Paris Agreement zero emissions goal is not always consistent with 2˚C and 1.5˚C temperature targets

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The Paris Agreement stipulates that global warming be stabilized at well-below 2˚C above pre-industrial levels, with aims to further constrain this warming to 1.5˚C. However, it also calls for reducing net anthropogenic greenhouse gas (GHG) emissions to zero during the second half of this century. Here, we use a reduced-form Integrated Assessment Model to examine the dependency between temperature and emission-based targets. We find that net-zero GHG emissions are not necessarily required to remain below 1.5˚C or 2˚C, assuming either target can be achieved without overshoot. With overshoot, however, our analysis suggests that the emissions goal is consistent with the temperature targets; substantial negative emissions are required to reduce warming after it peaks. Temperature targets are put at risk by late achievement of emissions goals and some GHG emission metrics. Therefore, refinement of Paris Agreement emissions goals should include a focus on net zero CO_2 –not GHG –emissions, achieved early in the second half of the century.

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