



2021

HAMBURG CLIMATE FUTURES OUTLOOK

Assessing the plausibility of
deep decarbonization by 2050



COVID-19 and the changing climate (1/2)

The COVID-19 pandemic has led to worldwide drastic lockdown measures, which in turn have temporarily reduced global greenhouse gas emissions. The emissions reductions are unprecedented and the year-to-year change is much greater than that experienced during the 2008 financial crisis or the Second World War (Liu et al., 2020). Estimates made using varying methods in the course of 2020 found that the reduction in CO₂ was around 7% over 2019 levels (Le Quéré et al., 2021). What effect might this reduction have on the pace of global warming? Forster et al. (2020) model the effect of an even larger emissions reduction on global temperature. They assume around 11% reduction in global emissions from the second half of 2020 until the end of 2021, and a linear return to baseline emissions by the end of 2022. Nevertheless, this rather generous projection of CO₂ reductions due to COVID-19 is estimated to have an impact of merely 0.01°C in avoided global surface warming (Forster et al., 2020).

Why does a strong external shock to CO₂ emissions like the COVID-19 lockdown have so little effect on surface temperature? It is not directly the emissions but rather the atmospheric concentration of CO₂ that determines surface warming. Short-term, partial emissions reductions do not prevent the concentration from increasing. The CO₂ concentration measured at the top of Germany's Zugspitze broke new records in 2020, as did the measurement on Hawaii's Mauna Loa (DKK, 2020). To limit CO₂ concentrations to a level compatible with the Paris Agreement's 1.5°-target would require more than a one-off reduction in emissions of 7%, it would require year-on-year CO₂ emissions

reductions, reaching 45% of their 2010 levels by 2030, and net-zero emissions by 2050 (IPCC, 2018b).

Nevertheless, the COVID-19 pandemic represents a window of opportunity for long-term progress toward decarbonization (Gawel and Lehmann, 2020). Disruptions like the pandemic can provoke societal changes at unprecedented speed, such as policy interventions (Herrero and Thornton, 2020), compliance with sudden new rules and social norms, and the rise of grassroots solidarity movements (Décobert, 2020; Ortega and Orsini, 2020). There is a strong case for using the window of opportunity presented by the pandemic to start "an economic recovery that puts emissions reduction [...] at its heart" (Howarth et al., 2020: 1113).

Indeed, a green recovery is considered by many to be the most reasonable way forward after the lockdown (UBA, 2020b; UBA, 2020c; IEA, 2020c; UNEP, 2020a). Incentives for climate-friendly transportation, remote communications and large-scale deployment of renewable energy could form key strategic actions for immediate and lasting emissions reductions (Le Quéré et al., 2021). Moreover, the economic costs of mitigation measures that meet the Paris Agreement may be lower than previously thought, due to COVID-related reductions in economic activity. Such costs are also a fraction of those required for the COVID-19 recovery stimulus (Andrijevic et al., 2020; Meles et al., 2020), so that the implementation of ambitious mitigation measures may now be more feasible than before the pandemic (Klenert et al., 2020). ▶

COVID-19 and the changing climate (2/2)

However, positive environmental impacts of lockdown strategies may be temporary, subject to rebound effects, or simply insufficient to bring about the change necessary for deep decarbonization. The emissions reduction due to the lockdown (Elliott et al., 2020) and most of the measures to promote economic recovery are currently not in line with the goal of reaching net-zero emissions by 2050 (Meles et al., 2020). So far, no structural transformations in the economic or energy systems can be observed (Beltermann et al., 2020; IEA, 2020d; Le Quéré et al., 2020) and it is plausible that the worldwide responses to the COVID-19 pandemic will trigger rebound effects in global emissions (see e.g., Wang et al., 2020). Global electricity demand

rebounded sharply by the end of 2020 and is back to pre-COVID trends, and coal-fired generation is expected to bounce back in 2021, resulting in an approximate 2% increase in CO₂ emissions from the power sector (IEA, 2021a). Indeed, the powerful fossil fuel industries are lobbying for a fossil-fuel-based recovery (Gawel and Lehmann, 2020; Lenzen et al., 2020; Mukanjari and Sterner, 2020). Hence, whether the pandemic will significantly influence the pathway toward deep decarbonization depends not only on political decision-making, but also on the potential for long-lasting normative and behavioral changes toward a low-carbon global society (Messner, 2015; Sovacool et al., 2020).