Stanford



Steven J. Davis

Professor of Earth System Science, Senior Fellow at the Precourt Institute for Energy and at the Woods Institute for the Environment, and Professor, by courtesy, of Energy Science and Engineering

Bio

BIO

Steve Davis is a highly-cited researcher and expert in earth system science, emissions and energy scenarios, climate impacts and solutions, and corporate climate strategy. He is a Professor of Earth System Science in the Stanford Doerr School of Sustainability and leads the Sustainable Solutions Lab, a research group dedicated to quantifying how different human activities are affecting climate and air quality, how those environmental changes in turn jeopardize human wellbeing, and the relative priority of solutions.

Steve was a Contributing Author of two Working Group III chapters in the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), serves on the Scientific Steering Committee of the Global Carbon Project, was the Lead Author of the Mitigation chapter in the U.S. Fifth National Climate Assessment, and is a member of the Technical Council of the Science Based Targets Initiative.

Prior to his science career, Steve worked as a lawyer to venture-backed companies in Silicon Valley, and holds degrees from Stanford University, the University of Virginia School of Law and the University of Florida, where he double-majored in Political Science and Philosophy.

ACADEMIC APPOINTMENTS

- Professor, Earth System Science
- Senior Fellow, Precourt Institute for Energy
- Senior Fellow, Stanford Woods Institute for the Environment
- Professor (By courtesy), Energy Science & Engineering

LINKS

- Sustainable Solutions Lab: https://sustainablesolutions.stanford.edu/

Teaching

COURSES

2026-27

- Counting Carbon for Climate Action: ESS 333 (Win)
- Science for Sustainable Solutions: EARTHSYS 115, EARTHSYS 215, SUST 215 (Win)

2025-26

- Counting Carbon for Climate Action: ESS 333 (Aut)

- Science for Sustainable Solutions: EARTHSYS 115, EARTHSYS 215, SUST 215 (Win)

2024-25

- Science for Sustainable Solutions: EARTHSYS 115, EARTHSYS 215, SUST 215 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Rob Buechler

Postdoctoral Faculty Sponsor

Julianne DeAngelo, Lamprini Papargyri, Yida Sun

Master's Program Advisor

Khandaker Aqib, Lawrence Chen, Anant Singhal

Doctoral Dissertation Co-Advisor (AC)

Abigail Fitzgibbon

Doctoral (Program)

Lauren Moody

Publications

PUBLICATIONS

- **Pathways to net-zero emissions from aviation** *NATURE SUSTAINABILITY*
  Bergero, C., Gosnell, G., Gielen, D., Kang, S., Bazilian, M., Davis, S. J.
  2023; 6 (4)

- **Forest carbon protocols underestimate climate-driven carbon loss risks.** *Nature*
  Wu, C., Badgley, G., Goulden, M. L., Randerson, J. T., Trugman, A. T., Wang, J. A., Yang, L., Acil, N., Cook-Patton, S. C., Cullenward, D., Davis, S. J., Williams, C. A., Anderegg, et al
  2026

- **Global carbon emissions and decarbonization in 2025: Climate chronicles** *NATURE REVIEWS EARTH & ENVIRONMENT*
  Deng, Z., Zhu, B., Davis, S. J., Ciais, P., Liu, Z.
  2026

- **Scaling traffic variables from sensors sample to the entire city at high spatiotemporal resolution with machine learning: applications to the Paris megacity (vol 4 , 035010 , 2024)** *ENVIRONMENTAL RESEARCH: INFRASTRUCTURE AND SUSTAINABILITY*
  Bonnemaizon, X., Ciais, P., Zhou, C., Arous, S., Davis, S. J., Megel, N.
  2026; 6 (1)

- **The effect of land costs on the economic and sustainability performance of solar photovoltaics in China.** *Proceedings of the National Academy of Sciences of the United States of America*
  Chen, S., Lu, X., Hao, J., Virgüez, E., Caldeira, K., Davis, S. J.
  2026; 123 (8): e2512930123

- **Global daily CO2 emissions from 1970 to 2024.** *Scientific data*
  Li, T., Wang, L., Qiu, Z., Ciais, P., Davis, S. J., Deng, Z., Zhao, Y., Peters, G. P., Ke, P., Jones, M. W., Andrew, R. M., Hao, Y., Sun, et al
  2026

- **Air quality improvement masks global cooling from CO2 reductions under China's carbon neutrality policies for half a century.** *Nature communications*
  Zhao, B., Wang, X., Wang, Y., Sun, Y., Gao, D., Ge, Q., Gao, Y., Zhang, J., Zhang, Y., Shindell, D., Davis, S. J., Lin, G., Wang, et al
  2026

- **The importance of multiregional accounting for corporate carbon emissions.** *Nature communications*
  Davis, S. J., Dumit, A., Li, M., Maldonado, Y., Steffen, M., Stevenson, M., Boldyreva, T., Suh, S.
  2025
- **Ownership of power plants stranded by climate mitigation** *NATURE SUSTAINABILITY*
  Fofrich Navarro, R., Liebermann, L., Moore, F. C., Shearer, C., Davis, S. J.
  2025
- **Hydroclimatic risk considerations in energy transitions Balancing thermal power decarbonization and energy security under hydroclimatic risks** *NATURE SUSTAINABILITY*
  Li, S., Liu, J., Yan, G., Davis, S. J., Aghakouchak, A., Liu, X., Hong, C., Zheng, Y., Jiang, Q., Liu, Y., Qin, Y.
  2025
- **Global hydroclimatic risks and strategic decommissioning pathways for thermal power units** *NATURE SUSTAINABILITY*
  Li, S., Liu, Y., Liu, J., Yan, G., Schmied, H., Davis, S. J., Aghakouchak, A., Wanders, N., Jiang, Q., Zheng, Y., Bosmans, J., Liu, X., Hong, et al
  2025
- **Drivers of CO₂ emissions from road transport in US urban areas** *ENVIRONMENTAL RESEARCH COMMUNICATIONS*
  Bonnemaizon, X., Ciais, P., Zhou, C., Ben Arous, S., Megel, N., Berghauser, G., Davis, S.
  2025; 7 (12)
- **Economic development, air conditioning and adaptation to warming** *ENVIRONMENTAL RESEARCH LETTERS*
  Wongel, A., Freese, L. M., Virguez, E., Davis, S. J., Caldeira, K.
  2025; 20 (12)
- **The global hydrogen budget.** *Nature*
  Ouyang, Z., Jackson, R. B., Saunois, M., Canadell, J. G., Zhao, Y., Morfopoulos, C., Krummel, P. B., Patra, P. K., Peters, G. P., Dennison, F., Gasser, T., Archibald, A. T., Arora, et al
  2025; 648 (8094): 616-624
- **A near-real time daily European Power Consumption and Carbon Intensity Dataset (ECON-PowerCI).** *Scientific data*
  Zhang, S., Zhao, W., Zhu, B., Yan, C., Song, X., Jiang, H., Fang, J., Ciais, P., Xuan, N., Gentine, P., Davis, S. J., Liu, Z., Qiu, et al
  2025; 12 (1): 1693
- **Long-range PM2.5 pollution and health impacts from the 2023 Canadian wildfires.** *Nature*
  Zhang, Q., Wang, Y., Xiao, Q., Geng, G., Davis, S. J., Liu, X., Yang, J., Liu, J., Huang, W., He, C., Luo, B., Martin, R. V., Brauer, et al
  2025
- **Harmonized Annual Averaged Traffic Data at Street Segment Level for European Cities.** *Scientific data*
  Bonnemaizon, X., Ciais, P., Zhou, C., Shi, Q., Mittakola, R. T., Goldmann, C., Ben Arous, S., Megel, N., Davis, S. J.
  2025; 12 (1): 1365
- **Large CO₂ removal potential of woody debris preservation in managed forests (vol 18, pg 675, 2025)** *NATURE GEOSCIENCE*
  Luo, Y., Wei, N., Lu, X., Zhou, Y., Tao, F., Quan, Q., Liao, C., Jiang, L., Xia, J., Huang, Y., Niu, S., Xu, X., Sun, et al
  2025; 18 (8): 809
- **Large CO₂ removal potential of woody debris preservation in managed forests** *NATURE GEOSCIENCE*
  Luo, Y., Wei, N., Lu, X., Zhou, Y., Tao, F., Quan, Q., Liao, C., Jiang, L., Xia, J., Huang, Y., Niu, S., Xu, X., Sun, et al
  2025
- **Strategies for climate-resilient global wind and solar power systems.** *Nature*
  Zheng, D., Yan, X., Tong, D., Davis, S. J., Caldeira, K., Lin, Y., Guo, Y., Li, J., Wang, P., Ping, L., Feng, S., Liu, Y., Cheng, et al
  2025
- **Globally interconnected solar-wind system addresses future electricity demands.** *Nature communications*
  Jiang, H., Yao, L., Qin, J., Bai, Y., Brandt, M., Lian, X., Davis, S. J., Lu, N., Zhao, W., Liu, T., Zhou, C.
  2025; 16 (1): 4523
- **Trade risks to energy security in net-zero emissions energy scenarios** *NATURE CLIMATE CHANGE*
  Cheng, J., Tong, D., Zhao, H., Xu, R., Qin, Y., Zhang, Q., Bhuwalka, K., Caldeira, K., Davis, S. J.

2025

- **Historical trends in snowmelt used for irrigation** *ENVIRONMENTAL RESEARCH: FOOD SYSTEMS*
  Kinnebrew, E., Sloat, L. L., Qin, Y., Davis, S. J., Abatzoglou, J. T., Siebert, S., Mueller, N. D.
  2025; 2 (1)

- **Mitigating climate change and ozone pollution will improve Chinese food security** *ONE EARTH*
  Li, S., Gao, Y., Zhang, J., Hong, C., Zhang, S., Chen, D., Wild, O., Feng, Z., Xu, Y., Guo, X., Kou, W., Yan, F., Ma, et al
  2025; 8 (2)

- **A path to US Tribal energy sovereignty.** *Science (New York, N.Y.)*
  Seibel, S., Luarkie, R., Cardenas, D., Mayer, C., Sanchez, R., Dannenberg, M., Panek, B. M., Bond, A., Gordon, Z., Morishige, D., Hadrick, K., Stahnke, G., Fofrich, et al
  2025; 387 (6732): 372

- **Building materials could store more than 16 billion tonnes of CO2 annually.** *Science (New York, N.Y.)*
  Van Roijen, E., Miller, S. A., Davis, S. J.
  2025; 387 (6730): 176-182

- **Synergetic strategies for carbon neutrality and clean air.** *Environmental science and ecotechnology*
  Davis, S. J.
  2024; 22: 100497

- **Opportunities and constraints of hydrogen energy storage systems** *Environmental Research: Energy*
  Dowling, J., Ruggles, T., Virguez, E., et al
  2024; 1 (3)

- **Global CO₂ uptake by cement from 1930 to 2019** *EARTH SYSTEM SCIENCE DATA*
  Guo, R., Wang, J., Bing, L., Tong, D., Ciais, P., Davis, S. J., Andrew, R. M., Xi, F., Liu, Z.
  2021; 13 (4): 1791-1805

- **Atmospheric Methane Removal: A Research Agenda** *Philosophical Transactions of the Royal Society A*
  Jackson, R. B., et al
  2021; 379: 20200454

- **Economic footprint of California wildfires in 2018** *NATURE SUSTAINABILITY*
  Wang, D., Guan, D., Zhu, S., Kinnon, M., Geng, G., Zhang, Q., Zheng, H., Lei, T., Shao, S., Gong, P., Davis, S. J.
  2021; 4 (3): 252-260

- **Optimizing emissions reductions from the US power sector for climate and health benefits** *ACS Publications*
  Sergi, B., Adams, P. J., Muller, N., Robinson, A. L., Davis, S., Marshall, J. D., Lima Azevedo, I. M.
  2020