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Transformative modelling to address High-End Climate Change

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Abstract: The growing plausibility of a world trespassing the 2°C global warming threshold is unveiling the limitations of existing assessment tools to tackle the multiple non-linearities, irreversibilities, feedbacks, tipping points and uncertainties associated to entering this new situation. A main challenge for transformative modelling is to unveil potentially disruptive strategies and assess distributed solutions capable of addressing high-end climate change while reconciling economic, climate and sustainability goals.

To this end, using a transformative Agent-Based Modelling (t-ABM) approach, we represent and assess the development and implementation of two distinct green growth strategies vis-à-vis a business-as-usual one. Strategy S1 is a distributed one, in which many situated solutions unfold in multiple contexts and progressively replace grey growth. This strategy helps to improve the structural diversity of the economic system, boost the resilience and coordination capacities of agents to respond to potential shocks resulting from high end climate change. In contrast, Strategy S2 tends to reduce the diversity of the economic system, increases the social inequalities, and ultimately amplifies the negative rebound effects of growth by increasing resource consumption and failing to replace grey growth in the long term. We argue that Integrated Climate Governance (ICG) policies aimed at supporting and implementing sustainable green growth strategies need to take into account: (1) Agents' opportunities capacities and networks for generating multiple distributed solutions, e.g. regarding green entrepreneurial competences and (2) Long term cumulative effects of short term policies and incentives as aiming to transform the structural configuration of the economic system.

Keywords: Climate policy, Green growth, System of systems, Agent based modelling