

PROMOTION RECOMMENDATION  
The University of Michigan  
School of Natural Resources and Environment

Approved by the Regents  
May 14, 2009

Gregory A. Keoleian, associate professor of sustainable systems, with tenure, School of Natural Resources and Environment, is recommended for promotion to professor of sustainable systems, with tenure, School of Natural Resources and Environment.

Academic Degrees:

Ph.D.	1987	Chemical Engineering, University of Michigan, Ann Arbor, MI
M.S.E.	1982	Chemical Engineering, University of Michigan, Ann Arbor, MI
B.S.E.	1980	Chemical Engineering, University of Michigan, Ann Arbor, MI
B.S.	1980	Chemistry, University of Michigan, Ann Arbor, MI

Professional Record:

2003-present	Associate Professor, with tenure, School of Natural Resources and Environment, University of Michigan
1999-present	Co-Director, Center for Sustainable Systems, University of Michigan
1998- 2003	Associate Research Scientist, School of Natural Resources and Environment, University of Michigan
1998- 2001	Associate Research Scientist, College of Engineering, University of Michigan
1992-1998	Assistant Research Scientist, School of Natural Resources and Environment, University of Michigan

Summary of Evaluation:

Teaching: Professor Keoleian's two courses are both co-listed with others schools: Industrial Ecology (NRE 557) is jointly offered with Civil and Environmental Engineering, and Sustainable Energy Systems (NRE 574) is also taught as Public Policy 519. The first course serves as a core course for two programs Professor Keoleian initiated: the Sustainable Systems field of study in SNRE and the Industrial Ecology Certificate Program. When first offered, the latter course was one of the few graduate level courses on energy offered by the University. While his courses make use of extensive analytic tools and methods, Professor Keoleian capably straddles the diversity of background among the students so that even those who begin with less technical background can become conversant in, and critical of, different assessment procedures by course's end. Professor Keoleian's commitment to teaching is further exemplified by his strong record of sponsoring interdisciplinary master's projects and mentorship of graduate students. He has advised 14 master's projects many of which have led to tangible outcomes for clients, including the University, Washtenaw County, the State of Michigan, a village in Ghana, and a variety of corporations and businesses such as DTE Energy, BHP Billiton and Aurora Organic Dairy. He has served on 20 doctoral committees (chair on four completed Ph.D.s) with many of the students now holding appointments in leading universities. Particularly noteworthy has been the funding Professor Keoleian has provided for his students, including 33 Graduate Student Research Assistantships and some financial support for the 52 master's students he has mentored.

Research: Professor Keoleian is a leading scholar in the field of industrial ecology and the subfield of life-cycle analysis. His research productivity, both in terms of number of peer-reviewed articles and research funding, is excellent. The 26 peer-reviewed articles published since 2003 appeared in a wide range of publications including *Journal of Industrial Ecology*, *Energy Policy*, *Materials and Structures*, *International Journal of Energy Research*, *Journal of Transportation Engineering*, *Resources Policy*, *Journal of Infrastructure Systems*, and *Renewable Energy*. Far from reflecting a lack of a coherent research agenda, this record represents the power and broad applicability of life-cycle analysis for the study of sustainability challenges. Professor Keoleian's accomplishments are extraordinary in their interdisciplinary scope and the successful record of garnering research support. He has been a principal investigator on 16 funded research grants, with over \$3.5 million in funding (including NSF, Alcoa Foundation, and the Wege Foundation) and co-principal investigator on nine other grants totaling over \$7 million. These funds have been of enormous value to post-doctoral scholars, as well as doctoral and master's students. They have also entailed collaborations with researchers from five schools and colleges. Professor Keoleian has twice been recognized as an AT&T Industrial Ecology Faculty Fellow; he also received the US Environmental Protection Agency P3 Award (as faculty co-advisor), was cited by the Materials Research Society for Best Paper for Symposium G Life-Cycle Analysis Tools, and was asked to deliver the Wrigley Sustainability Lecture at Arizona State University.

Recent Significant Publications:

- Kapur, A., Keoleian, G.A., Kendall, A., and Kesler, S.E. (in press). "Dynamic Modeling of In-Use Cement Stocks in United States." *Journal of Industrial Ecology*.
- Kendall, A., Keoleian, G.A., and Lepech, M. 2008. "Material Design for Sustainability through Life Cycle Modeling of Engineered Cementitious Composites." *Materials and Structures* 41(6): 1117-1131.
- Chan, A., Keoleian, G.A., and Gabler, E. 2008. "Evaluation of Life-Cycle Cost Analysis Practices Used by the Michigan Department of Transportation." *Journal of Transportation Engineering* 134(6): 236-245.
- Keoleian, G.A., and Spitzley, D.V. 2006. "Life Cycle Based Sustainability Metrics." In M.A. Abraham, Ed. *Sustainability Science and Engineering: Defining Principles* (Sustainability Science and Engineering, Volume 1), Elsevier. Pages 127-159.
- Keoleian, G.A., and Volk, T.A. 2005. "Renewable Energy from Willow Biomass Crops: Life Cycle Energy, Environmental and Economic Performance." *Critical Reviews in Plant Sciences*, 24:385-406.
- Smith, V.M., and Keoleian, G.A. 2004. "The Value of Remanufactured Engines: Life Cycle Environmental and Economic Perspectives." *Journal of Industrial Ecology* 8(1/2): 193-221.

Service: Professor Keoleian has played a major role in the field of industrial ecology at the professional level and in his many contributions on campus. He has chaired and hosted the international conference of the International Society for Industrial Ecology and has served on the editorial board of its flagship *Journal of Industrial Ecology* since its inception. Professor Keoleian co-founded and co-directs the Center for Sustainable Systems (CSS), has served as the coordinator of the Sustainable Systems program in SNRE which is the School's largest and fastest-growing field of study, and was the key driver in the creation of the new Engineering Sustainable Systems dual-degree program between the College of Engineering and SNRE. Professors Keoleian and Bulkley also co-created the highly visible Peter M. Wege Lecture on Sustainability, which has hosted such notables as Gro Harlem Brundtland, Al Gore, Lord John Browne, and the Dalai Lama. He was a prime mover in making Michigan the Alcoa Foundation Conservation and Sustainability Fellowship Program's sole North American partner.

External Reviewers:

Reviewer A: "When one thinks of names in industrial ecology, one thinks of Greg in the top handful. Importantly, he combines excellent technical knowledge with an exceptional ability to work smoothly across disciplinary lines."

Reviewer B: "Prof. Keoleian's research has had a strong and lasting impact on the practice of IE (Industrial Ecology) and LCA (Life Cycle Assessment)."

Reviewer C: "The range of disciplines with which Professor Keoleian has worked is impressive, as is his record in attracting financial support from a broad range of funding bodies."

Reviewer D: "He has achieved national prominence in the field of industrial ecology and sustainability science and has been at the cutting edge of these disciplines for quite some time."


Reviewer E: "While consistently of high academic quality, his work is transparent and easily applied to real-world cases."

Reviewer F: "Despite covering many topics, each of which requires special expertise, Dr. Keoleian's contributions are rigorous and groundbreaking."

Reviewer G: "Dr. Keoleian has been publishing in good journals, with several archival publications per year. He has secured funding from several competitive sources. He has achieved an international reputation in his areas of work."

Summary of Recommendation:

When the University of Michigan celebrates the interdisciplinary inquiries that thrive here, it would be hard pressed to find an individual who embodies that type of research more fully than Professor Keoleian. He has been extraordinarily successful in blending this research program with teaching graduate students and postdoctoral scholars who, in turn, have put their training to use in addressing the far-reaching and pressing challenges of achieving greater sustainability. He has played vital leadership roles in advancing the resources available at the University to enable teaching, research, and service toward meeting these challenges. In light of his achievements as teacher, researcher, and architect of numerous initiatives, I recommend the promotion of Gregory Keoleian to professor of sustainable systems, with tenure, School of Natural Resources and Environment.



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J. David Allan  
Acting Dean  
School of Natural Resources and Environment

May 2009