

PREVIEW

EGU General Assembly 2023

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Towards a net negative world: applying a rapid “Paris Test” to multi-gas national policy scenarios to assess and enable fair share 1.5°C achievement

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Overshoot of the global 1.5°C long term temperature goal is likely soon after 2030, so high emitting nations are liable to exceed their fair share of remaining warming to 1.5°C well before 2030. Net zero globally and for high emitters will occur in overshoot, therefore the meaningful goal is a net negative world until 1.5°C is reached. In addition to radical near-term reductions in fossil fuel and land CO₂ emissions, limiting and returning from overshoot will require substantial warming reduction (negative emissions), via some combination of methane mitigation and carbon dioxide removal (CDR), and limits on excessive agricultural N₂O resulting from inefficient reactive nitrogen usage. Therefore, for developed nations and their decision-makers, rapid assessment of the warming impact from primary greenhouse gases for alternative society-wide policy pathway options relative to a fair share of remaining warming to 1.5°C is required on a clearly defined equity basis. This research applies such a “Paris Test” through: a ‘micro climate model’ GWP* assessment of IPCC 1.5°C scenarios undertaken to establish a remaining global CO₂ warming equivalent (CO₂we) budget, aggregated for [CO₂+N₂O+CH₄], to 1.5°C from 2015; allocation of this budget on a global equal per capita and national population basis to set out 2015 remaining national ‘carbon’ quotas, as of 2015; and, a case study (Ireland) of alternative multi-gas national scenarios to compare aggregate society-wide cumulative CO₂we outcomes relative to meeting the 1.5°C national carbon quota well before 2100. Other equitable budget allocation principles are possible, but this case shows the importance of justifying the reference year choice, and other normative and quantitative assumptions, on a clearly defined “common but differentiated responsibility” basis. The study shows the benefits of such a rapid Paris Test national mitigation policy assessment methodology. Its outputs clarify the considerable difference for developed nations between *overshoot net zero*, commonly referred to as “no additional warming”, and *quota net zero*, the Paris Agreement aligned goal, which requires early and substantial CH₄ emissions rate reduction as well as CDR. The common use of GWP₁₀₀ CO₂e in mitigation analyses is shown to undervalue the importance of early, deep, and sustained annual CH₄ emission rate reduction toward reducing inequitable long-term reliance on uncertain and costly large scale CDR. If the 1.5°C goal is to be met, by limiting overshoot magnitude and quickly returning to a Paris-consistent net zero quota level, then urgent, substantial and sustained action by developed nations – to radically reduce their fossil fuel use and deforestation responsibility, and to limit

nitrogen flows to intensive animal agriculture – will be required at policy ambition levels far greater than those considered ‘technically feasible’ in IPCC mitigation assessments. To meet society-wide, 1.5°C fair share, national multi-gas quotas, so-called ‘hard-to-abate’ sectors, such as aviation and ruminant agriculture, likely have to be abated substantially and directly within developed nations through policy-directed regulation. This research confirms that the window of options for fair share 1.5°C climate action in developed nations is closing very rapidly.