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Impacts of COVID-19 induced energy demand changes on emissions and mitigation challenges

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The COVID-19 pandemic is causing radical temporary breaks with past energy use and GHG emissions trends. However, how a post-pandemic recovery will impact longer-term transformations to a low-carbon society is unclear. Here, we present different global COVID-19 shock-and-recovery scenarios that systematically explore economic uncertainty and the demand-side effect on emissions. We consider changes in the residential, industry and transport energy sub-sectors under diverging cases that might lead to a more carbon intensive and individualistic way of consumption, or to a policy-advised new future that supports the emission reduction opportunities seen during the pandemic. The resulting impact on cumulative CO₂ emissions over the coming decade can range from 28 to 53 GtCO₂ reduction depending on the depth and duration of the economic downturn and the extent and persistence of demand-side changes. Recovering from the pandemic with low energy demand practices - embedded in new patterns of travel, work, consumption, and production - reduces climate mitigation challenges in the long run. We show that a low energy demand recovery reduces carbon prices for a 1.5°C consistent pathway by 19%, saves energy supply investments until 2030 by 2.1 trillion USD, and lessens pressure on the upscaling of renewable energy technologies.