



Key conclusions from AVOID Work Stream One

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AVOID work stream (WS1)one has produced emission scenarios that simulate potential future global emission pathways for greenhouse gases during the 21st century. The study explored the influence of three key features of such pathways: (1) the year in which emissions peak globally, (2) the rate of emission reduction, and (3) the minimum level to which emissions are eventually reduced. It examined the resultant climate change, climate change impacts and economic implications using computer simulations. Avoided impacts, carbon taxes and GDP change increase throughout the 21st century in the models.

AVOID-WS1 showed that in the absence of climate policy it is very likely that global mean temperatures would exceed 3 degrees and there are even chances that the temperature would rise by 4 degrees relative to pre-industrial times. Scenarios that peak emissions in 2016 were more effective at constraining temperatures to below 3 degrees than those that peaked in 2030: one '2016' scenario achieved a probability of 45% of avoiding breaching of a 2 degree threshold. Scenarios peaking in 2030 were inconsistent with constraining temperatures to below 2 degrees.

Correspondingly, scenarios that peak in 2030 are more effective at avoiding climate impacts than scenarios that peak in 2016, for all sectors that we studied. Hence the date at which emissions peak is more important than the rate of subsequent emissions reduction in determining the avoided impacts. Avoided impacts increase with time, being negligible in the 2030s, significant by the 2050s and large by the 2080s. Finally, the choice of GCM influences the magnitude of the avoided impacts strongly, so that the uncertainties in our estimates of avoided impacts for each scenario are larger than the difference between the scenarios.

Our economic analysis is based on models which differ greatly in the assumptions that they make, but generally show that the date at which emissions peak is a stronger driver of induced GDP changes, and, with some exceptions, carbon taxes, than the rate at which emissions are subsequently reduced. In models which assume perfect rationality and foresight and/or assume the economy to be equilibrium with full employment, then mitigation could cause GDP to decrease. In models which do not make these assumptions, mitigation could cause GDP to increase. In either case the effects are small (a few % of GDP lost or gained in 2100) and insignificant when compared with the 600-1200% increase in global GDP forecast between 2000 and 2100 in the SRES A1B reference scenario used in this study. Estimates of carbon taxes required differ widely between models.