Estimating health co-benefits of China’s climate policies to meet the 2°C target

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INTRODUCTION

Climate policies can bring local air quality and health co-benefits, which may partially or entirely offset the cost of implementing these policies. While many existing studies have quantified the co-benefits of climate policies in China at national, regional, and provincial levels, most of them did not take the indirect efficiency gains and the cumulative effects of improved air quality into consideration.

We contribute to the existing studies by introducing a cross-scale integrated assessment model focusing on regional health co-benefits evaluation, the Regional Energy Emission Air-quality Climate Health (REACH) Modeling Framework. A primitive version of REACH framework was developed by Li et al. [1], which didn’t account for the indirect health benefits. In this study, we update the REACH framework by improving the traditional social accounting matrix (SAM) and using localized and provincially differentiated parameters to address the aforementioned problems.

We extend our previous work [2] to evaluate the province-specific health co-benefits under the scenario achieving the 2°C target. The result shows that a scenario consistent with the 2°C target and more aggressive than China’s current policy scenario could peak China’s emissions around 2025 and could avoid around 130 thousand premature deaths in 2030. This health benefits could partially or fully cover the policy cost under different assumptions of value of statistical life (VSL). Our framework illustrates that estimated costs and health benefits distribute unevenly across China’s different regions, and that the indirect economic cost due to the inefficient resource allocation in the economic system cannot be ignored.

SCENARIO & RESULT

We simulate and evaluate three scenarios: a) Base Scenario (BS), which represents a counterfactual ‘no policy’ scenario; b) Current Effort Scenario (CES), which is consistent with the NDC target to peak the CO2 emissions by 2030; and c) Policy Enhancement Scenario (PES), which is comparable with the scenario that limits the global warming within 2°C and peaks China’s CO2 emissions by 2025.

Reduced air pollutants and improved air quality

- Compared with the BS scenario, in 2030, different kinds of primary pollutants are reduced by 12%-21% and 18%-24% under the CES and PES scenarios, respectively.
- The national air quality is improved and the overall PM2.5 concentration is decreased under the CES scenario, but to a limited extent. Under the PES scenario, the air-quality improvement is greatly enhanced. The central and the south China experience the greatest improvement, with the average PM2.5 concentration decreasing by approximately 20% compared with the baseline year, to less than 70μg/m³ in 2030. However, the air quality improvement in the west China is limited.

Avoided premature deaths and monetized co-benefits

- The morbidity and mortality are reduced in both CES and PES scenarios compared with the BS scenario. Under the CES scenario, while the mortality in East China decreases significantly, it doesn’t change significantly in Central China, and even rises in West China in 2030.

CONCLUSION

A significant co-benefit of $56–457 billion can result from an enhanced policy which is consistent with the 2°C target, compensating 35%–285% of the additional economic loss, depending on different choices of the value of statistical life (VSL) estimation. When the total health co-benefits are decomposed into direct and indirect components, the indirect effects, accounting for 27% of the total co-benefits, cannot be neglected.

REFERENCE