

Global CO₂ storage capacity: Modelling limitations of geography and injectivity

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The importance of carbon capture and storage in the mitigation of climate changes arises from the potential capacity for the injection of large volumes of CO₂ into suitable subsurface geologic formations. The assessment reports of the Intergovernmental Panel on Climate Change estimate that in the average of scenarios where CO₂ concentration is stabilised at 450 ppm by 2100, storage demand approaches 15 Gt CO₂ per year by 2050, and persists at around 20 Gt per year from 2060-2100. This represents approximately 1200 Gt CO₂ stored underground by 2100. However, these modeled estimates disregard potential limitations to achieving these rates and volumes of storage from either the geographic availability of subsurface storage reservoirs, or the pressure limitations to allowable rates of injection.

The PhD project will evaluate the potential for geographic and reservoir injectivity constraints to lead to bottlenecks in the development of large scale CO₂ storage globally. Ultimately, we will construct models for plausible development trajectories that may be incorporated into energy systems models of the type used by the IPCC to outline techno-economic pathways for mitigating climate change.

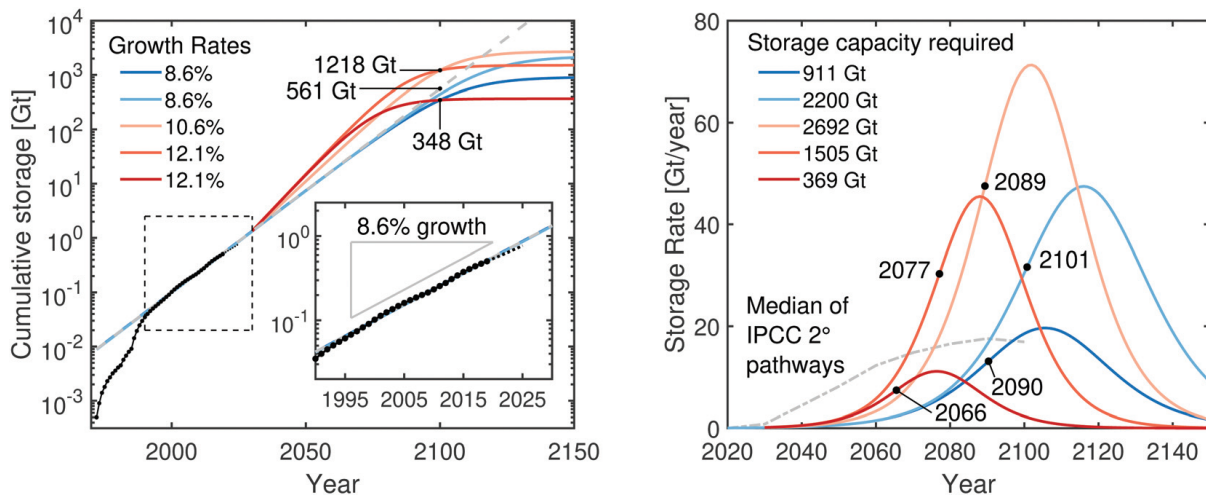


Figure 1. Plausible growth trajectories and associated storage capacity for CO₂ storage to meet 2100 climate change mitigation targets outlined by the IPCC. From: Zahasky, C., & Krevor, S. (2020). Global geologic carbon storage requirements of climate change mitigation scenarios. *Energy & Environmental Science*.