

Estimating National Carbon Quotas and Modelling Compatible Emission Pathways at a Small Nation Scale

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In light of the Paris Agreement to limit global warming to ‘well below 2 °C’, a key question is how to achieve fair allocation of the remaining global carbon budget and responsibility for negative emissions among UNFCCC Parties. To inform nation-scale modelling of rapid escalation of CO₂ removal through negative emissions technologies (NETs) and to progress the practical pursuit of mitigation actions in line with the Paris Agreement, we present a case study estimating the remaining national carbon quota for Ireland. We explore the implications of these CO₂ quota estimates for current and future Irish emission pathways, which potentially already include tacit obligations for deployment of NETs – at early and significant scale – to achieve land-based sequestration and geological carbon storage.

We consider five carbon quota allocation rules from the existing literature with differing weightings of *inertia* and *equity*. As of the end of 2017, a remaining “pure-inertia” CO₂ quota for Ireland (assuming commensurate action on non-CO₂ forcings) is estimated at about 900 MtCO₂. A “pure-equity” quota is estimated at about 500 MtCO₂. Fully allowing for historical responsibility and relative capacity would arguably constrain the quota still further. As of 2016, Ireland reported annual territorial emissions of approximately 40 MtCO₂ (~8.4 tCO₂ per capita) in addition to nett land use emissions of ~3.7 MtCO₂. Meeting the inertia and equity quotas would already require sustained reduction rates (of nett CO₂ emissions) in excess of 4% yr⁻¹ or 8% yr⁻¹ respectively.

Finally, we model, investigate and critically assess a number of alternative pathway combinations of gross emissions and removals aligned with the estimated Irish nett CO₂ quotas.

Keywords: Paris Agreement, climate change, negative emissions technology, carbon dioxide removal, Ireland, national carbon quota, equity.