

## James B. Bushnell

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### Education

- 1989-1993      **University of California at Berkeley**  
Ph. D. Industrial Engineering and Operations Research, December 1993  
M.S. Operations Research, May 1990
- 1984-1989      **University of Wisconsin - Madison**  
B.S. Economics and Industrial Engineering (Double Major), May 1989

### Research Interests

- Industrial Organization and Regulatory Economics
- Energy Policy
- Environmental Economics
- Game Theoretic Optimization Models

### Academic Appointments

- 1993-Present      **University of California Energy Institute (Berkeley, CA)**  
*Assistant Research Scientist, 1993-1998*  
*Associate Research Scientist, 1999-2002*  
*Research Scientist, 2003-*  
*Director of Research, 1998 -*

### Teaching Experience

- 1999-Present      **Haas School of Business, University of California (Berkeley, CA)**  
  
BA212 – Energy and Environmental Markets, Spring 99, 01, 02, 04, 07, 08  
MBA201a – Economic Analysis for Business Decisions, Fall 02

### Other Professional Experience

- 2007 -              **National Bureau of Economic Research**  
*Faculty Research Fellow*
- 2002 -              **California Independent System Operator (Folsom, CA)**  
*Member, Market Surveillance Committee*
- 1999- 2001        **California Power Exchange (Pasadena, CA)**  
*Member, Market Monitoring Committee*
- 1998                **California Independent System Operator (Folsom, CA)**  
*Advisor to the Market Surveillance Committee*
- 1990-1992        **California Public Utilities Commission (San Francisco, CA)**
- 1988-1989        **Madison Gas and Electric Company (Madison, WI)**

## James Bushnell

### Research Grants

- Co-Principle Investigator (with Alex Farrell) “Public and Private Risk Management in a Carbon-Constrained Energy Sector.” *Coleman Fung Center for Risk Management*. 2007.
- Co-Principle Investigator (with Catherine Wolfram), *Sloan Foundation - NBER program on International Productivity Comparisons*; 2003-  
Analysis of Human - Technology Variation on the Productivity of Electricity Generation
- Co-Principle Investigator (with Severin Borenstein), *California Energy Commission*, 2002-  
Grant to establish the Center for the Study of Energy Markets
- Co-Principle Investigator (with Catherine Wolfram), *EIA - ASA: 2004*  
Changes in Electricity Operating Costs after Deregulation
- Co-Principle Investigator (with Severin Borenstein) *California Energy Commission*, 2003-2005  
Analysis of the impact of environmental regulations on gasoline production in California  
*California Independent System Operator*, 1997-98  
Analysis of trading efficiency between electricity forward and spot markets.  
*California Energy Commission*, 1995-96  
Analysis and simulation of electricity production and competition under deregulation.

### Other Professional and Academic Activities:

**Associate Editor (for Energy and Resources)**, *Operations Research*, 2006-

**Associate Editor**, *Utilities Policy*, 1998-2001.

**Referee for:** *American Economic Review*, *Annals of Operations Research*, *Canadian Journal of Economics*, *Climate Policy*, *The Energy Journal*, *Energy Policy*, *European Economic Review*, *International Journal of Industrial Organization*, *Journal of Economics and Management Strategy*, *Journal of Industrial Economics*, *Journal of Regulatory Economics*, *Journal of Political Economy*, *Management Science*, *Networks*, *Operations Research*, *OR/MS Interfaces*, *Rand Journal of Economics*, *Resource & Energy Economics*, *Review of Economics and Statistics*, *Review of Industrial Organization*

### Legislative and Regulatory Testimony

- California Senate Energy, Utilities, and Communications Committee hearing on AB 32  
Implementation and Cap-and-Trade (5/08)
- California Senate Energy, Utilities, and Communications Committee hearing on Retail Direct  
Access in the Electricity Industry (3/08)
- California Public Utilities Commission (CPUC) and California Energy Commission (CEC)  
En-Banc Hearing on Electric Sector Point of Regulation in a Cap and Trade System (8/07)
- Federal Energy Regulatory Commission (FERC) Technical Conference on Horizontal Market  
Power Screens (1/05)
- California Public Utilities Commission (CPUC) Electricity Capacity Markets. (10/04)
- Federal Energy Regulatory Commission (FERC) Technical Conference on Market Based Rates  
for Public Utilities (6/04)
- California Public Utilities Commission (CPUC) en-banc hearing on Core/Non-Core Electric  
Market Structure Options (5/04)
- Federal Energy Regulatory Commission (FERC) - California Public Utilities Commission joint  
Technical Conference on Implementation of Standard Market Design. (11/03)
- Federal Energy Regulatory Commission’s (FERC) Technical Conference on the California  
System Operator’s proposed 2002 market redesign. (3/02)
- Federal Energy Regulatory Commission hearing on the Commission’s order proposing remedies  
for California’s wholesale electric markets. (11/00)
- Federal Energy Regulatory Commission (FERC) hearing on the competitiveness of the California  
electricity market. (9/00)
- California Senate hearing on electricity industry transmission planning. (4/99)
- California Senate hearing on the organization of electricity markets. (2/99)

## James Bushnell

### Publications in Refereed Journals

- “Local Solutions to Global Problems: Climate Change Policy Choice and Regulatory Jurisdiction.” *Review of Environmental Economics and Policy*. Vol 2, pp. 175-193. 2008. (with Carla Peterman and Catherine Wolfram)
- “Implementation of California AB 32 and its Impact on Electricity Markets.” *Climate Policy*. Vol. 8, pp. 277-292. 2008.
- “Vertical Arrangements, Market Structure and Competition: An analysis of Restructured U.S. Electricity Markets.” *American Economic Review*. Vol 98, No. 1. March 2008. (with Erin Mansur and Celeste Saravia)
- “Inefficiencies and Market Power in Financial Arbitrage: A Study of California's Electricity Markets,” *Journal of Industrial Economics*. Vol 56, No. 2, June 2008. (with Severin Borenstein, Chris Knittel, and Catherine Wolfram).
- “Oligopoly Equilibria in Electricity Contract Markets,” *Journal of Regulatory Economics*. Vol. 32: 225-245. 2007.
- “Consumption under noisy price signals: a study of electricity retail rate deregulation in San Diego.” *Journal of Industrial Economics*. Vol. 53, No. 4, December, 2005. (with Erin Mansur).
- “California's Electricity Crisis: A Market Apart?” *Energy Policy*. Vol. 32, No. 9, June 2004.
- “A Mixed Complementarity Model of Hydro-Thermal Competition in the Western U.S.” *Operations Research*. Vol. 51, No. 1, January-February 2003.
- “Measuring Market Inefficiencies in California’s Deregulated Electricity Industry.” *American Economic Review*. Vol. 92, No. 5, December 2002. (with Severin Borenstein and Frank Wolak).
- “The Competitive Effects of Transmission Capacity in a Deregulated Electricity Industry.” *Rand Journal of Economics*. Vol. 31, No. 2, Summer 2000. (with Severin Borenstein and Steven Stoff).
- “Market Power in Electricity Markets: Beyond Concentration Measures.” *The Energy Journal*. Vol. 20, No. 4, October, 1999. (with Severin Borenstein and Chris Knittel).
- “An Empirical Analysis of the Potential for Market Power in a deregulated California Electricity Industry.” *Journal of Industrial Economics*. Vol. 47, No. 3, September, 1999. (with Severin Borenstein).
- “Transmission Pricing in California’s Proposed Electricity Market.” *Utilities Policy*, Vol 6, No. 3, September, 1997. (with Shmuel Oren).
- “Improving Private Incentives for Electric Grid Investment.” *Resource & Energy Economics*. Vol. 19, No. 1-2, March, 1997. (with Steve Stoff).
- “Market Power in California Electricity Markets.” *Utilities Policy*, Vol 5, No. 3-4, October, 1996. (with Severin Borenstein, Edward Kahn, and Steven Stoff).

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“Electric Grid Investment Under a Contract Network Regime.” *Journal of Regulatory Economics*, Vol. 10, No.1, July, 1996. (with Steven Stoft).

“Internal Auctions for the Efficient Sourcing of Intermediate Products.” *Journal of Operations Management*, Vol. 12, April 1995. (with Shmuel Oren).

“Incentive Effects of Environmental Adders in Electric Power Auctions.” *The Energy Journal*, Vol. 15, No. 3, September, 1994. (with Shmuel Oren).

“Bidder Cost Revelation in Electric Power Auctions.” *Journal of Regulatory Economics*, Vol. 6, No. 1, February, 1994. (with Shmuel Oren).

### Other Publications

James Bushnell and Catherine Wolfram. “Electricity Markets,” *New Palgrave Dictionary of Economics and the Law*. Forthcoming.

James Bushnell “Electricity Resource Adequacy: Matching Policies and Goals,” *The Electricity Journal*. September, 2005.

James Bushnell “Looking for Trouble: Competition Policy in the U.S. Electricity Industry,” Chapter 6 in *Electricity Restructuring: Choices and Challenges*. Puller and Griffen, Eds. University of Chicago Press. 2005.

James Bushnell “West Coast Power Blues.” *New York Newsday* Op-ed Section. January 7, 2001.

Severin Borenstein and James Bushnell. “California consumers haven’t seen the benefits of deregulating the electricity industry yet – what went wrong?” *San Jose Mercury News* Op-ed Section. August 27, 2000.

Severin Borenstein and James Bushnell, “Electricity Restructuring: Deregulation or Reregulation?” *Regulation*. Vol. 23, No. 2.

James Bushnell, “Transmission Rights and Market Power,” *The Electricity Journal*, Vol. 12, No. 9, October, 1999.

James Bushnell and Steven Stoft. “Grid Investment: Can a Market do the Job?” *The Electricity Journal*, Vol. 9, No. 1, January, 1996.

Carl Blumstein and James Bushnell. “A Guide to the Blue Book: Issues in California’s Electric Industry restructuring and Regulatory Reform.” *The Electricity Journal*, Vol. 7, No. 7, September, 1994.

## James Bushnell

### Working Papers

James Bushnell and Catherine Wolfram, "The Guy at the Controls: Labor Quality and Power Plant Efficiency." NBER working paper 13215. July 2007. In submission.

James Bushnell, Carla Peterman, Catherine Wolfram, "California's Greenhouse Gas Policies: Local Solutions to a Global Problem?" CSEM-166. University of California Energy Institute. April 2007.

James B Bushnell and Jun Ishii. "A Dynamic Model of Investment in a Restructured Electricity Industry." CSEM-164. University of California Energy Institute. January, 2007.

James B. Bushnell and Catherine Wolfram, "The Economic Effects of Vintage Differentiated Regulations: The Case of New Source Review" Report CSEM-157, University of California Energy Institute, July 2006. In revision for the *American Economic Journal: Economic Policy*.

James B. Bushnell and Catherine Wolfram, "Ownership Change, Incentives and Plant Efficiency: The Divestiture of U.S. Electric Generation Plants." Report CSEM-140 University of California Energy Institute, March 2005.

Severin Borenstein and James Bushnell, "Retail Policies and Competition in the Gasoline Industry," CSEM-144, University of California Energy Institute, May 2005.

Severin Borenstein, James Bushnell and Matthew Lewis, "Market Power in California's Gasoline Market." Report CSEM-132, University of California Energy Institute, May 2004.

James Bushnell and Celeste Saravia. "An Empirical Assessment of the Competitiveness of the ISO New England's Electricity Market," Report CSEM-101, University of California Energy Institute, December 2001.

James Bushnell and Erin Mansur, "The Impact of Retail Rate Deregulation on Electricity Consumption in San Diego," Report PWP-082, University of California Energy Institute. March 2001.

James Bushnell, Chris Knittel, and Frank Wolak, "Assessing the Opportunities for Market Power in a Restructured Wisconsin's Electricity Market." Mimeo, September, 2000.

James Bushnell and Frank Wolak, "Regulation and the Leverage of Local Market Power in California's Electricity Market," Report PWP-070, University of California Energy Institute. June 1999.

James Bushnell and Eric Friedman "Linear Exchangeable Permits for the Efficient Control of Multiple Pollutants." Report PWP-019, University of California Energy Institute, November 1994.

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### Regulatory Filings or Reports

Opinions of the Market Surveillance Committee of the California ISO. (with Frank Wolak and Benjamin Hobbs (2005-2008) and Brad Barber (2002-2005). Numerous opinions available at <http://www.caiso.com/docs/2000/09/14/200009141610025714.html>.

Ross Baldick, Ashley Brown, James Bushnell, Sue Tierney, and Terry Winter. "A National Perspective on Allocating the Costs of New Transmission Investment: Practice and Principles." White Paper prepared by the Blue Ribbon Panel on Transmission Cost Allocation for WIRES. October, 2007.

James Bushnell. "Comments on Horizontal Market Power Screens and Market-Based Rates for Public Utilities. Federal Energy Regulatory Commission. Docket No. RM04-7-000. June 30, 2004.

James Bushnell and Robert Wilmouth. "Comments of the Market Monitoring Committee of the California Power Exchange on the Federal Energy Regulatory Commission order of Nov. 1 proposing remedies for the California wholesale electricity market. Nov. 22, 2000.

James Bushnell, Alvin Klevorick, and Robert Wilmouth. "The impact of reliability must-run contract reform and ancillary-services market redesign on the performance of California's energy market." 3<sup>rd</sup> report to FERC of the Market Monitoring Committee of the California Power Exchange. June 6, 2000.

Severin Borenstein, James Bushnell, and Chris Knittel, "Comments on the use of computer models for merger analysis in the electricity industry," Federal Energy Regulatory Commission. Docket No. PL98-6-000. June, 1998.

Severin Borenstein, James Bushnell, and Chris Knittel, "A Cournot-Nash Equilibrium Analysis of the New Jersey Electricity Market." Appendix A of Review of General Public Utilities' Restructuring Petition, Final Report. New Jersey Board of Public Utilities. Docket No. EA97060396. January, 1998.

### Work in Progress

Impact of Carbon Costs on Industrial Activity (with Erin Mansur)

Greenhouse Gas Regulation and International Trade (with Catherine Wolfram and Michael Greenstone)

Simulating CO2 Cap-and-Trade Policies in the Western U.S. (with Yihsu Chen)

A Model of Investment in Alternative Energy Technologies (with Jun Ishii)

### Conference Activities

Conference Co-Organizer (with Severin Borenstein), CSEM Research Conference on Petroleum and Refined Products. Berkeley, 2007

Conference Co-Organizer (with Severin Borenstein), POWER Research Conference on Electricity Restructuring Berkeley, 1996-2008.

Chair, Workshop on the Design and Organization of Electricity Markets. DOE/NARUC

**James Bushnell**

National Electricity Forum. Houston, September 1998.

**Selected Presentations**

“EIA Data and Evaluating Electricity Restructuring.” 2008 Energy Information Administration Energy Conference. Washington, DC. April 2008.

“Making the Call: Has Electricity Restructuring Helped Consumers in the U.S.?” Harvard Electricity Policy Group. December 2007.

“US Greenhouse Gas Policy.” London Energy Forum. October 2007.

“The Use of Oligopoly Models in Economic and Policy Applications.” European School of New Institutional Economics (ESNIE). Corsica, France, May 2007.

“Cap and Trade Mechanisms: Lessons for California’s Greenhouse Gas Policies,” California Public Utilities Commission. May 2007.

“Greenhouse gas policies and the western power market.” Presentation to the Western Power Trading Forum, New York, NY. March 2007.

“California’s Greenhouse Gas Policies: Local Solutions to Global Problems? POWER conference on electricity restructuring. UC Berkeley, March, 2007.

“The Economics of Electricity Transmission.” Colgate University. October 2006.

“The Economic Effects of Vintage Differentiated Regulations: The Case of New Source Review.” Yale University Environmental Economics Seminar. October, 2006.

“The Economic Effects of Vintage Differentiated Regulations: The Case of New Source Review.” Johns Hopkins University. October 2006.

“Vertical Commitments, Contracts, and Competition in Electricity Markets,” NEMIEC, Nordic Energy Research Program, Iceland, September, 2006.

“Electricity Restructuring in the United States.” Australian Economics Society, Sydney. Australia, July 2006.

“Market Structure and Competition: an analysis of US electricity restructuring” ACCC. Melbourne. Australia. July 2006.

“Vertical Integration and Competition,” ACCC Regulatory Conference. The Gold Coast. Australia. July 2006.

“Convergence Bidding and Market Efficiency,” CAISO Market Issues Forum. Folsom, CA. June 13, 2006.

“The evolution of US electricity markets,” ISO/RTO Council Governing Board Conference. Phoenix, AZ. May 24, 2006.

“Economic and Environmental Regulation and the US Gasoline Market.” Workshop on the regulatory power of the EU and its impact on transatlantic relations. Center on Institutions and Governance. UC Berkeley, May 12, 2006.

**James Bushnell**

“Labor Quality and Plant Efficiency in the Electricity Industry,” Stanford University, January 20, 2006.

“Ownership Change, Incentives and Plant Efficiency: The Divestiture of U.S. Electric Generation Plants.” AEA meetings, Boston, January 2006.

“The Future of the Electricity Industry,” State Legislative Leaders Foundation. UC Santa Barbara. October 2005.

“The Economics of Electricity Reliability,” Foundation for American Communications (FACS). Long Beach, CA, June 2005.

“The Economic Effects of Vintage Differentiated Regulations: The Case of New Source Review.” Economics of Electricity Markets Conference. IDEA, Toulouse. June 2005.

“Vertical Integration, Market Structure and Competition: A Cross-Market Analysis of the Competitive Performance of Restructured U.S. Electricity Markets,” Economics Dept., UC Irvine, May 2005.

“Ownership Change, Incentives and Plant Efficiency: The Divestiture of U.S. Electric Generation Plants.” Electric Power Research Institute (EPRI) Market Resstructuring Conference, San Francisco, May 2005.

“Retail Policies and Competition in the Gasoline Industry,” Platts Conference on Petroleum Markets. Long Beach, CA. April 2005.

“Market Power vs. Market Manipulation,” University of Houston Law Symposium on Energy Markets. Houston, TX. March, 2005.

“The Economics of Capacity Markets,” CSEM Policy Conference., Sacramento, CA, November 2004.

“Oligopoly Models in Capacity Constrained Transmission Networks,” Lawrence Berkeley National Laboratory. Berkeley, CA. October 2004.

“Vertical Integration and Competitive Performance in the Electricity Industry,” Universite Catolica de Louvain, Belgium. January 2004.

“Monitoring Electricity Markets,” IEEE Power Society, Toronto, Canada. July 2003.

“Market Structure and Competition: A cross-sectional analysis of US electricity markets,” Econometric Society, Northwestern University, Chicago, Illinois. June 2003.

“The near-term outlook for California’s Energy Markets,” National Association of Business Economists, San Francisco Federal Reserve. May 2003.

“A 3 Market Comparison of Electricity Market Performance in the U.S.,” University of Wyoming, Laramie, Wyoming. April 2003.

“Looking for Trouble: Competition Policy in the U.S. Electricity Industry,” Texas A&M, College Station, Texas. April 2003.

## **James Bushnell**

“An Empirical Assessment of the Competitiveness of the New England Electricity Market,” Universite Toulouse, France. November 2002.

“Transmission Management and Electricity Competition, LUISS Guido Carli, Rome, Italy. November 2002.

“What we do and do not know about how electricity markets work.” Keynote Address, Energy Information Administration’s National Energy Modelling System Annual Conference, Washington, D.C. March 2002.

“Measuring Market Inefficiency in California’s Deregulated Electricity Market.” Dept. of Agricultural and Resource Economics, U.C. Davis, February 2002.

“California’s Electricity Industry: the morning after.” Center for Environmental and Energy Policy Research, MIT. December 2001.

“Lessons from California’s Energy Crisis,” University of Arizona. April 2001.

“Electricity Restructuring in California,” Public Utilities Research Center, University of Florida, Gainesville. February, 2001.

“Diagnosing Market Power in California’s Restructured Wholesale Electricity Market,” Dept. of Ag. and Applied Economics. University of Wisconsin, Madison. February, 2001.

“Market Power in Electricity Markets: the California Experience - Lessons for Wisconsin.” Presentation to the Wisconsin Congressional Delegation. Rayburn Congressional Office Building, Washington, D.C., January, 2001.

“Dissecting California’s Electricity Restructuring Process,” Presented to the National Association of Business Economists. Federal Reserve Bank of San Francisco, October 2000.

“Water and Power: Hydro-electric resources in the era of deregulation in the western U.S.” Dept. of Operations and Information Management, School of Business, University of Wisconsin, Madison, October, 2000.

### **Other Consulting Projects**

Korean Power Exchange, 2008.

Korean Electric Power Company, 2007.

WIRES, 2007.

Energy Information Administration, 2006

Midwest ISO, 2006

Wisconsin Public Power Inc., 2001

ISO – New England, Massachusetts Attorney General, 2001

U.S. Dept. of Justice, 2001

Customers First! Coalition of Wisconsin, 2000

The World Bank, 1999-2000

California Independent System Operator, 1997-98

New Jersey Board of Public Utilities, 1997