

CURRICULUM VITAE

Erin D. Baker

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Mechanical and Industrial Engineering
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I. PERSONAL

A. Education

- Stanford University, Ph.D. in Engineering Economic Systems & Operations Research, August 2002
- Stanford University, M.S. in Engineering Economic Systems & Operations Research, June 1998
- University of California, Berkeley, B.A. in Applied Mathematics, June 1986

B. Academic and Professional Positions

- Associate Professor, Mechanical and Industrial Engineering, University of Massachusetts – Amherst, 2008 – Present
- Visiting Associate Professor, Precourt Institute for Energy Efficiency, Stanford University, 2009- 2010
- Assistant Professor, Mechanical and Industrial Engineering, University of Massachusetts – Amherst, 2002 – 2008
- Research Assistant, The Energy Modeling Forum, Stanford University, 1999 – 2002
- Research Assistant, The Center for International Security and Cooperation, 1998
- Summer Faculty Fellow, NASA Jet Propulsion Lab, 2005
- Consultant, Stanford Global Climate and Energy Program, 2003
- Peace Corps Volunteer, Mathematics Teacher, Kanton Secondary School, Tumu, Ghana, 1992 – 1994
- Mathematics Teacher, Los Cerros Middle School, Danville, CA, 1991 – 1992
- Actuarial Consultant, Coopers & Lybrand, San Francisco, CA, 1987 – 1991

C. Honors and Awards

- IEOR Professor of the Year 2008
- IEOR Advisor of the Year, 2005, 2006, 2009.
- Decision Analysis Student Paper Award, 2nd Place, 2003
- Food Research Institute Fellowship, Stanford, CA, 1995 -- 1998
- Second Year Honors awarded to the most outstanding second-year mathematics student at U.C. Berkeley, 1984.

D. Membership in Academic, Professional, and Scholarly Societies

- Institute of Operations Research and Management Sciences (INFORMS)
- Association of Environmental and Resource Economists (AERE)

- International Association for Energy Economics (IAEE)
- Northeastern Agricultural and Resource Economics Association (NAREA)
- The Decision Analysis Society

II. TEACHING

A. Courses Taught

- MIE 273 and CEE 260 Probability and Statistics (2008,2009)
- MIE 353 Engineering Economy (2004, 2005, 2006)
- MIE 379 Deterministic Operations Research (2002, 2003, 2004, 2005, 2006,2007,2008)
- MIE 492 Senior Seminar (2006)
- MIE 497 Senior Capstone Design (2009)
- MIE 686 Multi-Criteria Decision Making (2007,2008)
- MIE 754 Economic Decision Making (2002, 2003, 2004, 2005)
- MIE 794 Graduate Seminar (2004, 2005)
- MIE 754X PEEAS: Economic Decision Making (2002, 2003, 2004, 2005)

B. Statement of contribution to curriculum development

MIE 754: Economic Decision Making

- This class was completely re-tooled to provide the graduate students with the skills and knowledge they need to apply economic analysis to research topics in IEOR as well as in ME. The class provides a solid grounding in economic analysis from an optimization point of view. It is a very demanding and rigorous class. We cover topics such as the theory of the firm, the theory of the market, monopoly, game theory, oligopoly, decision making under uncertainty, options theory, and asymmetric information, as well as the traditional topic of the time value of money. The students work in teams to apply what they learn in a term project.

MIE 686: Multi-Criteria Decision Making

- This class was revised to focus on applying Decision Analysis methods to decisions with multiple criteria. Topics covered include structuring decision problems; probability concepts; decision trees and value of information; utility theory; non-inferior sets and stochastic dominance; and multi-attribute value and utility functions. The central focus of the class was on applying the concepts to a real decision problem. This class was attended by a wide variety of students, both graduates and undergraduates, from IE, ME, SOM, and ECE.

C. Graduate Students

Ph.D. Dissertations

- Ekundayo Shittu Ph.D. IEOR (2004 –2008) “Environmental Policy and Investment Decisions under Uncertainty.” Recipient of Isenberg Award in 2005, a 1-year fellowship awarded to students who demonstrate academic merit and a commitment to the

integration of science, engineering and management. Current Position: Visiting Asst. Prof. Tulane.

- Yiming Peng Ph.D. IEOR (2008 – expected 2012) “Technology, Uncertainty, and Climate Change.”
- Rose Zydbel Ph.D. IEOR (2008 – expected 2012) (Topic to be decided. Interest in technology choice and public good.)

M.S. Thesis

- Kwame Adu-Bonnah, M.S. IEOR (2003-2005) “Optimal climate technology research and development investment under uncertainty”
- Joseph Kalowekamo M.S. Mechanical Eng. (2005 – 2007) “Module cost estimation for Organic Solar Cells”
- Ben Ewing M.S. IEOR (2007 – 2009) “A Decision Support System for Energy Decision Making in the Pioneer Valley”
- Nathanael Miksis IEOR (2006 – Expected 2009) “Agent-based modeling for electricity markets.”
- Sandhya Ragavan M.S. Mechanical Engineering (2007 – Expected 2009) “Characteristics of Electricity Storage for Wind Farm Integration to Grid”
- Peter Rasmussen M.S. IEOR (2009 – Expected 2011) “A cost model for CCS”

Committee Member

- Dan Ball, Ph.D. Industrial Engineering, Advisor A. Deshmukh
- Chris Wernz, Ph.D. Industrial Engineering, Advisor A. Deshmukh
- Ravindra Lote, M.S. Industrial Engineering, Advisor A. Deshmukh
- Matthew Littlefield, M.S. Industrial Engineering, Advisor A. Deshmukh
- Yue Jin, Ph.D. Industrial Engineering, Advisor A. Muriel
- Rocio Ruiz Benitez, Ph.D. Industrial Engineering, Advisor A. Muriel
- Betel Lus, Ph.D. Industrial Engineering, Advisor A. Muriel
- Yihao Lu, M.S. Industrial Engineering, Advisor A. Muriel
- Mustafa Yuzukirmizi, Ph.D. Industrial Engineering, Advisor J. Smith
- Yiquin Wen, Ph.D. Industrial Engineering, Advisor J. Smith
- Barsendu Mukerjee, M.S. Industrial Engineering, Advisor J. Smith
- Kai Wu, M.S. Mechanical Engineering, Advisor J. MacGowan
- Lauren Mattison, M.S. Mechanical Engineering, Advisor L. Ambs

- Christopher Beebe, M.S. Mechanical Engineering, Advisor L. Ambs
- Ziad Fleyhan, M.S. Mechanical Engineering, Advisor L. Ambs
- Justin Evans, M.S. Mechanical Engineering, Advisor L. Ambs
- Dave McElvoy, Ph.D. Resource Economics, Advisor J. Stranlund
- Linus Nyiwul, Ph. D. Resource Economics, Advisor J. Stranlund
- Matthew Riddle, Ph. D. Economics, Advisor J. Boyce

D. Undergraduate Students

Independent Studies and Special Projects

- Michael Berthaume, B.S. Independent Study, 2008, Optimal Investment in Solar R&D
- Tim Olsen, B.S. Independent Study, 2007, Energy Consumption at The Hitchcock Center
- Ashley Lewis, B.S. Commonwealth College Honors Thesis, (2007 – 2008), Optimal Investment in Solar R&D as a Response to Climate Change
- Jessica Wilbarger, B.S. REU “Interactive Energy Projections: A Tool for Sustainable Decision Making in the Pioneer Valley” (2007)
- Marc Santos, B.S., REU “Electricity Market Simulations” (2006)
- Julia Sullivan and Cristina Rivera, B.S. Capstone project “An Optimal Driving Strategy for the Supermileage Vehicle” (2003)

III. RESEARCH

A. Grants and Contracts

Principal Investigator

Funded

- CAREER: Technology R&D, Climate Change, and Uncertainty, NSF. \$434,000. 09/01/2008 – 09/01/2013
- Decision Support for the Hitchcock Center Sustainable Building Demonstration Project, University of Massachusetts, Amherst Public Service Endowment Grant, \$14,715, 09/01/2007 – 06/01/2008
- Energy, Land-use, and Water: a framework for incorporating scientific information in sustainable planning. With Rick Taupier, Catherine Miller, and Sarah Dorner. U.S. Environmental Protection Agency, \$299,265 (about \$128,000 to my lab), 1/15/2007 – 1/15/2010, PI 2008-2010.
- Climate change R&D portfolio decision-making under environmental, economic, and technological uncertainty. PI, with co-PIs Jeffrey Keisler, Mathias Ruth, Detlof von Winterfeldt, and John Weyant. Department of Energy, \$347,000 (about \$145,000 to my lab), 3/1/2006 – 3/1/2008, PI
- Agent-based Modeling of Electricity Markets, ISO-New England and University of Massachusetts, Amherst \$27,642, 06/06/2005 – 06/01/2006, PI
- CADETS Technology Analysis, NASA-JPL, \$25,555, 09/21/2005 – 3/8/2006, PI
- Climate change policy in the face of uncertainty, Faculty Research Grant, University of Massachusetts, Amherst, \$10,000, 01/01/2003 – 01/01/2004, PI.

IV. PUBLICATIONS

A. Submitted Papers

1. Baker, E. and Keisler, J. *Expert Elicitations on Biofuels Technology*, under review at **Environmental Science and Technology**.
2. Baker, E., Chon H. and Keisler, J. *Battery Technology for Electric and Hybrid vehicles: Expert views about prospects for advancement*, under review at **Technological Forecasting and Social Change**
3. Baker, E., Jin, Y., Muriel, A., and Vits, J., *Impact of the Quality and Cost of Information on the Reverse Supply Chain*, Under Revision for **Operations Research Letters**.

B. Refereed Journal Publications

1. Shittu, E., and Baker, E. *A Control Model of Policy Uncertainty and Energy R&D Investments*, **International Journal of Global Energy Issues** (Forthcoming).
2. Shittu, E., and Baker, E. *Optimal Energy R&D Portfolio Investments in Response to a Carbon Tax*. **IEEE Transactions on Engineering Management** (Forthcoming)
3. Baker, E., Chon, H. and Keisler, J. *Carbon Capture and Storage: Combining Expert Elicitations to Inform Climate Policy*. **Climatic Change** 96 (3) Page 379 (2009)
4. Baker, E., *Optimal Policy under Uncertainty and Learning in Climate Change: A Stochastic Dominance Approach*, **Journal of Public Economic Theory** 11 (5): 721 - 747, (2009)
5. Ewing, B., and Baker, E. *Development of a Green Building Decision Support Tool: A Collaborative Process*. **Decision Analysis** 6 (3): 172 – (2009)
6. Kalowekamo, J. and Baker, E. *Estimating the Cost of Manufacturing for Purely Organic Solar Cells*. **Solar Energy** 83 (8), p.1224-1231, (Aug 2009)
7. Nemet G., and Baker, E. *Demand subsidies versus R&D: Comparing the uncertain impacts of policy on a pre-commercial low-carbon energy technology*. **The Energy Journal** 30(4): 49 - 80 (2009)
8. Baker, E., Chon, H. and Keisler, J. *Advanced Solar R&D: Applying Expert Elicitations to Inform Climate Policy*. **Energy Economics** 31:S37-S49 (2009)
9. Baker, E., Clarke, L., and Shittu, E., *Technical Change and the Marginal Cost of Abatement*, **Energy Economics** 30 (2008)
10. Baker, E. and Shittu, E. *Uncertainty and Endogenous Technical Change in Climate Policy Models*, **Energy Economics** 30 (2008).
11. Baker E. and Adu-Bonnah, K., *Investment in Risky R&D Programs in the face of Climate Uncertainty*. **Energy Economics**, 30:465-486 (2008).
12. Baker, E., *Increasing Risk and Increasing Informativeness: Equivalence Theorems*. **Operations Research**, 54:26-36 (2006)

13. Baker, E., Clarke, L., and Weyant, J., *Optimal Technology R&D in the Face of Climate Uncertainty*. **Climatic Change** 75:157 – 180 (2006)
14. Baker E. and E. Shittu, *Profit Maximizing R&D Investment in Response to a Random Carbon Tax*, **Resource and Energy Economics**, 28:105- 192 (2006)
15. Baker, E., *Uncertainty and Learning in a Strategic Environment: Global Climate Change*. **Resource and Energy Economics**, 27:19-40 (2005)

C. Refereed Conference Publications

1. Baker, E. Easter, R., Gray A., and Morse, E., *Architecting Space Exploration Campaigns: A Decision-Analytic Approach* IEEE Aerospace Conference 2006, Big Sky, Montana
2. Baker, E., *Institutional Barriers to Technology Diffusion in Rural Africa*, American Agricultural Economics Association General Meeting, Rhode Island, July 27, 2005

D. Working Papers

1. Baker, E., Chon H. and Keisler, J. *Advanced Nuclear Power: Combining Expert Elicitations to Inform Climate Policy*.
2. Baker, E., Clarke L., Keisler, J., and Shittu, E. *Uncertainty, Technical Change, and Policy Models*, Technical Report 1028, College of Management, University of Massachusetts, Boston.
3. Chon, H., Baker, E. and Keisler, J. *Advanced Nuclear Power: Converting Expert Elicitations into Economic Parameters to Inform Climate Policy*, Available at SSRN: <http://ssrn.com/abstract=1289823>; (2008).

E. Invited Workshop Presentations

1. *Climate Change Technology R&D Portfolio under Uncertainty*, The Research Workshop: Climate policy and Long Term Decisions - Investment and R&D, Milan, Italy, June 16, 2009
2. *Technology, R&D, and Climate Change*, EMF 22 Uncertainty Subgroup Meeting, Wesleyan, CN, October 29, 2008
3. *Decision Making Under Uncertainty: Modeling Innovation* (Poster), Uncertainty Workshop, University of Chicago, Illinois, July 21, 2008
4. *Climate Change, Uncertainty, and Technological Change*, Conference on the Economics of Climate Change and Sustainable Development, Sardinia, Italy, Sept. 27, 2007
5. *Uncertainties in Science-Driven Energy Innovations*, Climate Change Impacts and Integrated Assessment Workshop XIII, Snowmass, Colorado, July 23 to August 3, 2007
6. *Uncertainty, Climate Change, and Advanced Solar R&D*, Workshop on Technological Change and Uncertainty in Environmental Economics, Center for European Economic Research (ZEW) Mannheim, Nov. 27/28, 2006

7. *Climate Change, Representation of Technology, and Uncertainty*, Technological Change and the Environment Workshop, Dartmouth College, Hanover, NH, March 26, 2006
8. *Optimal Climate Policy under Uncertainty*, Conference on Adaptive Research on Global Climate Change, Ohio State, Columbus, OH, October 30, 2003

F. Invited Lectures

1. *Climate Change Technology R&D Portfolio Analysis under Uncertainty*, The Kennedy School, Harvard University, Cambridge, MA April 9, 2009
2. *Climate Change Technology R&D Portfolio Analysis under Uncertainty*, Tulane Univ. New Orleans, March 21, 2009
3. *Uncertainty, Climate Change, and Technology R&D*, Department of Mechanical Engineering, University of Texas at Austin, Austin, TX, April 15, 2008
4. *Uncertainty, Climate Change, and Technology R&D*, Department of Industrial Engineering, Pittsburgh University, Pittsburgh, PA, March 4, 2008
5. *Uncertainty, Climate Change, and Technology R&D*, Department of Industrial, Welding, and Systems Engineering, The Ohio State University, Columbus, OH, Jan. 17, 2008
6. *Applying Expert Elicitations to Inform Climate Policy*, Energy Resources Group Seminar, U.C. Berkeley, CA, Aug. 13, 2007
7. *Uncertainty, Climate Change, and Advanced Solar R&D*, Davis Environmental Economics Seminar, U. C. Davis, CA, April 24, 2007
8. *Technology, Uncertainty, and Climate Change*, Yale Environmental Economics Seminar, New Haven, CN, March 29, 2006
9. *Optimal Technology R&D in the Face of Climate Uncertainty*, Seminar, Agricultural and Resource Economics, University of Connecticut, Storrs, CN, Oct. 7, 2004
10. *Energy Technology R&D As Greenhouse Insurance*, Seminar, Mechanical Engineering, Tufts University, Boston, MA, September 30, 2004
11. *R&D as Greenhouse Insurance*, Seminar, Resource Economics Department, University of Massachusetts, Amherst, MA, Nov.14 2003

G. Conference Presentations

1. *Climate Change Technology R&D Portfolio under Uncertainty*, The International Energy Workshop, Venice, Italy, June 18, 2009
2. *Combining Expert Elicitation with Economic Analysis: Carbon Capture and Storage*, INFORMS General Meeting, Washington D.C. Oct 17, 2008
3. *Applying Expert Information to Inform Climate Policy: Advanced Solar R&D*, ASSA General Meeting, IAEE Track, New Orleans, LA, Jan. 5, 2008
4. *Technical Change and the Marginal Cost of Abatement*, ASSA General Meeting, AERE Track, New Orleans, LA, Jan. 5, 2008
5. *Applying Expert Information to Inform Climate Policy: Advanced Solar R&D*, INFORMS General Meeting, Seattle, WA, Nov. 17, 2007

6. *The Value of Technology for Climate Change Mitigation*, INFORMS General Meeting, Seattle, WA, Nov. 19, 2007
7. *Advanced Solar R&D: Using Expert Elicitations to Inform Climate Policy*, International Energy Workshop, Stanford, CA June 26, 2007
8. *Assessing Potential Electricity R&D Projects in the context of climate change*, INFORMS General Meeting, Pittsburg, PA, Nov. 6, 2006
9. *The Value of Non-definitive Information in Pure Science*, INFORMS General Meeting, Pittsburg, PA, Nov. 5, 2006
10. *Profit Maximizing R&D in Response to a Random Carbon Tax*, ASSA General Meeting, Boston, MA, January 8, 2006
11. *An Approach to Climate Change R&D Portfolio Decision Analysis*, INFORMS General Meeting, San Francisco, CA, Nov. 15, 2005
12. *Investment in Risky R&D Programs in the Face of Climate Uncertainty*, INFORMS General Meeting, San Francisco, CA, Nov. 14, 2005
13. *Investment in Risky R&D Programs in the Face of Climate Uncertainty*, Southern Economics Association General Meeting, Washington D.C., Nov. 19, 2005
14. *Profit Maximizing R&D in the Face of Climate Uncertainty*, American Agricultural Economics Association General Meeting, Rhode Island, July 25, 2005
15. *Optimal Technology R&D in the face of multiple uncertainties*, presented by Kwame-Adu Bonnah, INFORMS General Meeting, Denver, CA, October 26, 2004.
16. *The Value of Modeling Uncertainty in Climate Change*, INFORMS General Meeting, Denver, CA, October 26, 2004.
17. *Optimal Technology R&D in the Face of Climate Uncertainty*, American Agricultural Economics Association, Denver, CO, August 2004.
18. *R&D as Greenhouse Insurance*, International Energy Workshop, Paris, France, June 2004.
19. *R&D as Climate Insurance*, INFORMS General Meeting, Atlanta, GA October 21, 2003
20. *R&D as Climate Insurance*, NAREA General Meeting, Portsmouth, NH, June 7, 2003
21. *Global Climate Change: Uncertainty and Learning in a Strategic Environment*, INFORMS General Meeting, San Jose, CA, November 12, 2002
22. *Increasing Risk and Increasing Informativeness*, Microeconomics Theory Seminar, Graduate School of Business, Stanford University, October 2001.
23. *Risk, Institutions, and Technology Adoption in Africa*, Berkeley-Stanford Joint Center on Africa Spring Conference, April 24, 1999.
24. *Controlling Particulate Matter in the Bay Area*, Transportation, Energy, and Environmental Research Roundtable, Stanford University, May 1997.

H. Public Service Presentations

1. *Climate Change, Technology, and Decision Making under Uncertainty*, Climate Change Forum, State House, Boston, MA, April 3, 2006

2. *Uncertainty, Climate Change, and technology*, MassPIRG Professor Panel, UMass, Amherst, MA, April 23, 2008

VII. SERVICE

A. Department

- Faculty Advisor Alpha Pi Mu (2004-6)
- Editor of MIE Faculty Newsletter (2002-2004)
- Member Public Relations committee (2003-4, 2006-7)
- Member Department Personnel Committee (2003-4, 2006-7)
- Member Search Committee (IE 2006-7, 2007-8 (chair), Energy 2006-7, 2007-8, 2008-9)
- Member Undergraduate Committee (2005-6, 2007-8)
- Member Graduate Committee (2008-9)

B. College

- New Student Program Advisor (2003-6)
- Professional Education for Engineering and Applied Science, Advisory Board (2003-5)
- Faculty Advisor for Engineering Management Minor (2003 – present)
- College of Engineering Committee on Diversity and Social Justice (2005-6)
- Presenter, SWE Conference (2007)
- Member Search Committee, Environmental Engineering (2007-2008)

C. University

- Faculty Senate Council on the Status of Women (2002 – 5)
- Steering Committee for the Climate Change Working Group at UMass (2005 – 6)
- Steering Committee for the Water Resources Research Conference (2006-7)
- Active Member of North East Alliance (2006-8)
- Member Search Committee for Resource Economics (2005-6)

D. Professional Organizations

- **Secretary-Treasurer** of the Energy, Natural Resources, and Environment (ENRE) subdivision of INFORMS, 2004 – present.
- **Council Member:** Decision Analysis Society, 2007 – present
- **Cluster Chair:** Decision Analysis Society Cluster at the 2007 INFORMS general meeting in Seattle; and at 2008 INFORMS general meeting in Washington D.C.
- **Co-Chair:** Decision Analysis Society Student Paper Contest, 2006, 2009
- **Co-Chair:** ENRE Student paper contest 2006, 2007, 2008

- **Advisory Board Member**, Consortium on Atlantic Regional Assessment
- **Session Chair**: INFORMS 2003, 2004, 2005, 2006, 2007, 2008; NAREA 2003, AAEA 2005.
- **Reviewer**, *Operations Research* 8th ed. by Hillier and Lieberman
- **Reviewer**, National Science Foundation (2003, 2006, 2006, ad-hoc)
- **Presenter**, Panel on Women in Engineering, Smith College (2007)

Reviewed papers for:

- Journal of Environmental Economics and Management,
- Journal of Public Economic Theory
- Resource and Energy Economics,
- Energy Journal,
- Energy Economics,
- Management Science,
- Operations Research,
- Energy Policy,
- IIE
- Energy and Resource Economics
- Wind Energy