

## ADAM ZACHARY ROSE

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University of Southern California  
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### EDUCATION

Ph.D. (Economics)	Cornell University	1974
M.A. (Economics)	Cornell University	1972
B.A. (Economics)	University of Utah	1970

### RESEARCH AND TEACHING FIELDS

Environmental & Ecological Economics	Natural Hazards & Terrorism
Energy Economics	Transportation
Regional Science	Applied General Equilibrium Analysis

### PRIMARY POSITIONS

Research Professor, Price School of Public Policy, University of Southern California (USC) Department of Public Policy Department of Urban Planning and Spatial Analysis	2007-
Senior Research Fellow, Center for Risk and Economic Analysis of Threats and Emergencies (CREATE) (Coordinator for Economics, 2006-14; Director, 2019-21)	2005-
Professor, Department of Geography, The Pennsylvania State University	2002-07
Professor, Department of Energy, Environmental, and Mineral Economics, The Pennsylvania State University (Department Head, 1988-02)	1988-02
Professor, Department of Mineral Resource Economics, West Virginia University (Department Chairman, 1986-88)	1984-88
Associate Professor, Department of Mineral Resource Economics, West Virginia University (Department Chairman, 1981-83)	1981-84
Faculty Associate, Regional Research Institute, West Virginia University	1981-88
Lecturer and Assistant Professor, Department of Economics, University of California, Riverside	1975-81
Senior Council Economist, New York State Council of Economic Advisers	1974-75

### CONCURRENT POSITIONS

Senior Research Fellow, Center for Sustainability Solutions, USC	2022-
Senior Research Fellow, Schaeffer Center for Health Policy and Economics, USC	2020-21
Faculty Affiliate, Center for Accelerating Operational Efficiency, Arizona State University	2020-
Faculty Fellow, Risk Institute, Fisher College of Business, The Ohio State University	2017-
Faculty Fellow, Schwarzenegger Institute on State and Global Policy, USC	2015-
Faculty Affiliate, Critical Infrastructure Resilience Institute, University of Illinois	2015-
Faculty Affiliate, METRANS Center, USC	2015-
Faculty Affiliate, Regional Science Academy	2015-
Faculty Affiliate, Global Energy Network, USC	2012-
Member, Insurance Working Group, National Bureau of Economic Research	2012-14
Faculty Affiliate, Sustainable Cities Program, USC	2008-
Faculty Affiliate, Energy Institute, USC (Founding Acting Director, 2007-08)	2007-
Faculty Affiliate, Global Business Strategies Program, Penn State (Acting Director, 1999-00)	1998-07
Faculty Associate, Natural Hazards Center, Penn State	1998-03
Faculty Associate, Center for Integrated Regional Assessment, Penn State	1996-07
Faculty Affiliate, Environmental Pollution Control Program, Penn State	1995-06
Faculty Associate, Earth System Science Center/Earth-Environment Institute, Penn State	1993-07
Faculty Affiliate, Multidisciplinary Center for Earthquake Engineering Research (MCEER)	1993-06

Faculty Appointee, Environmental Assessment Division, Argonne National Laboratory	1991-92
Co-Director, Pennsylvania Economic Forecasting Model Project, Penn State	1990-95
Faculty Affiliate, Graduate Program in Policy Analysis, Penn State	1988-95
Faculty Affiliate, Graduate Program in Geography, West Virginia University	1986-88
Faculty Associate, Center for Economic Research, West Virginia University	1985-88

### VISITING POSITIONS

Visiting Professor, Institute for Advanced Study, Pavia, Italy	2015
Visiting Professor, School of Policy, Planning and Development; and Provost's Scholar, Future Fuels and Energy Initiative, University of Southern California	2006-07
Visiting Scholar, Center for Risk and Economic Analysis of Terrorism Events, USC	2005
Visiting Fellow, East-West Center, University of Hawaii	2004
Resident Visitor, Resources for the Future	2001
Intergovernmental Personnel Act Assignee, Statistics of Income Division, IRS	1990-91
Visiting Associate, Environmental Quality Laboratory, California Institute of Technology	1986
Visiting Scholar, Natural Hazards Center, University of Colorado	1979

### ADVISORY POSITIONS

National Academies of Science, Committee on Hazard Mitigation and Resilience Applied Research	2022-23
Global Alliance of Disaster Research Institutes (GADRI), CREATE Liaison	2021-
U.S. Army Corps of Engineers-DHS Port Resilience, Technical Advisory Committee	2019
U.S. Government Accountability Office/National Academy of Sciences, Expert Group on Security for Radiological Materials	2018
USC-Tsinghua University-Hertie School, T-20 Policy Brief to the G-20, Team Leader	2017
National Institute of Building Sciences, Mitigation Saves 2 Study, Oversight Committee	2016-18
U.S. Coast Guard, Working Group on Economic Consequence Analysis for Maritime Cyber Security, Chair	2016-17
International Institute for Applied Systems Analysis, Science-Policy Hub for Disaster Risk Management Exploratory Committee	2015-16
U.S. EPA Science Advisory Board, Panel on Economy-Wide Modeling	2015-17
<i>The Economist</i> Intelligence Unit, Expert Working Group on Flood Risk Mitigation	2015-16
U.S. DHS, Interagency Working Group on Economic Consequence Analysis of Terrorism	2014-18
USC Interdisciplinary Human Rights Initiative, Coordinator	2014-16
National Institute of Building Sciences, Multi-Hazard Mitigation Council Board of Directors	2011-18
Center for National Policy, Resilience Forum Advisory Board	2010-12
National Science Foundation, Review Panel	2010-11
Community and Regional Resilience Institute (CARRI), Community Resilience System Initiative Subject Matter Expert Working Group	2009-10
National Academies of Science, Panel on National Earthquake Resilience	2009-11
The Center for Climate Strategies, Advisory Council	2009-14
Centers for Disease Control, Research Review Panel	2008
DOE/NOAA/NASA, State of the Carbon Cycle Review, Coordinating Team	2005-07
Pennsylvania Consortium for Interdisciplinary Environmental Policy (Penn State Representative, 2005-06; Committee on Climate Change and Energy, Chair, 2001-03)	2001-07
U.S. EPA Science Advisory Board, Panel on the Second Generation Climate Policy Model	2004-06
NSF Site Review Team, Center for Decision-Making under Uncertainty, Chair	2004
National Academies of Science, Panel on Economic Benefits of Improved Seismic Monitoring	2003-05
Consortium for Atlantic Regional Assessment of Climate Change, Advisory Council	2003-05
NSF/EERI, Panel on Research Opportunities for Earthquake Engineering	2001-03
Multidisciplinary Center for Earthquake Engineering Research, Research Committee	2001
National Academies of Science, Panel on the National Helium Reserve	1998-00
U.S. Office of Technology Assessment, Review Panel on Energy and the U.S. Economy	1990
American Economic Association, Representative to the American Association for the Advancement of Science (AEA Liaison Committee, Chair, 1988-92)	1986-92
National Science Foundation, Advisory Committee on Flood Hazard Mitigation (see below for professional association and university boards and committees)	1980

## EDITORIAL POSITIONS

Senior Editorial Board Member, <u>Energies</u>	2022-
Area Advisor, <u>Oxford Research Encyclopedia of Natural Hazard Science</u>	2022-
Associate Editor, <u>Natural Hazards Review</u>	2018-
Editorial Board, <u>Economics of Disasters and Climate Change</u>	2017-
Editorial Board, Springer Book Series on Applied General Equilibrium Analysis	2015-
Editorial Board, <u>Environmental Hazards</u>	2015-
Guest Editor, <u>International Regional Science Review</u>	2014
Associate Editor, Springer Book Series on Integrated Disaster Risk Management	2014-
Associate Editor, <u>Journal of Sustainable Energy Engineering</u>	2013-20
Editorial Board, <u>International Journal of Disaster Risk Science</u>	2013-
Editorial Board, <u>Energy Journal</u>	2011-19
Editorial Board, <u>Integrated Disaster Risk Management Journal</u>	2010-
Guest Editor, <u>Peace Economics, Peace Science, and Public Policy</u>	2009
Acting Associate Editor, <u>Natural Hazards Review</u>	2001-03
Editorial Board, <u>Energy Policy</u>	2000-13
Editorial Board, <u>Pacific and Asian Journal of Energy</u>	1995-04
Guest Editor, <u>Energy Policy</u>	1995
Editorial Board, <u>Resource and Energy Economics</u>	1993-07
Guest Editor, <u>Resource and Energy Economics</u>	1993
Editorial Board, <u>Resources Policy</u>	1989-12
Guest Editor, <u>Journal of Policy Modeling</u>	1989
Associate Editor, <u>Journal of Regional Science</u>	1985-12

## HONORS AND AWARD

Society for Risk Analysis Fellow	2022-
Best Border Paper Award, Annual <b>IEEE</b> Symposium on Technologies for Homeland Security (with F. Roberts and others)	2022
Society for Risk Analysis Resilience Specialty Group Chair	2022-
International Society for Integrated Disaster Risk Management Distinguished Service Award	2020
PACEsetter Award for Innovation (with D. Wei)	2020
Outstanding Article of 2018 Award, <u>Journal of Benefit-Cost Analysis</u> (with S. Farrow)	2019
Outstanding Reviewer Award, <u>Natural Hazards Review</u>	2019
Robert Backoff Award for the Best PhD Student Paper in the Glenn College of Public Affairs, The Ohio State University (co-author with N. Dormady; co-mentor of A. Roa Henriquez)	2018
Regional Science Association International Fellow	2017-
International Society for Integrated Disaster Risk Management President	2017-
International Input-Output Association Sir Richard Stone Prize for the Best Article in <u>Economic Systems Research</u> in 2013-14 (with D. Wei)	2017
International Society for Integrated Disaster Risk Management Distinguished Research Award	2015
Center for Risk and Economic Analysis of Terrorism Events, Transition Project of the Year Award (Research Team Leader)	2015
Regional Economic Models, Inc. George Treyz Excellence in Economic Analysis Award (with D. Wei and N. Dormady)	2012
Applied Technology Council Award for Outstanding Achievement (Research Team Leader)	2006
Provost's Scholar, Future Fuels and Energy Initiative, University of Southern California	2006-07
East-West Center Fellowship	2003-04
Earthquake Engineering Research Institute Special Service Recognition Award	2003
Penn State University Provost's Award for Collaborative Instruction and Curricular Innovation (Teaching Team Member)	1993&96
American Planning Association Outstanding Planning Program Honor Award (Research Team Leader)	1983
University of California Regents Junior Faculty Fellowship	1979
Woodrow Wilson Fellowship	1970-71
University of Utah Economics Department Merit Scholarship	1969-70

## PUBLICATIONS

### Research Dissemination:

[http://scholar.google.com/citations?hl=en&user=MdqrwWwAAAAJ&pagesize=100&view\\_op=list\\_works](http://scholar.google.com/citations?hl=en&user=MdqrwWwAAAAJ&pagesize=100&view_op=list_works)

(direct access to publications below)

citations: 18,060

h-Index: 62

i10-index: 188

### Books and Monographs:

Economic Consequence Analysis of Disasters: The E-CAT Software Tool, Singapore: Springer, 2017 (with F. Prager, Z. Chen and S. Chatterjee).

Defining and Measuring Economic Resilience from a Societal, Environmental and Security Perspective, Singapore: Springer, 2017.

The Economics of Climate Change Policy: International, National and Regional Strategies, Cheltenham, UK: Edward Elgar Publishing Company, 2009.

Engineering and Socioeconomic Impacts of Earthquakes: An Analysis of Electricity Lifeline Disruptions in the New Madrid Area, Buffalo, NY: Multidisciplinary Center for Earthquake Engineering Research, 1998 (with M. Shinozuka and others).

Combating Global Warming: A Global System of Tradeable Carbon Emission Entitlements, New York: United Nations (UNCTAD), 1992 (with S. Barrett, T. Tietenberg and others).

Natural Resource Policy and Income Distribution, Baltimore: Johns Hopkins University Press, 1988 (with B. K. Stevens and G. Davis).

Forecasting Natural Gas Demand in a Changing World, Greenwich, CT: JAI Press, 1987 (with D. Kolk).

Geothermal Energy and Regional Development, New York: Praeger Publishers, 1979 (with S. Edmunds and others).

A Dynamic Interindustry Model for the Economic Analysis of Air Pollution Abatement: Theory and Applications, Regional Science Monograph No. 5, Center for Urban Development Research, Cornell University, 1976.

Marginal Pollution Analysis for Long-Range Forecasts, Regional Science Monograph No. 4, Center for Urban Development Research, Cornell University, 1975 (associate author with W. Isard and others).

### Books and Journal Issues Edited:

The Economics of Energy Security, Cheltenham, UK: Edward Elgar Publishing Company, forthcoming (co-editor with S. Brown)

Advances in Spatial and Economic Modeling of Disaster Impacts, Heidelberg, Germany: Springer, 2019 (co-editor with Y. Okuyama).

Regional Science Matters: Studies Dedicated to Walter Isard, Heidelberg, Germany: Springer, 2015 (co-editor with P. Nijkamp and K. Kourtit).

Papers in Memory of Walter Isard, Special Issue of International Regional Science Review (co-editor with T. Smith), Vol. 37, No. 1. 2014.

The Economic Impacts of the 2001 Terrorist Attacks on the World Trade Center: Regional and National, Special Issue of Peace Economics, Peace Science, and Public Policy, Vol. 15, No. 2, 2009 (co-editor with S. B. Blomberg).

The Economics of Natural Hazards, Cheltenham, UK: Edward Elgar Publishing Company, 2004 (co-editor with H. Kunreuther).

Frontiers of Environmental Economics, Cheltenham, UK: Edward Elgar Publishing Company, 2001 (co-editor with H. Folmer, S. Gerking, and L. Gabel).

Proceedings of the U.S.-Japan Joint Seminar on Civil Infrastructure Systems Research, Buffalo, NY: Multidisciplinary Center for Earthquake Engineering Research, 1998 (co-editor with M. Shinozuka).

Energy and Greenhouse Gas Mitigation: The IPCC Report and Beyond, Special Issue of Energy Policy, Vol. 24, Nos. 10/11, 1996 (co-editor with E. Haites).

The Economics of Global Warming, Special Issue of Resource and Energy Economics, Vol. 15, No. 1, 1993.

Frontiers of Input-Output Analysis, New York: Oxford University Press, 1989 (co-editor with R. Miller and K. Polenske).

Papers in Honor of Wassily Leontief, Special Issue of Journal of Policy Modeling, Vol. 11, No. 1, 1989.

### **Refereed Journal Articles:**

“Regional Economic Impacts of the Los Angeles 100% Renewable Energy Transition,” Climate Policy, electronic preprint, 2023 (with H. Cutler, M. Shields and others).

“The Long Shadow of a Major Disaster: Modeled Dynamic Impacts of the Hypothetical HayWired Earthquake on California’s Economy,” International Regional Science Review, electronic preprint, 2023 (with I. Sue Wing, D. Wei and A. Wein).

“The Economic Impacts of Russia-Ukraine War Export Disruptions of Grain Commodities,” Applied Economic Perspectives and Policy, Vol. 45, pp. 645-65, 2023. (with Z. Chen and D. Wei).

“Macroeconomic Consequences of the COVID-19 Pandemic,” Economic Modeling, 2023, Vol. 12, No. 106147, 2023 (with T. Walmsley, R. John and others).

“Methods and Lessons for Business Resilience and Recovery Surveys,” International Journal of Disaster Risk Reduction, Vol. 93, No. 103743, 2023 (with M. Watson, J. Handmer and others).

“Benefit-Cost Analysis of Low-Cost Flood Inundation Sensors,” Natural Hazards Review, Vol. 24, No. 05022011, 2023 (with D. Wei, J. Machado and K. Spencer).

“Socioeconomic Impacts of Resilience to Seaport and Highway Transportation Network Disruption,” Transportation Research D, Vol. 106, No. 103236, 2022 (with D. Wei, L. Soibelman and others)

“The Co-Benefits of California Offshore Wind Electricity,” Electricity Journal, Vol. 35, No. 7: 107167, 2022 (with D. Wei and A. Einbinder).

“Behavioral Economic Consequences of Disasters: A Basis for Inclusion in Benefit-Cost Analysis,” Economics of Disasters and Climate Change, Vol. 6, No.2, 2022, pp. 213-23.

“The Cost-Effectiveness of Economic Resilience to Disasters,” International Journal of Production Economics, Vol. 244, No. 108371, 2022 (with N. Dormady and others).

“Economic Impacts of Spillover Effects of Terrorism Countermeasures at Public Assembly Sites,” Journal of Homeland Security and Emergency Management, Vol. 19, No. 1, pp. 87-125, 2022 (with R. John and others).

“Estimating Economic Losses from Cyber-Attacks on Shipping Ports: An Optimization-Based Approach,” Transportation Research C, Vol. 137, No. 103423, 2022 (with G. Weaver, D. Wei and others).

“COVID-19 Economic Impacts in Perspective: A Comparison to Recent U.S. Disasters,” International Journal of Disaster Risk Reduction, Vol. 60, No. 102317, 2021.

“Spatial Transmission of the Economic Impacts of COVID-19 through International Trade,” Letters in Spatial and Resource Sciences, Vol. 14, No. 2, 2021, pp. 169-96 (with T. Walmsley and D. Wei).

“Impacts on the U.S. Macroeconomy of Mandatory Business Closures in Response to the COVID-19 Pandemic,” Applied Economics Letters, Vol. 28, No. 15, 2021, pp. 1293-1300 (with T. Walmsley and D. Wei).

“The Economic Benefits of Trade Facilitation: US Customs and Border Protection’s Centers of Excellence and Expertise Program,” The World Economy, Vol. 44, No. 6, 2021, 346-66 (with B. Roberts, F. Prager and others).

“The Impacts of the Coronavirus on the Economy of the United States,” Economics of Disasters and Climate Change, Vo. 5, No. 1, 2021, pp. 1-52 (with T. Walmsley and D. Wei).

“Economic Consequence Analysis of Electric Power Infrastructure Disruptions: An Analytical General Equilibrium Approach,” Energy Economics, Vol. 89, No. 104756, 2020 (with I. Sue Wing).

“Evaluating the Role of Resilience in Recovering from Major Port Disruptions: A Multi-Regional Analysis,” Papers in Regional Science, Vol. 99, No. 6, 2020, pp. 1691-1722 (with D. Wei and Z. Chen).

“The Design of a Deductible/Credit System for Post-Disaster Public Assistance,” Journal of Environmental Planning and Management, Vol. 63, No.12, 2020, pp. 2163-93 (with P. Ganderton, R. Bostic and others).

“Comprehensive Resilience Assessment Framework for Transportation Systems in Urban Areas,” Advanced Engineering Informatics, Vol. 46, No. 101159, 2020. (with E. Koc, D. Wei, L. Soibelman and others).

“Return Migration and Decontamination after the 2011 Fukushima Nuclear Power Plant Accidents,” Risk Analysis, Vol. 40, No. 4, 2020, pp. 800-17 2020 (with S. Nagamatsu and J. Eyer).

“Impacts of the Property Assessed Clean Energy (PACE) Program on the Economy of California,” Energy Policy, Vol. 37, No. 111087, 2020, pp. 1-13 (with D. Wei).

“Assessing the Benefits and Costs of Homeland Security Research: A Risk-Informed Methodology with Applications for the U.S. Coast Guard,” Risk Analysis, Vol. 40, No. 3, 2020, pp. 450-475 (with D. von Winterfeldt, S. Farrow and others).

“Estimating Economic Impacts of the U.S.-South Korea Free Trade Agreement,” Economic Systems Research, Vol. 31, No. 3. 2019, pp. 305-23 (with D. Wei and Z. Chen).

“Mitigation and Resilience Tradeoffs for Electricity Outages,” Economics of Disasters and Climate Change, Vol. 3, No. 1, 2019, pp. 61-77 (with J. Eyer).

“Economic Resilience of the Firm: A Production Theory Approach,” International Journal of Production Economics, Vol. 208, 2019, pp. 446-60 (with N. Dormady and A. Roa-Henriquez).

“Distributional Considerations for Transboundary Risk Governance of Environmental Threats,” International Journal of Disaster Risk Science, Vol. 9, No. 4, 2018, pp. 445-53.

“Achieving Paris Climate Agreement Pledges: Alternative Designs for Linking Emissions Trading,” Review of Environmental Economics and Policy, Vol. 12, No. 1, 2018, pp. 170-182 (with D. Wei, T. Vandyck, C. Flachsland and others).

“Dynamic Economic Resilience and Economic Recovery from Disasters: A Quantitative Assessment,” Risk Analysis, Vol. 38, No. 6, 2018, pp. 1306-18 (with W. Xie and others).

“What Influences the Destination of Disaster Migrants? Evidence from Hurricane Katrina,” Economics of Disasters and Climate Change, Vol. 2, No. 1, 2018, pp. 91-106 (with J. Eyer and others).

“Estimating and Comparing Economic Consequences of Multiple Threats: A Reduced-Form Computable General Equilibrium Approach,” International Journal of Disaster Risk Reduction, Vol. 31, 2018, pp. 51-67 (with Prager, F. and Z. Chen).

“Economic Consequences of a Disruption of Oil Imports: The Role of Seaports in U.S. Energy Security,” Energy Policy, Vol. 115, 2018, pp. 584–615 (with D. Wei and D. Paul).

“Economic Resilience to Transportation Failure: A Computable General Equilibrium Analysis,” Transportation, Vol. 95, 2018, pp. 207-26 (with Z. Chen).

“Welfare Analysis: Bridging the Partial and General Equilibrium Divide for Policy Analysis,” Journal of Benefit-Cost Analysis, Vol. 9, No. 1, 2018, pp. 67-83 (with Scott Farrow); recipient of the Outstanding Article of 2018 Award in this journal.

"The Effect of Foregone Productivity Improvement in the Estimation of Macroeconomic Impacts of Greenhouse Gas Mitigation Investment," Journal of Sustainable Energy Engineering, Vol. 5, No. 4, 2017 (with D. Wei).

"Equity, Emissions Allowance Trading, and the Paris Agreement on Climate Change," Economics of Disasters and Climate Change, Vol. 1, No. 3, 2017, pp. 203-32 (with D. Wei, N. Miller, and T. Vandyck).

"The Role of Behavioral Responses in the Total Economic Consequences of Terrorist Attacks on U.S. Air Travel Targets," Risk Analysis, Vol. 37, No. 7, 2017, pp. 1403-18 (with H. Rosoff, P. Slovic and others).

"Macroeconomic Impacts of Proposed Climate Change Mitigation Strategies for Transportation in Southern California," Research in Transportation Economics, Vol. 61, 2017, pp. 56-69 (with M. Lawrence and others).

"Total Economic Consequences of an Influenza Outbreak in the United States," Risk Analysis, Vol. 37, No. 1, 2017, pp. 4-19 (with F. Prager and D. Wei).

"Climate Change Policy and the Economy in Baja California: Assessment of Macroeconomic Impacts of the State's Climate Action Plan," Ecological Economics, 2017, Vol. 131, pp. 373-88 (with D. Wei, C. de la Parra and others).

"Economic Consequences of Aviation System Disruptions: A Reduced-Form Computable General Equilibrium Analysis," Transportation Research Part A, Vol. 95, 2017, pp. 207-26 (with Z. Chen and others).

"Economic Consequence Analysis of the ARkStorm Scenario," Natural Hazards Review, Vol. 17, No. 4, 2016 (with I. Sue Wing and A. Wein).

"The Impact of High-Speed Rail Investment on Economic and Environmental Change in China: A Dynamic CGE Analysis," Transportation Research Part A, Vol. 92, pp. 232-45, 2016 (with Z. Chen and K. Haynes)

"Improving Catastrophe Modeling for Business Interruption Insurance Needs," Risk Analysis, Vol. 36, No. 10, pp. 1896-1915, 2016 (with C. Huyck).

"Evaluating Modeling Approaches for Analyzing Macroeconomic Impacts of Microgrid Projects," Journal of Sustainable Energy Engineering, Vol. 4, No. 2, Article 2, 2016 (with Dan Wei).

"Economic Impacts of a California Tsunami," Natural Hazards Review, Vol. 17, No. 2, 2016 (with I. Sue Wing and others).

"Economy-wide Impacts of Reduced Wait Times at U.S. International Airports," Research in Transportation Business and Management, Vol. 16, No. 3, pp. 112–20, 2015 (with F. Prager and D. Wei).

"Competitiveness and Macroeconomic Impacts of Reduced Wait Times at US Land Freight Border Crossings," Transportation Research Part A, Vol. 78, No. 3, 2015, pp. 84–101 (with M. Avetisyan and others).

"Development of Reduced-Form Models to Evaluate Macroeconomic Impacts of Greenhouse Gas Mitigation," Journal of Sustainable Energy Engineering, Vol. 3, No. 1, pp. 1-21, 2015 (with D. Wei and N. Dormady).

"Intergovernmental Climate Change Mitigation: Theory and Outcomes," Journal of Public Policy, Vol. 37, No. 1, 2015, pp. 97-136 (with H. Nelson, D. Wei and others).

"A Framework for Analyzing the Economic Tradeoffs between Urban Commerce and Security," Risk Analysis, Vol. 34, No. 8, pp. 1554-79, 2014 (with M. Avetisyan and S. Chatterjee).

"A Post-Audit of Geothermal Development in California's Imperial Valley," Journal of Sustainable Energy Engineering, Vol. 2, No. 2, pp. 166-91, 2014 (with L. White and F. Aminzadeh).

"The Impact on the U.S. Economy of Changes in Wait Times at Ports of Entry," Transport Policy, Vol. 35, No. 2, pp. 162-75, 2014 (with B. Roberts and others).

"Macroeconomic Impacts of the California Global Warming Solutions Act on the Southern California Economy," Economics of Energy and Environmental Policy, Vol. 3, No. 2, pp. 101-18, 2014 (with Dan Wei).

"Developing and Assessing Investment Options for Economic, Energy, and Climate Security Gains in the U.S.," Low Carbon Economy, Vol. 5, No. 2, 2014, pp. 27-39 (with P. Delaquil, G. Goldstein and others).

"The Potential Impact of an Anthrax Attack on Real Estate Prices and Foreclosures in Seattle," Risk Analysis, Vol. 34, No. 1, 2014, pp. 187-201 (with N. Dormady and T. Szelazek).

- "Walter Isard's Contributions to Environmental Economics and Ecological Economics," International Regional Science Review, Vol. 37, No. 1. 2014, pp. 107-22 (with H. Folmer and P. Nijkamp).
- "An Economic Framework for the Development of a Resilience Index for Business Recovery," International Journal of Disaster Risk Reduction, Vol. 5, October, 2013, pp. 73-83 (with E. Krausmann).
- "Economic Impacts of Potential Foot and Mouth Disease Agro-terrorism in the U.S.: A Computable General Equilibrium Analysis," Journal of Biothreats and Biodefense, S12: 001, 2013 (with G. Oladosu and B. Lee).
- "Estimating the Economic Consequences of a Port Shutdown: The Special Role of Resilience," Economic Systems Research, Vol. 25, No. 2, 2013, pp. 212-32 (with D. Wei); Recipient of the Sir Richard Stone Prize of the international Input-Output Association for the Best Article in this journal in 2013-14.
- "A Reduced-Form Rapid Economic Consequence Estimating Model: Application to Property Damage from U.S. Earthquakes," International Journal of Disaster Risk Science, Vol. 4, No. 1, 2013, pp. 20-32 (with N. Heatwole).
- "Economic Considerations in Designing Emergency Management Institutions and Policies for Transboundary Disasters," Public Management Review, Vol. 15, No. 3, 2013, pp. 446-64 (with T. Kustra).
- "Distributional Impacts of Greenhouse Gas Emissions Trading: Alternative Allocation and Recycling Strategies in California," Contemporary Economic Policy, Vol. 30, No. 4, 2012, pp. 603-17 (with D. Wei and F. Prager).
- "Assessment of the Regional Economic Impacts of Catastrophic Events: A CGE Analysis of Resource Loss and Behavioral Effects of a Radiological Dispersion Device Attack Scenario," Risk Analysis, Vol. 32, No. 4, 2012, pp. 583-600 (with J. Giesecke, W. Burns, P. Slovic and others); Reprinted in M. Greenberg and A. Cox (eds.), Risk Analysis: Virtual Issue on Economic Consequence Analysis, 2015.
- "Economic Recovery to Disasters," International Journal of Mass Emergencies and Disasters, Vol. 30, No. 2, 2012, pp. 171-81 (with S. Chang).
- "Economic Impacts of the Florida Climate Change Action Plan," Climate Policy, Vol. 12, No. 1, 2012, pp. 50-69 (with D. Wei).
- "Regional Macroeconomic Assessment of the Pennsylvania Climate Action Plan," Regional Science Policy and Practice, Vol. 3, No.4, 2011, pp. 357-79 (with D. Wei and N. Dormady). Recipient of the Regional Economic Models, Inc., George Treyz Award for Excellence in Economic Analysis.
- "Regional Economic Impacts of a Verdugo Earthquake Disruption of Los Angeles Water Supplies: A Computable General Equilibrium Analysis," Earthquake Spectra, Vol. 27, No. 3, 2011, pp. 881-906 (with S. Liao and A. Bonneau).
- "Modeling a Major Source of Economic Resilience to Disasters: Recapturing Lost Production," Natural Hazards, Vol. 58, No. 2, 2011, pp. 163-82 (with J. Park and J. Cho); Reprinted in S. Fuchs and T. Thaler (eds.) Vulnerability and Resilience to Natural Hazards. New York: Cambridge University Press, 2018.
- "The ShakeOut Scenario: A Hypothetical M 7.8 Earthquake on the Southern Andreas Fault" (with K. Porter, L. Jones, D. Mileti, and others); "Economic Impacts of the ShakeOut Scenario" (with D. Wei and A. Wein); "Economic Resilience" (with A. Wein), Earthquake Spectra: Special Issue on the ShakeOut Earthquake Scenario, Vol. 27, No. 2, 2011, pp. 235-61; 539-57; 559-73.
- "A Meta-Analysis of the Economic Impacts of Climate Action Plans," Energy Journal, Vol. 32, No. 2, 2011, pp. 143-65 (with N. Dormady).
- "Benefits and Costs of Counter-Terrorism Security Measures in Urban Areas," Journal of Homeland Security, Special Issue on Catastrophes and Complex Systems, 2011, Article 28 (with S. Chatterjee).
- "Resilience and Sustainability in the Face of Disasters," Environmental Innovation and Societal Transitions, Vol. 1, No. 1, 2011, pp. 96-100.
- "The Economic Costs to the U.S. of Closing Its Borders: A Computable General Equilibrium Analysis," Defence and Peace Economics, Vol. 22, No. 1, 2011, pp. 85-97 (with P. Dixon and others).
- "Transportation Security and the Role of Resilience: A Foundation for Operational Metrics," Transport Policy, Vol. 18, No. 1, 2011, pp. 307-17 (with A. Cox and F. Prager).



"Effects on the U.S. of an H1N1 Epidemic: Analysis with a Quarterly CGE Model," Journal of Homeland Security and Emergency Management, Vol. 7, No. 1, 2010, Article 7 (with P. Dixon and others).

"Total Economic Impacts of a Terrorist Attack: Insights from 9/11," Peace Economics, Peace Science, and Public Policy, Vol. 16, No. 1, 2010, Article 2 (with S. B. Blomberg).

"Climate Change Policy Formation in Michigan: The Case for Integrated Regional Policies," International Regional Science Review, Vol. 32, No. 4, 2009, pp. 445-65 (with J. Wennberg and others).

"Interregional Sharing of Energy Conservation Targets in China: Efficiency and Equity," Energy Journal, Vol. 30, No. 4, 2009, pp. 81-111 (with D. Wei).

"Estimating Environmental Benefits of Natural Hazard Mitigation: Results from a Benefit-Cost Analysis of FEMA Mitigation Grants," Mitigation and Adaptation Strategies for Global Change, Vol. 14, No. 7, 2009, pp. 655-76 (with J. Whitehead).

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"A Social Accounting Matrix Framework for Modeling Transboundary Flows of Capital-Related Income," in G. Hewings and M. Madden (eds.), Social and Demographic Accounting: Papers in Honor of Sir Richard Stone, New York: Cambridge University Press, 1995, pp. 41-59 (with M. Kilkenny).

"A Global Marketable Permits Approach to CO<sub>2</sub> Mitigation: Implications for U.S. Energy Demand," in E. C. van Ierland (ed.), International Environmental Economics, Amsterdam: North-Holland, 1994, pp. 97-118 (with B. K. Stevens and P. C. Li).

"A Tradeable Carbon Entitlements Approach to Global Warming Policy: The Role of Equity in Establishing Allocations," in P. May and R. da Motta (eds.), Valorando a Natureza, Rio de Janeiro: Editora Campus, Ltda., 1994, pp. 11-32.

"Input-Output Analysis: Applications," in M. Bever (ed.), Encyclopedia of Materials Economics, Management and Policy, Elmsford, NY: Pergamon Press, 1993, pp. 99-106 (with K. L. Wang).

"The Need for Higher Resolution in the Economic Analysis of Global Warming," in S. K. Majumdar et al. (eds.), Global Climate Change: Implications, Challenges and Mitigation, Easton, PA: Pennsylvania Academy of Sciences, 1992, pp. 329-345 (with R. U. Ayres).



- “The Role of International Competition in Changing Energy Use Patterns in the U.S.,” in O. Guvenan et al. (eds.), Politiques Economiques et Marches Internationaux de Matieres Premieres: Analyses Econometriques, Paris: Economica, 1992, pp. 169-186 (with C. Y. Chen and S. M. Lin).
- “The Absolute and Relative Joint Stability of Input-Output Production and Allocation Coefficients,” in A. W. A. Peterson (ed.), Advances in Input-Output Analysis, New York: Oxford, 1991, pp. 25-36 (with C. Y. Chen).
- “Modeling the Responsiveness of Energy Use to Changing Economic Conditions,” in F. Fesharaki and J. Dorian (eds.), Energy Developments in the 1990s, Honolulu, HI, 1991, pp. 31-51 (with C. Y. Chen).
- “Minority Employment in the Energy Sectors of the U.S. Economy: Projections for the 1990s,” in Socioeconomic Energy Research and Analysis, Washington, DC: U.S. DOE, 1990, pp. 647-677 (with S. Seninger and G. Davis).
- “Interrelational Income Distribution Multipliers for the U.S. Economy,” in R. Miller et al. (eds.) Frontiers of Input-Output Analysis, New York: Oxford University Press, 1989, pp. 134-147 (with P. Beaumont).
- “Estimation and Analysis of a State Natural Gas Econometric Model,” in Proceedings of the American Statistical Association, 1986, pp. 380-385 (with T. Witt and W. Labys).
- “Regional Input-Output Methods for Tourism Impact Analysis,” in D. Propst et al. (eds.) Assessing the Economic Impacts of Recreation and Tourism, Asheville, NC: U.S. Forest Service, 1986, pp. 16-22 (with B. H. Stevens).
- “The Role of Sectoral Energy Intensities in Regional Import Growth,” Modeling and Simulation, Vol. 14, Part 3, Research Triangle Park: Instrument Society of America, 1983, pp. 651-656 (with D. Kolk).
- “Non-Renewable Resources and the Development of Arid Lands: A Planning Approach,” in UNITAR, Alternative Strategies for Desert Development and Management, Vol. 4, Elmsford, NY: Pergamon Press, 1982, pp. 1042-1059 (with M. Sheehan and D. Hurd).
- “Utility Lifelines and Economic Activity in the Context of Earthquakes,” in J. Isenberg (ed.), Social and Economic Impact of Earthquakes on Utility Lifelines, New York: American Society of Civil Engineers, 1981, pp. 107-120.

### **Selected Research Reports:**

- Economic Viability, Resilience, and Sustainability of Logistics Systems in Post-Conflict Zones, Final Report to the US Department of Defense Minerva Program, Center for Risk and Economic Analysis of Threats and Emergencies (CREATE), University of Southern California, Los Angeles, CA, 2023 (with K. Donaghy, T. Friesz and others).
- Power Outage Economics Tool, Final Report to Commonwealth Edison, Lawrence Berkeley National Laboratory, Berkeley, CA, 2023 (with I. Sue Wing, P. Larsen and others).
- Macroeconomic Consequences of the COVID-19 Pandemic, Final Report to the DHS Center for Accelerating Operational Efficiency (CAOE), CREATE, USC, 2021 (with T. Walmsley, R. John and others).
- California’s Offshore Wind Electricity Opportunity, Final Report to American Wind Energy Association, Offshore Wind California, and The Energy Foundation, 2021, Schwarzenegger Institute of State and Global Policy, USC, Los Angeles CA (with D. Wei and A. Einbinder).
- “Economic Impacts and Jobs,” in LA100 -- The Los Angeles 100% Renewable Energy Study. National Renewable Energy Laboratory, Golden, CO, 2021 (with H. Cutler, D. Wei and others)
- Economic Consequences of the HayWired Earthquake Scenario – Digital and Utility Network Linkages and Resilience, in S. Detweiler and A. Wein (eds.), The HayWired Earthquake Scenario – Societal Consequences, U.S. Geological Survey Scientific Investigations Report, 2021 (with I. Sue Wing, D. Wei and A. Wein).
- CDC Proposed Contact Tracing Rule Study. Final Report to the Centers for Disease Control and Prevention, CREATE, USC, 2020 (with J. Hlavka and others)
- Does Enhanced Security Improve Business Performance? Final Report to the DHS Cyber and Infrastructure Security Agency, CREATE, USC, 2020 (with R. John and others).
- Socioeconomic Dimensions of Resilience to Seaport and Highway Transportation Network Disruptions. Final Report to the California Department of Transportation, METRANS Transportation Center, USC, 2020 (with D. Wei and others).

Economic Impacts of the California Institute for Regenerative Medicine (CIRM). Final Report to California Institute for Regenerative Medicine, Schaeffer Center for Health Policy and Economics, USC, 2019 (with D. Wei).

Economic Impacts of the PACE Program, Final Report to Ygrene Energy Fund, Inc., Schwarzenegger Institute for State and Global Policy, USC, 2019 (with D. Wei).

Implications of G20 Country Non-Participation in the COP21 Accord, Policy Brief for the T-20 Global Solutions (Think Tank Group) Summit input to the G20 Meeting, 2017 (with D. Wei and N. Miller).

Demographic and Economic Research to Improve Forecasting of Border-Crossing Traffic. Report to U.S. Customs and Border Protection, CREATE, USC, 2017 (with J. Eyer and D. Wei).

Evaluating Modeling Approaches for Analyzing Macroeconomic Impacts of New York Prize Microgrid Projects, Report to New York State Energy Research and Development Authority, Price School of Public Policy, USC 2017 (with D. Wei).

Development and Application of an Economic Framework to Evaluate Resilience in Recovering from Major Port Disruptions. Final Report to the California Department of Transportation, METTRANS Transportation Center, USC, 2016 (with D. Wei and Z Chen).

Economic Impact of CBP Enforcement Activity Relating to Priority Trade Issues (PTIs). Final Report to U.S. Customs and Border Protection, CREATE, USC, 2016 (with B. Roberts and others).

Analysis of a Deductible/Credit Formula for FEMA Post-Disaster Public Assistance, Final Report to the Federal Emergency Management Agency, CREATE, USC, 2016 (with P. Ganderton, J. Eyer, D. Wei, D. von Winterfeldt and R. Bostic).

Private Sector Co-Benefits of Disaster Risk Management. Final Report to the World Bank, 2015.

Economic Consequence Analysis Tool (E-CAT). Final Report to DHS, CREATE, USC, 2015 (with F. Prager and others); Recipient of Transition Project of the Year Award, Center for Risk and Economic Analysis of Terrorism Events, 2015.

Broadening Economic Modeling for Biosurveillance Analysis. Final Report to the National Biosurveillance Integration Center, CREATE, USC, 2015 (with F. Prager and others).

Defining and Measuring Societal Resilience from an Economic, Environmental and Personal Security Perspective, Background Paper for the United Nations Development Programme Human Development Report, Price School of Public Policy, USC, 2014.

"Macro-economic Impacts of Policy Recommendations," Chapter 9 in Final Report of the Baja California Phase 2 Climate Action Plan, Center for Climate Strategies, Washington, DC, 2014 (with D. Wei and others).

Israeli-Palestinian Land Swap Auction Model, Final Report, RAND Intelligence Policy Center, Santa Monica, CA, 2014 (with N. Dormady).

Analyzing the Role of Fairness in Israeli-Palestinian Land Swaps, Final Report, RAND Intelligence Policy Center, Santa Monica, CA, 2013.

Modeling the Temporal and Spatial Consequences of Nuclear Terrorism Events. Report to the U.S. Domestic Nuclear Detection Office, CREATE, USC, 2013 (with N. Heatwole and others).

Economic Impacts of the SAFRR Tsunami Scenario in California. Report to U.S. Geological Survey, Price School of Public Policy, USC, 2013 (with A. Wein and others).

Analysis of Indirect Economic Impacts of Earthquake Scenarios, Final Report to Insurance Bureau of Canada, Boston, AIR Worldwide, 2013 (with D. Wei and I. Sue Wing).

Losses from Water Supply Disruptions to the Los Angeles County Economy, Final report to the Los Angeles Economic Development Corporation, 2012 (with I. Sue Wing and others).

Microeconomic and Macroeconomic Impact Analysis of Greenhouse Gas Mitigation Policy Options for the Southern California Climate and Economic Development Project (CEDP), Final report to SCAG, Center for Climate Strategies, Washington, DC, 2012 (with D. Wei and others)

Urban Commerce and Security, Draft Final Report to DHS, CREATE, USC and CCICADA, Rutgers University, 2012 (with S. Hora, S. Roberts and others).

The Macroeconomic Impact of the New York Climate Action Plan: A Screening Analysis. Report to New York State Energy Research and Development Authority, Price School of Public Policy, USC, 2011 (with D. Wei).

Measuring Economic Risk Benefits of U.S. Coast Guard Marine Safety Programs, Final Report to the U.S. Coast Guard, CREATE, USC, Los Angeles, CA, 2011 (with D. Wei and others).

Aggregate and Distributional Impacts of AB32 on the California Economy: Alternative Allocation Strategies for Cap & Trade. Next 10, San Francisco, CA, 2010 (with D. Wei and F. Prager).

Impacts of Comprehensive Climate and Energy Policy Options on the U.S. Economy, Johns Hopkins University, Baltimore, 2010 (with T. Peterson and others).

Macroeconomic Impact of the Michigan Climate Action Council Climate Action Plan on the State's Economy. Report to Michigan Department of Environmental Quality, Center for Climate Strategies, Washington, DC, 2010 (with S. Miller and D. Wei).

Economic Resilience to Disasters, Community and Regional Resilience Institute Report No. 8, Oak Ridge National Laboratory, Oak Ridge, TN, 2009.

The Economic Impact of the Florida Energy and Climate Change Action Plan on the State's Economy, Report to the Office of the Governor of the State of Florida, The Center for Climate Strategies, Washington DC, 2009 (with D. Wei).

Support for Risk and Economic Analysis for the National Biodefense Analysis and Countermeasures Center, Report to the Battelle National Biodefense Analysis Institute, CREATE, USC, Los Angeles, CA, 2008 (with D. von Winterfeldt and others).

Economic Impacts of Shutting Down the U.S. Borders in Response to a Security or Health Threat, Report to the U.S. Department of Homeland Security Center for Risk and Economic Analysis of Terrorism Events, University of Southern California, Los Angeles, CA, 2007 (with G. Asay and D. Wei).

Greenhouse Gas Emissions and Mitigation/Sequestration Options for Pennsylvania, Report to the Pennsylvania House of Representatives Environmental Resources and Energy Committee, The Pennsylvania State University, University Park, PA, 2006 (with T. Peterson).

User Costs in Seismic Risk Management for Urban Infrastructure Systems, Report to the National Science Foundation, Department of Geography, University of Washington, 2002 (with S. Chang and others).

Chad-Cameroon Development Project: Economic Impact Assessment of the Cameroon Oil Pipeline, Report to the World Bank for ExxonMobil, URS Corporation, Houston, TX, 2002 (with F. Bayne).

Mid-Atlantic Regional Assessment (MARA): The Impacts of Climate Change, Report to the U.S. Environmental Protection Agency, The Pennsylvania State University, 2000 (with A. Fisher and others).

Structural Decomposition Analysis of Global Economic-Environmental Change, Final Report to the National Science Foundation, The Pennsylvania State University, 1998 (with R. Ayres and S. Casler).

Economic Impacts of the Northridge Earthquake, Final Report to the National Science Foundation, The Pennsylvania State University, 1997 (with M. Lahr and D. Lim).

Transboundary Flows of Capital-Related Income, Final Report to the National Science Foundation, The Pennsylvania State University, 1996 (with M. Kilkenny).

Disaggregated Accounts for the ERS/USDA SAM Database, Final Report to the U.S. Department of Agriculture Economic Research Service, 1995 (with P. C. Li and B. Eduardo).

Coal Use in the People's Republic of China, Vol. 2: The Economic Effects of Constraining Coal Utilization, Argonne, IL: Argonne National Laboratory, 1994 (with D. Lim and others).

Prospects for the Expansion of Coal Consumption, Final Report to the U.S. Office of Technology Assessment, Department of Mineral Resource Economics, West Virginia University, 1989 (with W. Labys and T. Torries).

Natural Gas and the Economic Development of West Virginia, Energy Research Center, West Virginia University, 1985 (with W. Labys and others).

Development of an Input-Output Forecasting Model of the Demand for Natural Gas, Final Report to Southern California Gas Company, West Virginia University, 1983 (with D. Kolk).

The Employment Impact of Energy Options on the Los Angeles City Economy, Final Report to the Los Angeles Mayor's Energy Office, Regional Economics Group, Pomona CA, 1980 (with D. Kolk and others); Recipient of the American Planning Association Outstanding Planning Program Honor Award.

Assessing the Economic Effects of Implementing Air Quality Management Plans in California, Vol. 1: Economic Impact Modeling, Final Report to the California Air Resources Board, 1980, Public-Interest Economics West, San Francisco, CA (with R. Wolcott and others).

National Science Foundation, Flood Hazard Mitigation Study, Report to Congress, Washington, DC, 1980 (with other members of an NSF Advisory Group).

Federal and State Mandating to Local Governments, Final Report to NSF, Graduate School of Administration, University of California, Riverside, 1979 (with M. Neiman and others).

The Economic Impact of Geothermal Energy Development, Final Report to NSF/RANN, Dry Lands Research Institute, University of California, Riverside, 1977.

### **Contributions to Public Documents:**

U.S. Senate, Climate Change and Supply Chain Issues, Hearing before the Budget Committee, 118th Congress, Second Session, Washington, DC, 2023.

National Research Council, Resilience to Compounding and Cascading Events. Washington, DC: National Academies Press, 2022, (with other members of a National Academies of Science, Engineering, and Medicine Committee).

National Research Council, Equitable and Resilient Infrastructure Investments. Washington, DC: National Academies Press, 2022 (with other members of a National Academies of Science, Engineering and Medicine Committee).

U.S. EPA Science Advisory Board, Economy-Wide Modeling of Environmental Regulations. Washington, DC, 2017 (with P. Wilcoxon and other members of a SAB Panel).

National Research Council, National Earthquake Resilience: Research, Implementation and Outreach. Washington, DC: National Academy Press, 2011 (with others on a National Academy of Sciences Panel).

"ES-3: GHG Cap and Trade and ES-9: Carbon Tax," in Chapter 4 of *Maryland Climate Action Plan*, Annapolis, M.D., 2008 (with D. Wei and J. Wennberg).

"Cap and Trade," Chapter 8 in Minnesota Climate Change Advisory Group Final Report. Report to the Minnesota State Legislature, St. Paul, MN, 2008 (with J. Wennberg and D. Wei).

"Regional Economic Consequences," Chapter 7 in The ShakeOut Scenario. U. S. Geological Survey Open File Report 2008-1150, 2008 (with A. Wein).

DOE/NOAA/NASA, "What are the Options and Measures That Can Significantly Affect the Carbon Cycle?" in State of the Carbon Cycle Review, 2007 (with E. Haites, T. Wilbanks and others).

U.S. EPA Science Advisory Board Panel, Evaluation of the Second Generation (Climate Policy) Model, Washington, DC, 2006 (with L. Goulder and other members of a SAB Panel).

National Research Council, Improved Seismic Monitoring--Improved Decision-Making: Assessing the Value of Reduced Uncertainty, Washington, DC: National Academy Press, 2005 (with other members of a National Academy of Sciences Panel).

Multihazard Mitigation Council, Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities, Report to U.S. Congress on behalf of the National Institute of Building Sciences, Washington, DC, 2005 (with K. Porter and others); Recipient of Applied Technology Council Award for Outstanding Achievement, 2006.

European Union, "Understanding Sources of Resiliency to Natural Hazards," in A. van der Veen et al. (eds.), Proceedings of the Joint NEDEIS and University of Twente Workshop: In Search of a Common Methodology for Damage Estimation, Bruxelles: Office for Official Publications of the European Communities, 2003, pp. 137-50 (with S. Liao).

National Institute of Building Sciences/Federal Emergency Management Agency, “Indirect Economic Losses,” Flood Loss Estimation Methodology, Washington, DC, 2003 (with H. Cochrane and S. Chang).

Earthquake Engineering Research Institute, Securing Society Against Catastrophic Loss: A Research and Technology Transfer Plan, Report to the National Science Foundation, Oakland, CA, 2002 (with other members of an Expert Review Panel).

National Research Council, The Impact of Selling the Federal Helium Reserve, Washington, DC: National Academy Press, 2000 (with other members of a National Academy of Science Panel).

National Gambling Impact Study Commission, “The Regional Economic Impacts of Casino Gambling: Assessment of the Literature and Establishment of a Research Agenda,” Impacts of Gambling in the United States, Report to Congress, Washington, DC, 1999.

National Institute for Building Sciences/Federal Emergency Management Agency, “Indirect Economic Losses,” Earthquake Loss Estimation Methodology (HAZUS), Washington, DC, 1997 (with H. Cochrane and others).

U.S. Senate, The Intergovernmental Regulatory Relief Act, Hearing before the Subcommittee on Intergovernmental Relations, Ninety-Ninth Congress, First Session, Washington, DC, 1986, pp. 94-118.

Natural and Human Resource Implications of Industrial Development, Dry Lands Research Institute, University of California, Riverside, 1981 (with D. Isenberg and others).

Los Angeles Energy Management Advisory Board, The Energy/LA Action Plan, Los Angeles, CA, 1981, pp. 37-41 (with R. Kneisel and others).

National Association of Counties, Living with Mandates: A Guide for Elected Officials, Washington, DC, 1980 (with M. Neiman and others).

The Economic Impact of the University of California upon the Community, Dry Lands Research Institute, University of California, Riverside, 1980 (with D. Kolk and S. Edmunds).

Imperial County Planning Department, Geothermal Element, El Centro, CA, 1977, Part II, pp. 53-64.

New York State Council of Economic Advisers, State of the State Economy, New York City, 1974 (with R. Lindsay and others).

## Software Development

“The Business Resilience Calculator Decision Support Tool,” Critical Infrastructure Resilience Institute, Patent pending, 2024 (with N. Dormady).

“The Benefit-Cost Analysis Tool (BCAT),” Center for Risk and Economic Analysis of Threats and Emergencies (CREATE), forthcoming, 2024 (with D. von Winterfeldt, R. John and others).

“Power Outage Economics Tool (POET),” see Power Outage Economics Tool, Final Report to Commonwealth Edison, Lawrence Berkeley National Laboratory, Berkeley, CA, 2023 (with I. Sue Wing, P. Larsen and others).

“The Economic Consequence Analysis Tool (E-CAT),” 2017; see Economic Consequence Analysis of Disasters: The E-CAT Software Tool, Singapore: Springer, 2017 (with F. Prager, Z. Chen and others).

“Reduced-Form Rapid Economic Consequence Estimating Model for Earthquakes,” 2013; see “A Reduced-Form Rapid Economic Consequence Estimating Model: Application of Property Damage from U.S. Earthquakes,” International Journal of Disaster Risk Science, 2013 (with N. Heatwole).

“Water Services Disruption Spreadsheet Model,” see “Computing Regional Business Interruption Losses from Disruption to Water and Wastewater Utilities,” Report to ASME-Innovative Technologies Institute, Adam Rose and Associates, Pasadena, CA, 2005 (with D. Wei).

“HAZUS Patch for the Economic Impact of Electricity and Water Lifeline Disruptions,” 2005; see “Appendix I, Business Interruption Benefits for Electricity and Water Utilities,” in Multihazard Mitigation Council, Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities, Report to U.S. Congress on behalf of the National Institute of Building Sciences, Washington, DC, 2005.

“Economic Impacts of Pennsylvania’s Indigenous Energy Resources: A PC-Based Model,” 2005; see Report to the Pennsylvania Department of Environmental Protection, 2005 (with B. Yang and D. Wei); similar spreadsheet models developed for the states of Arizona, New Mexico and Oregon.

“Refinements of the HAZUS-MH Flood Module,” 2003; see National Institute of Building Sciences/Federal Emergency Management Agency, “Indirect Economic Losses,” Flood Loss Estimation Methodology, Washington, DC, 2003 (with H. Cochrane and S. Chang).

Revision of “Inclusion of Resilience Factors” of the HAZUS Direct Economic Loss Module and Indirect Economic Loss Module: Boston Case Study,” 1996; see “Direct and Indirect Economic Losses from Earthquake Damage,” Earthquake Spectra, 1997 (with D. Brookshire, S. Chang and others).

“Exploratory Study of the Development of an IMPLAN SAM,” see Procedures for Estimating Distributional Impacts of Alternative Land-Use Policies, Final Report to the U.S. Forest Service, West Virginia University, 1985 (with B. K. Stevens and C.Y. Chen)

“Update of the U.S. Input-Output Table for IMPLAN (mainframe version)”, 1980, Engineering-Economics, Berkeley, CA (with E. Lofting).

### **Research Submitted or in Progress**

“Applying Earth Observation Technologies to Economic Consequence Modeling: A Case Study of COVID-19 in Los Angeles County, California,” 2023, revise and resubmit at International Journal of Disaster Risk Science (with F. Prager, Huyck and others).

“The Impact of COVID-19 Fiscal Stimulus on the U.S. Economic Recovery,” submitted to Economic Systems Research, 2023 (with T. Walmsley, R. John and others).

“Economywide Consequences of Widespread, Long Duration Electric Power Interruptions: Evidence from the Greater Chicago Area,” 2023, to be submitted to Nature Energy (with I. Sue Wing, P. Larsen and others).

“Regional and National Supply-Chain Impacts of Mississippi River Fertilizer Shipment Disruptions,” 2023, to be submitted to Transportation Research D (with Zhenhua Chen, F. Roberts and others).

“An Expert Elicitation Process for Analyzing Decisions for Transportation Infrastructure Development in Post-Conflict Zones,” 2023, to be submitted to Journal of Conflict Resolution (with R. John, E. Berman and others).

“Balancing Security and Convenience: Public Views on Security in Three U.S. Public Venues,” 2023, to be submitted to Journal of Risk Research (with R. John and others).

“Balancing Security and Intrusiveness: Perceptions of Countermeasures in U.S. Commercial Facilities,” 2023, to be submitted to Risk Analysis (with R. John and others).

“Cost-Effective Business Resilience Decision Making,” 2023, to be submitted to Oxford Encyclopedia of Disaster Risk Science (with N. Dormady and others).

“Behavioral Aspects of Population Mobility Following a Chemical, Biological, Radiologic or Nuclear Event,” 2023 (with Bess Djavadi).

“Analyzing the Role of Fairness in Israeli-Palestinian Land Swaps.”

“Israeli-Palestinian Land Swap Auction Model,” (with N. Dormady).

## PROFESSIONAL PRESENTATIONS

### Conferences of Professional Organizations (\* denotes presentation by co-author):

American Association for the Advancement of Science Meeting: 1991, 1992, 1994, 1998\*

American Economic Association Meeting: 1986, 1987, 2011

American Geophysical Union Fall Meeting: 2011\*, 2015\*, 2021

American Political Science Association Meeting: 1986\*

American Society of Civil Engineers  
 Annual Meeting: 2004  
 National Conference on Earthquake Engineering Research: 2002  
 Specialty Conference on the Social and Economic Impact of Earthquakes on Utility Lifelines: 1980  
 Structural Engineers Joint World Congress: 1998  
 U.S. Conference on Lifeline Earthquake Engineering: 1999, 2022

American Society of Public Administration Meeting: 1978

American Statistical Association Meeting: 1985\*

Association of American Geographers Meeting: 1998\*, 1999\*, 2003-04, 2006, 2010\*, 2012\*, 2013, 2014\*

Association of Environmental and Resource Economists  
 Eastern Meeting: 1985  
 European Meeting: 1992, 1993, 1996-97, 2000-01, 2003-04, 2008, 2011, 2016, 2019, 2022  
 Southern Meeting: 1993\*  
 Summer Workshop: 2017\*  
 World Congress: 1998, 2014

Association for Public Policy Analysis and Management Meeting: 2008, 2012-13, 2014\*, 2017, 2018-19\*

Global Trade Analysis Project (GTAP) Annual Meeting: 2009\*, 2014-15, 2018, 2021, 2023

International Association for Energy Economics  
 International Meeting: 1984, 1987, 1988\*, 1989-91, 1994-95, 1999, 2001-02, 2005\*, 2009, 2014, 2017-18, 2021  
 United States Meeting: 2000, 2004\*, 2011\*  
 Republic of China Meeting: 1987\*

International Input-Output Association Conference: 1986, 1998, 2019

International Society for Ecological Economics Biennial Meeting: 1996, 1998

International Society for Integrated Disaster Risk Management Annual Meeting: 2011-15, 2017-23

Military Operations Research Society Annual Meeting: 2011

Mineral Economics and Management Society Meeting: 1993

Peace Science Society International Winter Meeting: 2010

Regional Science Association  
 Allied Social Science Meetings: 2023  
 European Meeting: 1994, 2011\*  
 North American Meeting: 1982, 1984-88, 1990, 1992, 1993\*, 1994-99, 2001-03, 2005, 2007-15, 2017-19, 2021-23  
 Northeast Meeting: 1988  
 Pacific Meeting: 1995, 2009  
 Southern Meeting: 1988, 1992\*, 1993  
 Western Meeting: 2007-09, 2010\*, 2012-19, 2021-22  
 World Congress: 1984, 1996\*

Society for Benefit-Cost Analysis Annual Meeting: 2015\*, 2016, 2022

Society for Risk Analysis Annual Meeting: 2006, 2007-09\*, 2010, 2012, 2014, 2016, 2021-23

Western Economic Association Meeting: 1980, 1994, 1999, 2017, 2022\*

### Selected Other Conferences:

International Urban Freight Conference, 2022\*

Graduate Institute of Geneva Conference on Globalization, COVID-19, and International Migration, 2021

Pusan National University Climate Change and Human Migration Conference, 2017

Resilience USA Conference, 2017

Cornell University Conference on Climate Justice, 2016

Federal Reserve Bank of New York Conference on Resilient Responses to Catastrophes, 2013

National Homeland Security Conference, 2013

National Institute of Building Sciences Multi-Hazard Mitigation Council, Annual Symposium, 2013-15

National Bureau of Economic Research Conference on Insurance Markets and Catastrophe Risk, 2012

Organization for Economic Cooperation & Development Conference on Terrorism Risk Insurance, 2012

United Nations Habitat 6<sup>th</sup> Urban Forum, 2012

European Policy Centre Conference on Developing EU Capacities for Crisis and Disaster Management, 2011  
 National Maritime Risk Annual Conference, 2010, 2011, 2014\*, 2016  
 Southern Governors Association Annual Meeting, 2009  
 UPMJ Center for Biosecurity Resilience Conference, 2009  
 Los Angeles International Earthquake Conference, 2008  
 American Water Works Association Research Foundation Water System Seismic Conference, 2007  
 Fudan University Shanghai Forum, 2007  
 U.S. Department of Homeland Security University Network of Centers Summit, 2007-11, 2021  
 Los Angeles Terrorism Early Warning Group Annual Conference, 2006  
 International Institute for Applied Systems Analysis / Disaster Preparedness Research Institute Forum on Integrated Disaster Risk Management, 2006, 2007  
 100th Anniversary Earthquake Conference Commemorating the 1906 San Francisco Earthquake, 2006  
 University of California, Berkeley Symposium on Real Estate, Catastrophic Risk and Public Policy, 2006  
 United Nations Framework Convention on Climate Change, COP 10 Ancillary Session, 2005  
 Center for Risk and Economic Analysis of Terrorism Events Annual Economics Symposium, 2004-08  
*Energy Policy* Editorial Board 25th Anniversary Conference, 2004\*  
 European Union Workshop on A Common Methodology for Disaster Damage Estimation, 2003  
 University of Illinois International Conference on Climate Change and Environmental Policy, 2002  
 World Summit on Sustainable Development, Global Forum, 2002  
 Goddard Forum on Environmental Policy, 2002, 2005, 2006  
 U.S. / China Millennium Symposium on Earthquake Engineering, 2000  
 Emirates Center for Strategic Studies and Research Annual Energy Conference, 1999  
 Universidad del CEMA (Buenos Aires) Annual Conference on Applied Economics, 1998  
 International Energy Workshop, 1998\*, 1999, 2012\*  
 International Energy Agency Conference on Joint Implementation of Greenhouse Gas Mitigation, 1997  
 United Nations Environmental Programme Conference on New Partnerships to Reduce the Build-Up of Greenhouse Gases, October 1996\*  
 University of Colorado Natural Hazards Workshop, 1996\*, 2004, 2009, 2016-18, 2020, 2021\*  
 Earthquake Engineering Research Institute and Federal Emergency Management Agency Conference on Analyzing Economic Impacts and Recovery from Urban Earthquakes: Issues for Policy Makers, 1996  
 Earth Summit, 1992  
 Global Forum, UNCTAD Workshop on Sustainable Development, Eco Tech Conference and United Nations Conference on Environment and Development\*  
 U.S. Department of Energy Socioeconomic Energy Research and Analysis Conference, 1987  
 University of Pittsburgh Conference on Modeling and Simulation, 1983-86, 1987\*  
 U.S. Congress Environmental and Energy Study Conference, 1982

#### **Selected Other Recent Presentations:**

USC IPPAM Salon on Global Climate Change Imperatives, 2023  
 National Academy of Science Committee Launch Event for Hazard Mitigation and Resilience Report 2: Resilience for Compounding and Cascading Events, 2022  
 U.S. DOD Minerva Grant Program Research Forum, 2022  
 IEEE Symposium on Technologies for Homeland Security, 2022  
 IDRiM Lecture for Young Scholars, 2022  
 National Academy of Science Committee Launch Event for Hazard Mitigation and Resilience Report 1: Equitable and Resilient Infrastructure Investments, 2022  
 National Academy of Science Workshop on Compounding and Cascading Events, 2022  
 National Academy of Science Workshop on Equitable and Resilient Infrastructure Investment, 2022  
 USC Price School Executive Education Forum Emergency Preparedness Summit, 2022  
 University of Washington Innovative Strategies in Transportation and Power Systems Workshop, 2021  
 Center for Risk and Economic Analysis of Threats and Emergencies (CREATE) 9/11 Symposium, 2021  
 Kyoto University International Symposium on Disaster Management in a Complex World, 2021  
 Stanford Energy Modeling Forum-USC Schwarzenegger Institute Climate Change Policy Symposium, 2021  
 USC Southern California Earthquake Center-NSF Convergence Accelerator Workshop on Societal Shock Resilience, 2021.  
 The Regional Science Academy-Tsinghua University Joint Workshop on Sustainability, 2021  
 LA100 Advisory Group Meeting on Jobs and Economic Impacts of 100% Renewable Electricity, 2021  
 CA Energy Commission Forum on Powering Resilient Communities through Innovative Technologies, 2020  
 FEMA Region V Meeting on Achieving Resilience through Coordination and Information Exchange, 2019\*  
 California Legislative Briefing on Economic Impacts of the Property Assessed Clean Energy Program, 2019  
 NSF CRISP Grand Challenges in Resilience Workshop, 2019



USC Bedrosian Center Symposium on Post-Disaster Migration and Repatriation Following Disasters, 2018  
 Mahatma Gandhi International Research Centre for Conflict Prevention & Management International  
 Workshop on Security, Peace & Development, 2018  
 The Regional Science Academy Workshop, 2018  
 Institute for Advanced Sustainability Studies (IASS) - International Society for Integrated Disaster Risk  
 Management (IDRiM) Workshop: Risk Governance for Natural Disasters, 2017  
 George Mason University-Sandia National Laboratory Frontiers in Resilience Symposium, 2017  
 White House Roundtable on the Business Case for Climate Resilience, 2016\*  
 National Institute of Standards and Technology International Workshop on Modeling of Physical, Economic  
 and Social Systems for Resilience Assessment, 2016  
 OECD Joint Expert Meeting on Disaster Loss Data, 2016  
 U.S. Department of Homeland Security, Technology Showcase, 2016,2021  
 USC-Tsinghua University-Hertie School of Governance Joint Energy Policy Forum, 2015-17  
 National Institute of Standards and Technology Economics of Community Disaster Resilience Workshop, 2015  
 CREATE-Transportation Security Administration Symposium on Transportation Security, 2015  
 National Academy of Sciences Disaster Resilience Roundtable, 2015  
 CREATE Executive Program, 2015  
 U.S. Department of Homeland Security, Economic Consequence Analysis Interagency Working Group, 2014  
 World Bank Resilience Indicator Workshop, 2014  
 Canadian Embassy briefing on Macroeconomic Impacts of Changes in Border Wait Times, 2013  
 U.S. Customs and Border Protection briefing on Macro Impacts of Changes in Border Wait Times, 2013  
 LUCRAM/CREATE/START Workshop on Community Resilience, 2013  
 California State Assembly, Governor's Office, Energy Commission, and Department of Natural Resources  
 briefings on Unconventional Oil Recovery, 2013  
 Santa Fe Institute Trustee and Business Network Symposium, 2012  
 Los Angeles Economic Development Corporation briefing on Impacts of Water Supply Disruptions, 2012  
 University of Southern California Sustainable Cities Earth Day Workshop, 2011, 2012  
 University of Oslo Climate Change and Income Distribution Workshop, 2010  
 United States Senate Staff Briefing on Stakeholder-Based Climate and Energy Actions, 2010  
 Southern California Leadership Council briefing on the Economic Impacts of State Climate Action Plans, 2010  
 Defense Advanced Research Projects Agency (DARPA) Workshop on Resilience, 2010  
 USC Center for Sustainable Cities Symposium on Climate Change Policy, 2010  
 CENTRA Technologies National Security Impacts of a Prospective Climate Change Treaty Workshop, 2010  
 Regional Economic Models, Inc. Webinar on Economic Impacts of State Climate Action Plans, 2010, 2012  
 USC Keston Institute Workshop on Climate Adaptation, 2010  
 National Academy of Sciences Workshop on Earthquake Resilience, 2009  
 Natural Hazards Center Resilience Research Workshop, 2009  
 National Academy of Sciences Disasters Roundtable, 2009  
 World Bank/University of Southern California Workshop on Megacities, 2009  
 U.S. Department of Homeland Security Port Security Workshop, 2009  
 Military Operations Research/Society Risk Analysis for Homeland Security Workshop, 2009  
 State Government Climate Action Policy Committees briefings on Modeling the Macroeconomic  
 Impacts of Climate Action Plans (New York, Pennsylvania, Michigan), 2009  
 State Government Climate Action Policy committees and Technical Working Groups (Minnesota, Maryland,  
 Florida, Iowa, Michigan) briefings on Greenhouse Gas Mitigation Policy Instrument Design, 2008, 2009  
 Center for Risk and Economic Analysis of Terrorism Events Workshop on Behavioral Economics, 2008  
 University of Southern California Workshop on Environmental Justice and California AB 32, 2008  
 Southern California Association of Governments briefing on Economic Impacts of the ShakeOut Earthquake  
 Scenario, 2008  
 U.S. Department of Homeland Security Workshop on Community Resilience, 2008  
 U.S. Department of Homeland Security Workshop on the Quantification of Security Benefits, 2007  
 University of Southern California Trustees Annual Meeting, 2007  
 Executive Office of the President briefing on the State of the Carbon Cycle Review, 2007  
 U.S. Climate Change Science Program briefing on the State of the Carbon Cycle Review, 2007  
 U.S. Geological Survey/American Association of Geographers/Wharton School Roundtable on a National  
 Framework for Risk Reduction and Management: Developing the Research Agenda, 2006  
 National Academy of Sciences Committee on Methodological Improvements to DHS Biological Agent Risk  
 Analysis briefing on Economic Loss Estimation, 2006  
 Multidisciplinary Center for Earthquake Engineering Research/Los Angeles Department of Water and Power  
 Workshop on Decision Support for Utility Management, 2006  
 DHS/CREATE Workshop on Benefit Methodologies for Homeland Security Analysis, 2006  
 Tinbergen Institute Workshop on Creativity and Smart Policy as Signposts for Innovative Development, 2006

U.S. Congress Hazards Caucus Alliance briefing on Benefits of FEMA Hazard Mitigation Grants, 2006  
 U.S. Congress Hazards Caucus Alliance briefing on Advanced National Seismic Monitoring Network, 2006  
 North Carolina Energy Council briefing on the Review of the Energy Scenario Economic Impact Model, 2005  
 Federal Emergency Management Field Operations Meeting, 2005  
 NSF Joint U.S.-New Zealand Workshop on Resilient Infrastructure, 2005  
 Rutgers Center for Research on Regulated Industries Research Seminar on Public Utilities, 2004  
 Pennsylvania Department of Environmental Protection briefing to the Secretary, 2003  
 National Institute of Building Sciences briefing on Adaptation of HAZUS to Flood Hazards, 2002  
 European Forum on Integrated Environmental Assessment of Climate Policy Workshop, 2000  
 Center for Clean Air Policy Workshop on Greenhouse Gas Emissions Trading, 1999, 2000  
 Mid-Atlantic Region Climate Change Impact Assessment Stakeholders Workshop, 1998, 2001  
 Pennsylvania Department of Revenue briefing on Computable General Equilibrium Modeling, 1998  
 National Academy of Sciences Helium Reserve Committee briefing on Natural Resource Economics, 1998  
 NSF Human Dimensions (of Climate Change) Centers Consortium Meeting, 1998  
 Intergovernmental Panel on Climate Change Workshop on Economic Impacts of Annex I Actions, 1997  
 Energy Modeling Forum / IIASA Workshop on Integrated Assessment of Global Climate Change, 1996  
 NSF / EERI Workshop on the Economic Impacts of the Northridge Earthquake, 1995  
 Cornell University Workshop on Market Mechanisms to Reduce Greenhouse Gases, 1994  
 U.S. Corps of Engineers Workshop on the Economic Impacts of Federal Infrastructure Spending, 1992  
 United Nations Expert Workshop on Tradeable Carbon Emission Entitlements, 1991

### Colloquia/Seminars/Webinars:

Stanford University, 2022	U.S. Environmental Protection Agency, 2010
University of Utah, 2022	University of California, San Diego, 2009
University of Houston, 2022	Monash University (Melbourne), 2009
World Trade Organization, 2021	Public Policy Institute of California, 2009
Arizona State University, 2020	University of Twente (Netherlands), 2007
Understanding Resilience-British Columbia, 2020	European Commission Secretariat for Research, 2006
World Bank, 2018	George Washington University, 2006
Critical Infrastructure Resilience Institute, 2018, 2020	University of Southern California, 2005-
Regional Economic Models, Inc., 2018-2020	University of Virginia, 2005
U.S. Government Accountability Office, 2018	U.S. Department of Homeland Security, 2005,
National Counterterrorism Center, 2018	2009, 2011, 2014, 2015
Kyoto University (Japan), 2017	East-West Center, 2004
Kansai University (Japan), 2017	Oak Ridge National Laboratory, 2003
Potsdam Institute for Climate Impact Research (PIK), 2017	Free University (Amsterdam), 2002
FEMA National Advisory Council, 2017	Inter-American Development Bank, 2001
OECD (Paris), 2017	Oxford Institute for Energy Studies, 2001
French Association for Disaster Risk Reduction (Paris), 2017	University of Chicago, 2001
Institute for Advanced Sustainability Studies (Potsdam), 2017	Israel Department of Finance, 2000
Sandia National Laboratory, 2017	Resources for the Future, 1999, 2001, 2022
National Oceanic Atmospheric Administration, 2016	University of California, Irvine, 1999
Transportation Security Administration, 2015, 2016	Tinbergen Institute (Amsterdam), 1998 & 1999
Tianjin University (China), 2015	University of Groningen (Netherlands), 1998
University of Canterbury (New Zealand), 2014	Princeton University, 1997
New Zealand Department of Treasury, 2014	Carnegie-Mellon University, 1996 & 2005
GNS Crowne Institute (New Zealand), 2014	Ecole de Mines (Paris), 1993
China National Development and Reform Commission, 2014	Rio de Janeiro Chamber of Commerce, 1992
Los Angeles Mayor's Office, 2014	U.S. Bureau of Economic Analysis, 1991
University of Windsor (Canada), 2014	U.S. Internal Revenue Service, 1991
Federal Emergency Management Agency, 2014	SNS Energy (Stockholm), 1990
United Nations Development Programme, 2013	The Pennsylvania State University, 1988-2006
London School of Economics, 2013	SUNY-Albany, 1988
Aon Insurance (London), 2012	Wirtschaftsuniversitat (Vienna), 1985
China Academy of Sciences, 2012	University of Pittsburgh, 1984
University of Missouri, 2012	Tata Energy Research Institute (New Delhi), 1984
European Commission Joint Research Centre, 2011	New York University, 1982
Southern California Association of Gov'ts, 2011	West Virginia University, 1981-86
Cal Poly, Pomona, 2011	University of Pennsylvania, 1981 & 1991
	University of California, Riverside, 1975-81
	CUNY-Lehman, 1975
	Cornell University, 1974 & 2005

**Expert Testimony:**

U.S. Senate Budget Committee Hearing on Climate Change and Supply Chain Issues, Washington, DC, October 2023  
 New Mexico Environment Improvement Board, Hearing on Proposed New Greenhouse Gas Cap and Trade Provisions, (Case No. 10-04), Santa Fe, NM, September 2010  
 Pennsylvania House of Representatives, Environmental Resources and Energy Committee, Informational Meeting on Climate Change, Springfield, PA, January 2006  
 National Gambling Impact Study Commission, Public Hearing, New Orleans, LA, September 1998  
 U.S. Department of Energy, Public Scoping Meeting on the York County Energy Partners Cogeneration Project, York, PA, August 1993  
 Pennsylvania Public Utility Commission, Hearing on the Cambria Partners Cogeneration Project (Docket No. P910515), Harrisburg, PA, April 1992  
 West Virginia Public Service Commission, Hearing on the Harrison Power Station Scrubber (Case No. 91-231-E-CN), Charleston, WV, October 1991  
 State of Kentucky, Department of Natural Resources and the Environment, Public Hearing on the Arch Mine Closing, Jackson, KY, December 1990  
 Washington County, Ohio, Court of Common Pleas, Civil suit on gas contracts in Straub Enterprises vs. Ohio L & M (Case No. 86 OT 181), Marietta, OH, November 1987  
 U.S. Senate Subcommittee on Intergovernmental Relations, Hearing on the Inter-governmental Regulatory Relief Act of 1985 (S.483), Washington, DC, May 1985  
 West Virginia Legislature, Special Interim Commission on Economic Development, Hearing on University Research, Morgantown, WV, July 1983

**Selected Media Interviews, Op-Eds, and Research Coverage:**

Television/Radio: NPR, BBC, CBS News, Fox News, Los Angeles KABC TV, Los Angeles KNBC TV, Los Angeles KTTV, Los Angeles KNX/CBS, Los Angeles KPCC/NPR, KTLA5 Los Angeles, KFI Los Angeles, San Diego KPBS, San Bernardino KVCR/PBS, San Francisco KCBS Radio, C-Span, CNN, CNN.com, FoxNews.com, CBSN.com, WGNTV.com, KNBC.com, KRONTV.com, London Ontario CBC, Australian Broadcasting Corporation, Morning Wave in Busan FM (Korea), Bloomberg TV, CCTV (plus than 50 other such media outlets)

Newspapers/Magazines: Business Week, The Economist, National Journal, The Hill, Politico, The Media Line, Wall Street Journal, The Atlantic, Forbes, New York Times, Washington Post, Washington Times, Los Angeles Times, LA Daily News, Philadelphia Inquirer, Denver Post, Boston Globe, Pittsburgh Post-Gazette, San Francisco Chronicle, Sacramento Bee, USA Today, San Jose Mercury News, Orange County Register, Pasadena Star News, Cal Matters, Christian Science Monitor, Associated Press, UPI, Reuters, Sinclair News Service, Yahoo News, World Economic Forum, Bloomberg Law, Insurance Journal, GreenTech Media, Nature.com, Foster Energy Report, HealthLine, News-Medical.Net (UK), El Pais (Spain), Deutsche Welle, Al Bayan (Emirates), Dahka Tribune (Bangladesh), The Business Standard (Bangladesh) USC News, USC Daily Trojan (plus more than 50 other such media outlets)

**PROFESSIONAL RESEARCH ACTIVITIES****Major Grant and Contract Research:**

Principal Investigator and Project Director, Defense Advanced Research Projects Agency (DARPA) contract--Resilient Supply-Demand Networks (sub-contractor to Raytheon BNN) 2023-26.

Principal Investigator and Project Director, California Solar and Storage Association grant--Economic and Societal Impacts of Proposed Licensing Restrictions on Solar PV and Battery Installations, 2021-22.

Principal Investigator and Project Director, Defense Threat Reduction Agency (DTRA) contract--Economic Impact of Nuclear Detonations: The Nuclear Economic Consequence Analysis Tool (NECAT), 2021-24.

Principal Investigator, DHS contract--Modeling the Economic Impact of Complex, Multi-Vector Disruptions to the Marine Transportation System and Supply Chains: MCAT (through the Center for Accelerating Operational Efficiency, COAE), Phase 1, 2021-22; Phase 2, 2022-23; Phase 3, 2023-24.

Principal Investigator and Project Director, DOD Minerva grant--Economic Viability, Resilience, and Sustainability of Logistics Systems in Post-Conflict Zones, 2021-23.

Principal Investigator, Lawrence Berkley National Laboratory contract--Power Outage Economics Tool (POET), 2020-22.

Principal Investigator and Project Director, DHS contract--The Impacts of the Coronavirus on the Economy of the United States: In-Depth Considerations of Health Effects, Avoidance Behavior, Resilience, and International Trade Linkages (through the Center for Accelerating Operational Efficiency, COAE), 2020-21.

Principal Investigator and Project Director, CDC contract--Technical Support for the Regulatory Impact Analysis of the Traveler Contact Data Collection Final Rule, 2020.

Co-Principal Investigator, Offshore Wind Association and Energy Foundation contract--Synthesis Report on California's Offshore Wind Opportunity, 2020.

Principal Investigator and Project Director, DHS contract--The Impacts of the Coronavirus on the Economy of the United States (through the DHS Center for Accelerating Operational Efficiency, COAE), 2020.

Principal Investigator, National Science Foundation grant--Collaborative Research: Distributed Edge Computing to Improve Reliability and Resilience of Interdependent Systems, 2019-20.

Co-Principal Investigator, City of Los Angeles contract (through the National Renewable Energy Laboratory--The City of Los Angeles 100% Renewable Energy Study: Economic Impacts, 2018-20.

Co-Principal Investigator, METTRANS Center grant--Socioeconomic Dimensions of Resilience to Seaport and Highway Transportation Network Disruptions, 2018-19.

Principal Investigator and Project Director, Ygrene, Inc. contract--Policy Analysis of the Impacts of the PACE Program, 2018-19.

Principal Investigator and Project Director, CIRM contract--Economic Impacts of the California Institute for Regenerative Medicine, 2018-19.

Co-Principal Investigator, DHS contract -- Benefit-Cost Analysis of DHS Research Projects, Phase 1, 2017-18, Phase 2, 2018-20; Phase 3, 2019-21; Phase 4, 2022-24.

Principal Investigator and Project Director, US Department of Homeland Cybersecurity and Infrastructure Security Agency contract--Does Enhanced Security Improve Business Performance? 2017-20.

Principal Investigator and Project Director, Japan Foundation grant--A Comprehensive Framework for Assessing and Responding to Disaster-Related Migration, 2017-18; Renewed Year 2, 2018-19.

Co-Principal Investigator, The Risk Institute, Fisher College of Business, The Ohio State University grant--Measuring the Economic Consequence of Cyber-Attacks and Cyber Resilience: A Computable General Equilibrium Modeling Approach, 2017-18.

Co-Principal Investigator, DHS contract--COE R&D Comprehensive Impact Study, 2016-17; Phase 2, 2017-19; Phase 3 2019-21; Phase 4, 2022-23

Co-Principal Investigator, U.S. Customs and Border Protection contract--Strategic Resource Assessments for Land Ports of Entry, 2016-19

Principal Investigator and Project Director, New York State Energy Research and Development Authority contract--Evaluation of Microgrid Macroeconomic Modeling Approaches, 2016.

Principal Investigator and Project Director, U.S. DHS contract--Measuring Business and Economic Resilience in Disasters (through the Critical Infrastructure Resilience Institute, CIRI), 2015-17; Renewed Year 2, 2017-19; COVID-19 Supplement, 2020; Renewed Year 3A, 2019-20; Renewed Year 3B, 2020-21.

Principal Investigator and Project Director, Federal Emergency Management contract--Development of a Disaster Deductible, 2015-16.

Co-Principal Investigator, METTRANS Center grant--Development of an Economic Framework to Evaluate Resilience in Recovering from Major Port Disruptions, 2015-16.

Co-Principal Investigator, U.S. DHS contract--Bio-Terrorism Risk Assessment (BTRA) and Integrated Terrorism Risk Assessment (ITRA), 2015-16.

Principal Investigator and Project Director, National Science Foundation grant--Measuring Dynamic Economic Resilience Following Disasters, 2014-17.

Principal Investigator and Project Director, U.S. DHS Customs and Border Protection contract--Economic Impact Analysis for the CBP Centers of Excellence and Expertise, Phase 1, 2013-14; Phase 2, 2014-15.

Co-Principal Investigator, National Biosurveillance Integration Center contract--Value of Information and Economic Analysis to Improve Biosurveillance, 2013-15.

Principal Investigator and Project Director, U.S. Communication Agency, sub-contract through RAND Corporation--Analyzing the Role of Fairness in Israeli-Palestinian Land Swaps, Phase 1, 2013-14, Phase 2, 2014-15.

Principal Investigator and Project Director, U.S. DHS Domestic Nuclear Detection Office contract--Temporal Study of Radiological and Nuclear Event Consequences, 2013-14.

Principal Investigator, United Nations Development Programme contract--Defining and Measuring Societal Resilience from an Economic, Environmental and Security Perspective, 2013.

Co-Principal investigator and Project Director, U.S. DHS Customs and Border Protection contract--The Economic Impacts on the U.S. Economy of Changes in Wait-Times at U.S. Border Crossings, Phase I, 2012-13; Phase II, 2013-14.

Co-Principal investigator, DHS/TSA contract—Risk Perception Survey, 2012-13.

Principal Investigator and Project Director, Metropolitan Water District/Los Angeles Department of Water and Power contract--Total Regional Economic Loss from Water Supply Disruptions to the Los Angeles County Economy, 2012.

Co-principal Investigator, U.S. Department of Homeland Security Office of University Programs contract--Risk, Economics and Operations Research of Terrorism and All Hazards (CREATE), 2010-15.

Principal Investigator and Project Director, New York State Energy Research and Development Authority Contract--Macroeconomic Impacts of the New York State Climate Action Plan, 2010-12.

Co-Principal Investigator, DHS contract--Urban Commerce and Security, 2010-12.

Principal Investigator and Project Director, Southern California Association of Governments contract (sub-contractor through the Center for Climate Strategies)--Socioeconomic Impact and Regional Competitive Analysis of AB32 for the SCAG Region Economy, 2010-12.

Principal Investigator, U.S. Department of Homeland Security contract--Risks and Economics of an Anthrax Attack in the Pacific Northwest, 2010-11.

Co-Principal Investigator, U. S. Coast Guard contract--Total Economic Impacts of Port Shutdowns, 2010-11.

Principal Investigator and Project Director, Next 10 contract--Aggregate and Distributional Impact Analysis of California Assembly Bill 32, 2010.

Principal Investigator and Project Director, U.S. Department of Homeland Security contract--Chemical Supply Chain and Economic Model Review and Verification, 2009-10.

Principal Investigator, Michigan Department of Environmental Quality contract (subcontractor through Center for Climate Strategies)--Analysis of Climate Change Mitigation Options, 2009-10.

Co-Investigator, Federal Emergency Management Agency contract--Using Risk Assessment, Economic Assessment, and Risk Management to Improve Preparedness for Terrorist Attacks and Natural Disasters, 2009-10.

Principal Investigator and Project Director, U.S. Department of Homeland Security contract--Economic Impacts of the H1N1 Virus, 2009.

Principal Investigator, New York State Energy Research and Development Authority contract (subcontractor through Center for Climate Strategies)--Greenhouse Gas Reduction Analysis for New York State, 2008-12.

Principal Investigator and Project Director, Community and Regional Resilience Institute grant—Economic Resilience, 2008-10.

Co-Principal Investigator, University of Southern California Zumberge grant--Toward an Interdisciplinary Center for Megacities, 2008-09.

Co-Principal Investigator, National Science Foundation Human Social Dynamics grant--Modeling Community Response and Economic Impacts of Risk Amplification Following a Terrorist Strike, 2007-10.

Principal Investigator and Project Director, Center for Climate Strategies grants--Energy and Climate Change, 2007-.

Principal Investigator and Project Coordinator, U.S. Department of Homeland Security Integrated Network of Centers grant--Advances in Economic Resilience, 2007-10.

Principal Investigator, U.S. Geological Survey contract--Regional Economic Analysis of Earthquake Losses, Mitigation, and Resilience for the Southern San Andreas Earthquake Scenario, 2007-08.

Principal Investigator, DHS Center for Risk and Economic Analysis of Terrorism Events grants--Conceptual and Empirical Advances in Analyzing Resilience to Terrorism, 2007-10.

Principal Investigator and Project Director, American Petroleum Institute contract--Analysis of the Price Impact of Increased Renewable Fuel Standard Levels, 2006-07.

Co-Principal Investigator and Coordinator for Economics, DHS National Biodefense Analysis and Countermeasures Center contract--Quantitative Risk and Economic Assessment of Biological Threat Agents, 2006-08.

Coordinating Team Member, DOE/NOAA/NASA contract (subcontractor through Oak Ridge National Laboratory)--State of the Carbon Cycle Review, 2005-07.

Principal Investigator, DHS Center for Risk and Economic Analysis of Terrorism Events grant--Computable General Equilibrium Analysis of the Regional Economic Impacts of a Terrorist Attack: Conceptual Advances and Applications, 2005-06.

Principal Investigator and Project Director, Center for Energy and Economic Development--Economic Impacts of U.S. Coal Production and Utilization, 2005-06.

Principal Investigator, Project Director, and MCEER Task Leader, National Science Foundation grants (through the Multidisciplinary Center for Earthquake Engineering Research)--Annual grants on Hazard Loss Estimation, Resilience to Disasters, and Recovery Management, 1997-2007.

Principal Investigator and Project Director, Pennsylvania Department of Environmental Protection contract--Economic Impact Modeling of Pennsylvania's Indigenous Resources, 2004.

Track A Team Leader, National Institute of Building Sciences/Federal Emergency Management contract--Independent Study to Assess Future Savings from Hazard Mitigation Activities: Report to U.S. Congress (subcontractor to Applied Technology Council), 2003-05.

Co-Principal Investigator and Project Director, Pennsylvania Department of Environmental Protection contract --Pennsylvania Greenhouse Gas Emission Inventory, 2001-02.

Principal Investigator and Project Director, Center for Energy and Economic Development contract--Economic Impacts of U.S. Coal Production and Utilization, 2001.

Co-Principal Investigator, U.S. Department of Energy NIGEC contract--Climate Change and Policy Impacts on the Southeastern U.S. Economy, 2000-02 (subcontractor through University of Alabama).

Principal Investigator, Energy Foundation grant--Building Support for Climate Policy by Identifying Winners, 1999-2000 (subcontractor through Center for Clean Air Policy).

Co-Principal Investigator, National Science Foundation grant--User Costs in Seismic Risk Management, 1998-2000 (subcontractor through EQE, Inc.).

Co-Investigator and Co-Chair of Human Dimensions sub-group, U. S. Environmental Protection Agency cooperative agreement--Mid-Atlantic Regional Assessment of Climate Change Impacts, Phase I, 1998-99 (renewed Phases 2 and 3, 1999-03).

Co-Principal Investigator, National Science Foundation grant--Methods for the Integrated Regional Assessment of the Human Dimensions of Global Change, 1996-2000.

Principal Investigator and Project Director, National Science Foundation grant--Economic Impacts of the Northridge Earthquake, 1994-95.

Principal Investigator and Project Director, Argonne National Laboratory subcontract--Economic Impact of Environmental Constraints on Coal Use in the People's Republic of China, 1994.

Co-Principal Investigator and Project Director, National Science Foundation grant--Economic Analysis of Greenhouse Gas Emissions: A Structural Decomposition Analysis, 1993-94.

Principal Investigator and Project Director, National Coal Association grant--Economic Impacts of the Coal Industry, 1993.

Principal Investigator and Project Director, Argonne National Laboratory subcontract--The Analysis of Income Distribution Impacts of Changes in Electricity Prices, 1992-93.

Principal Investigator and Project Director, National Science Foundation grants (through the National Center for Earthquake Engineering Research)--Annual grants on Earthquake Recovery and Reconstruction: The Key Role of Utility Lifelines and other Infrastructure, 1992-96.

Co-Principal Investigator and Coordinator for Economics, U.S. Department of Defense/Department of Energy contract--The Development of Coal-Based Technologies for Department of Defense Facilities, 1992-95.

Principal Investigator and Project Director, EUREMCO grant--Integrated Resource Management Training Program, 1991 (renewed 1992).

Project Member, National Science Foundation grant--Teacher Development and Research in STS Education for Rural Middle/Junior High School Science Teachers, 1991-94.

Principal Investigator and Project Director, National Science Foundation grant--Transboundary Flows of Capital-Related Income: An Empirical Assessment, 1990-92.

Principal Investigator and Project Director, Economic Research Service, U.S. Department of Agriculture cooperative agreement--Disaggregated Accounts for the ERS/USDA SAM Database, Phase I, 1990-91 (renewed Phases 2 and 3, 1991-93).

Co-Principal Investigator, National Coal Association grant--The Impact of Coal on the U.S. Economy, 1990.

Co-Principal Investigator, Commonwealth of Pennsylvania Department of Commerce contract--Analysis of the Market Structure and Organization of the Solid Hardwood Products Industry, 1989-90.

Co-Principal Investigator, National Science Foundation grant--Regional Input-Output Models: Toward the Next Generation, 1987-88.

Principal Investigator and Project Director, U.S. Congress Office of Technology Assessment Contract--Prospects for the Expansion of Coal Consumption, 1987-88.

Principal Investigator, WVU Energy Research Center grant--Design of a Cost-Effective Input-Output Model for Energy-Economic Analysis, 1986-87.

Principal Investigator and Project Director, WVU Energy Research Center grant--The Role of the Natural Gas Industry in the Economic Development of West Virginia, 1984-85

Principal Investigator, WVU Energy Research Center grant--Economic Analysis of the West Virginia Natural Gas Industry, Phase I, 1983-84 (renewed, Phases 2 and 3, 1984-86).

Co-Principal Investigator, U.S. Army Corps of Engineers contract--Economic Impacts of Whitewater Boating on the Gauley River, 1984.

Co-Principal Investigator and Project Director, U.S. Department of Energy grant--Socioeconomic Ramifications of Potential Coal Liquefaction Plant Sitings, 1983-84.

Principal Investigator and Project Director, U.S. Forest Service contract--Procedures for Estimating Income Distribution Impacts, 1982-83.

Principal Investigator and Project Director, WVU Energy Research Center grant--The Effects of Technological Change on the Demand for Steam Coal in the 1980s, 1982-83.

Principal Investigator and Project Director, Southern California Gas Company contract--Development of an Input-Output Forecasting Model of the Demand for Natural Gas, Phase 1, 1982 (renewed, Phase 2, 1982-83).

Co-Principal Investigator, Riverside County contract--Riverside/UCR Energy Study, 1980-81.

Co-Principal Investigator, Inland Private Industry Council contract--Regional Economic Development and Employment Planning in Riverside and San Bernardino Counties, 1980-81.

Principal Investigator and Project Director, City of Los Angeles contract--Jobs and Energy Options, 1980.

Co-Investigator, California Air Resources Board contract--Assessing the Economic Effects of Implementing Air Quality Management Plans in California, 1978-79.

Co-Investigator, National Science Foundation grant--Federal and State Mandating to Local Government, 1978-79.

Co-Investigator, National Science Foundation/Energy Research and Development Administration grant--Geothermal Energy Development in Imperial County, California, 1975-77.

#### **Selected Consultancies:**

National Aeronautics and Space Administration (NASA) (through ImageCat, Inc.)--Modeling the Economic Impact of COVID-19 with EO--based Technologies, 2020-22.

World Bank--Senior Adviser Economic on Analysis of Prevention and Preparedness in European Union Member States and Countries under EU Civil Protection Mechanism, 2020-21.

National Institute of Building Sciences--Portland Airport Runway Earthquake Mitigation Project (through SPA Risk), 2020.

World Bank--Advisor on the Disasters and Resilient Infrastructure Project, 2019.

FEMA Region X (through the Critical Infrastructure Resilience Institute)--FEMA Region X Power Grid Risk Profile Report, 2018.

RAND Corporation--Quality Review Panel for the Puerto Rico Economic Disaster and Recovery Plan, 2018.

Lawrence Berkeley Laboratory--White papers on Broader Economic Consequences of Electricity Supply Disruptions and on Electricity Reliability and Resilience, 2017-18.

World Bank--Framework for Implementing the Triple-Dividend of Disaster Risk Management, 2016.

AIR Worldwide--Analysis of Demand Surge Estimation Methodology, 2016.

U.S. Geological Survey--Modeling Assessment for Impact Analysis of the HayWired Earthquake Scenario, 2015-19.

Defense Threat Reduction Agency (subcontractor through Exelis Corporation)--Integrating Resilience into the NOEM Model, 2015.

World Bank--Private Sector Co-Benefits of Disaster Risk Management, 2014-15.

Insurance Bureau of Canada (through AIR Worldwide)--Analysis of Indirect Economic Impacts of Earthquake Scenarios, 2013.

U.S. Geological Survey--Modeling Assessment for Impact Analysis of a California Tsunami Scenario, 2011-14.

State Government Technical Working Groups--Economic Impacts of Climate Action Plans (FL, MI, WI, PA, NY, Baja California, Mexico) (through Center for Climate Strategies), 2010-16.



Wisconsin Public Service Commission--Macroeconomic Impacts of the State's Climate Action Plan, (subcontractor through the Center for Climate Strategies), 2010.

New Mexico Environment Department--Economic Analysis of the Mexico Climate Action Plan, 2009-10.

U.S. Geological Survey--Economic Consequences of the Severe Winter Storm (ARkStorm) Scenario, 2009-10.

State Government Technical Working Groups--Modeling Alternative Designs of Greenhouse Gas Cap and Trade Programs (MN, FL, MD, NC, IO, MI) (through Center for Climate Strategies and various state government agencies), 2007-08.

Baseline Management Company--Computable General Equilibrium Modeling of Demand Surge in the Aftermath of Disasters, 2007-10.

U.S. Department of Homeland Security--Computing Regional Business Interruption Losses from Disruption to Water and Wastewater Utilities Using the Regional Economic Impact Module (REIM) of Risk Analysis and Management for Critical Asset Protection (RAMCAP) (subcontractor through ASME-ITI), 2007-08.

State of Wisconsin, Department of Health and Family Services, Bureau of Public Health and Safety--Economic Impacts for Decision Support for Pandemic Planning (subcontractor to U. of Wisconsin) 2007.

U.S. Department of Homeland Security--Economic Impact Review (subcontractor to Michael Baker, Inc.), 2006-08.

Krugliak, Wilkins, Griffiths & Dougherty, LPA--Expert testimony on Amendment to the Official Plan of the Muskingum Watershed Conservancy District, 2006.

Center for Climate Strategies--Energy-Economic Modeling of Electricity Generating Options in the Western U.S. (AZ, NM, OR), 2004-06.

U.S. Department of Defense--Independent Review Panel on Economic Impact Analysis Methodology for the Base Realignment and Closure 2005 Process (through Booz Allen Hamilton), 2004.

U.S. Department of Homeland Security--Development of a Framework to Estimate the Economic Impacts of Terrorist Attacks (subcontractor to ABS Consulting), 2004-06.

ICF Consulting, Inc.--Upgrading the Outer Continental Shelf Economic Impact Models for the Gulf of Mexico and the Alaska OCS, 2003-06.

World Bank--Economic Impacts of the ExxonMobil Chad Project (sub-contractor to URS Corporation), 2001-02.

National Institute of Building Science/Federal Emergency Management Agency--Adaptation of Indirect Loss Module of HAZUS Expert System for Application to Flood Hazard, 2001-02 (subcontractor to EQE, Inc.).

Center for Energy and Economic Development--Economic Impact of Coal Production and Utilization in the Southern Appalachian Region, 2001.

ICF Kaiser, Inc.--Advised on U.S. Department of Interior Mineral Management Service Data System, 1998-2001.

Pennsylvania Department of Revenue--Advised on the Use of Computable General Equilibrium Models for Tax Policy Analysis, 1998-99.

U.S. Congress National Gambling Impact Study Commission--Economic Impacts of Casino Gambling, 1998.

Global Change in Local Places Program--Estimation of Carbon Dioxide Emissions from Energy Use in Central Pennsylvania, 1997-98.

U.S. Environmental Protection Agency--Review of the Impacts of Global Warming Policy on Major Sectors of the U.S. Economy, 1997 (subcontractor to Hagler Bailly, Inc.)

National Institute of Building Science/Federal Emergency Management Agency--Critical Review and Boston Pilot Test of HAZUS Expert System for Earthquake Loss Estimation, 1997 (subcontractor to EQE, Inc.).

Argonne National Laboratory--Advised on study of the Economic Impacts of the International Thermonuclear (Fusion) Experimental Reactor, 1994-95.

Center for Energy and Economic Development--Economic Impact of Coal in Major Consuming States, 1994-95.

Cambria Partners--Is the Pennsylvania Electricity Supply System Reliable Enough in the Face of Snow Emergencies and Other Natural Hazards? 1994.

National Center for Earthquake Engineering Research--Advised on economic modeling aspects of a study on Economic Impacts of Hurricane Andrew on Dade County, Florida, 1993 (subcontractor to EQE, Inc.).

Eurogold Madencilik (Izmir, Turkey)--Economywide Impacts of the Eurogold Izmir Mine, 1993.

Ohio Mining and Reclamation Association--Economic Impacts of the Decline of the Ohio Coal Mining Industry: 1988-95, 1993.

U.S. Corps of Engineers--Advised on the Federal Infrastructure Strategy Program, 1992-93.

Air Products and Chemicals, Inc.--Economic Impact of the York Energy Partners Cogeneration Project on the York County Economy, 1992-93.

York County Industrial Development Corporation--Economic Impact of the Possible Closing of the York Caterpillar Plant, 1992.

Foster-Wheeler Power Systems, Inc.--State and Regional Economic Benefits of the Cambria Partners Cogeneration Project, 1992.

EUREMCO (Frankfurt, Germany)--Economic Aspects of Integrated Resource Management, 1991-94.

United Nations Conference on Trade and Development--A Global System of Tradeable Carbon Emission Entitlements, 1991-2.

West Virginia Coal Forum--Regional Economic Losses Due to a Prohibition of High Sulfur Coal/Scrubber Use at the Harrison Power Station, 1991.

National Coal Association--Impact of the Coal Industry on the Economies of Major Producing States, 1991.

U.S. Department of Energy--Expert Review of "Refinery Yield Model Spreadsheet System," 1990.

Pennsylvania Department of Transportation--Contributed to a study on Impacts of Airports on the Pennsylvania Economy, 1989 (subcontractor to Aviation Planning Associates).

Zink, Zink and Zink Attorneys at Law--Expert witness on natural gas pricing, 1987.

West Virginia Independent Oil and Gas Association--West Virginia Oil and Gas Industry Data Base, 1986-87.

West Virginia Governor's Office of Community and Industrial Development--West Virginia Methanol Project, 1986.

San Francisco City Attorney's Office--Economic Impact of the Giants Baseball Team on the City of San Francisco, 1985-86.

Southern California Gas Company--Employment Multipliers for the SoCal Retail Service Area, 1985.

Geosurvey (Nairobi, Kenya)--An Economy-Wide Analysis of Mineral Development in Namibia, 1984-85.

West Virginia Governor's Office of Economic Development--Travel in West Virginia: Reevaluation for Growth in the 1980s, 1984-85.

Southern California Gas Company--Sectoral Shifts and the Derived Demand for Natural Gas, 1983-84.

Public-Interest Economics--Energy/Environment Clearinghouse Team, 1981-83.

Natural Resources Defense Council--Economic Effects of the Clean Air Act, 1981.

U.S. Forest Service--Construction of Government Expenditure Sectors of IMPLAN, 1980-81 (subcontractor to Engineering-Economics Associates).

Lawrence Livermore Laboratory--Economic Impacts of the Geysers Geothermal Power Plants, 1979-80 (subcontractor to Engineering-Economics Associates).

Chino Basin Municipal Water District--The Regional Economic Impact of Population Increases, 1978 (subcontractor to Richard Terry and Associates).

Appalachian Regional Commission--Impacts of Environmental Legislation on Economic Development in the Appalachian Region, 1975.

## OTHER PROFESSIONAL ACTIVITIES

### Service to Professional Organizations:

- American Economic Association (member since 1974)
  - Representative to the American Association for the Advancement of Science, 1986-92
  - Chair, AEA/AAAS Liaison Committee, 1988-92
  - Session Organizer, Annual Meetings, 1986, 1987, 1989, 2011
  
- Regional Science Association (member since 1975)
  - Program Committee, North American Meetings, 1984, 1986, 1987, 1990, 1996, 2001, 2007-10, 2013, 2015
  - Session Organizer, North American Meetings, 1985, 1988, 1992, 1997, 2013, 2015, 2017-22
  - Session Organizer, Western Meetings, 2007, 2008
  - Program Committee, World Congress, 2020
  
- Association of Environmental and Resource Economists (member since 1979)
  - Chair, Sponsoring Member Fund Committee, 1989-92
  - Session Organizer, European Meetings, 2004
  - Program Committee, European Meetings, 2005, 2013, 2014, 2016, 2021
  
- International Association for Energy Economics (member since 1983)
  - Program Committee, Annual Meeting, 1991, 2017
  - Session Organizer, Annual International Meeting, 1995, 2009, 2013, 2017
  
- American Association for the Advancement of Science (member 1986-94)
  - Section K (Social Sciences) Executive Committee, 1986-92
  - Symposium Organizer, Annual Meetings, 1987, 1988, 1994
  - Symposium Review Coordinator (Economics), Annual Meeting, 1994, 1995
  
- International Input-Output Association (founding member 1988-2004)
  - International Founding Member Committee, 1988-2004
  - Session Organizer, International Meeting, 1998
  
- Mineral Economics and Management Society (charter member 1990-96)
  - Nominating Committee, 1990-91
  - Program Committee, Annual Meeting, 1992, 1993, 1996
  
- International Society for Ecological Economics (member 1995-2004)
  - Session Organizer, Biennial Meeting, 1996
  
- Earthquake Engineering Research Institute (member 1995- 2010)
  - Sub-Committee on Economic Data Collection and Management, 2005
  
- Association of American Geographers (member 2002-07)
  - Board of Directors, Energy & Environmental Specialty Group, 2003-05
  - Session Organizer, Annual Meeting, 2004, 2013
  
- Society for Risk Analysis (member since 2008)
  - Session Organizer, 2012, 2014, 2016
  - Risk Analysis Quality Test Committee, 2022
  - Chair, Resilience Specialty Group, 2022-23
  
- Association for Public Policy Analysis and Management (member since 2008)
  
- International Society for Integrated Disaster Risk Management (member since 2010)
  - President, 2017-20
  - Board of Directors, 2010-
  - Chair, Awards Committee, 2012-
  - Strategic Planning Committee, 2020-21
  - Program Committee, Annual Meetings, 2011-22
  - Session Organizer, precursor DPRI/IIASA Forum on Disaster Risk Management, 2006, 2007
  
- American Society of Civil Engineers
  - Council on Disaster Risk Management, 2004-08
  - 7th National Conference on Earthquake Engineering, Co-Chair, Program Committee, 2002
  - Lifelines 2021-22 Conference, Session Organizer, 2021

## Conference and Workshop Organization:

National Academy of Science Workshop on Equitable and Resilient Infrastructure investment (virtual), March; Workshop on Resilience to Compounding and Cascading Events (virtual), May 2022 (Co-organizer).

USC Schwarzenegger Institute - Stanford Energy Molding Forum Symposium on Climate Change Policy and Transportation, Los Angeles, CA, November 2019; November 2020 (virtual); May 2021 (virtual) (Co-organizer and Local Host).

U.S. Department of Homeland Security Centers of Excellence Workshops on Supply-Chain Disruptions, 2020 (virtual); 2021 (virtual) (Co-organizer)

USC Bedrosian Center Symposium in Population Migration and Repatriation Following Major Disasters, Los Angeles, CA, November 2018 (Co-organizer and Local Host).

The Regional Science Academy Workshop, Los Angeles, CA, 2018 (Co-organizer and Local Host).

USC Price School of Public Policy Forum on Cross-Border Energy Collaboration: Mexico & California's Shared Future, Sacramento, CA, 2017 (Co-organizer).

Multi-Hazard Mitigation Council Symposium, Washington, DC January 2013-15 (Co-organizer).

International Society for Integrated Disaster Risk Management Annual Meeting, Los Angeles, CA, July 2011 (Co-organizer and Local Host).

Center for National Policy/Center for Risk and Economic Analysis of Terrorism Events Workshop on Energy Security and Resilience, Los Angeles, CA, April 2011 (Co-organizer and Local Host).

National Academy of Science Workshop on Earthquake Resilience, Irvine, CA, December 2009 (Co-Organizer).

USC Conference on Green Megacities, Los Angeles, CA, November 2008 (Co-Organizer).

USC Energy Institute Conference on Designing Climate Change Policy: Implementing California Assembly Bill 32, Los Angeles CA, May 2008 (Co-Organizer and Local Host).

USC Conference on the Future of the Automobile: Implications for Technology and Fuels, Los Angeles, CA, May 2007 (Co-Organizer and Local Host).

U.S. Department of Homeland Security/Center for Risk and Economic Analysis of Terrorism Events Workshop on Benefit Methodologies for Homeland Security Analysis, Washington, DC, June 2006 (Co-Organizer).

Penn State Goddard Forum, Opportunities/Challenges of the Pennsylvania Renewable Portfolio Standard, University Park, PA, January, 2006; Putting the Market to Work for Conservation, Harrisburg, PA, April 2005; Global Warming: Causes, Effects, and Mitigation Strategies, University Park, PA, April 2002; (Planning Group Member).

DOE/NOAA/NASA State of the Carbon Cycle Review Author/Stakeholder Meeting, Arlington, VA, October 2005 (Coordinating Team Member).

Multidisciplinary Center for Earthquake Engineering Research/LA Department of Water and Power Workshop on Utility Performance Criteria for Risk Management, Los Angeles, CA, December 2004 (Co-Organizer).

Association of European Universities/Pennsylvania State University Conference on Frontiers of Environmental Economics, Airlie Center, VA, October 1998 (Co-Organizer).

National Science Foundation U.S./Japan Joint Seminar on Civil Infrastructure Systems Research, Honolulu, HI, August 1997 (Scientific Advisory Committee Member and Conference Co-Chair).

Earthquake Engineering Research Institute/Federal Emergency Management Agency Conference on Analyzing Economic Impacts and Recovery from Urban Earthquakes: Issues for Policy Makers, April 1996, Pasadena, CA (Steering Committee Member).

Penn State Workshop on Global Change Assessment for Forestry, Agriculture, and Water: Social and Physical Science Linkages, University Park, PA, November 1992 (Co-Organizer and Local Host).

National Science Foundation Conference on the Construction and Use of Regional Input-Output Models, Alpine Lake, WV, August 1988 (Co-Organizer and Local Host).

**Journal Referee:**

Regular Basis (\* denotes current):

*Contemporary Economic Policy*  
*Ecological Economics*  
*Economics of Disasters & Climate Change\**  
*Economic Systems Research\**  
*Energy Journal\**  
*Energy Policy\**  
*Environment & Development Economics*  
*International Regional Science Review*  
*Journal of Environmental Economics & Mgt*  
*Journal of Regional Science\**  
*Natural Hazards Review\**  
*Papers in Regional Science*  
*Resource & Energy Economics*  
*Resources Policy*  
*Risk Analysis\**  
*Structural Change & Economic Dynamics*  
*Transportation Research B\**

Occasional Basis:

*Annals of Regional Science*  
*Applied Economics*  
*Canadian Journal of Economics*  
*China Economic Review*  
*Climate Policy*  
*Earthquake Spectra*  
*Ecological Economics*  
*Energy Economics*  
*Environment & Planning A*  
*Environment, Development & Sustainability*  
*Environmental & Resource Economics*  
*Environmental Hazards*  
*Environmental Systems & Decisions*  
*European Journal of Operational Research*  
*Global Environmental Change*  
*Growth & Change*  
*International Economic Review*  
*International Environmental Agreements*  
*Journal of Comparative Economics*  
*Journal of Comparative Policy Analysis*  
*Journal of Economic Dynamics & Control*  
*Journal of Economic Geography*  
*Journal of Economic Theory*  
*Journal of Infrastructure Systems*  
*Journal of Policy Analysis & Management*  
*Journal of Policy Modeling*  
*Land Economics*  
*Natural Resource Modeling*  
*Nature Climate Change*  
*Nature Communications*  
*Operations Research*  
*Policy Studies*  
*Professional Geographer*  
*Regional Science & Urban Economics*  
*Regional Studies*  
*Review of Economics & Statistics*  
*Review of Regional Studies*  
*Review of Transportation Economics*

*Scandinavian Journal of Economics*

*Science*

*Technological Forecasting & Social Change*

*Transport Policy*

*Transportation Research D*

*Water Resources Research*

**Manuscript Reviewer:**

Addison-Wesley Longman  
 Cambridge University Press  
 Earthscan Books  
 Edward Elgar  
 Harper-Collins  
 Kluwer Publishers  
 MIT Press  
 Palgrave  
 Resources for the Future  
 Sage Publishers  
 Springer Publishing  
 Stanford University Press  
 Westview Press

**Report Reviewer:**

Argonne National Laboratory  
 California Air Resources Board  
 Center for Clean Air Policy  
 Congressional Budget Office  
 IIASA  
 Illinois Department of Energy and Natural Resources  
 Intergovernmental Panel on Climate Change (SAR & TAR)  
 METRANS Center  
 National Center for Earthquake Engineering Research  
 National Academy of Sciences/ National Research Council  
 Next10  
 North Carolina Energy Policy Council  
 RAND Corporation  
 UNISDR  
 U.S. Climate Change Science Program  
 U.S. Department of Agriculture ERS  
 U.S. Environmental Protection Agency  
 U.S. Forest Service

**Proposal Reviewer:**

Defense Threat Reduction Agency (DTRA)  
 Kuwait Foundation for the Advancement of Sciences  
 MIT Center for Environmental Initiatives  
 National Oceanic and Atmospheric Administration  
 National Science Foundation  
 Netherlands Social Science Research Council  
 New Zealand Earthquake Commission  
 Penn State Mineral Research Institute  
 Research Council of Norway  
 Sea Grant Programs (California, Louisiana, Wisconsin)  
 Social Science & Humanities Research Council of Canada  
 South Coast Air Quality Management District (California)  
 Southern Illinois University Coal Research Center  
 U.S. Department of Energy  
 West Virginia University Energy Research Center

## ACADEMIC EXPERIENCE

**Teaching** (\* indicates new course developed):

### University of Southern California

#### Graduate

Public Sector Economics  
 Environmental Policy Design and Analysis\*  
 Applied General Equilibrium Analysis\*  
 Economic Impact Analysis\*  
 Renewable Energy and Collaborative  
 Policy: Mexico and California\*

### The Pennsylvania State University

#### Graduate

Economics of Energy & Environment\*  
 Resources & Economic Development\*  
 Economics of Minerals & Environment\*  
 Graduate Colloquium\*

#### Undergraduate

Economics of Energy & Environment  
 Ecological Economics\*  
 Economics of Natural Hazards\*  
 Human Dimensions of Natural Hazards\*  
 First-Year Seminar

### West Virginia University

#### Graduate

Natural Resource Economics  
 Energy Economics\*  
 Economics of Oil & Gas\*  
 Economics of Mineral Industries  
 Input-Output Analysis & Planning\*  
 Graduate Colloquium\*

### University of California, Riverside

#### Graduate

Environmental Economics  
 Environmental Management Models\*  
 Microeconomic Theory  
 Welfare Economics\*

#### Undergraduate

Environmental Economics  
 Regional Economics\*  
 Urban Economics  
 Intermediate Microeconomics  
 Intro to Environmental Science

## **Student Research Supervision:**

### University of Southern California

Ph.D. dissertations (Chairman) - 5  
 Ph.D. dissertations (Member) - 19  
 Post-docs supervised - 10

### The Pennsylvania State University

Ph.D. Dissertations (Chairman) - 11  
 Ph.D. Dissertations (Member) - 26

M.S. Theses (Chairman) - 12  
 M.S. Theses (Member) - 30

### West Virginia University

Ph.D. Dissertations (Chairman) - 6  
 Ph.D. Dissertations (Member) - 7

M.S. Theses (Chairman) - 5  
 M.S. Theses (Member) - 8

### University of California, Riverside

Ph.D. Dissertations (Chairman) - 4  
 Ph.D. Dissertations (Member) - 9

**Short Courses:**

Institute for Advanced Study Short-Course on Economic Impacts of Natural Hazards, Pavia, Italy, 2015  
 CREATE Short-Course on Computable General Equilibrium Modeling, Center for Risk and Economic Analysis of Terrorism Events, U. of Southern California, Los Angeles, CA, 2005.  
 U.S. Bureau of Mines Short-Course on Mineral Economic Impact Analysis, Washington, DC, 1988.  
 UCR Interindustry Economics in Instructional Workshop for the University Community, U. of California, Riverside, 1980.

**External Dissertation Examiner:**

Free University (The Netherlands)  
 Jadavpur University (India)  
 National University of Singapore  
 U. of Barcelona  
 U. of Groningen (The Netherlands)  
 U. of Melbourne  
 U. of Twente (The Netherlands)

**Major Administrative Assignments:**

## University of Southern California

Director, Center for Risk and Economic Analysis of Terrorism Events (CREATE)  
 Founding Acting Director, Energy Institute  
 Member, President's Working Group on Sustainability Research Committee  
 Chair, CREATE Strategic Planning Committee  
 Chair, Certificate in Sustainable Policy and Planning Revision Sub-Committee  
 Member, Faculty Council, Price School of Public Policy  
 Member, Executive Council, CREATE  
 Member, Executive Committee, Sustainable Cities Program  
 Member, Appointments, Promotion and Tenure Committee  
 Member, Master of Public Policy Committee, Price School  
 Member, Environmental Research Leadership Council  
 Member, Future Fuels and Energy Initiative Steering Committee  
 Member, Research Committee, Price School  
 Member, CREATE Director Recruitment Committee  
 Member, CREATE Research Committee

## The Pennsylvania State University

Head, Department of Energy, Environmental, and Mineral Economics (ENNEC)  
 Chair, Graduate Program Committee, ENNEC  
 Chair, Faculty Recruitment Committee, ENNEC  
 Chair, Student Internship Committee, Department of Geography  
 Member, Executive Council, College of Earth and Mineral Sciences (EMS)  
 Member, Task Force on the Center for Advanced Undergraduate Study and Experience, EMS  
 Member, Diversity Council, EMS  
 Member, Minority Recruitment Committee, EMS  
 Member, Faculty Senate  
 Member, Advisory Boards: Center for Economic & Environmental Risk Assessment, Environment Institute, Center for Regional Business Analysis, Goddard Forestry Chair Advisory Committee, Center for Energy and Minerals Policy Research, Natural Hazards Center

## West Virginia University

Chair, Department of Mineral Resource Economics (MRE)  
 Chair, Faculty Merit Fund Committee, College of Mineral and Energy Resources (COMER)  
 Placement Officer, MRE  
 Member, Faculty Senate and Faculty Senate Executive Committee  
 Member, Graduate Committee, COMER  
 Member, Promotion and Tenure Committee, COMER  
 Member, Deanship Recruitment Committee, COMER  
 Member, Directorship Recruitment Committee, Regional Research Institute

University of California, Riverside

Chair, Faculty Recruitment Committee, Department of Economics

Member, Steering Committee, Environmental and Resources Group

Member, Executive Committee, College of Humanities and Social Sciences

Member, Chancellor's Task Force on Teaching

Member, User's Committee on Campus Computers

### **External Reviewer of Academic Departments/Centers**

Department of Economics, Rensselaer Polytechnic Institute

Department of Mathematics, West Virginia University

Center for Economic Development, University of Southern California

Lusk Real Estate Center, University of Southern California

### **External Reviewer of Faculty and Research Staff Promotion/Tenure/Awards:**

Argonne National Laboratory (Environment Division)

Boston U. (Dept of Geography)

U. of British Columbia (Dept of Regional Planning)

U. of British Columbia (Centre for Human Settlements)

Carnegie Mellon (Dept of Engineering & Public Policy)

U. of Colorado (Dept of Civil & Architectural Eng)

Colorado School of Mines (Division of Economics)

Colorado State U. (Dept of Economics)

Cornell University (Dept of Applied Economics)

Cornell University (Dept of Civil & Environmental Eng)

Dartmouth College (Environmental Studies)

U. of Florida (Dept of Geography)

Florida State University (Dept of Economics)

George Washington U. (Dept of Eng Mgt & Systems)

U. of Hawaii (East-West Center)

Howard University (Dept of Economics)

U. of Illinois at Chicago (Dept of Economics)

U. of Illinois at Urbana (Dept of Ag Economics)

Indiana University (Public & Environmental Affairs)

INSEAD (Chair in Environmental Management)

London School of Economics (Grantham Institute)

Michigan Technological U. (Dept of Economics)

National Seoul University (Dept of Energy Engineering)

U. of New Mexico (Dept of Economics)

U. of New Mexico (Faculty Scholar Award)

New York U. (Dept of Public Administration)

Ohio U. (Dept of Economics)

Penn State U. (Goddard Chair in Forestry)

U. of Pennsylvania (Dept of Regional Science)

Purdue U. (Dept of Economics)

Rutgers U. (School of Planning & Public Policy)

U. of Southern California (CREATE Research Award)

U. of Southern California (Dept of Economics)

Southern Illinois U. (University Scholar Award)

SUNY Buffalo (Dept of Geography)

Texas A&M at Galveston

(Dept of Marine and Environmental Science)

U. of Utah (Dept of Economics)

U. S. Geological Survey (Geography Group)

West Virginia U. (University Scholar Award)

U. of Wisconsin (Dept of Agricultural Economics)