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.