

## 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
- Member of the American Academy of Arts and Sciences.
  - Co-chair, Alternative Energy Future Committee
- Member of the Electricity Advisory Committee, Department of Energy
- Member of the Energy and Environment Directorate Advisory Committee, Battelle Memorial Institute, Pacific Northwest Division, Pacific Northwest National Laboratory, Department of Energy
- Chair of the Scientific and Technical Council of the International Risk Governance Council
- 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
- Member of The Alternative Energy Future Committee, American Academy of Arts and Sciences
- 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
- 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 Ibrenk 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 CO<sub>2</sub>," *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 CO<sub>2</sub> 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.
- CCSP, 2009: *Best Practice Approaches for Characterizing, Communicating, and Incorporating Scientific Uncertainty in Decisionmaking*. [M. Granger Morgan (Lead Author), Hadi Dowlatabadi, Max Henrion, David Keith, Robert Lempert, Sandra McBride, Mitchell Small, and Thomas Wilbanks (Contributing Authors)]. A Report by the Climate Change Science Program and the Subcommittee on Global Change Research. National Oceanic and Atmospheric Administration, Washington, DC, 96pp, 2009.
- Robert L. Gresham, Sean T. McCoy, Jay Apt, and M. Granger Morgan, "Implications of Compensating Property-Owners for Geologic Sequestration of CO<sub>2</sub>," *Environmental Science & Technology*, 44, 2897-2903, 2010.
- 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 CO<sub>2</sub> 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.
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- Jean-Pierre Gattuso, Katharine J. Mach and Granger Morgan, "Ocean Acidification and Its Impacts: An expert survey," *Climatic Change*, DOI 10.1007/s10584-012-0591-5 (published online: October 02, 2012).
- 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.
- Kelly Klima, Ning Lin, Kerry Emanuel and M. Granger Morgan, "Hurricane Modification and Adaptation in Miami-Dade County, Florida," *Environmental Science & Technology*, 46(2), 636-642, 2012.
- 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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- "Some Methodological Issues in Estimating the Social Costs of the Energy System" BEAG-HH/EE 19/75, Brookhaven National Laboratory, Upton, NY, 1975 June.
- "Human Responses to Sulfur Pollutants: Proceedings of a Computer-Based Conference," edited with S.C. Morris, Brookhaven National Laboratory, Upton, NY, BNL 20328, 1975.
- M. Granger Morgan and Samuel C. Morris, "Some Thoughts on the Role of Individual Air Pollution Monitors in Epidemiological Studies of the Health Effects of Air Pollution," working paper prepared for a workshop on the Assessment of Research Needs in Individual Air Pollution Monitors for Ambient Air, BEAG, Brookhaven National Laboratory, Upton, NY, 1975 May.
- M. Granger Morgan and Samuel C. Morris, "A Review of Some Air Pollution Instrumentation Techniques Which May Hold Potential for Use in the Development of Individual Air Pollution Monitors," working paper prepared for workshop on the Assessment of Research Needs in Individual Air Pollution Monitors for Ambient Air, BEAG, Brookhaven National Laboratory, Upton, New York, 1975 May.
- M. Granger Morgan, "Sulfur Dioxide Damage to Alfalfa: A Case Study of the Limits to Single Valued Damage Functions," in ERDA/National Laboratories Workshop in Environmental Effects of Energy, BNL-20701, 102-115, Brookhaven National Laboratory, Upton, N.Y., 1975.
- M. Granger Morgan and Samuel C. Morris, "Individual Air Pollution Monitors: An Assessment of Research Needs," *Proceedings of the International Conference on Environmental Sensing and Assessment*, IEEE Catalogue No. 75-CH1004 ICESA, 1975 September.
- Individual Air Pollution Monitors: An Assessment of National Research Needs, Report of a Workshop held at Brookhaven National Laboratory, July 8-10, 1975; Brookhaven National Laboratory, Upton, New York, BNL 50482, 1976, January.
- Robert Dunlap, M. Granger Morgan, and Cynthia B. Wilson, "A Review of Technology/Public Policy Education," prepared for the Sloan Foundation sponsored Amelia Island Seminar on Education for Public Service, Carnegie Mellon University, Pittsburgh, PA, 1976 June.
- M. Granger Morgan, S.N. Talukdar, A.C. Parket and D.T. Tuma, "Social Impacts of Advanced Domestic Load Management Systems; Some Preliminary Assessments and Recommendations," *Proceedings of the Frontiers of Power Technology Conference*, Oklahoma State University, 1976, October.
- M. Granger Morgan, "Individual Air Pollution Monitors, 2: Examination of some non-occupational research regulatory uses and needs," Brookhaven National Laboratory, Upton, New York, BNL 10637, 1977 April.

- M. Granger Morgan, "Technical Uncertainty in the Policy Making Process," approximate transcript of a luncheon address, 6th Annual Conference of the Institute for Environmental Quality, State of Illinois, Champaign, IL, 1977 October.
- M. Granger Morgan, "Technical Uncertainty in the Policy Making Process," transcript of a luncheon address delivered to the 6th Annual Conference of the Institute for Environmental Quality, State of Illinois, Champaign, Illinois, 1977 October 25.
- M. Granger Morgan, Engineering School Graduate Programs in Technology and Public Policy, *Proceedings of the Engineering Foundation Conference "Engineering Graduate Programs: Future Directions,"* Heneker, New Hampshire, 1978 July 11.
- D. Markus, S. Talukdar and M. Granger Morgan, "Generic Models of Power System Networks," *Proceedings of the Pittsburgh Modeling and Simulation Conference*, Pittsburgh, 1978.
- M. Granger Morgan, "Policy Analysis: Some Strengths and Limitations of an Engineering Perspective," approximate transcript of a presentation in a series on "Contributions of Policy Analysis to Science and Technology Policy," George Washington University, 1979 January 24.
- "Working Paper 1 for Carnegie Mellon/Brookhaven National Lab Workshop on Eliciting and Using Subjective Expert Judgments Stated in Probabilistic Terms for Policy Analysis on Energy and Environmental Systems," Carnegie Mellon, 1979 June.
- "Expert Judgment for Policy Analysis: report of an invitational workshop held at Brookhaven National Laboratory," 1979 July 8-11, to explore problems and research needs in eliciting and using subjective probabilistic expert judgments for policy analysis involving energy and environmental systems, Brookhaven National Laboratory, BNL 51358, 1980.
- "Substituting Information Technologies for Energy-Intensive Technologies," final report to the National Science Foundation on Grant MCS-7623693, 1981 Fall.
- "Technological Uncertainty in Policy Analysis: final report on a case study directed at exploring long-range transport and possible health impacts of sulfur air pollution from coal-fired power plants" to the National Science Foundation on Grant PRA-7913070, with Deborah A. L. Amaral, Max Henrion and Samuel C. Morris, Carnegie Mellon/Engineering and Public Policy, 1982 August. NTIS Order Number PB 83165142.
- Materials for a workshop on Dealing with Uncertainty in DOE HEED Analysis held at Carnegie Mellon University, 1982 June 10-11, to provide professionals who are directly involved in HEED production with some modern techniques for characterizing and dealing with uncertainty in policy and risk analysis related to problems of energy and the environment, Carnegie Mellon/Engineering and Public Policy, 1982 June.
- M. Granger Morgan, "The Role of Decision Analysis and Other Quantitative Tools in Environmental Policy Analysis," Tutorial paper prepared for the Chemicals Division of the Environment Directorate, OECD, Paris, 1983 January.
- M. Granger Morgan, David Lincoln, Indira Nair, H. Keith Florig and others, "An Exploration of Risk Assessment Needs and Opportunities for Possible Health Effects from Exposure to 50/60 Hz Electromagnetic Fields," a draft report for the DOE Field Effects Program prepared under contract 19X-43342C, 392pp, 1983 October.
- M. Granger Morgan, Max Henrion, Indira Nair, Theresa Mullin and Charlie Wiecha, "A generic 'Pre-HEED' on characterizing and dealing with uncertainty in health and environmental risk assessment," report prepared for the U.S. DOE Health and Environmental Risk Assessment Program under contract DE-AC02-83ER60138, 1983 November.

- "Biological Effects of 60 Hz Power Transmission Lines," report of the Florida Electric and Magnetic Fields Science Advisory Commission (H.B. Graves, T. Dan Bracken, Jerry Griffin, John de Lorge, M. Granger Morgan, Thomas S. Tenforde) to the Florida Department of Environmental Regulation, Tallahassee, Florida 32301, 1985 January.
- M. Granger Morgan, H. Keith Florig, Indira Nair and David R. Lincoln, "Some First Steps Toward Assessing Possible Health Risks from Exposure to 50/60 Hz Electromagnetic Fields," in *Interaction of Biological Systems with Static and ELF Electric and Magnetic Fields*, L.E. Anderson, B.J. Kelman, and R.J. Weigel (eds.), Proceedings of the 23rd Hanford Life Sciences Symposium, Battelle Pacific Northwest Laboratories, Richland, Washington, CONF-84, 1984.
- H. Keith Florig, James F. Hoburg, and M. Granger Morgan, "Electrically-Induced Body Surface Fields and Average Internal Currents Associated with the Use of Electrically-Heated Bedding," paper presented to the annual meeting of the Bioelectromagnetics Society, San Francisco, CA, 1985 June.
- M. Granger Morgan, "When Should We Say Enough?," a background paper on the subject of "stopping rules" for activities related to possible health risks from exposure to the electric and magnetic fields associated with electric power, Department of Engineering and Public Policy, Carnegie Mellon University, 1985 October.
- M. Granger Morgan (Panel Chairman), National Research Council Panel Report, "Scientific Basis for Risk Assessment and Management of Uranium Mill Tailings," D.J.A. van Zyl et al. (eds.) in *Geotechnical & Geohydrological Aspects of Waste Management*, 7-13, 1987.
- H. Keith Florig, Indira Nair and M. Granger Morgan, "Briefing Paper 1: Sources and Dosimetry of Power-Frequency Fields," a policy guidance paper prepared for the Florida Department of Environmental Resources Under DER Contract Number SP117, Department of Engineering and Public Policy, Carnegie Mellon University, 1987 March.
- M. Granger Morgan, Indira Nair, H. Keith Florig and Gordon L. Hester, "Briefing Paper 2: A Framework for Thinking About, and Making Regulatory Decisions About, Power-Frequency Electromagnetic Fields," a policy guidance paper prepared for the Florida Department of Environmental Resources Under DER Contract Number SP117, Department of Engineering and Public Policy, Carnegie Mellon University, 1987 March.
- M. Granger Morgan, H. Keith Florig, Indira Nair and Gordon L. Hester, "Briefing Paper 3: Control Strategies for Power-Frequency Electromagnetic Fields Which Do Not Require a Measure of Dose," a policy guidance paper prepared for the Florida Department of Environmental Resources Under DER Contract Number SP117, Department of Engineering and Public Policy, Carnegie Mellon University, 1987 March.
- M. Granger Morgan, H. Keith Florig, Indira Nair and Gordon L. Hester, "Briefing Paper 4: Moving from General Policy Advice to Practical Regulations," a policy guidance paper prepared for the Florida Department of Environmental Resources Under DER Contract Number SP117, Department of Engineering and Public Policy, Carnegie Mellon University, 1987 June.
- M. Granger Morgan, "Quantitative Studies of Environmental Risk: An overview," in *Health & Environmental Research on Complex Organic Mixtures*, R.H. Gray, E.K. Chess, P.J. Mellinger, R.G. Riley and D.L. Springer (eds.), Proceedings of the 24th Hanford Life Sciences Symposium, Battelle Pacific Northwest Laboratories, 667-682, 1987.
- M. Granger Morgan, "Assessing, Managing, and Communicating About the Possible Risks of Exposure to 60 Hz Fields," *Proceedings of the American Statistical Association Conference on Radiation and Health*, 113-117, Copper Mountain, Colorado, 1989 July 9-13.
- Xiao-lin Xi, Edward S. Rubin and M. Granger Morgan, "Coal Use in China and Its Environmental Implications," *Proceedings of the Sixth Annual International Pittsburgh Coal Conference*, Volume 1, 202-211, 1989 September 26-29.

- Indira Nair, M. Granger Morgan and H. Keith Florig, "Biological Effects of Power Frequency Electric and Magnetic Fields," Background Report, Office of Technology Assessment, U.S. Congress, OTA-BP-E-53, U.S. Government Printing Office, Washington, DC, 1989.
- M. Granger Morgan, "Research in Engineering and Public Policy at Carnegie Mellon: Three case examples," *Proceedings of the NISTEP International Conference on Science, Technology and Policy Research*, Shimoda, Japan, 1990 February 2-4.
- Indira Nair and M. Granger Morgan, "Technology and People: Raising the awareness of engineering freshmen," *CIT*, 9, 6-9, 1990 Spring/Summer.
- M. Granger Morgan and Max Henrion, "Characterizing and Analyzing Uncertainty: Lessons for science policy studies drawn from the field of risk analysis," *Proceedings of the NISTEP 2nd International Conference on Science and Technology Policy Research - What Should be Done? What Can Be Done?* in Oiso, Japan, 1991 January 24-26.
- Ann Bostrom, Cynthia J. Atman, Baruch Fischhoff and M. Granger Morgan, "Public Knowledge About Indoor Radon: The effects of risk communication," in *Decision Making Under Risk and Uncertainty: New Models and Empirical Findings, Volume 22*, John Geweke (ed.), Kluwer Academic Publishers, 240pp, 1992. Proceedings of the Fifth International Conference on the Foundation and Applications of Utility, Risk, and Decision Theories held at Duke University in June 1990.
- M. Granger Morgan, "Power-Frequency Fields: Issues in risk perception, communication, assessment, and management," in *Proceedings of the 1992 World Congress for Electricity and Magnetism in Biology and Medicine*, June 15, 1992, Orlando, Florida, 1993.
- Jun Zhang, Jack Adams, M. Granger Morgan, and Indira Nair, "Estimates of Exposure Reduction Supply Curves for Several Different Effects Functions," in *Proceedings of the 1992 World Congress for Electricity and Magnetism in Biology and Medicine*, June 15, 1992, Orlando, Florida, 1993.
- 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.
- M. Granger Morgan, "Integrated Assessment of Climate Change," 57-77, in *Global Climate Change: Science, Policy, and Mitigation Strategies*, C.V. Mathai and Gary Stensland (eds.), Proceedings of the Air & Waste Management Association International Specialty Conference, Phoenix, Arizona, April 5-8, 1994.
- M. Granger Morgan, "Public Perception, Understanding, and Values," in *The Industrial Green Game: Implications for environmental design and management*, D.J. Richards (ed.), Proceedings of the National Academy of Engineering's International Conference on Industrial Ecology in May 1994, National Academy of Sciences, 269pp, 1997.
- M. Granger Morgan and colleagues, "Carnegie Mellon's Department of Engineering and Public Policy," *Int. J. Technology Policy and Management*, 1(2), 138-150, 2001. A presentation prepared for the 3rd International Conference on Technology Policy and Innovation, Austin, TX, August 30-September 2, 1999.
- D.W. Keith and M.G. Morgan, "Industrial Carbon Management: A Review of the Technology and Its Implications for Climate Policy," Aspen Global Change Institute, 2002.
- M. Granger Morgan and Hadi Dowlatabadi, "Integrated Assessment: A tool for policymaking," in *Evaluating Climate Change Action Plans*, C. White, W. Petry, and W. Wagner (eds.), Kluwer Academic/Plenum Publishers, 281pp, 1996. Proceedings of the National Actions for International Commitment: Evaluating Climate Change Action Plans Conference, November 30-December 2, 1994, Washington, DC.

- 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 2<sup>nd</sup> International Conference on Technology and Policy and Innovation, Lisbon, Portugal, August 3-5, 1998.
- Lave, L.B., J. Apt, and M.G. Morgan, *Worst Case Electricity Scenarios: The Benefits & Costs of Prevention in CREATE*, 2005, University of Southern California, Los Angeles.
- Granger Morgan, Jay Apt, Lester Lave, "The U.S. Electric Power Sector and Climate Change Mitigation," a report prepared for the Pew Center on Global Climate Change, 84pp, June 2005.
- Apt, J. and M.G. Morgan, *Critical Electric Power Issues in Pennsylvania: Transmission, Distributed Generation, and Continuing Services when the Grid Fails*, 2005, Commonwealth of Pennsylvania: Harrisburg, Pennsylvania, 102pp.
- Apt, J., D. Hoffmann, H. Kunreuther, E. Michel-Kerjan, and M.G. Morgan, *The Insurance Industry and Climate Change* (white paper) Carnegie Mellon University: Pittsburgh, 19pp, 2006.
- 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.

## 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*, November 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*, 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

### **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.
19. Eric H. Arnett, "Gunboat Diplomacy and the Bomb: Nuclear Proliferation and the U.S. Navy," 1988 July.
20. Martin Weiss, "Technological Choice in Voluntary Standards Committees: An empirical analysis," 1988 December.
21. Ike Ezekoye, "An Examination of the Prospects for Widescale Use of Methanol in Motor Fuels: Technical, economic and policy issues," 1989 May.
22. Gordon Hester, "Three Perspectives on Institutional Arrangement for Making Decisions About Managing Technological Risks," 1989 December.

23. Urbano A. Lopez Gomez, "Communicating Very Low Probability Events," 1990 May.
24. Cynthia J. Atman, "Network Structures as a Foundation for Risk Communication: An investigation of structure and format differences," 1990 August.
25. Kathryn Jackson, "Building a Better Mouse: Examination of product development processes product design quality in the cursor control industry," 1990 August.
26. Ann H. Bostrom, "A Mental Models Approach to Exploring Perceptions of Hazardous Processes," 1990 September.
27. David P. Reed, "An Engineering, Economic and Public Policy Analysis of Integrated Broadband Networks in Subscriber Loop: Interdisciplinary Implications for the Telephone Company/Cable Television Cross Ownership Debate," 1991 May.
28. Jayant Kalagnanam, "The Qualitative Analysis of Systems Behavior," 1991 May.
29. Jon Merz, "Toward a Standard of Disclosure for Medical Informed Consent: Development and demonstration of a decision-analytic methodology," 1991 August.
30. Lan Xue, "Technology Choice and Manufacturing Performance: An empirical analysis of the implementation of computer integrated manufacturing technologies," 1991 August.
31. Michael Maharik, "Public Perceptions of the Risks of an Unfamiliar Technology: The case of using nuclear energy sources for space missions," 1992 May.
32. Robert Axtell, "Theory of Model Aggregation for Dynamical Systems with Application to Problems of Global Change," 1992 December.
33. Xiaolin Xi, "Energy System Development and CO<sub>2</sub> Emissions in China," 1992 December.
34. Marek J. Druzdzel, "Probabilistic Reasoning in Decision Support Systems: From computation to common sense," 1992 December.
35. Jun Zhang, "A Parametric Approach to the Quantitative Assessment of Possible Health Risks from Power Frequency Fields," 1993 May.
36. Anand Patwardhan, "Incorporating Time Dynamics and Uncertainty in Policy Analysis: Evaluating responses to sea-level change," 1993 May.
37. Hector Salgado, "A Simulation Analysis on Dynamic Channel Assignment for Open Access Personal Communication Services," 1993 December.
38. Irving Lachow, "The Global Positioning System: Managing the tension between defense needs and civilian applications," 1994 May.
39. Hubert Vasseur, "Manufacturing Quality and Process Precision: A cost-based analysis," 1994 August.
40. Milind Kandlikar, "Reconciling Uncertainties in Integrated Science and Policy Models: Applications to global climate change," 1994 December.
41. Laura Painton, "Combinatorial Optimization Under Uncertainty with Applications to Engineering Synthesis and Design Reliability Models," 1994 December.
42. William Wescott, "The Influence of Organizational Factors on the Effectiveness of Environmental Management," 1995 May.
43. Joseph Mertz, "Using a Cognitive Architecture to Design Instructions," 1995 May.

44. Luis Cifuentes, "Social Costs of Air Pollution Related Mortality," 1995 May.
45. Richard Sonnenblick, "A Framework for Improving the Cost-Effectiveness of Demand-Side Management Program Evaluations," December 1995.
46. Lucien Randazzese, "The Activity and Performance of University-Industry Research Centers in the United States," December 1995.
47. Peter Ashcroft, "Integration of Air and Ground-based Methane Measurements with those of the NASA earth observing system," May 1996.
48. Elena Shewliakowa, "An Application of Statistical Methods for Modeling Impacts of Climate Change on Terrestrial Ecosystems," May 1996.
49. Paul Parfomak, "Electricity Conservation Programs: Empirical Studies of Impacts and Cost-Effectiveness," 1996 May.
50. Linda (Jean) Camp, "Privacy and Reliability in Internet Commerce," 1996 August.
51. Garrick Louis, "A Systems Evaluation of Regional Integrated Municipal Solid Waste Management in the North Eastern United States," 1996 August.
52. John Howard, "An Analysis of Security Incidents on the Internet 1989-1995," 1997 May.
53. Karen Jenni, "Attributes for Risk Evaluation," 1997 May.
54. Charles Linville, "General Methodology/Modeling/Computer-based Tools," 1998 May.
55. Vasiliki Hartonas-Garmhausen, "Formal Verification of Computer Systems," 1998 August.
56. Rahul Tongia, "Energy Development Especially for Third-World Countries," 1998 August.
57. Daniel Teitelbaum, "Intelligent Agents for the Study of Technological Change and Pollution Control," 1998 August.
58. John Chung-I Chuang, "Economies of Scale in Information Dissemination Over the Internet," 1998 December.
59. Kara Morgan, "The Development and Evaluation of a Risk Ranking Method," 1999 May.
60. James Corbett, "An Assessment of Air Pollution and Environmental Impacts from International Maritime Transportation Including Engineering Controls and Policy Alternatives," 1999 May.
61. Hiroshi Hayakawa, "Automobile Risk Perceptions and Insurance-Purchasing Decisions: A Japan-US Comparison During Deregulation," May 2000.
62. Kathy Notarianni, "The Role of Uncertainty in Improving Fire Protection Regulation," 2000 May.
63. Neil Strachan, "Adoption and Supply of a Distributed Energy Technology," 2000 December.
64. Guodong Sun, "Effectiveness, Efficiency, and Governance: An integrated study of China's air pollution management," 2001 May.
65. SHUI Bin, "Consumer Lifestyles Approach: A paradigm for understanding the role of consumers in energy use and environmental impacts," 2002 May.

66. Henry Willis, "Ecological Risk Perception and Ranking: Toward a method for improving public participation in environmental decision making," 2002 August.
67. Timothy Johnson, "Electricity Without Carbon Dioxide: Assessing the role of carbon capture and sequestration in US electric markets," 2002 August.
68. Anshu Bharadwaj, "Biomass Gasification and Combustion Technologies and Their Application to Rural Power Systems in India," 2002 December.
69. Felicia Wu, "Bt or Not Bt? Tools for Regulatory Decision Making Concerning Genetically Modified (Bt) Corn," 2002 December.
70. Bert Neal Davis, "A Technical and Policy Analysis of Building Integrated PV Systems," 2002 December.
71. Anand B. Rao, "A Technical, Environmental, and Economic Assessment of Amine-Based Carbon Capture Technologies for Greenhouse Gas Control," 2003 December.
72. Hisham Zerriffi, "Electric Power Systems Under Stress: An evaluation of centralized versus distributed system architectures," 2004 August.
73. Joseph DeCarolis, "The Economics and Environmental Impacts of Large-Scale Wind Power in a Carbon Constrained World," 2004 December.
74. Elizabeth Wilson, "Managing the Risks of Geologic Carbon Sequestration: A regulatory and legal analysis," 2004 December.
75. Graham W. Strauss, "Portable Electronic Devices Onboard Commercial Aircraft: Assessing the risks," 2005 May.
76. Shalini P. Vajjhala, "Mapping Alternatives: Facilitating Citizen Participation in Development Planning and Environmental Decision Making," 2005 July.
77. Claudia N. Gonzalez-Brambila, "Exploring Academic Scientific Productivity for the Design of Public Policies," 2005 December.
78. Joan French Adams, "A Study of Polymer Innovation in the Chemical Industry," 2005 December.
79. Ketra Schmitt, "Combining Information in Human Health Risk Assessment," May 2006.
80. Rajiv Sharma, "Understanding and Improving the Flow of Islamic Students Into Technical Education in Andhra Pradesh, India," August 2006.
81. Douglas King, "Electric Power Micro-grids: Opportunities and Challenges for an Emerging Distributed Energy Architecture," August 2006.
82. Jacqueline MacDonald, "Risks of Unexploded Ordnance (UXO) at Former Military Training Ranges: Mathematical Modeling and Assessment," May 2007.
83. Paul Hines, "A Decentralized Approach to Reducing the Social Costs of Cascading Failures," August 2007.
84. John Dawson, "Response of Regional and Urban Air Quality to Global Climate Change," December 2007.
85. Pavan Racherla, "The Sensitivity of Ozone and Fine Particulate Matter Concentrations to Global Change at Different Spatiotemporal Scales," December 2007.
86. Brian J. Fifarek, "Globalization, Offshoring and the Location of Innovation: A case study of rare earth technology," May 2008.

87. Sean T. McCoy, "The Economics of CO<sub>2</sub> Transport by Pipeline and Storage in Saline Aquifers and Oil Reservoirs," May 2008.
88. Christopher Weber, "Trade, Consumption, and Climate Change: An input-output study for the United States," May 2008.
89. Rahul S. Walawalkar, "Economics of Emerging Electric Energy Storage Technologies and Demand Response in Deregulated Electricity Markets," May 2008.
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