DECA policy-makings are not supported due to a lack of quantitative evaluations. To investigate the effects of current and possible Chinese DECAs policies, a model is presented for the forecast of shipping emissions and evaluation of potential costs and benefits of an DECA policy package set in 2020. It includes a port-level and regional-level projection accounting for shipping trade volume growth, share of ship types, and fuel consumption. The results show that without control measures, both SO₂ and particulate matter (PM) emissions are expected to increase by 15.3-61.2% in Jing-Jin-Ji, the Yangtze River Delta, and the Pearl River Delta from 2013 to 2020. However, most emissions can be reduced annually by the establishment of a DECA that depends on the size of the control area and the fuel sulphur content limit. Costs range from 0.667 to 1.561 billion dollars (control regional shipping emissions) based on current fuel price. A social cost method shows the regional control scenarios benefit-cost ratios vary from 4.3-5.1 with large uncertainty. Chemical transportation model combined with health model method is used to get the monetary health benefits and then compared with the results from social cost method. This study suggests that Chinese DECAs will reduce the projected emissions at a favorable benefit-cost ratio, and furthermore proposes policy combinations that provide high cost-effective benefits as a reference for future policy-making.