

MORT DAVID WEBSTER

Associate Professor

Engineering Systems Division
MIT Joint Program on the Science and Policy of Global Change
Massachusetts Institute of Technology
E40-235, 77 Massachusetts Avenue
Cambridge, MA 02139
(617) 253-3901
mort@mit.edu

EDUCATION

Massachusetts Institute of Technology

Ph.D. Engineering Systems Division, February 2000.

Major field: Technology, Management and Policy

Diss. title: *Uncertainty and Learning in Sequential Decision-Making: The Case of Climate Policy.*

Committee: Prof. Henry Jacoby, Prof. Gordon Kaufman, and Prof. Greg McRae

Massachusetts Institute of Technology

M.S. – Technology and Policy Program, June 1996.

University of Pennsylvania

B.S.E. - Computer Science and Engineering, June 1988

PROFESSIONAL EXPERIENCE

Assistant Professor, Engineering Systems Division, Massachusetts Institute of Technology, July 2008 – present.

Visiting Professor, Department of Earth Atmosphere and Planetary Sciences, Massachusetts Institute of Technology, July 2006 – June 2008.

Assistant Professor of Public Policy, Department of Public Policy, University of North Carolina at Chapel Hill, July 2001 – June 2006.

Post-doctoral Research Associate, MIT Joint Program on the Science and Policy of Global Change, Massachusetts Institute of Technology, March 2000 – June 2001.

Research Assistant, MIT Joint Program on the Science and Policy of Global Change, Massachusetts Institute of Technology, October 1994 – February 2000.

Research Assistant, Energy Laboratory, Massachusetts Institute of Technology, September 1993 - September 1994.

Software Engineer, Unisys, Co., Kyoto, Japan, April 1991 - August 1993.

Visiting Research Fellow, Department of Electrical Engineering, Kyoto University, April 1989 - October 1990.

Lab Coordinator, LINC Laboratory for Artificial Intelligence, Computer and Information Sciences Department, University of Pennsylvania, June 1988 - March 1989

PUBLICATIONS (Peer-reviewed articles)

- Parpas, P. and Webster, M. (2014). A stochastic multiscale model for electricity generation capacity expansion. *European Journal of Operational Research* **232** (2): 359-374.
- Felgenhauer, T. and Webster, M. (2013) Multiple Adaptation Types with Mitigation: A Framework for Policy Analysis. *Global Environmental Change*. (in press).
- Webster, M., Donohoo, P., and Palmintier, B. (2013). Water-CO₂ Tradeoffs in Electricity Generation Planning. *Nature Climate Change* (in press). DOI: 10.1038/nclimate2032.
- Popp, D., Santen, N., Fisher-Vanden, K. and Webster, M. (2013). Technology Variation vs. R&D Uncertainty: What Matters Most for Energy Patent Success? *Resource and Energy Economics* (in press). DOI: 10.1016/j.reseneeco.2013.05.002.
- Pacsi, A.P., Alhajeri, N.S., Webster, M.D., Webber, M.E. and Allen, D.T. (2013). Changing the spatial location of electricity generation to increase water availability in areas with drought: a feasibility study and quantification of air quality impacts in Texas. *Environ. Res. Lett.* **8** 035029.
- Panos, P. and Webster, M. (2013). A stochastic minimum principle and a meshfree method for stochastic optimal control. *Automatica* **49** (6): 1663-1671.
- Webster, M.D., Santen, N.R. and Parpas, P. (2012). An approximate dynamic programming framework for modeling global climate policy under decision-dependent uncertainty. *Computational Management Science* **9**: 339–362.
- Sun, L., Webster, M., McGaughey, G., McDonald-Buller, E.C., Thompson, T., Prinn, R., Ellerman, A.D. and Allen, D.T. (2012). Flexible NO_x Abatement from Power Plants in the Eastern United States. *Environmental Science and Technology* **46** (10): 5607–5615.
- Webster, M., A.P. Sokolov, J.M. Reilly, C.E. Forest, S. Paltsev, A. Schlosser, C. Wang, D. Kicklighter, M. Sarofim, J. Melillo, R.G. Prinn and H.D. Jacoby (2012). Analysis of Climate Policy Targets under Uncertainty. *Climatic Change* **112** (3): 569-583.
- Alhajeri, N.S., Donohoo, P., Stillwell, A.S., King, C.W., Webster, M.D., Webber, M.E. and Allen, D.T. (2011). Using Market-Based Dispatching With Environmental Price Signals to Reduce Emissions and Water Use at Power Plants in the Texas Grid. *Environmental Research Letters* **6** 044018.
- Webster, M. D., Sue Wing, I., and L. Jakobavits (2010). Second-Best Instruments for Near-Term Climate Policy: Intensity Targets vs. the Safety Valve. *Journal of Environmental Economics and Management* **59** (2010) 250–259.
- Webster, M. D., Paltsev S., and J. M. Reilly (2010). “The Value of Emissions Trading.” *Energy Policy* **38** (2010): 1787-1796.

- Selin, N.E., S. Wu, K.-M. Nam, J.M. Reilly, S. Paltsev, R.G. Prinn and M.D. Webster (2009). Global Health and Economic Impacts of Future Ozone Pollution. *Environmental Research Letters* **4** (2009) 044014: 1-9.
- Sokolov, A.P., P.H. Stone, C.E. Forest, R. Prinn, M.C.Sarofim, M.D. Webster, S. Paltsev, C.A. Schlosser, D. Kicklighter, S. Dutkiewicz, J. Reilly, C. Wang, B. Felzer, H.D. Jacoby (2009). "Probabilistic Forecast for 21st Century Climate based on Uncertainties in Emissions (without Policy) and Climate Parameters." *Journal of Climate* **22**: 5175-5204.
- Webster, M. D. (2009). "Uncertainty and the IPCC: An Editorial Comment." *Climatic Change* **92**: 37-40.
- Webster, M. D. (2008). "Incorporating Path-Dependency into Decision Analytic Methods: An Application to Global Climate Change Policy." *Decision Analysis* **5** (2): 60-75.
- Webster, M. D., Paltsev S., and J. M. Reilly (2008). "Autonomous Efficiency Improvement or Income Elasticity of Energy Demand: Does it Matter?" *Energy Economics* **30** (2008): 2785–2798.
- Webster, M.D., L. Jakobovits, and J. Norton (2008). "Learning about Climate Change and Implications for Near-term Policy." *Climatic Change* **89** (1-2): 67-85.
- Oppenheimer, M., B. C. O'Neill, and M.D. Webster (2008). "Negative Learning and Global Environmental Change." *Climatic Change* **89** (1-2): 155-172.
- Nam, J., M.D. Webster, Y. Kimura, H. Jeffries, W. Vizuette, and D.T. Allen (2008). "Reductions in ozone concentrations due to controls on variability in industrial flare emissions in Houston, Texas." *Atmospheric Environment* **42**: 4198-4211.
- Scott, J., A. Sokolov, P. Stone, and M. Webster (2008). "Relative roles of climate sensitivity and forcing in defining the ocean circulation response to climate change." *Climate Dynamics* **30**: 441–454.
- Webster, M.D., J. Nam, Y. Kimura, H. Jeffries, W. Vizuette, and D.T. Allen (2007). "The effect of variability in industrial emissions on ozone formation in Houston, Texas." *Atmospheric Environment* **41** (40) 9580–9593.
- Webster, M. D., J. Scott, A. Sokolov, S. Dutkiewicz, and P. Stone (2007). "Estimating Probability Distributions from Complex Models with Bifurcations: The Case of Ocean Circulation Collapse." *Journal of Environmental Systems* **31** (1): 39-59.
- Oppenheimer, M., B. C. O'Neill, M.D. Webster, and S. Agrawala (2007). "The Limits of Consensus." *Science* **317** (14 September 2007): 1505-1506.

- Webster, M. D. and C.-H. Cho (2006). "Analysis of Variability and Correlation in Long-term Economic Growth Rates" *Energy Economics* **28** (5-6) 653-666.
- O'Neill, B., et al. (2006). "Learning and Climate Change." *Climate Policy* **6** (2006): 585-589.
- Webster, M. D. (2003). "Communicating Climate Change Uncertainty to Policy-makers and the Public" *Climatic Change* **61** (1-2) 1-8.
- Webster, M. D., Forest, C., Reilly, J., Babiker, M., Kicklighter, D., Mayer, M., Prinn, R., Sarofim, M., Sokolov, A., Stone, P., Wang, C. (2003). "Uncertainty Analysis of Climate Change and Policy Response", *Climatic Change* **61** (3) 295-320.
- Webster, M. D. (2002). "The Curious Role of Learning: Should We Wait for More Data?" *The Energy Journal* **23** (2), 97-119.
- Webster, M.D., M. Babiker, M. Mayer, J.M. Reilly, J. Harnisch, M.C. Sarofim, and C. Wang (2002). "Uncertainty in Emissions Projections for Climate Models." *Atmospheric Environment* **36** (22) 3659-3670.
- Forest, C.E., P.H. Stone, A.P. Sokolov, M.R. Allen, M.D. Webster (2002). "Quantifying Uncertainties in Climate System Properties using Recent Climate Observations." *Science* **295**(5552): 113-117.
- Reilly, J.M., P.H. Stone, C.E. Forest, M.D. Webster, H.D. Jacoby, and R.G. Prinn (2001). "Uncertainty in Climate Change Assessments." *Science* **293** (5529): 430-433.
- Webster, M. D. and A. P. Sokolov (2000). "A Methodology for Quantifying Uncertainty in Climate Projections." *Climatic Change* **46**(4) 417-446.
- Mayer, M., C. Wang, M. D. Webster, and R. Prinn (2000). "Linking Local Air Pollution to Global Chemistry and Climate." *Journal of Geophysical Research* **105**(D18): 22,869-22,896.
- Valverde, L. J. A. and M. D. Webster (1999). "Stabilizing Atmospheric CO₂ Concentrations: Technical, Political, and Economic Dimensions." *Energy Policy*, **27**: 613-622.
- Calbo, J., W. Pan, M. D. Webster, G. J. McRae, and R. Prinn (1998). "Parameterization of urban subgrid scale processes in global atmospheric chemistry models." *Journal of Geophysical Research* **103**(D3): 3437.

BOOKS

- Ellerman, A. D., M. D. Webster, J. Parsons, H. D. Jacoby, M. McGuinness (2008). *Cap-and-Trade: Contributions to the Design of a U.S. Greenhouse Gas Program*. MIT Center for Energy and Environmental Policy Research, Cambridge, MA, 100pp.

BOOK CHAPTERS

Webster, M. D. (2007). “Boiled Frogs, Hysteresis, and Path-Dependency in Climate Policy Decisions”, Chapter 29 in [Schlesinger, M., H. Kheshgi, J. Smith, F. de la Chesnaye, J. Reilly, C. Kolstad, and T. Wilson, eds.] *Human-Induced Climate Change: An Interdisciplinary Assessment*, Cambridge University Press, pp. 355-364.

GOVERNMENT REPORTS

Parson, E., V. Burkett, K. Fisher-Vanden, D. Keith, L. Mearns, H. Pitcher, C. Rosenzweig, M. Webster (2007). Global Change Scenarios: Their Development and Use. Sub-report 2.1b of Synthesis and Assessment Product 2.1 by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. Department of Energy, Office of Biological & Environmental Research, Washington DC., USA, 154pp.

PAPERS SUBMITTED/IN REVIEW

Felgenhauer, T. and Webster, M. (2012) Modeling Adaptation as a Flow and Stock Decision with Mitigation. *Climatic Change*. (Revise-and-Resubmit).

Parpas, P., Ustun, B. and Webster, M. (2012). Importance Sampling in Stochastic Programming: A Markov Chain Monte Carlo Approach. *INFORMS Journal on Computing*. (Revise-and-Resubmit).

Palmintier, B. and Webster, M. (2013). Heterogeneous Unit Clustering for Efficient Operational Flexibility Modeling. *IEEE Transactions on Power Systems* (Revise-and-Resubmit).

Palmintier, B. and Webster, M. (2013). Impact of Operational Flexibility on Generation Planning. *IEEE Transactions on Power Systems* (in review).

Díaz, C.A., Webster, M., Villar, J. and Campos, F.A. (2013). Market Power in ERCOT System: a Fundamental CSFE with Network Constraints. *IEEE Transactions on Power Systems* (in review).

Jacquillat, A, Odoni, A.R. and Webster, M.D. (2013). Dynamic Control of Runway Configurations and of Arrival and Departure Service Rates at JFK Airport under Stochastic Queue Conditions. *Transportation Science* (in review).

DISCUSSION PAPERS (Unpublished)

Morris, J. and Webster, M. (2013). Electricity Generation and Emissions Reduction Decisions under Uncertainty: A General Equilibrium Analysis. Working Paper.

- Eide, J., de Sisternes, F., Herzog, H. and Webster, M. (2013). CO₂ emissions standards and investment in carbon capture. Working Paper.
- Levy, T., Webster, M. and Allen, D. (2013). Temporal and Spatial Considerations in Emissions Reductions due to Increased Renewables. Working Paper.
- Santen, N.R., Webster, M.D., Popp, D. and Perez-Arriaga, I. (2013). Inter-temporal R&D and capital investment portfolios for the electricity industry's low carbon future. Working Paper.
- Jacquillat, A, Odoni, A.R. and Webster, M.D. (2013). Dynamic Control of Runway Configurations and of Arrival and Departure Service Rates at JFK Airport under Stochastic Queue Conditions. Working Paper.
- Palmintier, B. and Webster, M. (2013). Impact of Operational Flexibility on Generation Planning. Working Paper.
- De Sisternes, F.J. and Webster, M.D. (2013) Selection of Sample Weeks for Approximating the Net Load in Generation Planning Problems. Working Paper.
- Palmintier, B. and Webster, M. (2013). Heterogeneous Unit Clustering for Efficient Operational Flexibility Modeling. Working Paper.
- Popp, D., Santen, N., Fisher-Vanden, K. and Webster, M. (2012). Technology Variation vs. R&D Uncertainty: What Matters Most for Energy Patent Success? NBER Working Paper No. 17792, January 2012. URL: <http://www.nber.org/papers/w17792>.
- Pena-Alcaraz, M., Webster, M. and Ramos, A. (2011). An approximate dynamic programming approach for designing train timetables. (Working Paper). Available at: <http://esd.mit.edu/WPS/2011/esd-wp-2011-11.pdf>
- Webster, M.D., Santen, N.R. and Pappas, P. (2011). An approximate dynamic programming framework for modeling global climate policy under decision-dependent uncertainty. (Working Paper). Available at: <http://esd.mit.edu/WPS/2011/esd-wp-2011-12.pdf>.
- Webster, M., A.P. Sokolov, J.M. Reilly, C.E. Forest, S. Paltsev, A. Schlosser, C. Wang, D. Kicklighter, M. Sarofim, J. Melillo, R.G. Prinn and H.D. Jacoby. 2009. Analysis of Climate Policy Targets under Uncertainty. MIT Joint Program Report #180, MIT Joint Program on the Science and Policy of Global Climate Change, Cambridge, MA.
- Selin, N., Paltsev, S., Sokolov, A., Wang, C., and Webster, M. (2011). "Implications of Climate Policies for Future Aerosol: Health and Economic Impacts." (Working Paper).
- Selin, N.E., S. Wu, K.-M. Nam, J.M. Reilly, S. Paltsev, R.G. Prinn and M.D. Webster. 2009. Global Health and Economic Impacts of Future Ozone Pollution. MIT Joint Program

Report #177, MIT Joint Program on the Science and Policy of Global Climate Change, Cambridge, MA.

Webster, M. D., S. Paltsev, J. Parsons, J. Reilly, and H. Jacoby. 2008. Uncertainty in Greenhouse Emissions and Costs of Atmospheric Stabilization. MIT Joint Program Report #165, MIT Joint Program on the Science and Policy of Global Climate Change, Cambridge, MA.

Webster, M.D. and H.D. Jacoby (2008). "Carbon Cycle Uncertainty and the Cost of Atmospheric Stabilization." (working paper).

Webster, M.D., I. Sue Wing, L. Jakobavits, and T. Felgenhauer (2008). "Uncertainty in costs and abatement from near-term carbon reduction policies in the U.S." (working paper).

Webster, M.D., J. Holak, and H.D. Jacoby (2008). "Avoiding Foreclosure of Future Climate Options." (working paper).

Allen, D., C. Murphy, Y. Kimura, W. Vizuete, T. Edgar, H. Jeffries, B.-U. Kim, M. Webster and M. Symons (2004). Draft Progress Report, Texas Environmental Research Consortium Project H-13, "Variable Industrial VOC Emissions and their impact on ozone formation in the Houston Galveston Area." April 9, 2004.

Webster, M. D. (1997). *Uncertainty in Future Carbon Emissions: A Preliminary Exploration*. Cambridge, MA, MIT Joint Program on the Science and Policy of Global Change, Report No. 30.

Webster, M. D., M. A. Tatang, and G. J. McRae (1996). *Application of the probabilistic collocation method for an uncertainty analysis of a simple ocean model*. Cambridge, MA, MIT Joint Program on the Science and Policy of Global Change, Report No. 4.

REFEREED CONFERENCE PROCEEDINGS

November 2011, "Importance Sampling in Stochastic Programming & Application to Economic Dispatch for Power Systems" Institute for Operations Research and the Management Sciences (INFORMS), Annual Conference, Charlotte, NC. Joint with Berk Ustun and Panos Parpas.

November 2011, "An Approximate Dynamic Program for Modeling Low-carbon Energy Research Investments under Uncertainty" Institute for Operations Research and the Management Sciences (INFORMS), Annual Conference, Charlotte, NC. Joint with Nidhi Santen, David Popp, and Karen Fisher-Vanden.

November 2011, "Electricity Planning with Environmental Policy Uncertainty using ADP: Carbon Policies and Renewables" Institute for Operations Research and the Management Sciences (INFORMS), Annual Conference, Charlotte, NC. Joint with Bryan Palmintier.

November 2011, "An Approximate Dynamic Programming approach for solving the Train Design Optimization Problem" Institute for Operations Research and the Management Sciences (INFORMS), Annual Conference, Charlotte, NC. Joint with Maite Pena-Alcaraz.

November 2011, "Integrating Dynamics and Uncertainty for Robust Transmission Planning" Institute for Operations Research and the Management Sciences (INFORMS), Annual Conference, Charlotte, NC. Joint with Pearl Donohoo.

Prinn, R.G., A. Sokolov, and M. Webster, 2008: Current and Future Emissions and Concentrations of Trace Gases Impacting the Stratosphere. *Eos Transactions AGU*, 89(53), Fall Meeting Supplement, Abstract A12B-03.

October 2004, "Prudent Policy or Boiling Frogs: Can Standard Two-Period Decision Models Give False Justification for Delaying Abatement?" Institute for Operations Research and the Management Sciences (INFORMS), Annual Conference, Denver, CO.

November 2003, "Air Quality Regulatory Design and Analysis Support Tools in the Presence of High Temporal Variability: The Case of Houston's CAA SIP," Association for Public Policy and Management, Annual Conference, Washington, DC.

Panel Organizer: "Issues in the Design of Cost-Effective Environmental Regulations: Connecting Theory to Application."

October 2003, "Design of Control Strategies in the Presence of High Temporal Variability in Emissions," NARSTO Emissions Inventory Conference, Austin, TX.

November 2002, "Incorporating Path-Dependency into Decision Analytic Methods: An Application to Global Climate Policy," Association for Public Policy and Management, Annual Conference, Dallas, TX.

Panel Organizer: "Global Climate Policy Choices under Uncertainty: Adapting the Analysis Tools"

INVITED LECTURES

November 2012, "Sequential Decision-Making Under Uncertainty with IAM Models Using Approximate Dynamic Programming." Integrated Assessment Modeling Consortium, Utrecht, Netherlands.

July 2012, "New Analysis Tools for Long-Term Power Systems Planning." National Renewable Energy Laboratory, Golden, CO.

May 2012, "An Approximate Dynamic Programming Framework for Long-Term Energy Planning Models." Instituto de Investigación Tecnológica, Universidad Pontificia Comillas, Madrid, Spain.

- April 2012, "An Approximate Dynamic Programming Framework for Climate Decision Under R&D Uncertainty." University of Texas, Austin, Operations Research & Industrial Engineering Dept., Austin, TX.
- April 2012, "An Approximate Dynamic Programming Framework for Climate Decision Under R&D Uncertainty." Carnegie-Mellon University, Engineering and Public Policy Dept., Pittsburgh, PA.
- February 2012, "An Approximate Dynamic Programming Framework for Global Climate Decision Under Uncertainty." University of Michigan, Dept. of Atmospheric, Oceanic, and Space Sciences, Ann Arbor, MI.
- September 2011, "Methods for Modeling Decisions under Uncertainty for Integrated Assessment Models." U.S. Department of Energy Integrated Climate Change Modeling, PI Meeting, Washington, DC. Joint with Nidhi Santen (graduate student).
- September 2011, "Methods for Modeling Decisions under Uncertainty for Integrated Assessment Models." U.S. Department of Energy Integrated Climate Change Modeling, PI Meeting, Washington, DC. Joint with Nidhi Santen (graduate student).
- September 2011, "Methods for Modeling Decisions under Uncertainty for Integrated Assessment Models." U.S. Department of Energy Integrated Climate Change Modeling, PI Meeting, Washington, DC. Joint with Nidhi Santen (graduate student).
- October 2011, "U.S. Electric Power Generation Planning under Endogenous Learning-by-Searching Technology Change." U SAEE/IAEE North American Conference, Washington DC. Joint with Nidhi Santen (graduate student).
- September 2011, "Methods for Modeling Decisions under Uncertainty for Integrated Assessment Models." U.S. Department of Energy Integrated Climate Change Modeling, PI Meeting, Washington, DC. Joint with Nidhi Santen (graduate student).
- August 2011, "Uncertainty Analysis of the MIT Integrated Global System Model." Energy Modeling Forum, Snowmass Workshop 2011, Snowmass, CO.
- December 2010, "R&D Portfolio as a Sequential Decision under Uncertainty." U.S. Department of Energy / Pacific Northwest National Laboratory, R&D Portfolio Analysis Tools and Methodologies, Washington, DC.
- October 2010, "Air Pollution, Health and Economic Impacts of Global Change Policy and Future Technologies: An Integrated Model Analysis." U.S. Environmental Protection Agency, EPA-STAR Kickoff Meeting, RTP, NC.

September 2010, "Collaborative Research: An Improved Climate Policy Model of Endogenous Technical Change Considering Uncertain R&D Returns and Uncertain Climate Response." National Science Foundation, Human and Social Dynamics Conference, Washington DC.

March 2010, "Uncertainty and Technology Innovation," Department of Energy Integrated Climate Change Modeling, Science Team Meeting, Washington, DC.

February 2010, "EFRI RESIN: Infrastructures, Markets, and Natural Cycles: Managing Electricity, Water and Air Quality in Texas; Transformative Research in Resilient and Sustainable Infrastructures," National Science Foundation, EFRI Grantee Meeting, Washington, DC.

December 2009, "The Interface of Infrastructures, Markets, and Natural Cycles: Innovative Modeling and Control Mechanisms for Managing Electricity, Water and Air Quality in Texas," National Science Foundation – Virginia Tech RESIN Workshop, Washington, DC.

June 22, 2009, "Considering Risk in Developing a Regulatory Response to Climate Change," New Ideas for Risk Regulation, Society for Risk Analysis & Resources for the Future, Washington, DC.

June 8, 2009, "A Cost-Effectiveness Analysis of Alternative Ozone Control Strategies: Flexible Nitrogen Oxide (NO_x) Abatement from Power Plants in the Eastern United States," U.S. Environmental Protection Agency, Clean Air Markets Division, Washington, DC.

May 22, 2009, Interview, Worldview, Chicago Public Radio.

April 28, 2009, "Long-term Greenhouse Gas Stabilization and the Risks of Dangerous Impacts," Society for Risk Analysis, New England Chapter, Boston MA.

November 2008, "Cost-Containment: A Primer," Carbon Market Insights Americas 2008, Pew Center on Climate & Point Carbon, Washington, DC.

October 2008, "Uncertainty in Emissions, Costs, and Climate Impacts under Stabilization Scenarios," Energy Modeling Forum 22 Uncertainty Workshop, Wesleyan University, Middletown, CT.

August 2008, "Sequential Decision under Uncertainty in Integrated Assessment Models, and Implications for Near-Term Mitigation," Victoria University, Victoria, Canada.

July 2008, "Challenges in Uncertainty Analysis of Integrated Assessment Models," U.S. Department of Energy / Argonne National Lab Uncertainty Workshop, Chicago, IL.

February 2008, "Considering Risk and Uncertainty in Designing Climate Change Policy," Princeton University, Woodrow Wilson School of Public and International Affairs,

Princeton, NJ; also at Rice University, James A. Baker III Institute for Public Policy, Houston, TX.

January 2008, “Cost-Containment: A Comparison of Instruments,” MIT Center for Energy and Environmental Policy Research Workshop: The EU ETS, Perspectives and Lessons, Washington D.C.; also presented at University of North Carolina at Chapel Hill, Department of Public Policy, Chapel Hill, NC, February 2008.

January 2008, “Smart Trading for Ozone Reductions in PJM: A Feasibility Study,” U.S. Environmental Protection Agency, Clean Air Markets Division, Washington D.C.

MIT, Technology and Policy Program, Cambridge, MA, January 8, 2008, Invited Presentation, “Considering Risk and Uncertainty in Designing Climate Change Policy.”

November 2006, “Climate-Gate: What will we know and when will we know it?” University of Michigan, Ann Arbor, MI; also at Dartmouth College, Hanover, NH, February 2007.

April 2006, “Uncertainty in Integrated Assessments,” IIASA Conference on Learning and Climate Change, International Institute for Applied Systems Analysis, Vienna, Austria.

September 2005, “Uncertainty in Integrated Assessments,” Watson Institute Conference on Frontiers of Environmental Change Research, Brown University, Providence, RI.

January 2005, “Constructing Probabilistically-Based Emissions Scenarios,” IPCC expert meeting on Emission Scenarios, Washington, DC.

October 2004, “To Probabilize or Not to Probabilize...” National Academy of Sciences, Climate Research Committee, Washington, DC.

August 2004, “Multi-Period Decision-Making and the “Boiled Frog” Dilemma,” Energy Modeling Forum, Snowmass Conference on Climate Change Impacts Assessment, Snowmass, CO.

June 2004, “Describing Scientific Uncertainties in Climate Change to Support Analysis of Risk and of Options: Coupling Models Across Disciplines”. *IPCC Workshop on Describing Uncertainties in Climate Change to Support Analysis of Risk and of Options*, IPCC Working Group I Technical Support Unit, Boulder, CO.

March 2004, “Uncertainty for Climate Policy: Coupling Models Across Disciplines,” Aspen Global Change Institute, Conference on Climate Scenarios and Projections: The Known, the Unknown, and the Unknowable as Applied to California, Aspen, CO.

December 2003, “The Right Tool for the Wrong Job? Path-Dependency and Climate Change Policy,” Science, Technology, and Environmental Policy Seminar, Woodrow Wilson School of Public Affairs, Princeton University, Princeton, NJ.

MIT Global Change Forum XXI, October 9, 2003. "Scenarios and Uncertainty Analysis of Future Emissions and Climate Change." Invited Presentation.

August 2003, "Analysis of Variability and Correlation in Economic Growth Rates: 1950-2000 Data for Subsequent Uncertainty Analyses," Energy Modeling Forum, Snowmass Conference on Climate Change Impacts Assessment, Snowmass, CO.

May 2003, "Incorporating Path-Dependency into Decision Analytic Methods: An Application to Global Climate Policy," Duke Workshop on Reconstructing Climate Policy, Duke University, Durham, NC.

April 2003, "Uncertainty Analysis of Climate Change and Policy Response." EGS-AGU Joint Assembly, Venice, Italy.

January 2003, "An Analysis of Uncertainty in Future Greenhouse Gas Emissions," Intergovernmental Panel on Climate Change Expert Meeting on Guidance for Further Development of the SRES Scenarios, Amsterdam, The Netherlands.

October 2002, "Uncertainty in Future Greenhouse Gas Prices: Methods and Models for Industry Project Evaluation," International Association for Energy Economists, Vancouver, Canada.

August 2002, "The Curious Role of Learning in Climate Policy," Energy Modeling Forum, Snowmass Conference on Climate Change Impacts Assessment, Snowmass, CO.

July 2002, "Quantifying Uncertainty in Climate Assessments: Progress, Challenges, and Next Steps," National Center for Atmospheric Research, US Workshop on Climate Projections, Uncertainty, and Scenarios for Impacts Assessment, Boulder, CO.

FUNDED RESEARCH

September, 2012: co-Principal Investigator (MIT site PI), "What are Sustainable Climate-Risk Management Strategies?," U.S. National Science Foundation, Sustainable Research Network, \$500,000 (to MIT).

September, 2012: co-Principal Investigator, (MIT site PI), "Analysis of Dynamic, Flexible NOx and SO2 Abatement from Power Plants in the Eastern U.S. and Texas," U.S. Environmental Protection Agency, EPA-STAR, \$500,000.

September, 2011: Principal Investigator, "Decision making under coupled multi-timescale uncertainty: Advanced electric power systems planning," U.S. National Science Foundation, Energy, Power, Adaptive Systems, \$330,000.

- March, 2010: Principal Investigator, “Methods for Decision under Technological Change Uncertainty and Risk Assessment for Integrated Assessment of Climate Change,” U.S. Department of Energy, Early Career Award, \$750,000.
- September, 2009: Co-Principal Investigator, “Air Pollution, Health and Economic Impacts of Global Change Policy and Future Technologies: An Integrated Model Analysis,” U.S. Environmental Protection Agency, EPA-STAR, \$600,000.
- September, 2008: Co-Principal Investigator, “The Interface of Infrastructures, Markets, and Natural Cycles—Innovative modeling and control mechanisms for managing electricity, water and air quality in Texas,” U.S. National Science Foundation, Emerging Frontiers in Research and Innovation (EFRI), \$4,000,000.
- July, 2008: Principal Investigator, “Collaborative Research: An improved model of endogenous technical change considering uncertain R&D returns and uncertain climate response”, National Science Foundation, Human and Social Dynamics, \$750,000.
- June, 2008: Principal Investigator, “Uncertainty in Carbon Prices and the Role of REDD”, Environmental Defense, \$50,000.
- June, 2008: Principal Investigator, “Smart Trading”, US Environmental Protection Agency, Clean Air Markets Division, \$75,000.
- June, 2007: Co-Investigator, “Scenario Analysis of Carbon Capture and Sequestration in the Western Electric Grid,” WESTCARB (partnership between State of California and U.S. Department of Energy), \$200,000.
- Oct. 2005: Principal Investigator, “Design of Multi-Gas Emissions Scenarios for Climate Change Assessment”, US Environmental Protection Agency, Office of Atmospheric Programs, \$25,000.
- Oct. 2005: Co-Investigator “Time-differentiated NO_x Emissions Control, Ozone Forecasting, and Value of Information: The Development of an Integrated Analysis Framework”, National Oceanographic and Atmospheric Administration, \$150,000 (with A Denny Ellerman, MIT).
- Oct. 2004: Principal Investigator, “Methods for Developing Emissions Scenarios for Integrated Assessment Models”, Integrated Assessment of Climate Change, Office of Science, U.S. Department of Energy, \$299,897 (3 years).
- Aug. 2003: Co-Investigator, “Inventories of HR VOC Emissions & Impact of Emission Magnitude & Variability on Ozone Formation in H/G Area”, Houston Advanced Research Center, \$145K (Split among UT Austin and three UNC faculty: myself, Harvey Jeffries, and Michael Symons).

Oct. 2002: Principal Investigator, “Integrated Assessment of Climate Change”, Office of Science, U.S. Department of Energy, \$127,000 (2 years).

HONORS AND AWARDS

U.S. Department of Energy Early Career Award, January, 2010.

Tanner Award for Excellence in Undergraduate Teaching, Univ. of North Carolina, Feb. 2006.

Most Outstanding Faculty Award, Public Policy Majors Union, May, 2003.

Martin Fellowship, Massachusetts Institute of Technology, 1996-1997

Monbuscho Scholarship, Japanese Ministry of Education, April 1989 – October 1990

TEACHING RECORD

Massachusetts Institute of Technology

Fall, 2013: ESD.862 – Modeling Risk, Decisions, and Dynamics (Graduate).
ESD.710 – Risk and Decision Analysis (Graduate).
Spring, 2013: ESD.865 – Modeling Electric Power Systems (Graduate).
Fall, 2012: <Parental/Family Leave>
Spring, 2012: <Research Leave>
Fall, 2011: ESD.862 – Modeling Risk, Decisions, and Dynamics (Graduate).
ESD.710 – Risk and Decision Analysis (Graduate).
Spring, 2011: ESD.128 – Science, Economics, and Policy of Climate Change (Graduate).
Fall, 2010: ESD.865 – Modeling Electric Power Systems (Graduate).
ESD.710 – Risk and Decision Analysis (Graduate).
Spring, 2010: ESD.862 – Modeling Risk, Decisions, and Dynamics (Graduate).
Fall, 2009: <Parental/Family Leave>
Spring, 2009: ESD.862 – Modeling Risk, Decisions, and Dynamics (Graduate).
Fall, 2008: ESD.934 – Energy and Environmental Systems (Graduate).

University of North Carolina Chapel Hill

Spring, 2006: PLCY 298 – Quantitative Modeling Methods for Risk and Decision in Env. Policy (Graduate).
Fall, 2005: PLCY 71 – Introduction to Public Policy Analysis (Undergraduate).
PLCY 231 – Theories and Methods for Analyzing Decision in Public Policy and Ethics (Graduate).
Spring, 2005: PLCY 183 – Policy Analysis for Global Climate Change (Undergraduate).
PLCY 231 – Theories and Methods for Analyzing Decision in Public Policy and Ethics (Graduate).
Fall, 2004: PLCY 71 Sec. A – Introduction to Public Policy Analysis (Undergraduate).
PLCY 71 Sec. B – Introduction to Public Policy Analysis (Undergraduate).
Spring 2004: PLCY 71 – Introduction to Public Policy Analysis (Undergraduate).

PLCY 231 – Theories and Methods for Analyzing Decision
in Public Policy and Ethics (Graduate).

- Fall, 2003: <Research and Study Leave>.
Spring, 2003: PLCY 71 – Introduction to Public Policy (Undergraduate).
PLCY 298 – Quantitative Modeling Methods for Risk and Decision in Env. Policy
(Graduate).
Fall, 2002: PLCY 231 – Theories and Methods for Analyzing Decision in Public
Policy and Ethics (Graduate).
PLCY 198 (183) – Policy Analysis for Global Climate Change (Undergraduate).
Spring, 2002: PLCY 71 – Introduction to Public Policy Analysis (Undergraduate).
Fall, 2001: PLCY 175 – Quantitative Analysis in Public Policy (Undergraduate).
PLCY 231 – Theories and Methods for Analyzing Decision in Public Policy and
Ethics (Graduate).

Theses Supervised:

Doctoral:

- De Sisternes, Fernando, ESD-PhD, Quantifying the Combined Impact of Wind and Solar Power Penetration on the Optimal Generation Mix and Thermal Power Plant Cycling. Expected Completion: May 2014.
Octaviano, Claudia, ESD-PhD, Power System Planning with Intermittent Renewable Generation. Expected Completion: May 2014.
Ramberg, David, ESD-PhD, Technological Change and the Fossil Fuel Sector. S: Expected Completion: May 2014.
Morris, Jennifer, Climate Policy Analysis. August, 2013.
Donohoo, Pearl, Electricity Transmission Planning. Expected Completion: November, 2013.
Santen, Nidhi, Stochastic Model of Technological Change. September, 2012.
Palmintier, Bryan, Stochastic Dynamic Model for Electricity Capacity Planning. October 2012.
Jordan, Rhonda, Dynamic Programming of Electric Sector Development in a Developing Country Context. October, 2012.
Karplus, Valerie, “Incorporation of engineering models of automotive technologies into an economic general equilibrium model.” February, 2011.
Tyler Felgenhauer, Ph.D., UNC Chapel Hill, Public Policy, “Prevention and Protection: The Simultaneous Implementation of Climate Change Mitigation and Adaptation Policy Responses.” November, 2010.

Masters:

- Lisa Jacobovits, S.M., MIT, TPP, “A Comparison of Cost-Containment Instruments for US Carbon Reduction Policies”, May, 2008.
Jong-Ryool Kim, MS, UNC Chapel Hill ESE/SPH at UNC-CH, “The Analysis of Cost-Effectiveness of Voluntary Agreements Compared to Emission Trading in Korea,” April, 2003.
Elizabeth Jordan, UNC Chapel Hill MPA, Govt at UNC-CH, “Juvenile Justice Programs – What’s The Point? Calculating Recidivism Rates,” April, 2002.

Undergraduate:

Courtney Enlow, BA/honors, UNC Chapel Hill Public Policy, “for Voluntary Participation by Developing Countries in Global Climate Change Accords” April, 2006.

Kevin Feltes, BA/honors, UNC Chapel Hill Public Policy, “The Federal Ethanol Subsidy in a Changing Fuel Market” April, 2005.

Charles Anderson, BA/honors, UNC Chapel Hill Public Policy, “North Carolina Clean Smokestacks, A Critical Case Study on the Process of State-Level Environmental Policy Making,” April, 2005.

Charles J McCall, BA/honors, UNC Chapel Hill Intl Stud / CEP, “Roads Diverged: Should the United States pursue a non-cooperative alternative to Kyoto?” December, 2003.

Anna Stimmel, BA/honors, UNC Chapel Hill Public Policy, “Hidden in the Polls: An Alternative to the Death Penalty,” April, 2003.

PROFESSIONAL SERVICE

EDITORIAL

Associate Editor of Energy Economics: 2005-present

REFeree FOR JOURNALS

Atmospheric Environment

Climatic Change

Energy Economics

Energy Journal

Geophysical Research Letters

Global Environmental Change

Journal of Climate

Journal of Environmental Economics and Management

Management Science

Science

PROFESSIONAL AFFILIATIONS

- Institute for Operations Research and Management Sciences (INFORMS)
- IEEE
- Association for Public Policy Analysis and Management (APPAM)
- American Geophysical Union (AGU)
- Association of Environmental and Resource Economists (AERE)
- Society for Risk Analysis (SRA)
- International Association for Energy Economics (IAEE)

PROFESSIONAL PARTICIPATION

Organized panel session for INFORMS, organized two panel sessions for APPAM, have participated in numerous conferences and workshops, including IAEE, INFORMS, and IEEE meetings, Energy Modeling Forum (EMF) Snowmass meetings, IPCC meetings, and NCAR workshops.