SABRINA SPATARI, Ph.D., P.Eng

Assistant Professor
Department of Civil, Architectural and Environmental Engineering
Drexel University
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EDUCATION

Ph.D. Civil Engineering, University of Toronto, 2007
Dissertation: "Biomass to Energy Pathways: Assessment of Lignocellulose-based Fuel Production Technologies"

M.S.E. Chemical Engineering, University of Michigan (Ann Arbor), April 1998
Thesis: "Sustainable Materials Management"

B.A.Sc. Department of Chemical Engineering, University of Toronto, May 1995
Thesis: "Industrial Ecology and Its Application to Chemical Engineering"

APPOINTMENTS

Assistant Professor, Department of Civil, Environmental, and Architectural Engineering, Drexel University — January 2009-present

Postdoctoral Scholar, Energy and Resources Group, University of California, Berkeley — October 2007-December 2008

PUBLICATIONS:

Articles published in refereed journals

1. Wilson, T.O., McNeal, F., Spatari, S., Abler, D., Adler, P.R. Densified switchgrass can cost-effectively mitigate greenhouse gas emissions and address energy security in thermal applications, *Environmental Science & Technology* **2011**, in press.
2. Spatari, S.; Yu, Z.; Montalto, F. A., Life cycle implications of urban green infrastructure. *Environmental Pollution* **2011**, *159*, (8-9), 2174-2179.
3. Stadel, A.; Eboli, J.; Ryberg, A.; Mitchell, J.; Spatari, S., Intelligent Sustainable Design: Integration of Carbon Accounting and Building Information Modeling. *Journal of Professional Issues in Engineering Education and Practice* **2011,** *137*, (2), 51-54.
4. Dilworth, R.; Stokes, R.; Weinberger, R.; Spatari, S., The Place of Planning in Sustainability Metrics for Public Works: Lessons From the Philadelphia Region. *Public Works Management & Policy* **2011,** *16*, (1), 20-39.
5. Spatari, S.; MacLean, H. L., Characterizing Model Uncertainties in the Life Cycle of Lignocellulose-Based Ethanol Fuels. *Environmental Science & Technology* **2010,** *44*, (22), 8773-8780.
6. Yeh, S.; Jordaan, S. M.; Brandt, A. R.; Turetsky, M. R.; Spatari, S.; Keith, D. W., Land Use Greenhouse Gas Emissions from Conventional Oil Production and Oil Sands. *Environmental Science & Technology* **2010,** *44*, (22), 8766-8772.

7. Spatari, S., Bagley, D.M., MacLean, H.L. Life cycle evaluation of emerging lignocellulosic ethanol conversion technologies, *Bioresource Technology* **2010**, 101: 654–667.

8. *MacLean, H.L. and Spatari, S., (2009). The Contribution of Process Enzymes and Process Chemicals to the Life Cycle of Ethanol, *Environ. Res. Lett.* 4(2009):1-10.
*The authors share first-authorship of this manuscript and names appear alphabetically.

9. McIntyre, J., Spatari, S., MacLean, H.L. (2009). Environmental Implications of Closing the Concrete Loop, *Journal of Infrastructure Systems*, 15(4): 361-370.

10. Spatari, S., Zhang, Y., MacLean, H.L. (2005). Life Cycle Assessment of Switchgrass and Corn Stover-Derived Ethanol Fueled Automobiles. *Environ. Sci. Technol.*, 39(24):9750-9758.

11. Spatari, S.**,** Bertram, M., Gordon, Robert B., Henderson, K., Graedel, T.E. (2005) Twentieth century copper flows in North America: A dynamic analysis. *Ecological Economics.* 54:37-51.

12. Bjorn, A., Declerq-Lopez, L., Spatari, S., MacLean, H.L. (2005). Decision Support for Sustainable Development using a Canadian Economic Input-Output Life Cycle Assessment Model. *Can. J. Civ. Eng*. 32:16-29.

13. Graedel, T. E., Van Beers, D., Bertram, M., Fuse, K., Gordon, R.B., Gritsinin, A., Harper, E.M., Kapur, A., Klee, R.J., Lifset, R., Memon, L., and Spatari, S. (2005). The Multilevel Anthropogenic Cycle of Zinc. *J. Industrial Ecology*, 9(3):67-90.

14. Gordon, R.B., Lifset, R. J., Bertram, M., Reck, B., Spatari, S., Graedel, T.E. (2004). Where Is All the Zinc Going? The Stocks and Flows Project, Part 2. *JOM* 56(1):24-29.

15. Graedel, T.E., van Beers, D., Bertram, M., Fuse, K., Gordon, R.B., Gritsinin, A., Kapur, A. Klee, R., Lifset, R.J., Memon, L., Rechberger, H., Spatari, S., Vexler, D. (2004). The multi-scale cycle of anthropogenic copper. *Environ. Sci. Technol.*, 38:1242-1252.

16. Graedel, T.E., Bertram, M., Kapur, A., Reck, B., Spatari, S. (2004). Exploratory data analysis of the multi-level anthropogenic copper cycle. *Environ. Sci. Technol.*, 38:1253-1261.

17. Van Beers, D., Bertram, M., Fuse, K., Spatari, S., Graedel, T.E. (2004). The contemporary Oceania zinc cycle: one-year stocks and flows. *J. Mater. Cycles Waste Mgt.* 6:125–141.

18. Spatari, S.**,** Bertram, M., Fuse, K., Shelov, E., Graedel, T.E. (2003). The contemporary European zinc cycle: One-year stocks and flows. *Resour., Conserv. Recycl*., 39:137-160.

19. Van Beers, D., Bertram, M., Fuse, K., Spatari, S., Graedel, T.E. (2003). The contemporary African zinc cycle: One-year stocks and flows. *African J. of Env. Ass. & Mgt.* 7:21–40.

20. Van Beers, D., Bertram, M., Fuse, K., Spatari, S., Graedel, T.E. (2003). The contemporary African copper cycle: one year stocks and flows. *J.S. Afr. Inst. Min. Metal.*, 103:147-162.

21. Kapur, Bertram, M., Spatari, S., Fuse, K., Graedel, T.E. (2003). The contemporary copper cycle of Asia, *J. Mater. Cycles Waste Mgt.* 5:143–156.

22. Graedel, T.E., Bertram, M., Fuse, K., Gordon, R., Lifset, R., Rechberger, H., Spatari, S. (2003). The Copper Cycles of European Countries. *Reg. Environ. Change*. 3(4):119-127.

23. Spatari, S.**,** Bertram, M., Fuge, D., Graedel, T.E., Rechberger, H. (2002). The contemporary European copper cycle: One-year stocks and flows. *Ecol. Econ.* 42:27-42.

24. Gordon, R.B., Graedel, T.E., Bertram, M., Fuse, K, Lifset, R., Rechberger, H., Spatari, S. (2003). The characterization of technological zinc cycles. *Resour., Conserv. Recycl*. 39:107-135.

25. Graedel, T.E., Bertram, M., Fuse, K., Gordon, R.B., Rechberger, H., and Spatari, S. (2002). The characterization of technological copper cycles. *Ecol. Econ.* 42: 9-26.

26. Lifset, R.J., Gordon, R.B., Graedel, T.E., Spatari, S., Bertram, M. (2002). Where has all the copper gone?: The stocks and flows project, Part 1. *JOM*. 54(10):21-26.

27. Bertram, M., Graedel , T.E., H. Rechberger, H., Spatari, S. (2002). The contemporary European copper cycle: The waste management subsystem. *Ecol. Econ.* 42:43-57.

28. Spatari, S., Betz, M., Florin, H., Baitz, M., and Faltenbacher, M. (2001). Using GaBi 3 to Perform Life Cycle Assessment and Life Cycle Engineering. *Int. J. LCA* 6(2):81-84.

29. Saur, K.; Fava, J. A.; Spatari, S., Life cycle engineering case study: Automobile fender designs. *Environmental Progress* **2000,** *19*, (2), 72-82.

30. Keoleian, G.A., Spatari, S., Beal, R., Stephens, R.D., Williams, R. (1998). Application of Life Cycle Inventory Analysis to Fuel Tank System Design. *Int. J. LCA* 3(1):18-28.

Other refereed Contributions (conference papers)

31. Hubler, J.F., Spatari, S., Hsuan, Y.G. Environmental Life Cycle Assessment of Conventional and Advanced HDPE Pipe in Highway Drainage Applications, Submitted to the 2012 Transportation Research Board Meeting, August 1, 2011.

32. Gallagher, P.M., Spatari, S., 2011. Life Cycle Approaches for Brownfields Redevelopment. Georisk 2011: Risk Assessment and Management in Geoengineering, pp. 736-742, June 26-29, 2011, Atlanta, GA.

33. Spatari, S., Kandasamy, N., Kusic, D., Ellis, E.V., Wen, J. Energy and Environmental Aspects of Data Centers. World Renewable Energy Congress 2011 – Sweden, Energy End-Use Efficiency Issues (EEE), p. 1-8, 8-11 May 2011, Linköping, Sweden (paper and presentation).

34. S. Spatari, N. Kandasamy, D. Kusic, and E. V. Ellis, "Energy and locational workload management in data centers," in *Sustainable Systems and Technology (ISSST), 2011 IEEE International Symposium on*, 2011, pp. 1-5, 16-18 May 2011, Chicago, IL (paper and presentation).

35. Hubler, J., Spatari, S., Hsuan, Y.G., 2011. Life cycle assessment of conventional and advanced plastic pipe materials. 2011 IEEE International Symposium on Sustainable Systems and Technology (ISSST), 16-18 May 2011, Chicago, IL (paper and presentation).

36. Spatari, S., Tomkins, C.D., Kammen, D., 2009. Can transportation reduce its carbon intensity by 1 giga tonne? 8th World Congress of Chemical Engineering (WCCE8), August 23-27, 2009 – Montreal, Quebec – Canada (Paper and presentation).

37. Dilworth, R., Stokes, R., Weinberger, R., Spatari, S., 2009. Measuring Sustainability in Infrastructure: The Case of Philadelphia, Villanova University Sustainability Conference, April 23-26, 2009.

38. Spatari, S.; Zhang, Y. M.; MacLean, H. L., FUEL 95-Life cycle evaluation of pretreatment options for lignocellulosic ethanol. *Abstracts of Papers of the American Chemical Society* **2007,** *234*, 95-FUEL.

39. Spatari, S., Vexler, D., Bertram, M., Graedel T.E. The contemporary Latin American copper cycle: one year stocks and flows. Cobre ’03, Santiago Chile, December 1-4, 2003 (Paper and presentation).

40. Spatari, S., Young, S.B., Life Cycle Tools and Databases for Building Technology, Canadian Society for Civil Engineering 2000 Conference, London, ON, June 7-10, 2000 (Paper and presentation).

41. Spatari, S., Saur, K. 2000, Ecomaterials Database Development: Addressing Issues of Quality and Data Exchange, 39th Conference of Metallurgists, August 20-23, 2000 (Paper and presentation).

42. Kim, H.C., Keoleian, G.A., Spatari, S., Bulkley, J.W. (2000). Optimizing Vehicle Life Using Life Cycle Energy Analysis and Dynamic Replacement Modeling, Total Life Cycle Conference, Detroit, MI, Paper No. 2000-01-1499, 241-250.

43. Stephens, R. D., Williams, R.L., Keoleian, G.A., Spatari, S., Beal, R. (1998). Life Cycle Assessment of Plastic and Steel Vehicle Fuel Tanks, SAE 98224.

Non-refereed Contributions (Conference papers, presentations, book chapter, and posters)

44. Pourhashem, G., Spatari, S, Boateng, A.A., McAloon, A., 2011 Life cycle assessment of pyrolysis bio-oil and bio-char from corn stover, AIChE 2011 Annual Meeting, October 16-21, Minneapolis, MN (presentation).
45. Pourhashem, G., Spatari, S., Adler, P.R. 2011. Temporal implications of life cycle greenhouse gas emissions for biofuel pathways with carbon storage, SIEYP 2011, June 11, 2011, University of California, Berkeley, CA (Poster).
46. Pourhashem, G., Spatari, S., Adler, P.R. 2011. Temporal implications of life cycle greenhouse gas emissions for biofuel pathways with carbon storage, ISIE 2011 Conference, June 7-10, 2011, University of California, Berkeley, CA (Oral presentation).
47. Hubler, J., Spatari, S., Hsuan, Y.G., 2011. Life cycle assessment of conventional and advanced plastic pipe materials. 2011 IEEE International Symposium on Sustainable Systems and Technology (ISSST), 16-18 May 2011, Chicago, IL (poster).
48. Spatari, S., Hsuan, G.Y., Capaldi, F., Na, S.Y., Hubler, J.F., Enhancing the Life Cycle of Plastic Pipes Through Nanoclay-reinforcement, NSF CMMI Research and Innovation Conference 2011, Engineering for Sustainability and Prosperity, January 4-7, 2011, Atlanta, GA (Poster).
49. Gallagher, P., Spatari, S., 2011. Life Cycle Approaches for Brownfields Redevelopment, 2nd International Congress on Sustainability and Engineering, January 9-12, 2011 in Tucson, Arizona (Poster).
50. Pourhashem, G., Adler, P.R., McAloon, A., Spatari, S. 2010. Life Cycle Cost of Greenhouse Gas Reduction through Lignin-Land Application, AIChE 2010 Annual Meeting, November 7-12, 2010, Salt Lake City, UT (Paper and oral presentation).
51. Spatari, S. Kandasamy, N., Kusic, D., Ellis, E.V., 2010. Average and Marginal Reductions in Greenhouse Gas Emissions from Data Center Power Optimization. LCA X Conference, Portland, OR. November 2-4, 2010 (Oral presentation).
52. Adler, P.R., Del Grosso, S.J., Ogle, S.M., Pourhashem, G., Stadel, A., Spatari, S., Roth, G.W., Parton, W.J., 2010. Life cycle assessment of cellulosic and advanced biofuel crops, ASA, CSSA, and SSSA 2010 International Annual Meetings, Oct. 31-Nov. 4, 2010, Long Beach, CA.
53. Zhang, Y., Spatari, S., Heath, G., 2010. Are we ready for consequential life cycle assessment-based regulations? LCA X Converence, Portland, OR. November 2-4, 2010 (Oral presentation).
54. Spatari, S., Stadel, A., McAloon, A., Adler, P.R., Hicks, K.B., 2010. Life cycle assessment of greenhouse gas emissions for winter barley ethanol—Status as an advanced biofuel. AACC International Annual Meeting, October 24-27, 2010, Savannah, Georgia (Oral presentation).
55. Adler, P.R., Del Grosso, S.J., Pourhashem, G., Spatari, S., Roth, G.W., Parton, W.J., 2010. Quantifying and mitigating the environmental impacts of using corn stover as a biofuel feedstock, 95th ESA Annual Meeting, August 1-6, 2010, Pittsburgh, PA.
56. Spatari, S., Yu, Z., Montalto, F.A., 2010. Environmental life cycle benefits of urban green infrastructure. Gordon Research Conference on Industrial Ecology, July 11-16, 2010, Colby-Sawyer College, New London, NH (Poster presentation).
57. Pourhashem, G., Spatari, S., 2010. Reducing life cycle GHG emissions and costs of cellulosic ethanol through lignin-land application. Gordon-Kenan Research Seminar on Industrial Ecology, July 10-11, 2010, Colby-Sawyer College, New London, NH (Oral and poster presentation).
58. Cucura, J.A., Spatari, S., Gallagher, P.M., 2010. Life Cycle Assessment of a colloidal silica grouted soil barrier. Gordon-Kenan Research Seminar on Industrial Ecology, July 10-11, 2010, Colby-Sawyer College, New London, NH (Poster presentation).

59. Yu, Z., Spatari, S., Montalto, F.A., 2010. Modeling the life cycle implications of urban green infrastructure development. Urban Environmental Pollution: Overcoming Obstacles to Sustainability and Quality of Life, June 20-23, 2010, Boston, MA, USA (Oral presentation).

60. Cucura, J.A., Spatari, S., Gallagher, P.M., 2010. Life cycle assessment of a colloidal silica grouted soil barrier, International Conference on Green Remediation: Environment ~ Energy ~ Economics, Amherst, MA, June 15-17, 2010 (Poster presentation).

61. Zhang, Y., Spatari, S., McKechnie, J., MacLean, H.L., 2010. Environmental life cycle assessment (LCA) of lignocellulose-to-bioalcohol production, in: Biochemical conversion of lignocellulosic biomass, Waldron, K. (Editor). (Book chapter).

62. Spatari, S., Adler, P.R., Del Grosso, S., Roth, G.W., 2009. Do Winter Cover Crops Improve the life cycle of corn and corn-stover ethanol conversion? LCA IX Conference, Boston, September 29th - October 2nd, 2009 (Oral presentation).

63. Wilson, T., Spatari, S., Adler, P.R., 2009. Switchgrass Production in the Northeast: LCA of switchgrass for heat and power. LCA IX Conference, Boston, September 29th - October 2nd, 2009 (Oral presentation).

64. Stadel, A., Spatari, S., 2009. Sustainability implications of vertical farming for Philadelphian urban food supply. LCA IX Conference, Boston, September 29th - October 2nd, 2009 (Poster presentation).

65. Adler, P.R., Spatari, S., Del Grosso, S.J., Parton, W.J., 2009. Dormant season or summer harvest of grasslands: Tradeoffs in ethanol yield and life cycle GHG emissions, 94th ESA Annual Meeting, August 2 - 7, 2009, Albuquerque, NM.

66. Spatari, S., Tomkins, C.D., Kammen, D.M., 2009. Biofuels, chapter in The Gigaton Throwdown (Book chapter).

67. McIntyre, J., Spatari, S., MacLean, H.L., 2008. Evaluating the Life Cycle Energy and Greenhouse Gas Tradeoffs of Using Recycled Concrete Aggregates in New Concrete. International Life Cycle Assessment and Management 2008. Seattle, WA - October 2 to 4 (Oral presentation).

68. Spatari, S. 2008. From the Low Carbon Fuel Standard to Sustainable Fuels, 2008 Climate Decision Making Center Annual Meeting, Carnegie Mellon University, Pittsburgh, PA, May 19-21, 2008.

69. Spatari, S., MacLean, H.L. Life Cycle Assessment of Emerging Bio-Ethanol Pathways. International Life Cycle Assessment and Management 2007. Portland, Oregon - October 2 to 4 (Oral presentation).

70. Spatari, S., Zhang, Y., MacLean, H.L. Life Cycle Evaluation of Pre-treatment Options for Lignocellulosic Ethanol. American Chemical Society 234th National Meeting and Exposition. August 19-23, 2007. Boston, MA (Oral presentation and paper)

71. Spatari, S., MacLean, H.L. (2006). Implications of a Lignocellulosic Ethanol Industry for Fueling Light-Duty Vehicles in Ontario, Canada. 2006 SAE Powertrain & Fluid Systems Conference & Exhibition, Sheraton Hotel, Toronto, Canada, October 16-19, 2006 (Oral presentation).

72. Spatari, S., MacLean, H.L. (2006). Life Cycle Evaluation of Emerging Lignocellulosic Ethanol Conversion Technologies, World Biofuels, 2006 World Congress on Industrial Biotechnology and Bioprocessing, Westin Harbour Castle Hotel, Toronto, Ontario, Canada, July 11-14 (Poster presentation)

73. Spatari, S., MacLean, H.L. (2006). Life Cycle Evaluation of Four Lignocellulosic Ethanol Pretreatment Technologies, 28th Symposium on Biotechnology for Fuels and Chemicals, Nashville, TN, Nashville Airport Marriott, Nashville, TN, April 20-May 3, 2006 (Oral presentation).

74. Spatari, S. (2005). Material flow analysis use in a mineral efficiency framework, Chapter in Managing Metals for the Future: Issues and Opportunities for Improved Metals Stewardship in Canada, A. Young & M. L. Barreto (Eds.), MERG, Ottawa, in press (Book chapter, invited contributor).

75. Spatari, S., MacLean, H.L., Investigating the Potential for Biomass Fuels: A Techno-economic evaluation of Bioethanol, 55th Canadian Chemical Engineering Conference. Metro Toronto Convention Centre, Toronto, Ontario, Canada, October 16-19, 2005 (Oral presentation).
76. MacLean, H.L., Spatari, S., Fleming, J. Investigating the Sustainability of the Personal Transportation Sector through Life Cycle Inventory and Impact Assessment, 55th Canadian Chemical Engineering Conference. Metro Toronto Convention Centre, Toronto, Ontario, Canada, October 16-19, 2005 (Oral presentation).
77. MacLean, H.L., Spatari, S., Fleming, J.S. Life Cycle Assessment of Alternative Fuels for Light-Duty Vehicles: Assessing the Potential of Biomass-Derived Alternatives, Materials Research Society, 2005 Fall MRS Meeting, November 28 - December 2, Boston, MA, USA (Oral presentation).
78. Spatari, S., MacLean, H.L. A Life Cycle Model for Lignocellulosic Ethanol Fuels in Ontario. Capturing Canada's Green Advantage: Biosphere Solutions for Climate Change and the Economy, BIOCAP Canada Foundation, February 2-3, 2005, Ottawa, Canada (Poster presentation).
79. MacLean, H.L., Spatari, S., Zhang, Y. Green Designing the Automobile: Evaluating Fuel/Propulsion System Alternatives. Society of Automotive Engineers 2004 World Congress. April, 2004. Detroit, MI (Oral presentation).
80. Spatari, S., Graedel, T.E. Characterizing Zinc Stocks and Flows: Material Flow Analysis at Regional and Global levels. Conference of Metallurgists, August 22-24, 2003, Vancouver, BC. (Poster presentation).
81. S. Spatari. Continental Scale Substance Flow Analysis: Zinc Stocks and Flows in Europe. Gordon Research Conference on Industrial Ecology. June 9-14, 2002, New London, NH. (Poster presentation).
82. Spatari, S. The Contemporary European Copper Cycle, Inaugural meeting of the International Society for Industrial Ecology, November 11-14, 2001, Leiden, The Netherlands (Oral presentation).
83. Spatari, S., Young, S. 2000, Life Cycle Tools and Databases for Building Technology, 28th Canadian Society for Civil Engineering Conference, London, ON (Paper and oral presentation).
84. Spatari, S. Life Cycle Engineering: Performing LCIA and Sensitivity Analysis Using GaBi 3, InLCA: Tools for Sustainability, April 25 - 27, 2000 (Oral presentation).

Invited Presentations:

1. Spatari, S., 2011, Uncertainties in Life Cycle Modeling of Biofuels, ExxonMobil, Annondale, NJ, October 12, 2011.
2. Spatari, S., 2011, Biofuels: The land use and environmental implications of addressing transportation and energy problems, The 21st Annual UCLA Lake Arrowhead Symposium on the Transportation – Land Use – Environmental Connection, October 16-18, 2011.
3. Spatari, S., 2011, Technological, Climate Change and Sustainability Aspects of Future Transportation Fuels, University of Oklahoma, November 10, 2011.
4. Spatari, S., 2011, Life Cycle Assessment and Winter Cropping Systems, Short Course on Life Cycle Assessment, Pennsylvania State University, July 26-27, 2011.
5. Spatari, S., 2011. Life cycle assessment of plastic infrastructure materials. Plastic Pipe Institute Annul Meeting, Hilton Head, SC, May 2-3, 2011.
6. Spatari, S., 2011. Life cycle assessment and winter cropping systems, Winter Crops for Bioenergy and more, Penn State Bioenergy Short Course Series, Pennsylvania State University, March 29, 2011.
7. Spatari, S., 2011, Life cycle assessment of advanced plastic pipe materials. Nanocor (a division of the Amcol Company, January 28, 2011.

8. Spatari, S., 2010. “Infrastructure Materials Ecology”. 2010 EU-US Frontiers of Engineering Symposium, Jesus College, University of Cambridge, Cambridge, UK, September 1-3, 2010 (Poster presentation).
9. Spatari, S. Life Cycle Assessment of GHG Emissions from Winter Barley Ethanol, Winter Barley Ethanol Project Meeting, Thursday, July 22, 2010 Meeting At ERRC, ARS, USDA (invited speaker)
10. Spatari, S. Can Government be Green? A Panel Discussion: Hosted by the Program on Law, Environment and Economy (PLEE) University of Pennsylvania Law School, September 25, 2009 (invited speaker and panelist).
11. Spatari, S., Life Cycle Assessment in the Bio-Economy, Bioenergy Bridge Meeting, July 15-16, 2009
12. Spatari, S., Gigaton Throwdown Initiative Launch, Washington D.C., June 24, 2009 (speaker and panelist)
13. Spatari, S., Achieving Rapid Scale-up of Clean and Low-Carbon Energy Technology, Washington D.C., Congressional Briefing, 2456 Rayburn House Office Building, June 24, 2009 (panelist)
14. Spatari, S. Evaluating the Sustainability of Second Generation Biofuels, Pennsylvania State University, School of Forestry, March 4, 2009.
15. Spatari, S. Technological, Climate Change and Sustainability Aspects of Future Transportation Fuels, Drexel University, Hydrology Seminar, March 2, 2009.
16. Spatari, S. Technological, Climate Change, and Sustainability Aspects of Future Transportation Fuels, California Biomass Collaborative’s 5th Annual Forum on Bioenergy Sustainability and Lifecycle Analysis, Sacramento, California, May 28-30, 2008.
17. Spatari, S. Technological and Climate Change Impacts of Lignocellulosic Ethanol Fuels, Environmental Defense Fund, Berkeley, California (and broadcast to offices nation-wide), April 7, 2008.
18. Spatari, S. Technological and Climate Change Impacts of Lignocellulosic Ethanol Fuels, Energy and Resources Group Spring Colloquiem, University of California, Berkeley, April 2, 2008.
19. Spatari, S. Biomass to Ethanol Pathways, Biofuels Interest Group Seminar, University of California, Berkeley, November 19, 2007.
20. Spatari, S. Evaluating the Potential of Biofuels: A Life Cycle Evaluation of Lignocellulosic Ethanol. The School of Natural Resources and Environment, The University of Michigan, Ann Arbor. November 5, 2007. Ann Arbor, MI.
21. Spatari, S. Evaluating the Potential of Biofuels: A Life Cycle Evaluation of Lignocellulosic Ethanol. The Department of Geography and Environmental Engineering Spring 2007 Seminar Series. The Johns Hopkins University. April 4, 2007. Baltimore, MD.
22. Spatari, S. Investigating the Potential for Biomass Fuels. The Department of Earth and Environmental Engineering, Columbia University, New York City, NY, May 11, 2006.
23. Spatari, S. A Life Cycle Evaluation of Bio-Ethanol. Department of Environmental Engineering, University of Guelph, Guelph, ON, March 2006.
24. Spatari, S., MacLean, H.L., Life Cycle Modeling of Alternative Propulsion Systems, Canadian Biodiesel Research Initiative, BIOCAP Canada, June 28-29, 2004, Hilton Toronto Airport, Toronto, ON.
25. Spatari, S. The Multi-scale Zinc Cycle: Regional, Continental, and Global Stocks and Flows. University of Chile, December 2003.
26. Spatari, S. Copper Stocks and Flows. RWTH Aachen University, Aachen, Germany, November 2001.

27. Spatari, S., Metal Stocks, Flows, and Life Cycles: The Contemporary Copper and Zinc Cycles. Eastern Minerals Seminar, U.S. Geological Survey, Reston, VA, August 14, 2001.

Invited Participation and Attendance in Workshops/Conferences/Journal Editing:

2011 ISIE Conference Session Chair, Energy Systems, ISIE 2011 Conference, June 7-10, 2011, University of California, Berkeley, CA

2010 NNI Nanotechnology Summit, Gaylord Convention Center, Washington D.C., December 8-10, 2010 (attended).

2010 National Academy of Engineering: 2010 EU-US Frontiers of Engineering Symposium, Materials Ecology, Cambridge, UK, September 1-3, 2010.

2010 NSF ADVANCE Program: Junior Faculty Development Workshop, Rice University, Houston, TX, April 17, 2010.

2010 Learning Bridge Kick-off Meeting, Palmyra Cove, NJ, Invited participant, November 13, 2009

2008 2008 Kathryn Fuller Science for Nature Symposium, World Wildlife Fund, Washington, DC, November 19-20, 2008

2008 Biofuels in the Midwest Workshop, sponsored by the Woodrow Wilson Center and held at the Joyce Foundation, Chicago, Illinois, September 5-7, 2008

2008 Biofuels in the Midwest: A Discussion, The Joyce Foundation and the Woodrow Wilson Center's Program on Science, Technology, America, and the Global Economy & The Global Energy Initiative, Chicago, Illinois, September 5-7, 2008

2008 Workshop on Measuring and Modeling the Lifecycle GHG Impacts of Transportation Fuels, University of California (Berkeley), Berkeley, CA, July 1-2, 2008

2008 Climate Decision Making Center Annual Meeting, Carnegie Mellon University, Pittsburgh, PA, May 19-21, 2008

2003 BE/MUSES Expert Workshop, Model Development for the Global Cycles of the Alloying Elements of Steel, Yale University, New Haven, CT, February 5-8, 2003

CONFERENCE ORGANIZATION

International Society for Industrial Ecology, Energy Systems Session co-organizer, June 2011.

GRANTS AND AWARDS

<u>While at Drexel:</u>

- National Science Foundation, Catalyzing New International Collaborations: The Use of Life Cycle Assessment (LCA) Methods in Geotechnical Engineering, PI (Gallagher), co-PI (Spatari, Bartoli), $32,130
- National Science Foundation, REU Student support for grant, "Enhancing the Life Cycle of Plastic Pipes Through Nano-reinforcement", PI (Spatari), shared with co-PI's Grace Hsuan and Franco Capaldi, Drexel University, September 1, 2010-August 31, 2013, $6,000.
- United States Department of Agriculture, Life Cycle GHG Emissions of Pyrolysis/Bio-Oil and Biochar Products, PI (Spatari), October 1, 2010-September 31, 2011, $10,000.

- National Science Foundation, Enhancing the Life Cycle of Plastic Pipes Through Nano-reinforcement, PI (Spatari), shared with co-PI's Grace Hsuan and Franco Capaldi, Drexel University, September 1, 2010-August 31, 2013, $265,056.
- DECI Internal award for, "Reducing Climate-Change Impact of the Information Age: Optimizing Data Center Operations", shared with Naga Kandasamy (Electrical and Computer Engineering), Jin Wen (CAEE), Eugenia V. Ellis (Architecture), $4000
- DECI Internal award for, "The global carbon debt of 20th century urbanization: using computable general equilibrium models to measure the ecological footprint of land development", shared with Richardson Dilworth (Dept. History and Politics), Robert Stokes (Dept. of Culture and Communication), $4000
- DECI Internal award for, "Producing Fuels from Landfill Wastes – Using Algae to Convert Landfill Gases and Landfill Leachate into Oil and Biodiesel", shared with Richard Cairncross (Chemical and Biological Engineering), Grace Hsuan (CAEE), Susan Kilham (Biology), Mira S. Olson (CAEE), $4000
- Osage Bioenergy, "Life Cycle Analysis of Winter Barley-to-Ethanol", PI (Spatari), August 15, 2009-December 31, 2010, $25,000
- Gigaton Throwdown, Clinton Global Initiative, conference travel support, $1,000
- Edenspace Systems, 2009, $5000

Prior to Drexel

- Natural Science and Engineering Research Council (NSERC), 2007-2009: $80,000 CDN ($50,000 used)
- Mineral Efficiency Research Group (MERG), 2005, $3000 CDN
- Ontario Graduate Scholarship (OGS), 2005/05-2006/04, $15,000 CDN
- University of Toronto Fellowship, annually from 2003-2006, $16,000 CDN
- Natural Science and Engineering Research Council (NSERC) Canada Postgraduate Scholarship, 01/01/2003-12/31/04, $45,000 CDN

PROPOSAL REVIEWING

USDOE/USDA BRDI Pre-proposal Review, reviewed 45 grant preproposals on biomass and biofuels, July 17-22, 2011.

USDA NIFA, AFRI Bioenergy CAP Phase II Panel: Reverse site Visit, reviewing largest grant awarded in USDA history ($45 million), 8 finalists proposals reviewed, March 7-11, 2011.

USDA NIFA, AFRI Bioenergy CAP Phase I Panel: reviewing largest grant awarded in USDA history ($45 million), 7 proposals reviewed, January 11-14, 2011.

EREF, Environmental Research and Education Foundation, October 2010.

COLLABORATORS & OTHER AFFILIATONS

P.R. Adler (USDA), A.E. Aktan (Drexel), A.A. Boateng (USDA), A.D. Brandt (Stanford), R. Cairncross (Drexel), R. Dilworth (Drexel), E.V. Ellis (Drexel), K.B. Hicks (USDA), K. Fingerman (UC Berkeley), P. Gallagher (Drexel), T.E. Graedel (Yale University), G. Hsuan (Drexel), S.M. Jordaan (Harvard), N.

Kandasamy (Drexel), T.E. Lipman (UC Berkeley), A. McAloon (USDA), F.A. Montalto, M. Olson (Drexel), R. Stokes (Drexel), M. Turetsky (Guelph), J. Wen (Drexel), S.L. Yeh (UC Davis)

PROFESSIONAL AFFILIATIONS:

- Professional Engineer in the Province of Ontario, Canada
- Member of the American Chemical Society (ACS), the Canadian Institute of Metallurgy (CIM), the Canadian Society for Chemical Engineering (CSChE), the International Society for Industrial Ecology (ISIE), and the Transportation Research Board (TRB)

PROFESSIONAL ACTIVITIES

- Invited Session Chair at Probabilistic Models in Water and Wastewater, Conference for Barry Adams
- Invited to be guest editor of special issue on applied systems analysis and sustainability in the journal *Stucture and Infrastructure Engineering*, 2011
- Technical Committee for ISIE 2011, Technical reviewer and Session Chair for 'Energy Systems', ISIE Biannual Meeting, June 7-11, 2011,
- Technical Session Chair, Biofuels (Track 16), May 18, 2011, 2011 IEEE International Symposium on Sustainable Systems and Technology; IEEE/ISSST Student Paper reviewer and judge
- Peer-reviewer for Energy End Use Efficiency at World Renewable Energy Congress (WREC) 2011.
- Expert Declarant: Asked by the State of California's Attorney General's Office to write a declaration on the status of cellulosic and advanced biofuels, December 17, 2010
- Technical Session Chair, Fossil Energy and Power, LCAX, ALCA Annual Meeting, November 2-4, 2010
- Invited to participate in the "Biofuels in the Midwest" Conference, sponsored by the Woodrow Wilson Center and held at the Joyce Foundation, Chicago, Illinois, September 5-7, 2008
- Invited Session chair on energy sustainability in "Greening the City's Infrastructure" workshop, Drexel University, June 19, 2008
- Peer reviewer for IEA Bioenergy Task 29, Task 31 and Task 39 International Workshop "Biofuels and Bioenergy: Challenges and Opportunities", Vancouver, BC Canada – 2006; papers under consideration for publication in journal *Biomass and Bioenergy*.
- Peer reviewer for conference papers presented for the 2004 SAE World Congress, session on Global Climate Change and its Potential Impact on the Mobility Industry Session
- Invited session chair at Cobre 2003, Applications-Environment Session, Santiago, Chile, December 3, 2003

- Peer reviewed 75 (13 in 2011-12 academic year) journal articles for: *Atmospheric Environment, Biomass and Bioenergy, Bioresource Technology, Biofuels, Bioresources, Climate and Development, Ecological Economics, Environmental Science and Technology, Integrated Environmental Assessment and Management, Environmental Pollution, Global Change Biology Bioenergy (GCBB), International Journal of Life Cycle Assessment, Journal of Cleaner Production, Journal of Environmental Management, Journal of Industrial Ecology, Journal of Infrastructure Systems, Journal of Professional Issues in Engineering Education and Practice Resources, Conservation, and Recycling, The Science of the Total Environment*, and *Waste Management*, 2000-present.

TEACHING

Drexel University:

CIVE 790/380, *Industrial Ecology*, Instructor, graduate level, Fall 2010

CIVE 567, *Watershed Analysis*, co-Instructor with Dr. Paul Block, planned for 2011-2012

CIVE 790/380, *Environmental Life Cycle Assessment*, Instructor, graduate level, 2009-present

CIVE 240, *Engineering Economic Analysis*, Instructor, undergraduate level, 2009-present

University of Toronto:
CIV 1307, *Evaluating the Sustainability of Engineering Activities*, Co-instructor with H.L. MacLean, Civil Engineering, graduate-level

APS 103, *Technology, Society, and the Environment*, Teaching assistant, Civil Engineering, undergraduate

CIV 101, *Statics and Vector Mechanics*, Teaching assistant, Civil Engineering, undergraduate

Yale University:

F&ES 501b, *Industrial Ecology*, Guest lecturer, School of Forestry and Environmental Studies, graduate level

University of Michigan:

NRE 557, *Industrial Ecology*, Teaching Assistant, School of Natural Resources and Environment, graduate level

UNIVERSITY SERVICE (DREXEL)

2010-11 Co-organized visiting seminar with speaker Lee Schipper for Drexel's The Mobilities Research and Policy Center

Sustainability Minor Committee: Leading a committee across the College of Engineering (CAEE, CBE, CS, ECE, MEM, MSE) to develop a minor in sustainability for engineering students.

2010-11 Junior Faculty Committee, College of Engineering, Drexel University; on

2010-11 The Learning Bridge, Workshop and project participant on past and on-going meetings.

2010 Future in Academia, Drexel University, Mechanical Engineering Graduate student Association (MEGA), Invited speaker and panelist, March 4, 2010.

2010 Balancing Work and Relationships, Drexel University Graduate Students Association, Invited speaker and panelist, January 12, 2010

STUDENT SUPERVISION

James G. Mitchell, Ph.D. (expected 2014-15)

Ghasideh Pourhashem, Ph.D. (expected 2012-13)

Jeffrey Cucura, Ph.D. (expected 2011-12), co-supervised with Patricia Gallagher

Kimberlee A. Marcellus, Ph.D (began 2010-11), co-supervised with Patricia Gallagher

Michael Carnivale, Ph.D. (began 2010-11), co-supervised with Patricia Gallagher

Alex Moseson, serving on Ph.D. committee, defended: August 22, 2011

Roxanne Sai, serving on Ph.D. proposal defense committee

Alexander Stadel, BS/MS (2010-11)

Samuel Steppes BS/MS, (2011-12)

Jonathan Hubler BS/MS, (2011-12)

Chun Chan BS/MS, (2011-12), co-supervised with Grace Hsuan

Jonathan Istranyi BS Civil, (2009-10), independent study with Anu Pradham

Phillip Stolzfus BS Business and Engineering, (2009-10), independent study

Chris Van der Neut, BS/MS Chemical Engineering (2009-10), thesis reader

Senior Seminar 2011-12: Jonathan Hubler, Long B. Tran

Senior Seminar 2010-11: Chun Chan, Alexander Stadel, Dan Vignola

Senior Seminar 2009-10: Andrew Gould, Jonathan Istranyi, Donald Ken-Worgu, Casey Nave, Tom Smiley

PRIOR WORK EXPERIENCE

Post-Doctoral Scholar,
Energy and Resources Group, University of California, Berkeley, Berkeley, CA, USA

October 2007 – December 2008:

- Research focuses on evaluating the sustainability and life cycle impacts of biofuels using systems analysis methods such as LCA with Dr. Alex E. Farrell.

Researcher and Doctoral Candidate,
Department of Civil Engineering, University of Toronto, Toronto, ON, Canada

January 2003 – September 2007:

- Research in alternative fuel propulsion systems, with focus on biofuel production technologies and systems evaluation methods such as LCA, EIO-LCA, and MFA
- Assistant Instructor for CIV 1307 “Evaluating the Sustainability of Engineering Activities”, a graduate-level course; Teaching assistant for CIV 101 “Statics and Vector Mechanics”, and APS 103 “Technology, Society, and the Environment”, two undergraduate-level courses.

Research Engineer and Data Manager
Center for Industrial Ecology, School of Forestry and Environment, Yale University, New Haven, CT, USA

November 2000 – December 2002:

- Data Manager for a major NSF industrial ecology research project titled, "Should we Mine the Landfills," and supervised by Thomas E. Graedel
- Conducted research that evaluated current and historical flows of specific materials (copper, zinc, nickel, and silver) and estimated the stocks available in primary and secondary reservoirs, especially industrial and municipal stockpiles and landfills
- Managed data collection activities; design, built, and applied a numerical modeling tool for substance flow analysis; supervised undergraduate and graduate students in engineering, forestry, and environmental studies on data collection and model application for copper, zinc, nickel, and silver; and wrote research papers for publication in leading interdisciplinary academic journals in environmental science, engineering, and policy
- Organized conferences and seminars, gathering together international experts on metals use in the economy and their environmental impact
- Guest lecturer in FES 501b, Industrial Ecology

Project Engineer,
PE Americas/Five Winds International, Consulting, Guelph, ON, Canada

October 1999 – October 2000:

- Conducted life cycle engineering studies of product systems for clients in the automotive, chemicals, construction and metals industries
- Involved in life cycle inventory database development and modeling using Gabi, a commercial LCA software tool

Research Associate,
Center for Sustainable Systems (CSS), formerly the National Pollution Prevention Center (NPPC), The University of Michigan, Ann Arbor, MI, USA

June 1996 – August 1999:

- Graduate Student Instructor for Industrial Ecology
- Conducted many LCA studies with the automotive and materials supply industries, and co-wrote several academic and government publications on assessing the life cycle environmental impacts and evaluating performance, cost, and legal standards for various products and services
- Co-wrote a major NSF research proposal titled, "Life Cycle Optimization of Vehicle Replacement", with Dr. Gregory Keoleian, who was subsequently awarded this three-year research grant

Project Engineer,
Health and Environment Department, General Motors Corporation, Warren, MI, USA

June 1995 - June 1996:

- Worked with company scientists, plant managers, and suppliers on initiating data collection efforts for LCA studies of automotive components
- Developed a model for evaluating the life cycle environmental impact of plastic and steel fuel tanks, one of the pioneering life cycle design studies in the automotive industry, and published the results in the academic literature

Research Assistant, Centre for Technology and Social Development, The University of Toronto

May 1993 - May 1995:

- Researched pollution prevention techniques to improve environmental, technical and economic performance in industry

SCHOLARSHIPS, FELLOWSHIPS, HONOURS, AND AWARDS RECEIVED:

- Natural Science and Engineering Research Council (NSERC) Postdoctoral Fellowship (PDF), 2007-2009
- Mineral Efficiency Research Group (MERG), 2005/20
- Ontario Graduate Scholarship (OGS), 2005/05-2006/04
- University of Toronto Fellowship, 2003-2006
- Natural Science and Engineering Research Council (NSERC) Postgraduate Scholarship (PGSB), 2003/01-2004/12
- University of Windsor Fellowship, declined
- Graduate Student Instructorship (GSI), School of Natural Resources and Environment, University of Michigan, 1998/01-1998/04
- Graduate Student Research Assistantship (GSRA), School of Natural Resources and Environment, University of Michigan, 1996/09-1997/12
- Dean's Honour Roll, Applied Science and Engineering, The University of Toronto, 1995

SKILLS AND GRADUATE COURSEWORK

Economic Input-Output Life Cycle Analysis (EIO-LCA)

Environmental Impact Assessment

Environmental Modeling using computer software tools

Environmental Management Systems

Environmental Policy and decision-making

Life Cycle Assessment (LCA)

LCA modeling using commercial software (Gabi and Simapro)

Life Cycle Design (LCD)

Material Flow Analysis (MFA)

Multimedia Environmental Fate and Transport Modeling

Risk Assessment

Substance Flow Analysis (SFA)

Total Cost Accounting

Transportation Demand Analysis; discrete choice modeling

Transportation and land-use planning

French and Italian languages