

Global Fossil-fuel Subsidies and Emission Externalities: Inclusive Approaches to Welfare Assessment

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For several decades energy subsidies remain on the top of international policy agenda, serving as one of the most debated and widely used policy tools. Several major international organizations have attempted to quantify global energy subsidies and provide assessment of their potential reform. This includes studies by Organization for Economic Co-operation and Development (OECD), International Energy Agency (IEA) and International Monetary Fund (IMF). While most of these contributions provide estimates of economy-wide effects, they lack consistent assessment of environmental co-benefits of subsidies elimination, which can have a significant influence on aggregate results and their regional distribution.

In this paper, we apply a multistep framework to analyze two global energy policy scenarios. First one includes elimination of pre-tax fossil-fuel consumption subsidies. Second scenario, in addition to the first one, includes imposition of the compensatory air pollution taxes, which correspond to the local air pollution externalities (post-tax subsidies). Dynamic computable general equilibrium ENVISAGE model is used to implement energy policies, quantify economic impacts, estimate energy use changes and emissions. Energy use changes are linked to emission of air pollutants and pollution-mortality impacts are estimated based on the population exposed by pollution and corresponding mortality risks. Finally, welfare benefits related to reduced mortality rates are assessed using country-adjusted willingness-to-pay measure from direct valuation studies. To account for the uncertainty associated with monetization of welfare co-benefits systematic sensitivity analysis approach is used to report the results.

Results show that inclusion of mortality and climate change related benefits has significant impact on net welfare estimates. According to our results, in case of pre-tax consumption energy subsidies elimination global (greenhouse gas) GHG emissions fall by 4.7-5.1% in 2050 and air pollutants emission reduction results in avoidance of 49-78 thousand deaths. Global monetary welfare co-benefits of such policy contribute to around \$300-400 billion (international \$2011) in 2050, turning some regions from net welfare losers to gainers. Most high-income countries experience insignificant pollution and mortality increase due to leakage effects.

Imposition of the compensatory air pollution taxes, in addition to pre-tax subsidies reform, provides much more significant reduction in GHGs emissions and air pollutants emissions – by 22-31% and 17-39% respectively in 2050, depending on the baseline scenario. Associated premature deaths reduction are between 0.9 million and 1.7 million people in 2050. Introduction of air pollution-related mortality co-benefits to the conventional welfare estimates turns world welfare loss into gain under both baseline scenarios, with China turning from main loser to key gainer.