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## The Gap between INDC Proposals and Optimal Climate Policy: Economic Impacts and Climate Change Consequences

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### Abstract

The 19th Session of the Conference of the Parties to UNFCCC (COP19) in 2013 in Warsaw, Poland, sponsored the discussion on the core elements of the new agreement about climate change. All the Parties are expected to submit their intended nationally determined contributions (INDCs) in 2015 (COP21 in Paris). Based on the INDC proposals updated by October 2nd, 2015, when 120 countries/regions in the world submitted their INDCs proposals, this study attempts 1) to assess the optimal levels of climate change mitigation and adaptation of INDC proposals by DICE; 2) to provide the implications for policy-makers to further understand what's the gap between the INDC proposals and optimal climate policy, and corresponding economic costs. There are the following advantages comparing to previous studies 1) based on the new socioeconomic development scenarios – SSPs and explicit consideration of adaptation; 2) new marginal abatement cost curves (MACs) consistent to the SSPs; 3) all available climate related emissions (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, BC, CO, NO<sub>x</sub>, OC, SO<sub>2</sub>, NH<sub>3</sub> and VOC) are considered and corresponding sources - industrial and land use emissions - are distinguished, in the optimal-IAM; 4) optimal assessment of INDC proposals. This study shown that 1) The carbon prices for the INDC2DEG in 2070s will be 30% higher than that of SPA12DEG and it reveals the economic costs differences of the climate actions from now and INDC from 2030 with respect to the 2 degree target. 2) About 20% of the Kyoto gases are cut within the INDC proposals in 2030, comparing to the reference case. However, the Kyoto Gases of INDC in 2030 is 12.8 Gt CO<sub>2</sub>-equiv larger than RCP26. To achieve the 2 degree target, more emissions are required to be cut in the following periods, to a lower than RCP26 level after 2030. 3) The gap between INDCCONT and INDC2DEG indicates that the 2 degree target is still far away even if the INDC target is achieved unless substantial efforts are undertaken after 2030. 4) Here both the radiative forcing and temperature increase paths of INDC2DEG are comparable to that of RCP26.