



## **Social tipping dynamics for stabilizing Earth's climate by 2050**

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Safely achieving the goals of the Paris Climate Agreement requires a world-wide transformation to carbon-neutral societies within the next 30 years. Despite decades-long efforts in international negotiations, not much progress has been achieved and few are convinced that business-as-usual technological progress and gradual policy implementations will deliver emissions reductions at rates sufficiently fast to avoid crossing dangerous tipping points in the Earth's climate system. Here, we present historical, recent empirical and theoretical evidence supporting the potential of social tipping elements (STEs) as drivers of the required disruptive change. STEs are subdomains of the planetary socio-economic system where targeted policy interventions can activate contagious processes of rapid spreading of technologies, behaviors and social norms that can ultimately propel a sufficiently fast reduction in anthropogenic greenhouse gas emissions. We identify six outstanding candidates for STEs and their associated critical intervention points based on online expert elicitation, a subsequent expert workshop, and a literature review. These critical social tipping interventions include (i) removing fossil fuel subsidies and incentivizing distributed energy generation (STE1: energy production and storage systems), (ii) building carbon-neutral cities (STE2: human settlements), (iii) divestments from assets linked to fossil fuels (STE3: financial markets), (iv) revealing the moral implications of fossil fuels (STE4: norms and value systems), (v) strengthened climate education and engagement (STE5: education system) and (vi) greenhouse gas emissions information disclosure (STE6: information feedbacks). Larger-scale empirical and modelling efforts are needed to understand the potentials of STE dynamics and their role in climate change mitigation pathways in more detail.