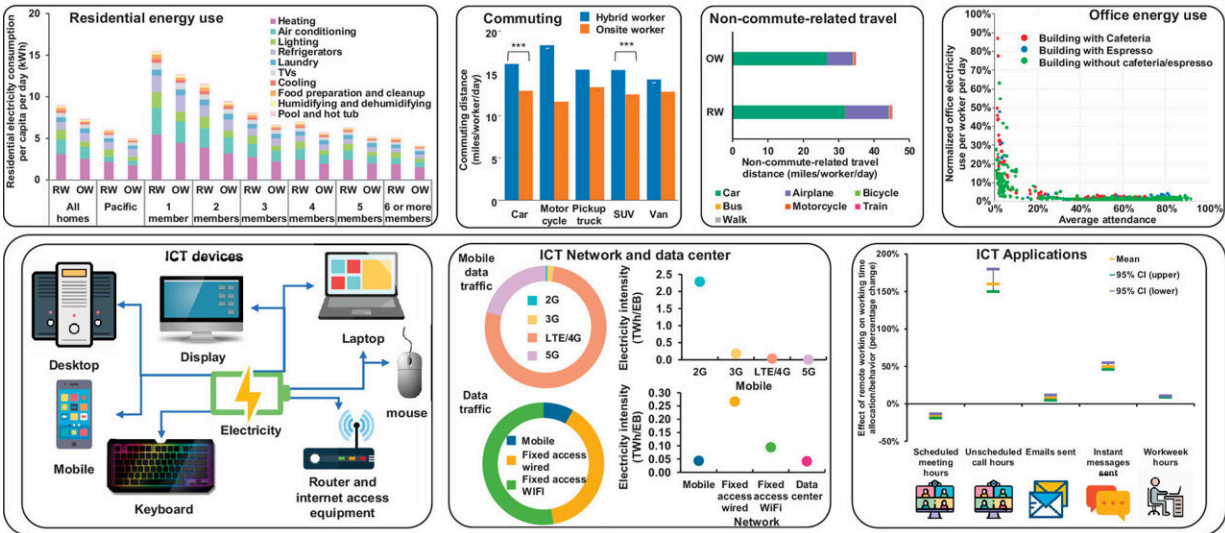


# Remote work can slash your carbon footprint, if done right

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Methodology to investigate the climate change mitigation effects of remote and hybrid work in the United States. Residential energy use, non-commute-related travel, commuting, office energy use, and ICT services are included in the system boundary. Acronyms: natural gas (NG), remote work/remote worker (RW), onsite work/onsite worker (OW). Credit: *Proceedings of the National Academy of Sciences* (2023). DOI: 10.1073/pnas.2304099120

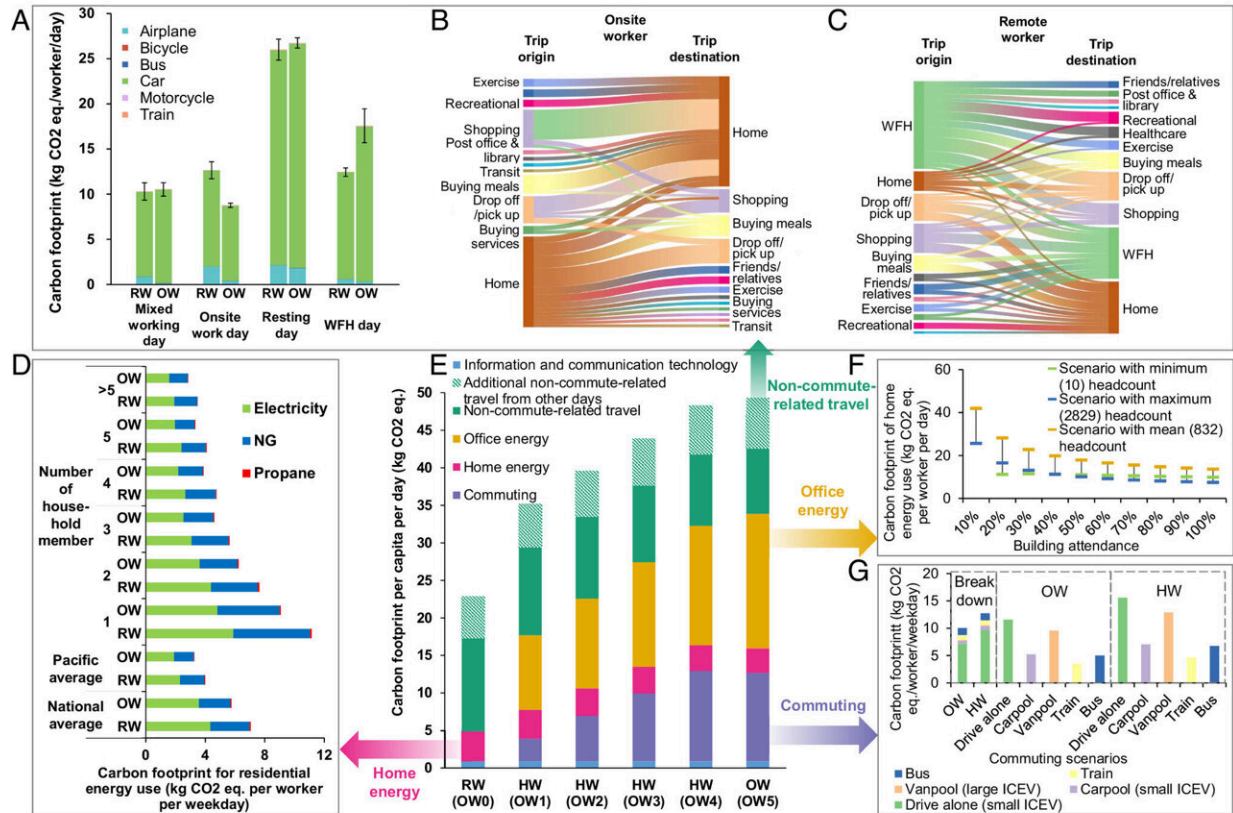
Remote workers can have a 54% lower carbon footprint compared with onsite workers, according to a new study by Cornell University and Microsoft, with lifestyle choices and work arrangements playing an essential role in determining the environmental benefits of remote and

hybrid work.

The [study](#), published in the *Proceedings of the National Academy of Sciences*, also finds that hybrid workers who work from home two to four days per week can reduce their [carbon footprint](#) by 11% to 29%, but working from home one day per week is more negligible, cutting carbon footprint by only 2%.

"Remote work is not zero carbon, and the benefits of hybrid work are not perfectly linear," said study senior author Fengqi You, professor in [energy systems](#) engineering at Cornell. "Everybody knows without commuting you save on [transportation energy](#), but there's always lifestyle effects and many other factors."

The main contributors to carbon footprint for onsite and hybrid workers, according to the study, are travel and office energy use. That's no surprise to researchers quantifying the impact of remote work on the environment, but Cornell and Microsoft used [survey data](#) and modeling to incorporate factors sometimes overlooked when calculating carbon footprint, including residential energy use based on time-use allocation, non-commute distance and mode of transportation, communications device usage, number of household members and office configuration, such as seat sharing and building size.



Effect of remote and hybrid work on carbon footprint in the case of US Microsoft. (A–C) Show how transit type and trip origin and destination pairs differ by remote and onsite workers for non-commute-related travel. (D) Shows the variation in residential energy use. (E) Shows the breakdowns of carbon footprint for all six remote, hybrid, and onsite work scenarios. (F and G) Show the variation in household, workplace, and commuting GHG emissions for remote and onsite scenarios. Acronyms: remote work/remote worker (RW), onsite work/onsite worker (OW), combustion engine vehicle (ICEV). Credit: *Proceedings of the National Academy of Sciences* (2023). DOI: 10.1073/pnas.2304099120

Notable findings and observations include:

- Non-commute travel, such as trips to social and [recreational](#)

[activities](#), becomes more significant as the number of remote workdays increases.

- Seat sharing among hybrid workers under full-building attendance can reduce carbon footprint by 28%.
- Hybrid workers tend to commute farther than onsite workers due to differences in housing choices.
- The effects of remote and hybrid work on [communications technologies](#) such as computer, phone and internet usage have negligible impacts on overall carbon footprint.

"Remote and hybrid work shows great potential for reducing carbon footprint, but what behaviors should these companies and other policymakers be encouraging to maximize the benefits?" said Longqi Yang, principal applied research manager at Microsoft and corresponding author of the study. "The findings suggest organizations should prioritize lifestyle and workplace improvements."

You said the study finds that companies and policymakers should also focus on incentivizing public transportation over driving, eliminating office space for remote workers and improving energy efficiency for office buildings.

"Globally, every person, every country and every sector have these kinds of opportunities with [remote work](#). How could the combined benefits change the whole world? That's something we really want to advance our understanding of," said Yanqiu Tao, a doctoral student and the study's first author.

The study leveraged survey data from Microsoft, the American Time Use Survey, the National Household Travel Survey and the Residential Energy Consumption Survey.

**More information:** Tao, Yanqiu et al, Climate mitigation potentials of

teleworking are sensitive to changes in lifestyle and workplace rather than ICT usage, *Proceedings of the National Academy of Sciences* (2023). DOI: [10.1073/pnas.2304099120](https://doi.org/10.1073/pnas.2304099120).

Provided by Cornell University

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