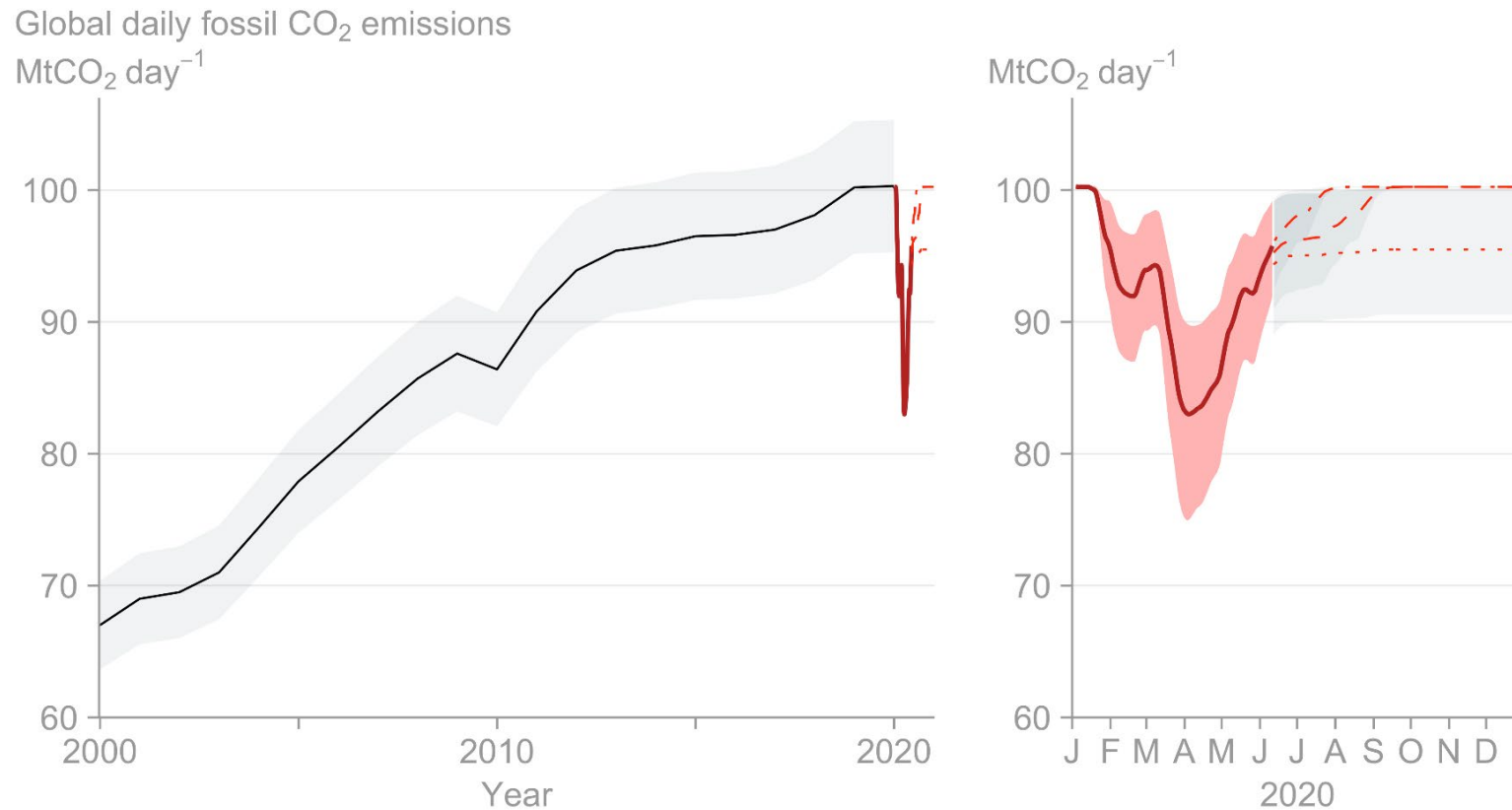


Impact of the Covid-19 crisis on greenhouse gas emissions and implications for the zero carbon transition in urban land use and transport

Felix Creutzig



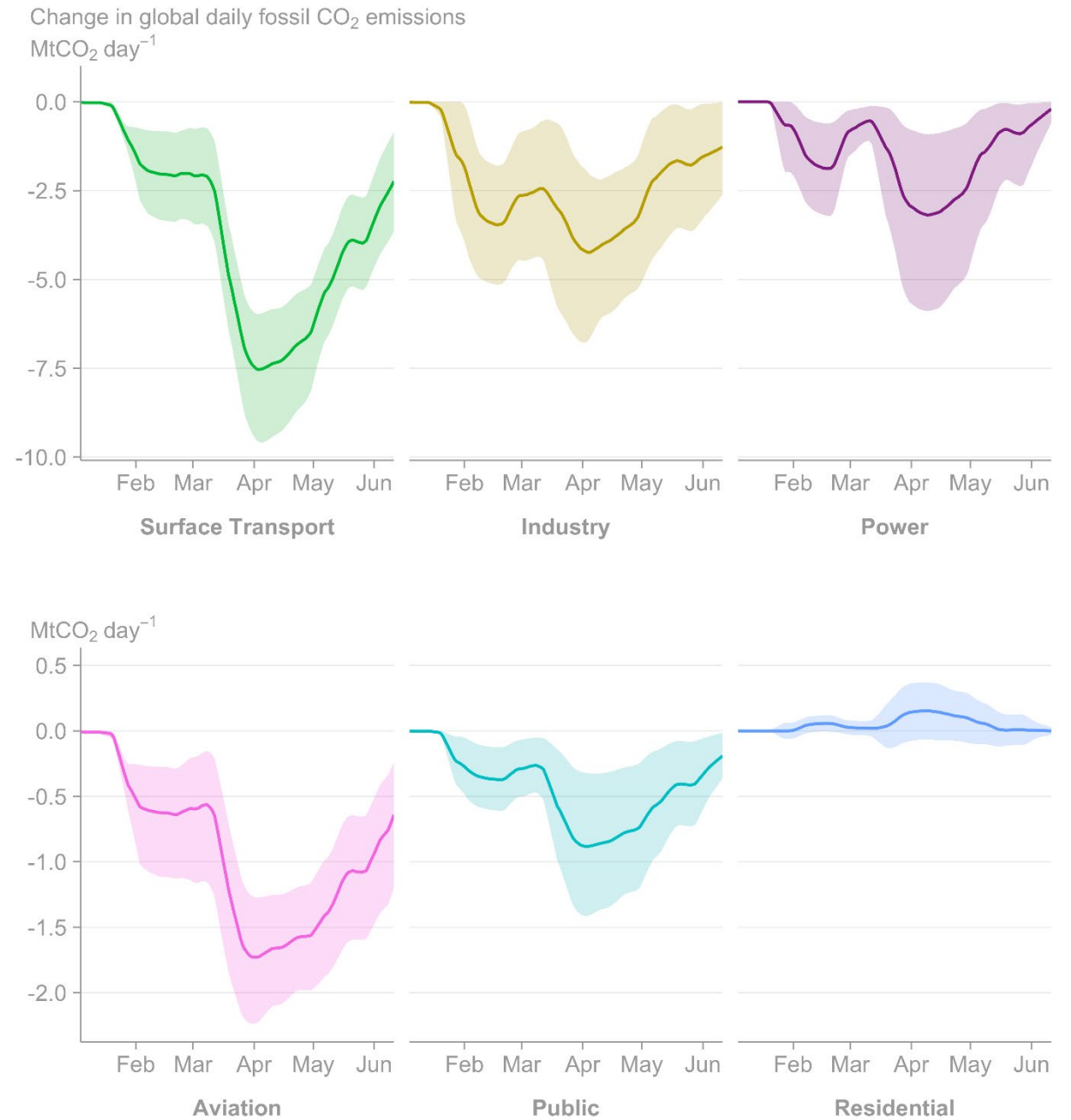
Strong but temporary decrease of global GHG emissions due to COVID-19



© ⓘ Source: Le Quéré et al. *Nature Climate Change* (2020); Global Carbon Project

Le Quéré, C., Jackson, R. B., Jones, M. W., Smith, A. J., Abernethy, S., Andrew, R. M., ... & Friedlingstein, P., **Creutzig, F.**, Peters, G. (2020). Temporary reduction in daily global CO₂ emissions during the COVID-19 forced confinement. *Nature Climate Change*, 1-7.

Surface transport and aviation witnessed the strongest decrease

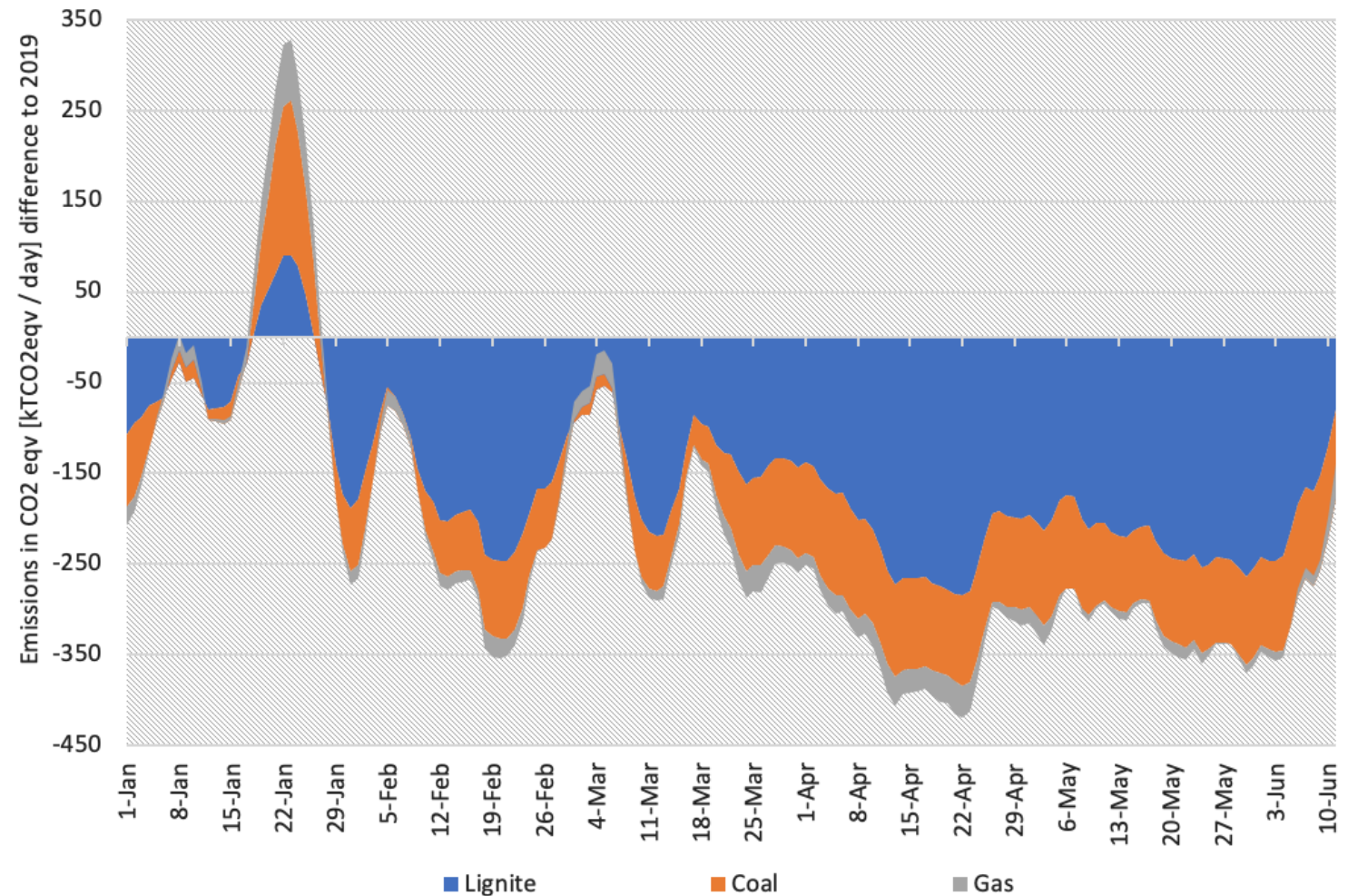


Le Quéré, C., Jackson, R. B., Jones, M. W., Smith, A. J., Abernethy, S., Andrew, R. M., ... & Friedlingstein, P., **Creutzig, F.**, Peters, G. (2020). Temporary reduction in daily global CO₂ emissions during the COVID-19 forced confinement. *Nature Climate Change*, 1-7.

Spotlight: electricity sector

- In Germany, emissions from electricity fell more than demand reductions imply
- Reason: merit order effect pushes coal out first
- Confluence with good PV and wind conditions and low gas prices

Creutzig, F., Lohrey, S., Emele, L., Le Quere, C., Jones, M. (2020) COVID-19 und CO₂-Emissionen in Deutschland: Eine Analyse basierend auf den Schätzungen des Global Carbon Projects, report for Klimakabinett

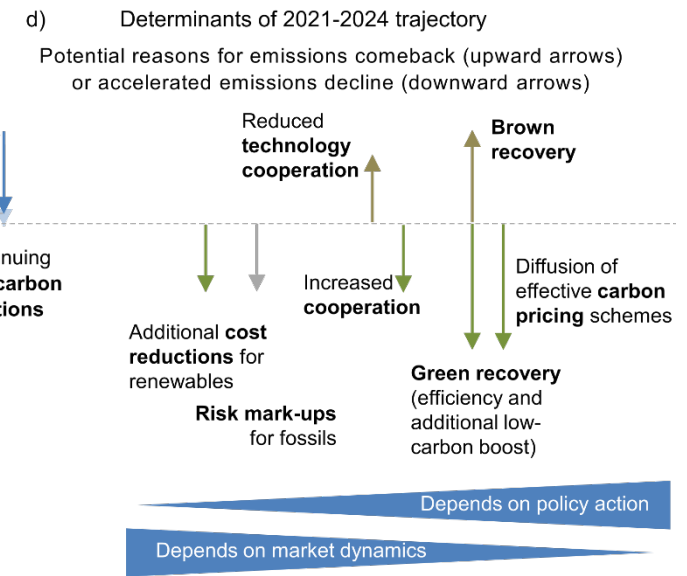
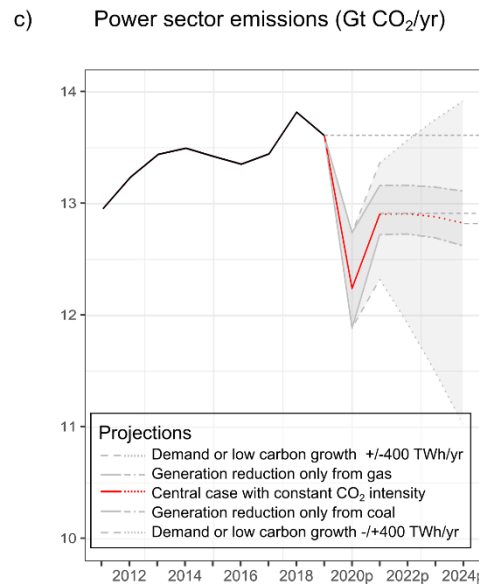
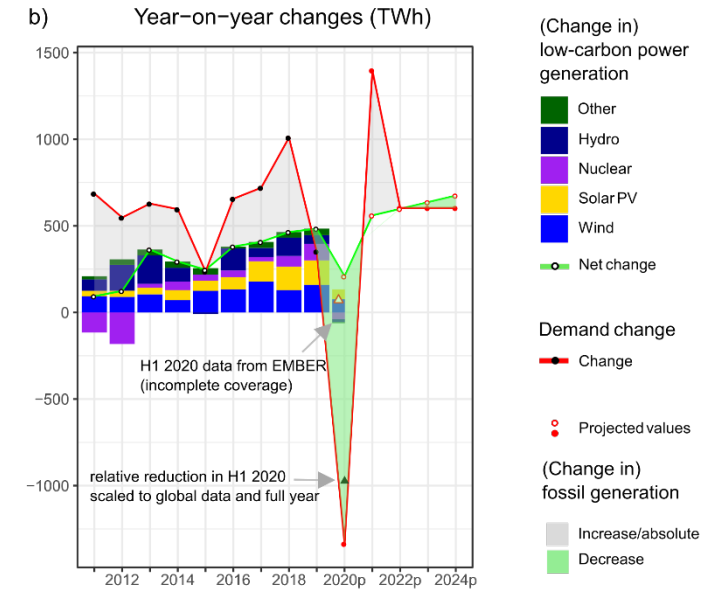
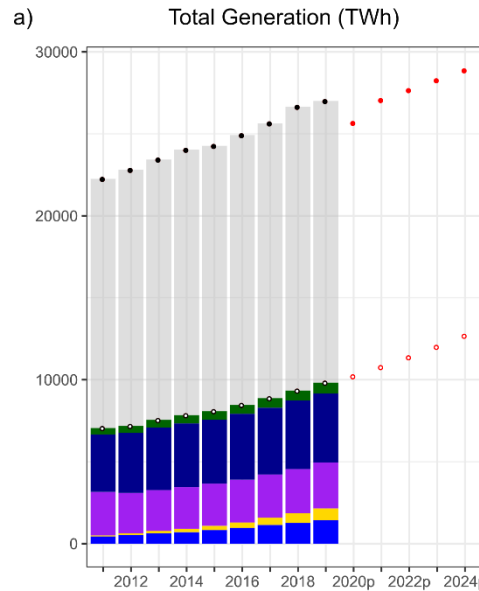


Implication: We may have passed peak power sector emissions in 2018

- Power sector merit order effect witnessed globally (less in China)
- RE capacity continues to grow, pushing more and more coal out of the market
- Power from coal may be on accelerating decline –

if supported by green recovery and CO₂-pricing

Bertram, C., Luderer, G., **Creutzig, F.**, Bauer, N., Ueckerdt, F., Malik, A., Edenhofer, O. (2020) COVID-induced low power demand and market forces starkly reduce CO₂ emissions, resubmitted to Nature Climate Change



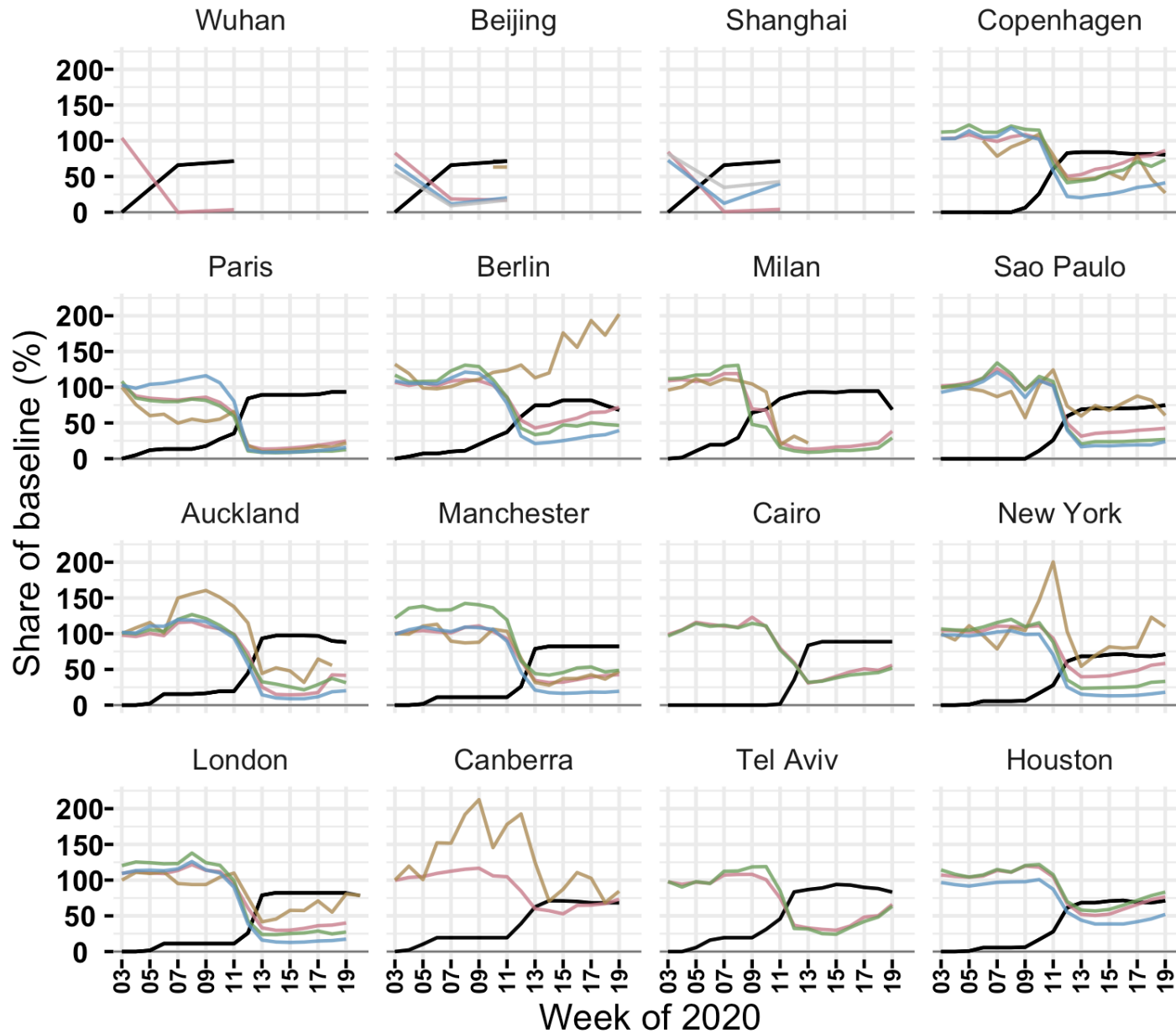
Changes in urban transport

- Overall strong decline in lockdown
- Public transport continues to have lower patronage
- Cycling and car driving take up modal share

Policy response

- Pop-up bike infrastructure
- Street space allocation for play and restaurants
- Financial aid for public transit





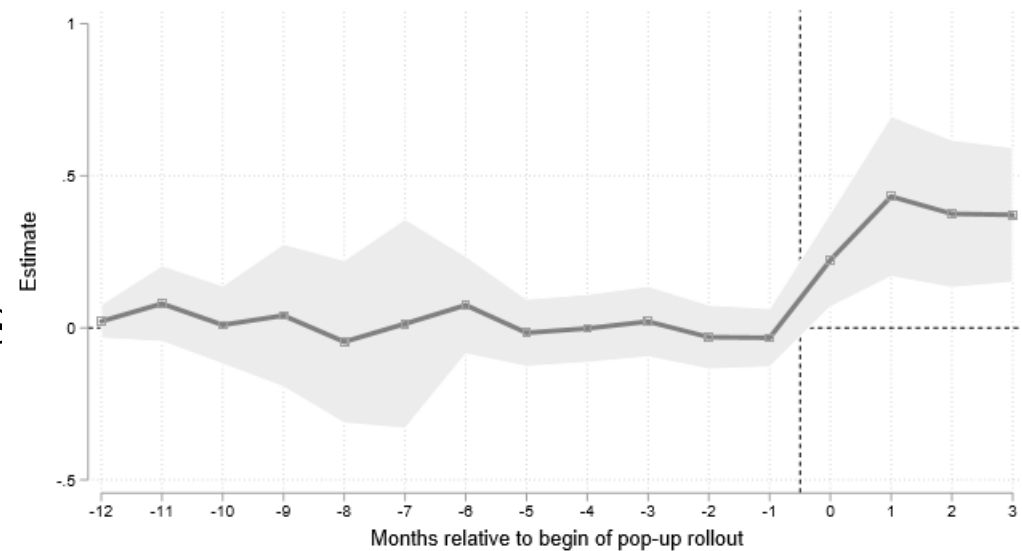
- With confinement, urban transport slumped heavily (mostly in range of 40-65%), in some cases to zero
- Cities that were affected most by COVID-19, such as Wuhan, Milan and New York, witnessed the strongest reduction in transport
- In this sample of 16 cities, public transit slumped by 80% but cars only by 64%.

Creutzig, F.,
Lohrey, S.
Covid-19,
shifting urban
mobility
patterns, and
sustainability
implications.
in preparation



The effect of bicycle infrastructure

- In 106 European cities, in average 11.5km of pop-up bicycle lanes have been built during the pandemic
- Data from 736 bicycle counters
- Each km bicycle lane increase bike modal share by 0.6% in average
- \$2.3 billion health benefits expected from this infrastructure



Kraus, S., Koch, N. (2020) Effect of pop-up bike lanes on cycling in European cities

Enabling conditions for pop-up infrastructure

Analysis of 12 cities world wide that succesfully invested into bicycle lanes reveals that

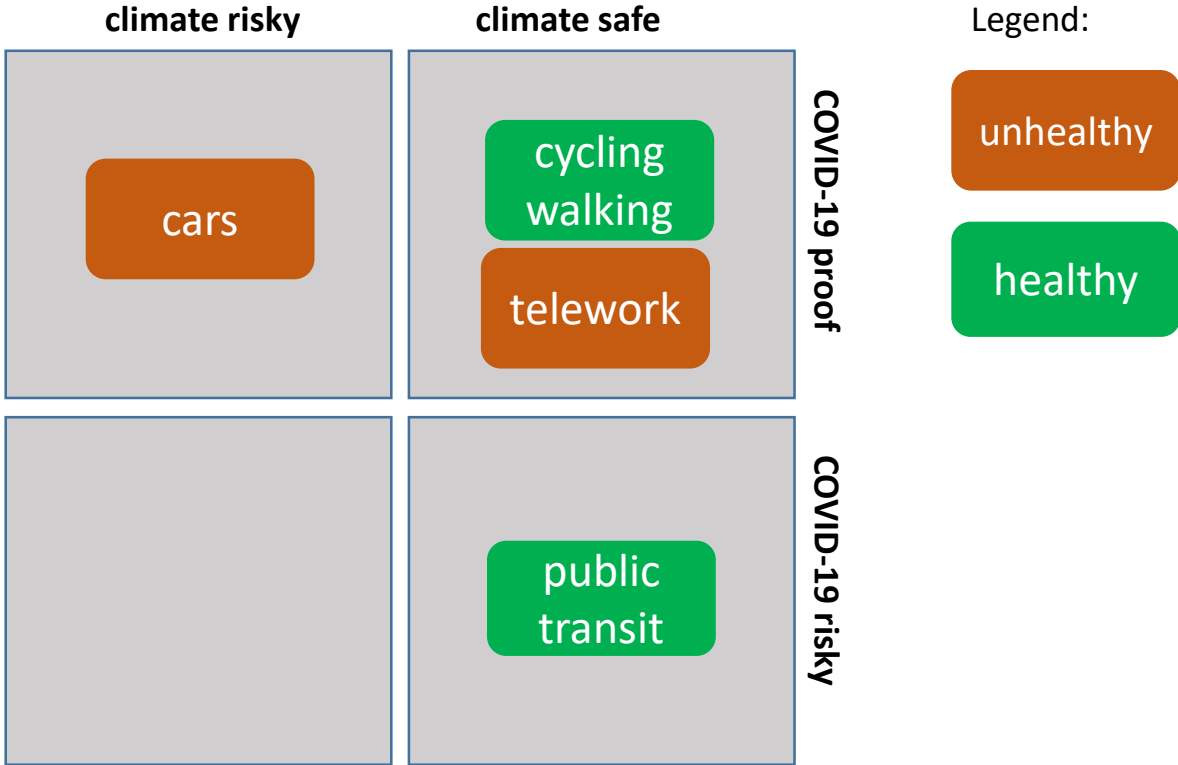
- all cities had already plans in their drawers
- civil, public, and administrative motivation aligned

For example, in Manchester, mayor Andy Burnham, cycling commissioner Chris Boardman, and local campaign groups like Walk Ride Greater Manchester all support bicycle infrastructure extension

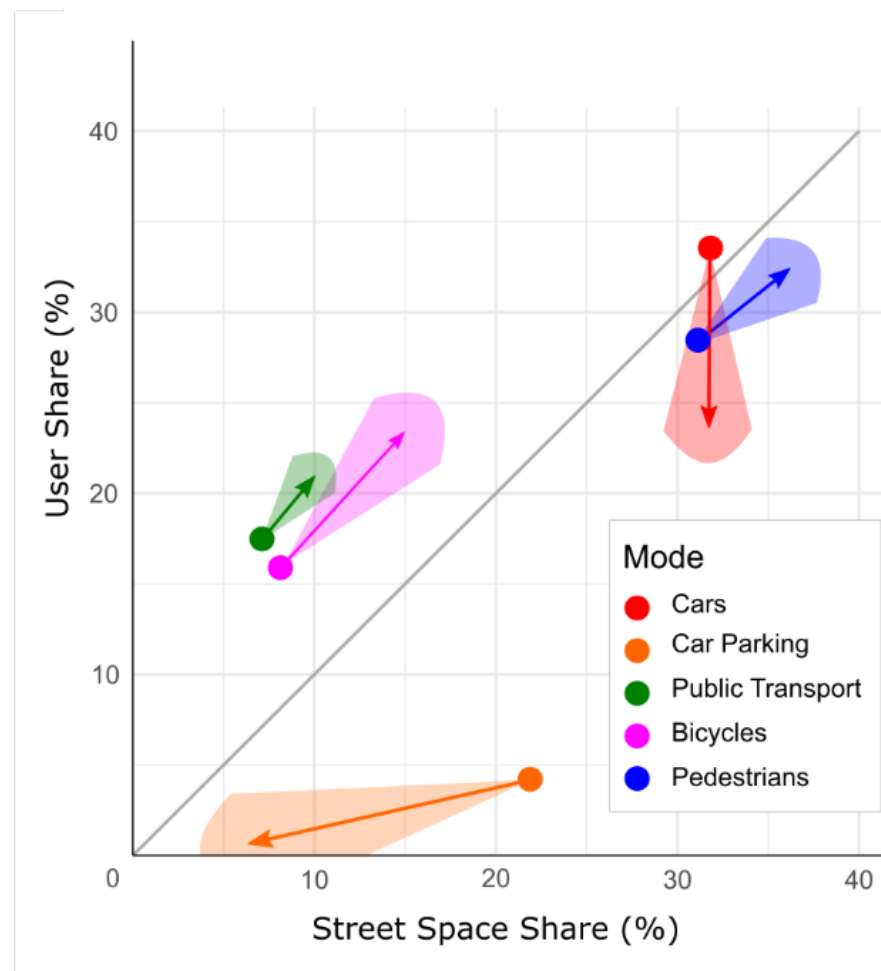
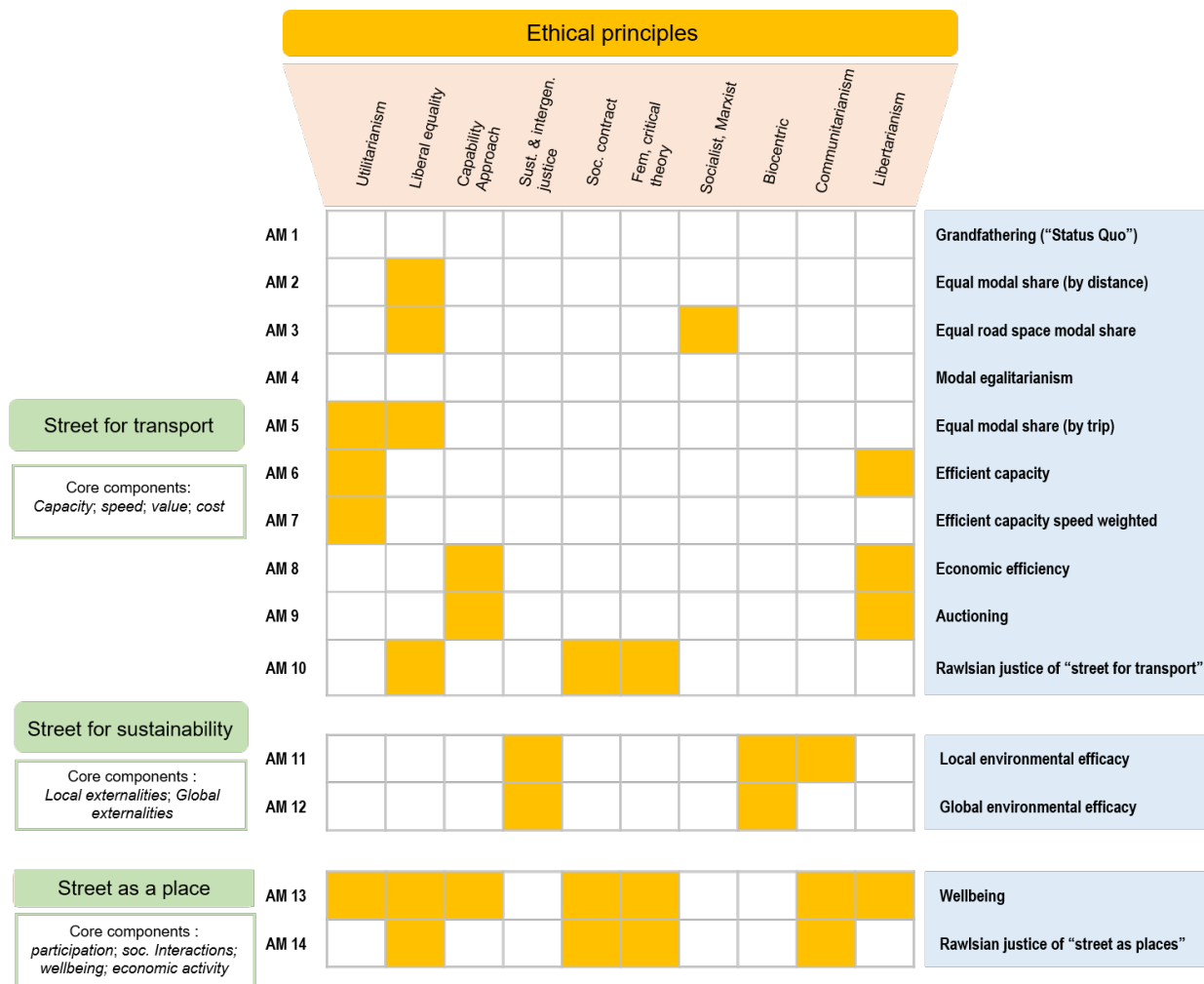


Creutzig, F., Lohrey, S. Covid-19, shifting urban mobility patterns, and sustainability implications. in preparation

Cycling and walking match sustainability requirements of urban mobility



How fair is street space allocation?



Creutzig, F. et al (2020) Fair street space allocation: ethical principles and empirical insights. Transport Reviews

Urban sustainability trajectories

Digital infrastructure



Telework. Confinement dramatically increased telework levels and demand for videoconferencing tools.

- Ready to go
- Institutional alignment



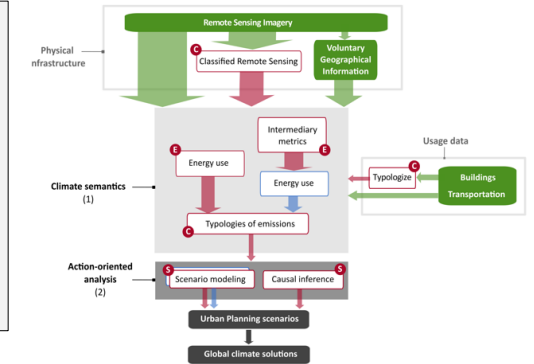
Use digitalization to optimize public transit. Contactless payment and time-specific ticketing to optimize capacity consistent with physical distancing.



Sustainable urban planning. Use big data and machine learning tools to optimize transport and urban planning. Build up urban data governance.

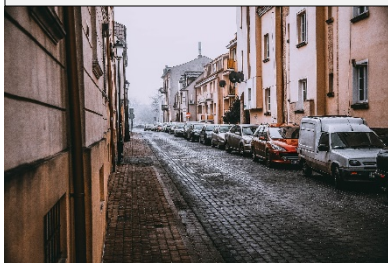


- Vision
- Political stamina



Physical infrastructure

Desolation. High level of confinement emptied streets, especially in cities with high exposure to COVID-19, such as Wuhan, Milan, and New York.



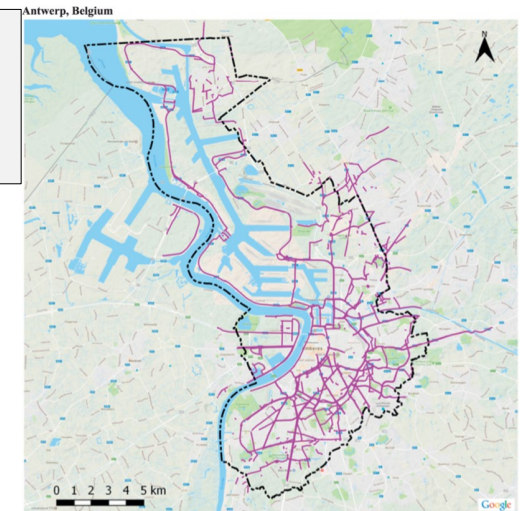
- Ready to go
- Institutional alignment



PUI. Municipalities providing pop-up infrastructure to incentivize more walking and cycling.

Consolidation. PUI made permanent and safe. Continuous network provided.

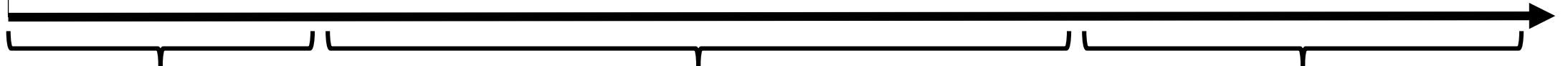
- Vision
- Political stamina



Confinement

Smart physical distancing

Post-COVID-19

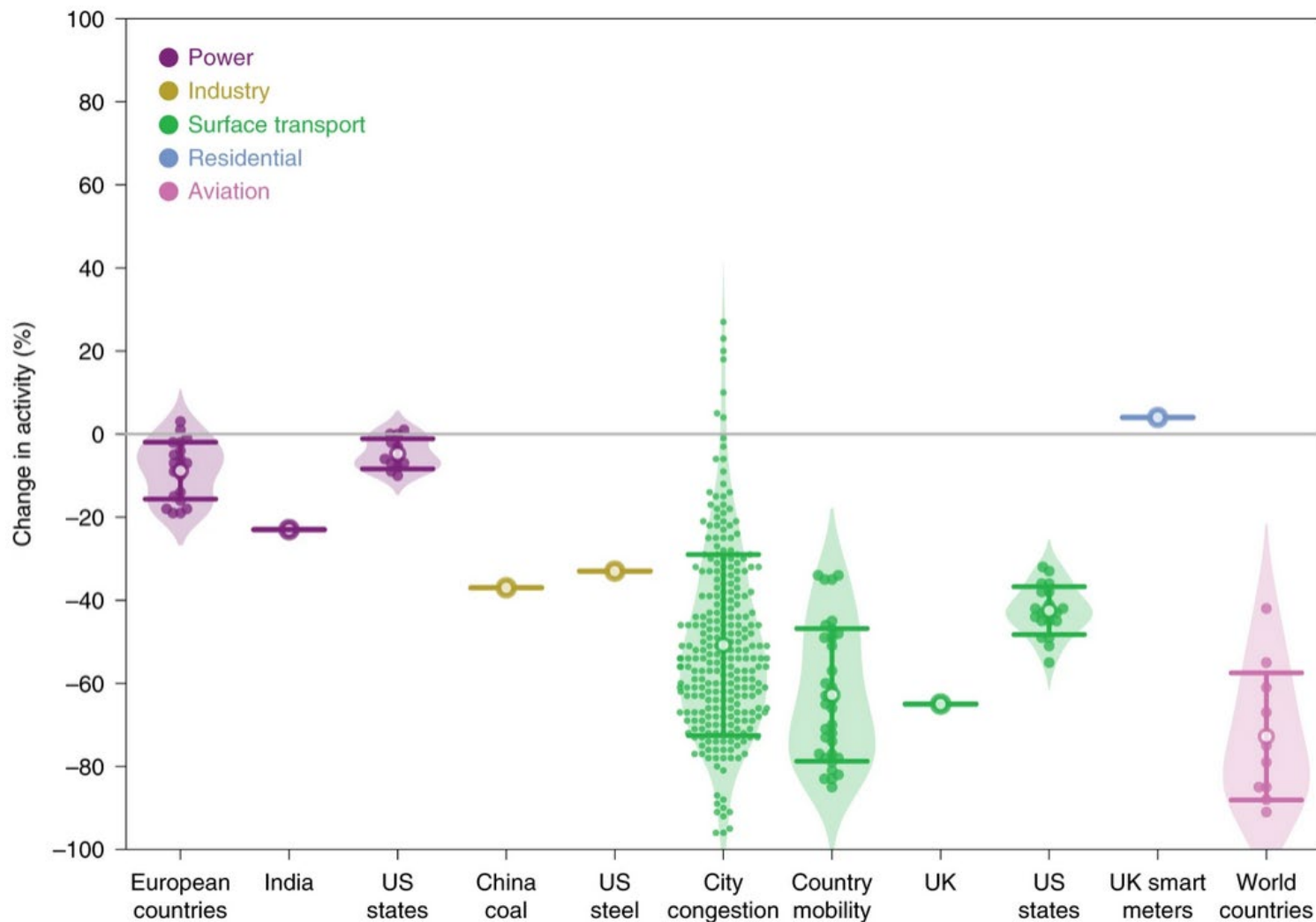


Policy implications

- Maintain a lifeline for public transit and make it pandemic resilient, e.g.,
 - with digital tools to optimize occupancy
- Support bicycle lane investments, e.g.,
 - a manual and guidebook
 - mainstreaming with workshops
 - financial support for municipalities (e.g., via Green New Deal)
- Build an agenda on fair street space allocation
 - Mainstream maximal (not minimal parking requirements)
 - Develop guidelines for fair street space allocation that incentivize active and low-carbon mobility
- Overall: Use the pandemic to invest into new municipal capacities to also govern urban-scale digitalization

Appendix

Impacts of COVID-19 on GHG emissions



Le Quere et al, 2020