

VIVEK ASHOK SAKHRANI

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OBJECTIVE

Develop theories and models, enhance practice, and teach systems design and architecture for civil infrastructure

EDUCATION

MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT)

Doctor of Philosophy (PhD) in Engineering Systems 2010 - 2015

Thesis: *Tradespace Boundary Objects for Collaborative Design*
Research areas: Flexibility in design; tradespace modeling for life-cycle performance;
Project complexity, architecture, and governance
Doctoral committee: Richard de Neufville, Donald Lessard, John Parsons and Olivier de Weck
Fellowships: MIT Tata Fellow for Technology & Design Fellow (2013 – 2015)
MIT Global Fellow (2012)
MIT Martin Family Fellow for Sustainability (2011 – 2012)

Master of Science (SM) in Technology and Policy 2008 - 2010

Thesis: *Role of Long-term Contracts for New Investments in Power Generation: Pain or Gain?*
Research areas: Financial valuation; real options analysis; contracts; risk management; electricity policy

Graduate Teaching Certificate, MIT Teaching & Learning Lab 2014

Practiced syllabus design, lecture design, problem sets, learning assessment, & micro-teaching with feedback

UNIVERSITY OF TEXAS AT AUSTIN

Bachelor of Science (BS) in Mechanical Engineering, Business (minor) 2003 - 2008

Capstone project: *Fuel-belt Coal Composition Analysis in Power Plant Operations Management*
Fellowships: Eva Stevenson Woods Endowed Presidential Scholarship (2007 – 2008)
Steve K. Sin Endowed Presidential Scholarship (2006 – 2007)
Judge Marvin Jones Endowed Presidential Scholarship (2005 – 2006)
Pi Tau Sigma Mechanical Engineering Honors

JOURNAL ARTICLES

* denotes corresponding author, where multiple authors

Sakhrani, V.*, D. Lessard, O. de Weck, & R. de Neufville, "Value of Collaboration in Systems Design for Infrastructure," in preparation for *Research in Engineering Design*

Sakhrani, V. *, L. Jordan, & R. de Neufville, "Value of Flexible Project Definition: Lessons from Kabul Water Supply," under revision for resubmission to *International Journal of Project Management*

Lessard, D., **V. Sakhrani*** & R. Miller. (2014). "House of Project Complexity—understanding complexity in large infrastructure projects," *Engineering Project Organization Journal*, 4(4), 170 – 192

EDITED VOLUMES

Taylor, J. E., P. Chinowsky, & **V. Sakhrani**, "Grand Challenges in Engineering Project Organization," in final stages of preparation, *Engineering Project Organization Society*

REFEREED PROCEEDINGS

*** denotes corresponding author, where multiple authors**

Sakhrani, V. (2014). "Using Tradespaces to allocate Contractual Risk in Flexible Design Concepts," Working Paper Series, *Proceedings of the Engineering Project Organization Conference*, Winter Park, CO, July 29-31, 2014.

Taylor, J.E., P. Chinowsky, **V. Sakhrani** (Eds.) (2014). "Grand Challenges in Engineering Project Organization," Working Paper Series, *Proceedings of the Engineering Project Organization Conference*, Winter Park, CO, July 29-31, 2014.

Sakhrani V. (2014). "Sharing Risk by Embedding Flexibility through Collaborative Design," presentation at the *Technology Management and Policy Consortium / International Risk Governance Council 2014* meeting, Instituto Superior Tecnico, Lisbon, Portugal

Jacquillat, A. & **V. Sakhrani*** (2014). "A Joint Planning, Management, and Operations Framework for Airport Infrastructure," *Proceedings of the 4th International Engineering Systems Symposium*, Hoboken, NJ, June 8 – 11, 2014

AlAbdulkareem, A.*, A. Alfaris, **V. Sakhrani**, A. AlSaati, A., & O. de Weck (2014). "The Multidimensional Hierarchically Integrated Framework (MHIF) for Modeling Complex Engineering Systems." In M. Aiguier, F. Boulanger, D. Krob & C. Marchal (Eds.), *Proceedings of the 4th International Conference on Complex Systems Design & Management* (pp. 301-313): Springer International Publishing.

Sakhrani V.*, A. AlAbdulkareem, A. AlSaati, A. Alfaris, N. Selin, O. de Weck (2013). "A Risk-based Evaluation of Policies for Sustainable Water System Design in the Kingdom of Saudi Arabia," paper presented at the *International System Dynamics Conference 2013*, Cambridge, MA

Sakhrani, V.*, A. AlSaati, O. de Weck (2013). "Modeling the Dual-Domain Performance of Large Infrastructure Projects: The Case of Desalination," in the *Proceedings of the Institute of Industrial Engineers Asian Conference 2013*, pp. 1315 – 1323, Taipei

Sakhrani, V. (2013). "A Joint Technical and Contractual Tradespace Model for Large Desalination Projects," **Best Poster Award** at the *Engineering Project Organization Conference 2013*, Winter Park, Colorado

Lessard, D., **V. Sakhrani***, R. Miller (2013). "House of Project Complexity: Understanding Complexity in Large Infrastructure Projects," **Best Paper Award** at the *Engineering Project Organization Conference 2013*, Winter Park, Colorado

Sakhrani, V. (2013). "Understanding Complexity in Large Infrastructure Projects," presentation at the *Technology Management and Policy Consortium 2013* meeting, Massachusetts Institute of Technology, Cambridge, MA

Sakhrani, V. (2012). "Project Architecture and Life-Cycle Performance in Large Infrastructure Projects," paper & poster presented at the *Complex Systems Design & Management 2012 Conference*, Paris, France

Sakhrani, V.*, A. Bagiati, S. Sarma, R. de Neufville (2012). “Institutional Transplantation in Education – Cultural Transfusion to a New Institution,” paper presented at the *World Engineering Education Forum 2012*, Buenos Aires, Argentina

Bagiati, A.*, **V. Sakhrani**, S. Sarma, R. de Neufville (2012). “Approaching Institutional Transplantation through Faculty Development,” paper presented at the *40th European Society for Engineering Education (SEFI) 2012 Conference*, Thessaloniki, Greece

Sakhrani, V. (2011). “Designing the Governance Framework for Public-service Infrastructure Delivery: Opportunities and Challenges for Research,” presentation at the *Technology Management and Policy Consortium 2011 meeting*, Pennsylvania State University, State College, PA

Sakhrani, V. (2009). “Role of Long-term Contracts for New Investments in Power Generation,” poster presented at the *Technology Management and Policy Consortium 2009 meeting*, Vancouver, Canada

Sakhrani, V.*, T. Morisset, “Should U.S. Airports accommodate New Large Aircraft?” **Best Presentation Award** for Business Track at the *AAAS Science and Technology in Society Conference 2009*, Washington, D.C.

TECHNICAL REPORTS & WORKING PAPERS

Collins, R. D.*, **V. Sakhrani**, N. E. Selin, A. AlSaati, & K. Strzepek, *Using inclusive wealth for policy evaluation: the case of infrastructure capital*, chapter in preparation for Inclusive Wealth Report 2014, UNU-IHDP and UNEP, November 2014

Sakhrani, V. with N. Rose, I. Perez-Arriaga, H. Jacoby, T. Heidel, R. Schmalensee & J. Kassakian, *Chapter 7: Engaging Electricity Demand and Chapter 8: Utility Regulation* in “Future of the Electric Grid: An Interdisciplinary MIT Study,” MIT Energy Initiative, Massachusetts Institute of Technology, Cambridge MA, December 2011

Sakhrani, V., “Africa in Context: A Brief on Global Electricity Power Pools,” prepared for the Africa Energy Group, The World Bank, July 2011

Sakhrani, V., “A Risk-based Financial Valuation for Cross-border Electricity Transmission Interconnections,” prepared for the Africa Energy Group, The World Bank, July 2011

Sakhrani V.*, J.E. Parsons, “Electricity Network Tariff Architectures: A Comparison of Four OECD Countries,” Working Paper 2010-008, MIT Center for Energy and Environmental Policy Research, July 2010

Sakhrani, V.*, V. Mohta, “Alternatives and Economic Analysis in Support of the Commonwealth of Massachusetts' Petition to Exempt from Federal Preemption Massachusetts' 90% Annual Fuel Utilization Efficiency Standard for Non-Weatherized Gas Furnaces,” prepared for the Massachusetts Department of Energy Resources, September 2009

TEACHING

ESD.801 Leadership Development for Technology & Policy (co-instructor with Dava Newman) 2012 – 2014

Flexibility in Infrastructure Project Design (prepared course; yet to be taught)

RESEARCH AFFILIATIONS

MIT Tata Center for Technology + Design	<i>Research Fellow</i>	2013 - 2015
Secured US\$50,000 in funds to lead an exploratory study on infrastructure public-private partnerships in India;		
Conducted Value for Money (VfM) study of Delhi International Airport, India's first public-private partnership		

KACST – MIT Center for Complex Engineering Systems	<i>Research Assistant</i>	2012 - 2015
Developed a new tradespace model for technical and contractual co-design of large desalination plants; Contributed to proposal to secure US \$ 1.4 million for follow-on phase of research; Co-developed uncertainty-based decision support models for public sector stakeholders to probabilistically evaluate water system investment policies in the Kingdom of Saudi Arabia		
MIT Future of the Electric Grid Study	<i>Research Assistant</i>	2009 - 2011
Led research on electricity distribution infrastructure in areas of demand response, grid modernization, distributed generation, and electric vehicle deployment; Lead student author on two chapters of report to inform state and national electricity policy		
MIT Center for Energy and Environmental Policy Research	<i>Research Assistant</i>	2008 – 2011
Assessed the impact of electricity network tariff designs on reliability of supply, quality of power and service, and deployment of distributed generation in Australia, Portugal, Spain, and the USA; Investigated the role of long-term contracts for new investments in power generation		

INTERNATIONAL PARTNERSHIPS

Global Infrastructure Projects Research Network (GIPRN)	<i>Founding Participant</i>	2014 -
Co-developing a database of 1000+ large infrastructure projects in energy, water and transportation with 19 university members from 11 countries; contributed detailed data on 40 large desalination projects		
Indian School of Business Infrastructure Management Institute	<i>Advisory Support</i>	2012 - 2015
Work with Richard de Neufville to advise ISB leaders on the research agenda and course offerings in Infrastructure Management at ISB's Hyderabad and Mohali campuses		
Singapore University of Technology and Design	<i>Research / Teaching Assistant</i>	2011 - 2012
Co-created with Richard de Neufville a new, year-long Teach-the-Teachers experiential leadership program at MIT for junior faculty from SUTD to absorb and transplant MIT's academic and research culture to SUTD Investigated the effectiveness of regulatory incentives for urban development outcomes in Singapore through stakeholder interviews and a case study analysis		

VISITING ARRANGEMENTS

Indian Institute of Technology (IIT)- Madras, India	2013 -
Department of Civil Engineering, Building Technology and Construction Management Division	
Delft University of Technology (TU Delft)	2012
Department of Technology Management and Policy	

PROFESSIONAL EXPERIENCE

World Bank Group	<i>Consultant, Competitive Industries Practice Group</i>	Summer 2012
Developed decision analysis model for selecting flexible infrastructure procurement strategies to enhance social value of Kabul's water system, a potential increase in Return to Capital from 7% to 25% (US\$ 225 million)		
World Bank Group	<i>Consultant, Africa Energy Group</i>	Summer 2011
Developed financial valuation model for cross-border electricity transmission investments in the Eastern Africa Power Pool that demonstrated trade-off between level of tariffs and loan subsidies for economic viability		

Department of Energy Resources, Massachusetts	<i>Policy Researcher</i>	Summer 2009
Conceptualized, performed, and submitted a policy alternatives analysis to US Department of Energy for deploying energy-efficient residential consumer appliances in Massachusetts, while collaborating with state officials, agencies, public utilities, and consumer interest groups; Helped facilitate negotiations between electricity utilities for long-term power purchase agreements to secure investments in renewable generation capacity		
Lower Colorado River Authority	<i>Engineering Consultant</i>	Spring 2008
Designed and executed feasibility study for fuel-belt coal composition analysis and integration procedures at the Fayette Power Project (1600 MW, La Grange, TX) to optimize fuel supply chain and manage emissions		
Parsons Infrastructure and Technology	<i>Engineering Consulting Intern</i>	Summer 2007
Spearheaded cost estimation effort for US\$ 150 million water quality compliance project with 26 communities in eight West Texas counties for Texas Commission on Environmental Quality (TCEQ)		
National Instruments Corporation	<i>Applications Engineering / Marketing Intern</i>	Summer 2006
Resolved customers' technical issues in real-time through call center phone support Developed a benchmarking and calibration testing process for Data Acquisitions (DAQ) and Signal Conditioning hardware products that was adopted by marketing and sales teams		
Engineering Student Life Programs, UT Austin	<i>Student Coordinator for Leadership Programs</i>	2004 – 2008
Empowered over 300 engineering student leaders in 50 student organizations over four years by developing and teaching programs such as Ramshorn Retreats Executed ten campus-wide sessions of LeaderShape-Texas for 50 students each with an annual budget of US\$100,000		
Department of Biology, UT Austin	<i>Laboratory Assistant</i>	2003 – 2004
Prepared lab experiments under lab manager's supervision for introductory biology courses Managed and maintained lab equipment and facilities to improve lab efficiency and comply with EHS standards		
EducationMatch Counseling	<i>Counselor</i>	2002 – 2003
Expanded operations by setting up two new branch offices to counsel high school students on college admissions and financial aid packages for US universities		
15to25.com Youth Website	<i>Web Journalist</i>	Summer 2000
Generated daily and weekly content focused on social and professional topics for Indian youth aged 15 – 25 by conducting executive interviews, marketplace surveys, independent analysis, book and movie reviews		

LEADERSHIP & COMMUNITY ENGAGEMENT

Longhorn Engineering Advisory Delegation (L.E.A.D.)	<i>Founding President</i>	2014 – 2016
Created and leading a new strategic advisory board for the Cockrell School of Engineering at UT Austin to “enhance the engineering student experience through alumni engagement” at the request of the Dean of the School		
MIT Engineering Systems Society	<i>Co-President, Research & Education Co-chair, Athletics Chair</i>	2010 – 2013
Doubled the number of research and professional events with only 30% increase in budget over a two year period Organization awarded the 2013 Martore Award for contributions to the ESD academic program		
MIT Corporation Joint Advisory Committee	<i>Graduate Representative</i>	2010 – 2012
Represented 6,000 graduate students as advisor to MIT's Board of Trustees		
UT Cockrell School of Engineering Advisory Board	<i>Recent Alumni Representative</i>	2008 – 2014
Support UT 's Dean of Engineering in executing capital projects, influencing legislative agenda, and curricular reform		
MIT Energy Education Task Force	<i>Graduate Student Representative</i>	2010 – 2012

Developed strategic initiatives for energy education at MIT such as a Graduate Student Travel Fund		
MIT Energy Conference	<i>Panel Lead</i>	2011
Conceptualized and executed the “Valuing Risk in Big Energy Panel” for the nation’s premier annual energy conference		
Science & Technology Leadership Association	<i>Lead Instructor for China Forum, Advisor</i>	2010 – 2011
Instructed 40 students in a week-long workshop on applying leadership models to issues in energy policy in Beijing		
MIT Clean Energy Prize	<i>Judging Team</i>	2010
Developed judging criteria and team evaluation metrics for the student-run US\$200,000 innovation competition		
MIT Search Committee for the Associate Dean for Student Leadership & Engagement		2010
Evaluated candidates for MIT’s first strategic Associate Dean hire in student leadership and community engagement		
Leadership Development Subcommittee, Graduate Student Council	<i>Founding Chair</i>	2009 - 2011
Co-founder of MIT Leadership Evolution for Graduate Students (LEGS) workshop series		
MIT Faculty Committee on Student Life	<i>Graduate Student Representative</i>	2009 – 2011
Collaborating with MIT faculty to improve the graduate and undergraduate student life experience		
MIT Technology Policy Program (TPP) Curricular Review Student Committee	<i>Member</i>	2008 – 2009
Evaluated classes and provided course feedback to TPP faculty on curricular improvement		
MIT IDEAS Social Entrepreneurship Competition	<i>Proposal Reviewer, Judging Facilitator</i>	2008 – 2011
Enabled student teams to win US\$5,000 - \$7,500 grants by providing high quality feedback and constructive advice		
Selection Committee for the Dean of the Cockrell School of Engineering, UT Austin		2007 – 2008
Selected and recommended final candidate for the position of Dean, Cockrell School of Engineering		
Selection Committee, UT Cockrell School of Engineering Student Leadership Award		2007 – 2008
Selected recipients for the Cockrell School’s most prestigious student award		
UT Austin President's Student Advisory Committee (PSAC)	<i>Undergraduate Representative</i>	2006 – 2007
Student advisor to president of UT Austin and liaison between student body and senior administration on academic and student life		
Texas Ballroom Dance Competition Team	<i>Member</i>	2005 – 2007
Represented UT Austin at regional and national collegiate amateur competitions in four Standard and four Latin dances		
Selection Committee, James W. Vick Awards for Academic Advising		2005 – 2006
Selected recipients for UT’s highest recognition for academic advisors		
UT Engineering Ambassador		2004 – 2008
Official student representative of the school of Engineering at university and external relations events; conducted presentations and workshops for high school and middle school students on preparing for engineering degrees		

COMMUNITY HONORS

MIT Larry G. Benedict Leadership Award 2011

For empowering fellow students to develop as leaders and active mentoring and coaching of peers within the MIT community

UT Cockrell School of Engineering Student Leadership Award 2006

For superlative performance in organizational leadership, college service, innovation and humanitarianism

Texas Exes' President's Leadership Award 2005

For outstanding achievement in student leadership as an undergraduate sophomore

Best Boy Scout Award – Rajmachi Camp 1999, St. Vincent's High School Scouts Troop

For exemplary leadership as a junior scout and Patrol Leader

ACADEMIC PROJECTS

Sakhrani, V., "Valuation of Electricity Transmission Investments: A Review of Common Planning Methodologies and a Case Study Application," in partial fulfillment of the requirements for ESD.86 Models, Data and Inference for Sociotechnical Systems, Spring 2011

Sakhrani, V., "Origins of Natural Monopoly Regulation in the U.S. Electricity Industry," in partial fulfillment of the requirements for ESD.108 Science, Technology and Policy, Fall 2009

Sakhrani, V., "Historical Roots: Scientific Management and Real Options," in partial fulfillment of the requirements for ESD.83 Doctoral Seminar in Engineering Systems, Fall 2009

Sakhrani, V., "Regulation of Distribution for Distributed Generation in the European Union," in partial fulfillment of the requirements for ESD.162J Engineering, Economics and Regulation of the Electric Power Sector, Spring 2009

With T. Morisset, R. Kar, Y. Funahashi, "Should U.S. Airports accommodate New Large Aircraft?" in partial fulfillment of the requirements for ESD.162J Engineering, Economics and Regulation of the Electric Power Sector, Fall 2008

With M. McCradic, G. Power, "Fayette Power Project (FPP) On-line Coal Analyzer Feasibility Study," prepared for the Lower Colorado River Authority; capstone senior design project in partial fulfillment of the requirements for B.S. degree in Mechanical Engineering, University of Texas at Austin, Spring 2008

Sakhrani, V., "A Thermal-fluidic Analysis and Simulation of the Gas Turbine-Modular Helium Reactor (GT-MHR) Nuclear Power Plant Design Prototype," in partial fulfillment of the requirements for B.S. degree in Mechanical Engineering, University of Texas at Austin, Spring 2008

INVITED PARTICIPATION & MEETINGS

MIT delegate, Third International Engineering Systems Symposium: Design & Governance in Engineering Systems, TU Delft, The Netherlands (2012)

Panelist, *The Engineer of the Future*, Cockrell School Engineering Advisory Board Meeting, UT Austin (2011)

MIT delegate, Engineer of the Future Summit, Olin College of Engineering, Massachusetts (2009)

Lead student presenter on engineering leadership, Cockrell School Engineering Advisory Board Meeting, UT Austin (2006)

Co-founder, Roden Issues Conference on Technology Policy and Innovation: Engineering Change, UT Austin (2005)

UT delegate, Engineers for a Sustainable World Annual Conference (2005, 2006)

WORK AUTHORIZATION

Nationality: India

Immigration: F-1 student visa

Languages: Fluent in English, Hindi, Marathi