

M. GRANGER MORGAN

Curriculum Vitae

BORN: 1941 March 17, Hanover, New Hampshire
CITIZENSHIP: U.S.A.
FAMILY: Elizabeth Nichols Morgan (wife) b 1941, m 1963
Kristiana M. Provasnik (daughter) b 1968, m 1991 to Stephen Provasnik
Frederick M. Morgan (son) b 1971, m 1995 to Debbie Bellinger

Education

- University of California at San Diego, 1965-1969, Ph.D., Department of Applied Physics and Information Science.
- University of California at Berkeley, 1965, graduate work in modern Latin American History.
- Cornell University, 1963-1965, M.S., Program in Astronomy and Space Science. Experimental thesis work at Arecibo Ionospheric Observatory.
- Harvard College, 1959-1963, B.A., concentrated in Physics, graduated cum laude in General Studies.

Professional Positions

2015 - Present Hammerschlag Chair University Professor

2003 - Present University Professor

2012 - 2014 Founding Director, Wilton E. Scott Institute for Energy Innovation, Carnegie Mellon University

1996 – 2015 Lord Chair Professor of Engineering

1986 - 1995 Director of the Carnegie Mellon Program in International Peace and Security.

1981 - 1982 Acting Head (Planning and Recruiting), Department of Electrical Engineering, Carnegie Mellon University, Pittsburgh, PA

1980 - Present Professor of Engineering and Public Policy and of Electrical and Computer Engineering. Also Professor in The H. John Heinz III College.

1977 - 2014 Founding Head, Department of Engineering and Public Policy

1977 - 1980 Head, Department of Engineering and Public Policy and Associate Professor of Electrical Engineering and Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA

1974 - 1977 Assistant Professor of Electrical Engineering and Engineering and Public Policy (EPP) and Coordinator of the Graduate Program in EPP, Carnegie Mellon University, Pittsburgh, PA

1974 Visiting Associate Physicist (May - November) Brookhaven National Laboratory, Associated Universities, Inc., Upton, NY

1972 - 1974	Associate Program Director and later Program Director, Division of Computer Research, National Science Foundation, Washington, D.C.
1970 - 1972	Lecturer (1970-1971) and Acting Assistant Professor (1971-1972), Department of Applied Physics and Information Science, University of California at San Diego
1969 - 1972	Director, Computer Jobs through Training Project, A job vocational and pre-vocational motivational program for disadvantaged high school students and young adults, University of California at San Diego
1959 - 1969	Research Assistant, Graduate Research Assistant and NASA Fellow at: Dartmouth College, Jicamarca Radar Observatory, Cornell University, Arecibo Observatory, and University of California at San Diego

Professional Activities and Memberships

Current:

- Member of the National Academy of Sciences
 - NAS Co-chair of the National Academies' Report Review Committee
 - Member of the NRC Committee for the Division on Engineering and Physical Sciences
 - Chair of the NRC Committee on Enhancing the Resilience of the Nation's Electric Power Transmission and Distribution System
 - Co-chair of the NRC Roundtable on Risk, Resilience, and Extreme Events Committee
 - Chair of the NAS Grid Modernization Committee
- Member of the American Academy of Arts and Sciences.
 - Former Co-chair, Alternative Energy Future Committee
- Member of the Energy and Environment Directorate Advisory Committee, Battelle Memorial Institute, Pacific Northwest Division, Pacific Northwest National Laboratory, Department of Energy
- Member of the Arthur L. Irving Institute of Energy and Society (IIES) Advisory Board, Dartmouth College
- Member of the Scientific Advisory Board of the E.ON Energy Research Center, RWTH Aachen University
- Member of the Clean Energy Expert Advisory Committee, Environmental Defense Fund
- Chairman of the Board of the International Risk Governance Foundation
- Member of the CRANE Academic Advisory Group, PRIME Coalition
- Member of the following professional societies:
 - American Association for the Advancement of Science - Fellow; Past member of the Editorial Board, *Science* 86; Past member of committee on Science and International Security
 - Life Member of the American Geophysical Union
 - Institute of Electrical and Electronic Engineers – Fellow and Life Member; Past member of the Editorial Board, *IEEE Spectrum*; Past member of the Publications Board; Past member of the Editorial Board, *The Proceedings*; Past Editor IEEE Press Reprint Books; Past Member, Committee on Man and Radiation; Past Member of the Editorial Board, *The Institute*

- Society for Risk Analysis- Fellow; Member of the Editorial Board, *Risk Analysis*; Past Member of the Board; Past member of the Awards and other Committees
- Past Member of the Board of Directors, Association of Public Policy and Management and, Past Book Review Editor for *JPP&M* in the area of Technology and Policy
- Member of the Board of Advisors, *Scientific American*
- Member of Advisory Board, *Innovations: Technology/Government/Globalization*

Past (selected list):

- Member of the National Academies Keck Futures Initiative Steering Committee on Ecosystem Services
- Member of the NRC Committee on Science for EPA's Future
- Member of Paul Scherrer Institute Evaluation Committee in Energy Policy
- Member of the Advisory Board for the Center for Science, Technology and Policy (CSTEP), Bangalore, India
- Member of the World Economic Forum Global Agenda Council on New Energy Architecture
- Member of the Task Force on Innovation for China's Environmentally Friendly Society of the China Council for International Cooperation on Environment and Development
- Member of the Intelligent Transportation Systems (ITS) Advisory Committee, U.S. Department of Transportation
- Member of the Advisory Board of the Competence Center Environment and Sustainability of the ETH Domain
- Member of Leadership Board for the Sustainable Energy, Environment and Economy, University of Calgary
- Chair of the NRC Committee on Enhancing the Robustness and Resilience of Electrical Transmission and Distribution in the United States to Terrorist Attack
- Member of the Environmental Technology Advisory Board, Alcoa Corp.
- Member of Pittsburgh Indicators Steering Committee
- Member of the Academic Committee of the Center for Crisis Management Research, Tsinghua University
- Past Chair of the EPA Science Advisory Board
- Past Chair and past member of the Advisory Council of the Electric Power Research Institute
- Member of the Electricity Advisory Committee, Department of Energy
- Recent past Member of the Visiting Committee of Engineering Systems Division, MIT; the Department of Management Science and Engineering, Stanford; the Department of Environmental Sciences (D-UWIS) at ETH Zurich; EAWAG; and the International Advisory Panel for the Division of Engineering & Technology Management (D-ETM), National University of Singapore
- Program advisory boards at Heinz Center, RFF, IIASA, Stanford, TUDelft and other Dutch technology and policy programs, and MISTRA

- Member of the recently completed NRC Study on Geoengineering Climate: Technical Evaluation and Discussion of Impacts Committee
- Past Chair of the Advisory Council of the Electric Power Research Institute
- Member of the Electric Power Research Institute External Scientific Advisory Committee (SAC) on Environmental Risk Assessment and Communication

Research Interests

Research interests are focused on policy problems in which technical and scientific issues play a central role. Methodological interests include problems in the integrated analysis of large complex systems; problems in the characterization and treatment of uncertainty; problems in the improvement of regulation; and selected issues in risk analysis and risk communication. Application areas of current interest include global climate change; decarbonization and the future of the energy system, especially electric power; risk analysis; health and environmental impacts of energy systems; security aspects of engineered civil systems; national R&D policy; and a number of general policy, management, and human resource issues involving science and technology.

Publications

Refereed Journal Publications:

- M. Granger Morgan and Kenneth L. Bowles, "Cross-Correlation and Cross-Spectral Methods for Drift Velocity Measurements," *Science*, 161, 1139-1142, 1968.
- M. Granger Morgan, "A Laboratory Model for Radio Star Scintillation and Other Diffraction Phenomena," *Journal of Geophysical Research*, 76, 2469-2486, 1971.
- M. Granger Morgan, "Topics in Technology and Modern Social Problems ... A New Course for Advanced Undergraduate Science Students," *American Journal of Physics*, 40, 116-120, 1972.
- M. Granger Morgan, Barbara R. Barkovich and Alan K. Meier, "The Social Costs of Producing Electric Power from Coal: A First Order Calculation," *Proceedings of the IEEE*, 61, 1431-1442, 1973.
- M. Granger Morgan and Samuel C. Morris, "Needed: A National R&D Effort to Develop Individual Air Pollution Monitor Instrumentation," *Journal of the Air Pollution Control Association*, 27, 670-673, 1977.
- M. Granger Morgan, Samuel C. Morris, Alan K. Meier and Debra L. Shenk, "A Probabilistic Methodology for Estimating Air Pollution Health Effects from Coal-Fired Power Plants," *Energy Systems and Policy*, 2, 287-310, 1978.
- M. Granger Morgan, Samuel C. Morris, William R. Rish and Alan K. Meier, "Sulfur Control in Coal-Fired Power Plants: A Probabilistic Approach to Policy Analysis," *Journal of the Air Pollution Control Association*, 28, 993-997, 1978.
- M. Granger Morgan and Sarosh N. Talukdar, "Electric Power Load Management: Some Technical, Economic, Regulatory, and Social Issues," *Proceedings of the IEEE*, 67, 241-312, 1979.
- William R. Rish and M. Granger Morgan, "Regulating Possible Health Effects from AC Transmission Line Electromagnetic Fields," *Proceedings of the IEEE*, 67, 1416-1427, 1979.

- Alex Hills and M. Granger Morgan, "Telecommunications in Alaskan Villages: A technical, economic, and institutional analysis," *Science*, 211, 241-248, 1981.
- M. Granger Morgan and Francis Clay McMichael, "A Characterization and Critical Discussion of Models and Their Use in Environmental Policy," *Policy Sciences*, 14, 345-370, 1981.
- M. Granger Morgan, "Probing the Question of Technology-Induced Risk," *IEEE Spectrum*, 18, (11), 58-64, 1981 November.
- M. Granger Morgan, "Choosing and Managing Technology-Induced Risk," *IEEE Spectrum*, 18(12), 53-60, 1981 December.
- Indira Nair, M. Granger Morgan and Max Henrion, "Office Automation: Assessing Energy Implications," *Telecommunications Policy*, 207-222, 1982 September.
- EPP Graduate Research Methods Class, "On Judging the Frequency of Lethal Events: A Replication," *Risk Analysis*, 3, 11-16, 1983 March.
- M. Granger Morgan, Samuel C. Morris, Max Henrion, Deborah A.L. Amaral and William R. Rish, "Technical Uncertainty in Quantitative Policy Analysis: A Sulfur Air Pollution Example," *Risk Analysis*, 4, 201-216, 1984 September.
- Max Henrion and M. Granger Morgan, "A Computer Aid for Risk and Other Policy Analysis," *Risk Analysis*, 5, 195-208, 1985 September.
- M. Granger Morgan, Samuel C. Morris, Max Henrion and Deborah A. L. Amaral, "Uncertainty in Environmental Risk Assessment: A case study involving sulfur transport and health effects," *Environmental Science & Technology*, 19, 662-667, 1985 August.
- M. Granger Morgan, Paul Slovic, Indira Nair, Dan Geisler, Donald MacGregor, Baruch Fischhoff, David Lincoln and H. Keith Florig, "Power line Frequency Electric and Magnetic Fields: A Pilot Study of Risk Perception," *Risk Analysis*, 5, 139-150, 1985 June.
- M. Granger Morgan, H. Keith Florig, David Lincoln and Indira Nair, "Power-line Fields and Human Health," *IEEE Spectrum*, 22, 62-68, 1985 February.
- Max Henrion, M. Granger Morgan, Indira Nair, and Charles Wiecha, "Evaluating an Information System for Policy Modelling and Uncertainty Analysis," *Journal of the American Society for Information Science*, 37, 319-330, 1986 September.
- H. Keith Florig, James F. Hoburg, and M. Granger Morgan, "Electric Field Exposure from Electric Blankets," *IEEE Transactions on Power Delivery*, Vol. PWRD-2(2), 527-536, 1987 April.
- Harald Ibrekk and M. Granger Morgan, "Graphical Communication of Uncertain Quantities to Nontechnical People," *Risk Analysis*, 7(4), 519-529, 1987.
- M. Granger Morgan, Max Henrion and Charles Wiecha, "DEMOS: A computer aid for engineering-economic policy modeling and uncertainty analysis," *Large Scale Systems*, 383, 1987.
- H. Keith Florig and M. Granger Morgan, "Measurements of Housing Density Along Transmission Lines," *Bioelectromagnetics*, 9, 87-93, 1988.
- M. Granger Morgan, "Quantitative Risk Assessment: Low frequency electromagnetic fields as an example," *Statistical Science*, 3(3), 314-319, 1988.

- Xiaolin Xi and M. Granger Morgan "Energizing China: First itself, next the world," *IEEE Spectrum*, 1989 March.
- Gordon Hester, M. Granger Morgan, Indira Nair and Keith Florig, "Small Group Studies of Regulatory Decision Making for Power-Frequency Electric and Magnetic Fields," *Risk Analysis*, 10, 213-228, 1990.
- Indira Nair and M. Granger Morgan, Three-Part Special Report: "Part 1: Biological Effects," 23-27; M. Granger Morgan and Indira Nair, "Part 3: Managing the Risks," 32-35, *IEEE Spectrum*, 27, 1990 August.
- Emilie Roth, M. Granger Morgan, Baruch Fischhoff, Lester B. Lave and Ann Bostrom, "What Do We Know About Making Risk Comparisons?," *Risk Analysis*, 10(3), 375-392, 1990.
- M. Granger Morgan, H. Keith Florig, Indira Nair, Concepcion Cortes, Kevin Marsh and Karen Pavlosky, "Lay Understanding of Power-Frequency Fields," *Bioelectromagnetics*, 11, 313-335, 1990.
- M. Granger Morgan, "Probing the Question of Technology-Induced Risk," *IEEE Spectrum*, 18(11), 58-64, 1981 November and "Choosing and Managing Technology-Induced Risk," *IEEE Spectrum*, 18(12), 53-60, 1981 December. Reprinted in *Readings in Risk*, T. Glickman and M. Gough (eds.), Resources for the Future, Johns Hopkins Press, 5-29, 1990.
- Gregory W. Fischer, M. Granger Morgan, Baruch Fischhoff, Indira Nair and Lester B. Lave, "What Risks are People Concerned About?," *Risk Analysis*, 11(2), 303-314, June 1991.
- M. Granger Morgan and Indira Nair, "Alternative Functional Relationships Between ELF Field Exposure and Possible Health Effects: Report of an expert workshop," *Bioelectromagnetics*, 13, 335-350, 1992.
- M. Granger Morgan, Baruch Fischhoff, Ann Bostrom, Lester Lave and Cynthia J. Atman, "Communicating Risk to the Public," *Environmental Science & Technology*, 26(11), 2048-2056, November 1992.
- Ann Bostrom, Baruch Fischhoff and M. Granger Morgan, "Characterizing Mental Models of Hazardous Processes: A methodology and an application to radon," *Journal of Social Issues*, 48(4), 85-100, 1992.
- Vincent T. Covello, Baruch Fischhoff, Roger Kasperson and M. Granger Morgan, "Comments on 'The Mental Model' Meets 'The Planning Process,'" *Risk Analysis*, 13(5), 493, 1993.
- Hadi Dowlatabadi and M. Granger Morgan, "A Model Framework for Integrated Studies of the Climate Problem," *Energy Policy*, 21(3), 209-221, March 1993. Reprinted in *The International Library of Critical Writings in Economics*, Mark Blaug (Series Editor), *The Economics of Natural Hazards*, Howard Kunreuther and Adam Z. Rose (eds), Edward Elgar Publishing Company, 1040pp, 2004.
- Ann Bostrom, M. Granger Morgan, Jack Adams and Indira Nair, "Preferences for Exposure Control of Power-Frequency Fields Among Lay Opinion Leaders," *Risk: Health, Safety & Environment*, 5(4), 295-318, Fall 1994.
- Cynthia J. Atman, Ann Bostrom, Baruch Fischhoff and M. Granger Morgan, "Designing Risk Communications: Completing and correcting mental models of hazardous processes, Part I," *Risk Analysis*, 14(5), 779-788, October 1994. Also reprinted in Simon Gerrard, R. Kerry Turner, and Ian Bateman (eds.), *Environmental Risk Planning and Management*, Chapter 18, Edward Elgar Publishers, 251-260, 2001.
- Ann Bostrom, Cynthia J. Atman, Baruch Fischhoff and M. Granger Morgan, "Evaluating Risk Communications: Completing and correcting mental models of hazardous processes, Part II," *Risk Analysis*, 14(5), 789-798, October 1994. Also reprinted in Simon Gerrard, R. Kerry Turner, and Ian Bateman (eds.), *Environmental Risk Planning and Management*, Chapter 19, Edward Elgar Publishers, 261-270, 2001.

- Donald G. MacGregor, Paul Slovic and M. Granger Morgan, "Perception of Risks from Electromagnetic Fields: A Psychometric Evaluation of a Risk-Communication Approach," *Risk Analysis*, 14(5), 815-828, October 1994.
- Ann Bostrom, M. Granger Morgan, Baruch Fischhoff and Daniel Read, "What Do People Know About Global Climate Change? Part 1: Mental models," *Risk Analysis*, 14(6), 959-970, 1994.
- Daniel Read, Ann Bostrom, M. Granger Morgan, Baruch Fischhoff and Tom Smuts, "What Do People Know About Global Climate Change? Part 2: Survey studies of educated laypeople," *Risk Analysis*, 14(6), 971-982, 1994.
- M. Granger Morgan and David Keith, "Subjective Judgments by Climate Experts," *Environmental Science & Technology*, 29(10), 468A-476A, October 1995.
- M. Granger Morgan, Indira Nair, and Jun Zhang, "A Method for Assessing Alternative Effects Functions That Uses Simulation With EMDEX Data," *Bioelectromagnetics*, 16, 172-177, 1995.
- John G. Adams, Jun Zhang, M. Granger Morgan, and Indira Nair, "A Method for Evaluating Transmission Line Magnetic Field Mitigation Strategies That Incorporates Biological Uncertainty," *Risk Analysis*, 15(3), 313-318, 1995.
- M. Granger Morgan and Hadi Dowlatabadi, "Learning from Integrated Assessment of Climate Change," *Climatic Change*, 34, 337-368, 1996.
- Jun Zhang, Indira Nair, and M. Granger Morgan, "Effects Function Simulation of Residential Appliance Field Exposures," *Bioelectromagnetics*, 18, 116-124, 1997.
- M. Granger Morgan and Daniel Read, "The Efficacy of Different Methods for Informing the Public About the Range Dependency of Magnetic Fields from High Voltage Power Lines," *Risk Analysis*, 18(5), 603-610, October 1998.
- M. Granger Morgan, Milind Kandlikar, James Risbey, and Hadi Dowlatabadi, Editorial - "Why Conventional Tools for Policy Analysis Are Often Inadequate for Problems of Global Change," *Climatic Change*, 41, 271-281, 1999.
- Elizabeth A. Casman, M. Granger Morgan and Hadi Dowlatabadi, "Mixed Levels of Uncertainty in Complex Policy Models," *Risk Analysis*, 19(1), 33-42, 1999.
- M. Granger Morgan, H. Keith Florig, Michael DeKay, Paul Fischbeck, Kara Morgan, Karen Jenni, and Baruch Fischhoff, "Categorizing Risks for Risk Ranking," *Risk Analysis*, 20(1), 49-58, 2000.
- M. Granger Morgan, Louis F. Pitelka and Elena Shevliakova, "Elicitation of Expert Judgments of Climate Change Impacts on Forest Ecosystems," *Climatic Change*, 49, 279-307, 2001.
- Elizabeth Casman, Baruch Fischhoff, Mitchell Small, Hadi Dowlatabadi, Joan Rose and M. Granger Morgan, "Climate Change and Cryptosporidiosis: A qualitative analysis," *Climatic Change*, 50, 219-249, 2001.
- H. Keith Florig, M. Granger Morgan, Kara M. Morgan, Karen E. Jenni, Baruch Fischhoff, Paul S. Fischbeck and Michael L. DeKay, "A Deliberative Method for Ranking Risks (I): Overview and test bed development," *Risk Analysis*, 21(5), 913-921, 2001.
- Kara M. Morgan, Michael L. DeKay, Paul S. Fischbeck, M. Granger Morgan, Baruch Fischhoff, "A Deliberative Method for Ranking Risks (II): Evaluation of validity and agreement among risk managers," *Risk Analysis*, 21(5), 923-937, 2001.

- Michael L. DeKay, Mitchell J. Small, Paul S. Fischbeck, R. Scott Farrow, Alison Cullen, Joseph B. Kadane, Lester B. Lave, M. Granger Morgan, Kazuhisa Takemura, "Risk-based Decision Analysis in Support of Precautionary Policies," *Journal of Risk Research*, 5(4), 391-417, 2002.
- Edward A. Parson, Robert W. Corell, Eric J. Barron, Virginia Burkett, Anthony Janetos, Linda Joyce, Thomas R. Karl, Michael C. MacCracken, Jerry Melillo, M. Granger Morgan, David S. Schimel, and Thomas Wilbanks, "Understanding Climatic Impacts, Vulnerabilities, and Adaptation in the United States: Building a capacity for assessment," *Climatic Change*, 57, 9-42, March 2003.
- M. Granger Morgan, "Characterizing and Dealing with Uncertainty: Insights from the Integrated Assessment of Climate Change," *Integrated Assessment*, 4(1), 46-55, 2003.
- Sarosh N. Talukdar, Jay Apt, Marija Ilic, Lester Lave and M. Granger Morgan, "Cascading Failures: Survival versus Prevention," *The Electricity Journal*, 25-31, November 2003.
- Margo T. Brown and M. Granger Morgan, "Expert Assessment of the Performance of the US System for Environmental Regulation," *Journal of Risk Research*, 7(5), 507-521, July 2004.
- Henry H. Willis, Michael L. DeKay, M. Granger Morgan H. Keith Florig, and Paul S. Fischbeck, "Ecological Risk Ranking: Development and evaluation of a method for improving public participation in environmental decision making," *Risk Analysis*, 24, 363-378, April 2004.
- Minh Ha-Duong, Elizabeth A. Casman, and M. Granger Morgan, "Bounding Poorly Characterized Risks: A lung cancer example," *Risk Analysis*, 24(5), 1071-1084, 2004.
- Elizabeth A. Casman, Minh Ha-Duong, and M. Granger Morgan, "Response to Sander Greenland's Critique of Bounding Analysis," *Risk Analysis*, 24(5), 1093-1096, 2004.
- Claire R. Palmgren, M. Granger Morgan, Wändi Bruine de Bruin, and David W. Keith, "Initial Public Perceptions of Deep Geological and Oceanic Disposal of Carbon Dioxide," *Environmental Science & Technology*, 38(24), 6441-6450, 2004.
- Elizabeth Casman and M. Granger Morgan, "Use of Expert Judgment to Bound Lung Cancer Risks," *Environmental Science & Technology*, 39, 5911-5920, 2005.
- Henry H. Willis, Michael L. DeKay, Baruch Fischhoff, and M. Granger Morgan, "Aggregate, Disaggregate, and Hybrid Analyses of Ecological Risk Perceptions," *Risk Analysis*, 25(2), 405-427, 2005.
- M. Granger Morgan, Robin Cantor, William C. Clark, Ann Fisher, Henry D. Jacoby, Anthony C. Janetos, Ann P. Kinzig, Jerry Melillo, Roger B. Street, and Thomas J. Wilbanks, "Learning from the U.S. National Assessment of Climate Change." *Environmental Science & Technology*, 39, 9023-9032, 2005.
- David Keith, Julie A. Giardina, David Keith, M. Granger Morgan, and Elizabeth Wilson, "Regulating the Underground Injection of CO₂," *Environmental Science & Technology*, 499A-504A, December 15, 2005.
- Bill Strauss, M. Granger Morgan, Jay Apt and Daniel Stancil, "Unsafe at Any Airspeed: Cellphones and other electronics are more of a risk than you think," *IEEE Spectrum*, 43(3), 44-49, 2006.
- M. Granger Morgan, Peter Adams, and David W. Keith, "Elicitation of Expert Judgments of Aerosol Forcing," *Climatic Change*, 75, 195-214, 2006.
- Jay Apt, Lester B. Lave, and M. Granger Morgan, "A More Reliable U.S. Electric System," *Issues in Science & Technology*, 22(4), 51-58, 2006.
- Anand B. Rao, Edward S. Rubin, David W. Keith, and M. Granger Morgan, "Evaluation of Potential Cost Reductions from Improved Amine-based CO₂ Capture Systems," *Energy Policy*, 34, 3765-3772, 2006.

- Kirsten Zickfeld, Anders Levermann, Till Kuhlbrodt, Stefan Rahmstorf, M. Granger Morgan and David Keith, "Expert Judgements on the Response on the Atlantic Meridional Overturning Circulation to Climate Change," *Climatic Change*, 82, 235-265, 2007.
- Douglas King and M. Granger Morgan, "Customer-focused Assessment of Electric Power Microgrids," *Journal of Energy Engineering*, 133, 150-164, September 2007.
- M. Granger Morgan, "Moving to a Low-Carbon Future: Perspectives on nuclear and alternative power sources," *Health Physics*, 93(5), 568-570, November 2007. Proceedings for the 2006 Annual Meeting on "Chernobyl at Twenty."
- Adam Newcomer, Seth Blumsack, Jay Apt, Lester Lave and M. Granger Morgan, "Short Run Effects of a Price on Carbon Dioxide Emissions from US Electric Generators," *Environmental Science & Technology*, 22(9), 3139-3144, 2008.
- Elizabeth Wilson, M. Granger Morgan, and 16 other authors, "Regulating the Geological Sequestration of Carbon Dioxide," *Environmental Science & Technology*, Feature issue on Greenhouse Gas Mitigation and Utilization, 2718-2722, April 15, 2008.
- Jacqueline Anne MacDonald, Mitchell J. Small and M. Granger Morgan, "Explosion Probability of Unexplored Ordnance: Expert Beliefs," *Risk Analysis*, 28, 825-841, 2008.
- M. Granger Morgan and David Keith, "Improving the Way We Think About Projecting Future Energy Use and Emissions of Carbon Dioxide," *Climatic Change*, 90(3), 189-215, October 2008.
- Aimee Curtright, M. Granger Morgan and David Keith, "Expert Assessment of Future Photovoltaic Technology," *Environmental Science & Technology*, 42(24), 2008.
- David G. Victor, M. Granger Morgan, Jay Apt, John Steinbruner, and Katharine Ricke, "The Geoengineering Option," *Foreign Affairs*, 88(2), 64-76, March/April 2009.
- Inês M. Lima Azevedo, M. Granger Morgan and Fritz Morgan, "The Transition to Solid-State Lighting," *Proceedings of the IEEE*, 97(3), 481-510, March 2009.
- M. Granger Morgan, "Carbon Capture and Sequestration: How can it succeed commercially?," in a special issue of *Innovations on Energy and Climate Change* titled *Energy for Change: Creating Climate Solutions*, 4(4), 167-171, Fall 2009.
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- Lauren A. Fleishman, Wändi Bruine de Bruin and M. Granger Morgan, "Informed Public Preferences for Electricity Portfolios with CCS and Other Low-Carbon Technologies," *Risk Analysis*, 30, 1399-1410, 2010.
- Kirsten Zickfeld, M. Granger Morgan, David Frame and David W. Keith, "Expert Judgments About Transient Climate Response to Alternative Future Trajectories of Radiative Forcing," *Proceedings of the National Academy of Science*, 107, 12451-12456, July 13, 2010.

- Katharine Ricke, M. Granger Morgan and Myles R. Allen, "Regional Climate Response to Solar-radiation Management," *Nature Geoscience*, 3, 537-541, 2010.
- Travis Reynolds, Ann Bostrom, Daniel Read and M. Granger Morgan, "Now What Do People Know About Climate Change?," *Risk Analysis*, 30(10), 1520-1538, 2010.
- Kelly Klima, M. Granger Morgan, Iris Grossmann and Kerry Emanuel, "Does It Make Sense to Modify Tropical Cyclones? A decision approach," *Environmental Science & Technology*, 45(10), 4242-4248, 2011.
- M. Granger Morgan, "Certainty, Uncertainty, and Climate Change," *Climatic Change*, 108, 707-721, 2011.
- M. Granger Morgan and Sean T. McCoy, "A U.S. Strategy for Regulating the Geologic Sequestration of Carbon Dioxide," *Forum, EOS*, 92(11), 91-92, March 15, 2011.
- Iris Grossmann and M. Granger Morgan, "Tropical Cyclones, Climate Change, and Scientific Uncertainty: What do we know, what does it mean, and what should be done?," *Climatic Change*, 108, pp. 543-579, 2011.
- Inês M. Lima Azevedo, M. Granger Morgan and Lester Lave, "Residential and Regional Electricity Consumption in the U.S. and EU: How Much Will Higher Prices Reduce CO₂ Emissions?," *The Electricity Journal*, 24(1), Jan./Feb. 2011. (Not refereed)
- Kyle Siler-Evans, M. Granger Morgan and Inês Azevedo, "Distributed Cogeneration for Commercial Buildings: Can we make the economics work?," *Energy Policy*, 42, 580-590, January 2012.
- Katharine L. Ricke, Daniel J. Rowlands, William J. Ingram, David W. Keith and M. Granger Morgan, "Effectiveness of Stratospheric Solar-Radiation Management as a Function of Climate Sensitivity," *Nature Climate Change*, 2, 92-96, February 2012 (published on line December 18, 2011).
- Brinda A. Thomas, Inês L. Azevedo and M. Granger Morgan, "Edison Revisited: Should we use DC circuits for lighting in commercial buildings?," *Energy Policy*, 45, 399-411, 2012.
- Kelly Klima and M. Granger Morgan, "Thoughts on Whether Government Should Steer a Tropical Cyclone If It Could," *Journal of Risk Research*, 15(8), 1013-1020, 2012.
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- Kelly Klima, Wändi Bruine de Bruin, M. Granger Morgan, and Iris Grossmann, "Public Perceptions of Hurricane Modification Techniques," *Risk Analysis*, 32(7) 1194-1206, 2012.
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- Lynn M. Russell et al., "Ecosystem Impacts of Geoengineering: A review for developing a science plan," *Ambio: A Journal of the Human Environment*, 41, 350-369, 2012.
- Kyle Siler-Evans, Inês Azevedo and M. Granger Morgan, "Marginal Emissions Factors for the US Electricity System," *Environmental Science & Technology*, 46(9), 4742-4748, 2012.
- Anu Narayanan and M. Granger Morgan, "Sustaining Critical Social Services During Extended Regional Power Blackouts," *Risk Analysis*, 32, 1183-1193, 2012.
- Lauren A. Fleishman, Wändi Bruine de Bruin and M. Granger Morgan, "The Value of CCS Public Opinion Research," *International Journal of Greenhouse Gas Control*, 7, 265-266, 2012.

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- Indira Nair and M. Granger Morgan, "Technology and People: Raising the awareness of engineering freshmen," *CIT*, 9, 6-9, 1990 Spring/Summer.
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- M. Granger Morgan, Baruch Fischhoff, Lester Lave, Paul Fischbeck with Stephanie Byram, Karen Jenni, Garrick Louis, Sandra McBride, Laura Painton, Stuart Siegel and Ned Welch, "A Procedure for Risk Ranking for Federal Risk Management Agencies," manuscript prepared for the Office of Science and Technology Policy, February 1994.
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- M. Granger Morgan, "Climate Policy and Technology Policy," in *Knowledge for Inclusive Development*, Pedro Conceicao, et al. (eds.), Quorum Books, 504pp, 2002. Proceedings of the 2nd International Conference on Technology and Policy and Innovation, Lisbon, Portugal, August 3-5, 1998.
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- Bill Strauss and M. Granger Morgan, "In-Flight Radio Frequency Spectrum Measurements of Commercial Aircraft Cabins," final report to the U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Research and Development on grant 01-C-AW-CMU (June 2002-October 2004), NTIS, Springfield, VA, September 2006.
- Adam Newcomer, Seth Blumsack, Jay Apt, Lester Lave and M. Granger Morgan, "Electricity Load and Carbon Dioxide Emissions: Effects of a carbon price in the short term," In 41st Hawaii International Conference on System Sciences, Waikoloa, Hawaii, January 2008.
- Inês Lima Azevedo, Marco Sonnberger, Brinda Thomas, Granger Morgan Ortwin Renn, *Developing Robust Energy Efficiency Policies while Accounting for Consumer Behavior*, a report of the International Risk Governance Council, 2013.
- Sunhee Baik, Selin Sirinterlikci, Jun Woo Park, Alexander L. Davis, and M. Granger. "II. Estimating Residential Customers' Costs of Large Long-duration Blackouts." In Proceeding of a workshop on *Frontiers in the Economics of Widespread, Long-Duration Power Interruptions*, LBNL, 2019.
- Parth Vaishnav, M. Granger Morgan, Sunhee Baik, "Estimating the Value of Enhanced Electric Power Resilience: Case Study of Idaho National Laboratory and a Planned Small Modular Reactor," 93pp, 2019 June.

Television

Host of the two-hour show "Frontiers of High Technology" produced by IEEE *Spectrum* and aired nationwide on the Learning Channel in 1986 November. Sole guest on half hour edition of "The Editors," WQED-TV, on energy policy, April 7, 1989. Miscellaneous shorter appearances. Spokesman on promotional spot for IEEE Membership, 1994.

Book Reviews

Author of numerous book reviews. For several years served as science, technology, and policy book reviewer for the *Journal of Public Policy and Management* that involved about 20 reviews per year. Have also been a regular reviewer for *IEEE Spectrum*. The following are selected examples:

- *Science and Technology Advice to the President, Congress and Judiciary*, William T. Golden (ed.) reviewed in *IEEE Spectrum*, March 1989.
- *Current of Death: Power lines, computer terminals, and the attempt to cover up their threat to your health* by Paul Brodeur, Simon and Schuster, 1989, reviewed in *Scientific American*, 118-123, April 1990.
- *Science and the Navy: The history of the office of Naval Research*, Harvey M. Sapolsky, Princeton, 1990, reviewed in *IEEE Spectrum*, 11, February 1991.
- *Technologies Without Boundaries: On telecommunications in a global age*, Ithiel de Sola Pool, edited by Eli M. Noam, Harvard, 1990, reviewed in *IEEE Spectrum*, 6, June 1991.
- *Steinmetz: Engineer and Socialist* by Ronald R. Kline, The Johns Hopkins University Press, 1992, reviewed in *American Scientist*, 182-183, March-April 1993.
- *Elements of Risk: The politics of radon* by Leonard A. Cole, AAAS Press, reviewed in *Chemical and Engineering News*, 35-36, October 11, 1993.
- *The Highest Stakes: The economic foundations of the next security system*, A BRIE project with chapters contributed by Wayne Sandholtz, Michael Borrus, John Zysman, Oxford University Press, 1992, reviewed in *IEEE Spectrum*, 16-18, September 1993.
- *The Elusive Transformation: Science, Technology and the Evolution of International Politics*, Eugene B. Skolnikoff, Princeton University Press, 1993, reviewed in *IEEE Spectrum*, 14-15, December 1993.
- *Phantom Risk: Scientific inference and the law*, Kenneth R. Foster, David E. Beirnsstein, and Peter W. Huber (eds.), MIT Press, 1993, reviewed in *IEEE Spectrum*, 12, June 1994.
- *Compass and Gyroscope: Integrating science and politics for the environment* by Kai N. Lee, Island Press, 1993, reviewed in *American Scientist*, 475-476, September-October 1994.
- *Soothing the Establishment: The impact of foreign-born scientists and engineers* by David S. North, University Press of America, 1995, reviewed in *IEEE Spectrum*, 12-14, April 1996.
- *Endless Frontier: Vannevar Bush, engineer of the American century* by G. Pascal Zachary, The Free Press, 1997, reviewed in *IEEE Spectrum*, March 1998.
- *Consuming Power, A social history of American energies* by David E. Nye, MIT Press, 1997, reviewed in *Science*, April 24, 1998.

- *The Invention that Changed the World: How a small group of radar pioneers won the second world war and launched a technical revolution* by Robert Buder, Simon and Schuster, 1996, reviewed in *IEEE Spectrum*, August 1998. Reviewed with my father, Millett G. Morgan.
- *Pasteur's Quadrant: Basic Science and Technological Innovation* by Donald E. Stokes, Brookings Institution Press, 1997. Reviewed in *IEEE Spectrum*, January 1999.
- *Forged Consensus: Science, technology and economic policy in the United States, 1921-1953* by David M. Hart, Princeton University Press, 1998, reviewed in *IEEE Spectrum*, June 1999.
- *The Sun, the Genome and the Internet: Tools of scientific revolutions* by Freeman J. Dyson, Oxford University Press, 1999, reviewed in *IEEE Spectrum*, December 1999.
- *The Collapse of the Kyoto Protocol: And the struggle to slow global warming* by David G. Victor, Princeton University Press, 2001, reviewed in *IEEE Spectrum*, July 2001.
- *Uncertain Science...Uncertain World* by Henry N. Pollack, Cambridge University Press, 2003, reviewed in *Climatic Change*, 65, 2004.
- *What We Know About Climate Change* by Kerry Emanuel, MIT Press, 2007, reviewed in *IEEE Spectrum*, December 2007.
- *Improving Energy Decisions: Towards better scientific policy advice for a safe and secure future energy system*, reviewed for Springer International Publishing Switzerland, 2015.

Awards and Recognition

- Carnegie Institute of Technology Ladd Award for Outstanding Young Faculty, 1976
- U.S. Environmental Protection Science Advisory Board "Hit List" (under Gorsuch), citation: "Get Him Out," 1982
- "Outstanding Editorial Board Member," *IEEE Spectrum*, 1983, 1986 and 1988
- Listed in *American Men and Women in Sciences*
- Life Fellow of IEEE
- Carnegie Mellon University Robert Doherty Prize Award for "substantial and sustained contributions to excellence in education," 1989
- Fellow of SRA
- Fellow of AAAS
- 1995 Society for Risk Analysis Distinguished Achievement Award
- 1996 Lord Chaired Professor of Engineering, Carnegie Mellon
- 2002 Designated "National Associate" of the U.S. National Academies
- 2003 named "University Professor," Carnegie Mellon University
- 2007 elected to the National Academy of Sciences

- 2008 recipient of the EPA Federal Advisory Committee Act (FACA) Impact Award in recognition for efforts as Chairman of the EPA's Science Advisory Board
- 2009 Society for Risk Analysis Outstanding Educator Award
- 2011 American Physical Society Joseph A. Burton Forum Award
- 2011 American Society for Engineering Education Chester F. Carlson Award
- Carnegie Mellon University Barbara Lazarus Award for Graduate Student and Junior Faculty Mentoring, 2014
- 2016 Federation of American Scientists Public Service Award
- 2018 Distinguished Professor of Engineering Award, Carnegie Mellon

Ph.D. Theses

Played a significant role in the supervision of the following Ph.D. theses at Carnegie Mellon:

1. Alex Hills, "Television and Telephone Service in Alaskan Villages: A technical, economic, and organizational analysis," 1979 June.
2. Steven Goldstein, "Uncertainty in Life Cycle Demand and the Preference Between Flexible and Dedicated Mass-Production Systems," 1981 December.
3. H. Gilbert Miller, "The Reliability and Cost Impacts of Alternative Levels of Centralization in Electric Power Systems," 1981 December.
4. William R. Rish, "Characterizing Uncertainty in Estimating Impacts for Energy Systems: Two case studies," successfully defended 1981 June, requirements completed 1982 October.
5. Max Henrion, "The Value of Knowing How Little You Know," 1982 May.
6. William P. Marberg, "A Technical and Regulatory Assessment of Direct Broadcast Satellite Systems," 1983 January.
7. Felix B. "Yemisi" Dayo, "Choice Between Alternative Nuclear Energy Systems: A Decision Analytical Model for Less Developed Countries," 1983 January.
8. Deborah A.L. Amaral, "Estimating Uncertainty in Policy Analysis: Health Effects from Inhaled Sulfur Oxides," 1983 August.
9. John D. Graham, "Automobile Safety: An Investigation of Occupant-Protection Policies," 1983 September.
10. Leonard Wojcik, "Separation Requirements for Protection of High Altitude Satellites for Co-orbital Anti-satellites Weapons," 1984 December.
11. John Moteff, "The Advanced Gas Turbine and the Uncooled Diesel: Maximizing the potential benefits from two advanced engine systems," 1985 August.
12. Ben P. Wise, "An Experimental Comparison of Uncertain Inference Systems," 1986 June.

13. Charles F. Wiecha, "An Empirical Study of How Visual Programming Aids in Comprehending Quantitative Policy Models," 1986 June.
14. Theresa Mullin, "Understanding and Supporting the Process of Probabilistic-Estimation," 1986 September.
15. H. Keith Florig, "Population Exposures to Power-Frequency Fields: Concepts, components and control," 1986 November.
16. Daryl Ditz, "Courting Needless Risks: The United States Environmental Protection Agency and hazardous waste incineration at sea," 1987 September.
17. Grace Hammonds, "Crowd-Pleasing Cryptosystems: Utility Evaluations for Standardization Decisions," 1987 November.
18. Susan R. Bereiter, "Looking for Trouble: Troubleshooters' Information Utilization in Computer-Controlled Manufacturing Systems," 1988 April.
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