

ATTACHMENT 1: CV

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Professional Preparation

Stanford University, Stanford, CA; Civil Engineering B.S., with distinction, 1988
Stanford University, Stanford, CA; Economics B.A., with distinction, 1988
Stanford University, Stanford, CA; Environmental Engineering M.S., 1988
UCLA, Los Angeles, CA; Atmospheric Sciences M.S., 1991
UCLA, Los Angeles, CA; Atmospheric Sciences Ph.D., 1994

Professional Appointments

Co-founder, The Solutions Projection, 2011-present
Senior Fellow, Precourt institute for Energy, 2010-present
Senior Fellow, Woods Institute for the Environment, 2008-present
Stanford University Atmosphere/Energy Program Director/co-founder, 2004-present
Stanford University Energy Resources Engineering Professor by Courtesy, 2007-2010
Stanford University Civil & Environmental Engineering Professor, 2007-present
Stanford University Civil & Environmental Engineering Associate Professor, 2001-2007
Stanford University Civil & Environmental Engineering Assistant Professor, 1994-2001

Mark Z. Jacobson's career has focused on better understanding air pollution and global warming problems and developing large-scale clean, renewable energy solutions to them. Toward that end, he has developed and applied three-dimensional atmosphere-biosphere-ocean computer models and solvers to simulate air pollution, weather, climate, and renewable energy. He has also developed roadmaps to transition states and countries to 100% clean, renewable energy for all purposes and computer models to examine grid stability in the presence of high penetrations of renewable energy.

To date, he has published six textbooks of two editions each and 175 peer-reviewed journal articles. He has testified four times for the U.S. Congress. Nearly a thousand researchers have used computer models he has developed. In 2005, he received the American Meteorological Society Henry G. Houghton Award for "significant contributions to modeling aerosol chemistry and to understanding the role of soot and other carbon particles on climate." In 2013, he received an American Geophysical Union Ascent Award for "his dominating role in the development of models to identify the role of black carbon in climate change" and the Global Green Policy Design Award for the "design of analysis and policy framework to envision a future powered by renewable energy." In 2016, he received a Cozzarelli Prize from the *Proceedings of the National Academy of Sciences* for "outstanding scientific excellence and originality" in his paper on a solution to the U.S. grid reliability problem with 100% penetration of wind, water, and solar power for all purposes. In 2018, he received the *Judi Friedman Lifetime Achievement Award* "for a distinguished career dedicated to finding solutions to large-scale air pollution and climate problems." In 2019, he was selected as "one of the world's 100 most influential people in climate policy" by Apolitical. In 2022, he received the *Visionary Clean Tech Influencer of the Year* award at the World Clean Tech Awards. He has served on an advisory committee to the U.S. Secretary of Energy, appeared in a TED talk, appeared on the David Letterman Show to discuss converting the world to clean energy, and cofounded The Solutions Project (www.thesolutionsproject.org). His work is the scientific basis of the energy portion of the U.S. *Green New Deal* and laws to go to 100% renewable energy in cities, states, and countries worldwide.

Publications 2007-2022

1. Jacobson, M.Z., Effects of ethanol (E85) versus gasoline vehicles on cancer and mortality in the United States, *Environ. Sci. Technol.*, 41 (11), 4150-4157, doi:10.1021/es062085v, 2007, www.stanford.edu/group/efmh/jacobson/Articles/I/E85vWindSol.

2. Jacobson, M.Z., Y.J. Kaufmann, Y. Rudich, Examining feedbacks of aerosols to urban climate with a model that treats 3-D clouds with aerosol inclusions, *J. Geophys. Res.*, 112, D24205, doi:10.1029/2007JD008922, 2007, www.stanford.edu/group/efmh/jacobson/Articles/III/IIIe.html.
3. Jacobson, M.Z., On the causal link between carbon dioxide and air pollution mortality, *Geophysical Research Letters*, 35, L03809, doi:10.1029/2007GL031101, 2008, www.stanford.edu/group/efmh/jacobson/Articles/V/Ve.html.
4. Jacobson, M.Z., Effects of wind-powered hydrogen fuel cell vehicles on stratospheric ozone and global climate, *Geophys. Res. Lett.*, 35, L19803, doi:10.1029/2008GL035102, 2008, www.stanford.edu/group/efmh/jacobson/Articles/I/fuelcellhybrid.html.
5. Jacobson, M.Z., The short-term effects of agriculture on air pollution and climate in California, *J. Geophys. Res.*, 113, D23101, doi:10.1029/2008JD010689, 2008, www.stanford.edu/group/efmh/jacobson/Articles/IV/IVb.html.
6. Jacobson, M.Z., Review of solutions to global warming, air pollution, and energy security, *Energy & Environmental Science*, 2, 148-173, doi:10.1039/b809990c, 2009, www.stanford.edu/group/efmh/jacobson/Articles/I/revsolglobwarmairpol.htm.
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8. Jacobson, M.Z., Effects of biofuels vs. other new vehicle technologies on air pollution, global warming, land use, and water, *Int. J. Biotechnology*, 11, 14-59, 2009, www.stanford.edu/group/efmh/jacobson/Articles/Others/BiofuelFinPapMZJIntJBioTechnol08.pdf.
9. Jacobson, M.Z., and M.A. Delucchi, A path to sustainable energy by 2030, *Scientific American*, November 2009 (cover story), www.stanford.edu/group/efmh/jacobson/Articles/I/susenergy2030.html.
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12. Jacobson, M.Z., Short-term effects of controlling fossil-fuel soot, biofuel soot and gases, and methane on climate, Arctic ice, and air pollution health, *J. Geophys. Res.*, 115, D14209, doi:10.1029/2009JD013795, 2010, www.stanford.edu/group/efmh/jacobson/Articles/VIII/controlfossilfuel.html
13. Jacobson, M.Z., and D.L. Ginnebaugh, Global-through-urban nested three-dimensional simulation of air pollution with a 13,600-reaction photochemical mechanism, *J. Geophys. Res.*, 115, D14304, doi:10.1029/2009JD013289, 2010, www.stanford.edu/group/efmh/jacobson/Articles/V/3Dgas-photochem.html.
14. Jacobson, M.Z., Numerical Solution to Drop Coalescence/Breakup With a Volume-Conserving, Positive-Definite, and Unconditionally-Stable Scheme, *J. Atmos. Sci.*, 68, 334-346, doi:10.1175/2010JAS3605.1, 2011, www.stanford.edu/group/efmh/jacobson/Articles/IX/BreakupPaper1010.html.
15. Jacobson, M.Z., and M.A. Delucchi, Providing all Global Energy with Wind, Water, and Solar Power, Part I: Technologies, Energy Resources, Quantities and Areas of Infrastructure, and Materials, *Energy Policy*, 39, 1154-1169, doi:10.1016/j.enpol.2010.11.040, 2011, www.stanford.edu/group/efmh/jacobson/Articles/I/susenergy2030.html.
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Invited Congressional Testimony

- July 12, 2005. Written testimony on a comparison of wind with nuclear energy to the U.S. House of Representatives Subcommittee on Energy and Resource, and accepted into the Congressional Record (testimony requested by Dr. Rowan Rowntree).
- October 18, 2007. Oral and written testimony on the role of black carbon as a factor in climate change and its impact on public health. U.S. House of Representatives Committee on Oversight and Government Reform, Washington, D.C. http://www.stanford.edu/group/efmh/jacobson/101807_testimony.htm.
- April 9, 2008. Oral and written testimony on the relative impact of carbon dioxide on air pollution health problems in California versus the rest of the U.S., U.S. House of Representatives Select Committee on Energy Independence and Global Warming, Washington, D.C. http://www.stanford.edu/group/efmh/jacobson/040908_testimony.htm.

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Invited EPA Testimony

Oral testimony invited by the State of California at the Environmental Protection Agency Hearing AMS-FRL-8772-7, California State Motor Vehicle Control Standards; Greenhouse Gas Regulations; Reconsideration of Previous Denial of a Waiver of Preemption, Arlington, Virginia March 5, 2009.
<http://www.stanford.edu/group/efmh/jacobson/EPAhearing.html>.

Oral testimony at the Environmental Protection Agency Hearing: Endangerment and cause or contribute findings for greenhouse gases under the Clean Air Act, Arlington, Virginia, May 18, 2009.
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Utility Board Testimony

June 17, 2016, Written testimony to the Iowa Utilities Board on the feasibility of Iowa, Roadmap to transition Iowa to 100% wind, water, and solar (WWS) power for all purposes by 2050, with 80% conversion by 2030.

Invited Court Briefs

Brief of *amici curiae* climate scientists James Hansen, Mark Z. Jacobson, Michael Kleeman, Benjamin Santer, and Stephen H. Schneider in Support of the State of California in State of California v. U.S. Environmental Protection, U.S. Court of Appeals for the Ninth Circuit (No. 08-70011), June, 2008.

Motion for leave to file brief of proposed amica curiae climate scientists Inez Fung, James Hansen, Mark Z. Jacobson, Michael Kleeman, Benjamin Santer, Stephen H. Schneider, and James C. Zachos in support of respondents, Chamber of Commerce of the United States of America et al. vs. United States Environmental Protection Agency (No. 09-1237), November, 2009.

Brief for Respondents United States Environmental Protection Agency, et al., in Chamber of Commerce of the United States of America, et al., v. United States Environmental Protection Agency, et al., in the United States Court of Appeals for the District of Columbia Circuit, No. 09-1237, Filed August 26, 2010.

Brief of *amici curiae* atmospheric scientists and air quality modeling experts William Chameides, Arlene Fiore, Tracey Holloway, Mark Jacobson, Paul Miller, and Mehmet Odman in support of Petitioners, U.S. Environmental Protection Agency et al. and American Lung Association et al. v. EME Homer City Generation L.P., et al. (No. 12-1182, -1183) in the Supreme Court of the United States of America, September 11, 2013, <http://law.wustl.edu/news/pages.aspx?id=10120>.

Brief of *amici curiae* in support of respondents and cross-appellants; Proposed brief of *amici curiae* climate scientists Dennis D. Baldocchi, Ph.D., Robert A. Eagle, Ph.D., Marc Fischer, Ph.D., John Harte, Ph.D., Mark Z. Jacobson, Ph.D., Ralph Keeling, Ph.D., James C. Williams, Ph.D., Terry L. Root, Ph.D., Richard C.J. Somerville, Ph.D., Aradhna K. Tripathi, Ph.D., and Anthony L. Westerling, Ph.D., Cleveland National Forest Foundation; Sierra Club; Center for Biological Diversity; Creed-21; Affordable Housing Coalition of San Diego County; People of the State of California Respondents and Cross-Appellants, v. San Diego Association of Governments; San Diego Association of Governments Board of Directors, Appellants and Cross-Respondents. Court of Appeal of the State of California, Fourth Appellate District, Division One.

Declaration of Mark Z. Jacobson, PhD, in support of Western Environmental Law Center and Our Children's Trust's Comments on Proposed Clean Air Rule, Submitted to the Washington Department of Ecology, July 21, 2016.

Expert report of Mark Z. Jacobson, Ph.D., In the United States District Court, District of Oregon, *Kelsey Cascadia Rose Juliana et al. vs. The United States of America*, Case 6:15-cv-01517-TC, April 6, 2018.

Rebuttal expert report of Mark Z. Jacobson: Response to Howard J. Herzog, James L. Sweeney, and David G. Victor, In the United States District Court, District of Oregon, *Kelsey Cascadia Rose Juliana et al. vs. The United States of America*, Case 6:15-cv-01517-TC, September 19, 2018.

Expert report of Mark Z. Jacobson, In the United States Court of Appeals for the Ninth Circuit, *Kelsey Cascadia Rose Juliana et al. vs. The United States of America*, Declaration of Mark Z. Jacobson in support of plaintiffs' urgent motion under circuit rule 27-3(b) for preliminary injunction, February 7, 2019.

Brief of Energy Economists as Amici Curiae, In the Supreme Court of the United States, *Electric Power Supply Association et al., Petitioners, v. Anthony Star, in his official capacity as director of the Illinois Power Agency*

and John B. Rhodes, in his official capacity as chair of the New York Public Service Commission et al., Respondents, On Petitions for a Writ of Certiorari to the United States Courts of Appeals for the Seventh and Second Circuits, February 6, 2019.

Expert Report of Mark Z. Jacobson, Ph.D., In the matter of the application of New Mexico Gas Company, Inc. for approval of revisions to its rates, rules, and charges pursuant to advice notice No. 87 New Mexico Gas Company, Inc., Case 21-00267-UT, on behalf of the New Energy Economy, New Mexico, May 25, 2022.