

John J. Sheehan

Home: 7044 Fox Paw Trail, Littleton, CO 80125

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PROFESSIONAL EXPERIENCE

University of Minnesota Institute on the Environment, St. Paul, Minnesota
February 2009 to present

Program Coordinator, Biofuels Sustainability

SHEEHANBOYCE, LLC, LITTLETON, COLORADO

August 2008 to present

Principal

Consultant on biofuels and sustainability. Clients include DuPont, Biotechnology Industry Organization, AgProcessing, Inc., the University of Minnesota, the National Biodiesel Board, and the Natural Resources Defense Council.

LIVEFUELS, INC., MENLO PARK, CA

August 2007 to August 2008

Vice President, Strategy and Sustainable Development

- Established critical business partnerships
- Developed detailed techno-economic model of algae oil production options
- Planned and led first algae harvest campaign at southern California site
- Organized and wrote comprehensive two-volume proposal to Department of Defense for development and commercialization of algae-based jet fuel
- Conducted various strategic and technical analyses
- Represented the company

NATIONAL RENEWABLE ENERGY LABORATORY, GOLDEN, COLORADO

July 2001 to July 2007

Senior Engineer II, 2004 to 2007

Senior Engineer I, 1995 to 2003

Senior Project Coordinator, 1991 to 1994

2005 to 2007

Strategic Energy Analyst, Strategic Energy Analysis Center

Key responsibilities included leading cross-cutting strategic analyses of DOE's energy efficiency and renewable energy technology portfolio. Major products included:

- 50-year projected benefits of energy efficiency and renewable energy technology based on integrated energy market models
- 30-year projected market penetration for biofuels technology in support of Presidential advanced energy initiative using system dynamics model

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PROFESSIONAL EXPERIENCE (CONT'D)

NATIONAL RENEWABLE ENERGY LABORATORY, GOLDEN, COLORADO

July 2001 to present (continued)

1998 to 2005

General Support to DOE Client and NREL Biomass Program Technology Manager

Rapid response for DOE "fire drills" as well as ongoing support for development of high level analysis and reports on an as-needed basis for DOE and for the NREL technology manager. Frequent spokesperson for DOE and NREL.

2001 to 2003

Lead, Life Cycle Assessment (LCA) of Corn Stover-to-Ethanol Technology

Landmark study of energy, air quality, greenhouse gas and soil impacts of stover-to-ethanol.

- 🏆 Unprecedented multi-disciplinary, multi-institutional team of scientists and engineers
- 🏆 First time rigorous modeling of soil carbon and soil erosion impacts incorporated in an LCA
- 🏆 Published in Yale University's *Journal of Industrial Ecology*

1998 to 2002

Biofuels Strategic Analyst

Responsible for a wide variety of projects. These include:

- 🏆 Lead author 1999, 2000 and 2001 editions of bioethanol/biofuels annual outlook reports
- 🏆 Lead author 1998, 2000, 2001, 2002 editions of bioethanol/biofuels multi-year technical plans
- 🏆 Contributor to 2000 and 2002 process design reports for bioethanol and first edition of DOE's *Biomass Multi-Year Program Plan*

1995 to 1998

Biodiesel Project Manager

Responsible for coordinating, monitoring and reporting on internal and external biodiesel R&D

- 🏆 Led a multi-institutional team in the first life cycle assessment of biodiesel made from soybeans
- 🏆 Co-led a close-out report on DOE's 20-year research program on microalgae

1993 to 1998

Biofuels Program Strategic Planner

Responsible for development of multi-year technical and strategic plans

- 🏆 Contributed to 1994 *Biofuels at the Crossroads* plan and 1995 *NREL Biofuels Strategic Plan*
- 🏆 Lead author 1996 and 1997 editions of *Multi-Year Technical Plan for Ethanol*

1991 to 1993

Biofuels Program Coordinator.

Responsible for monitoring and reporting of subcontracted and in-house research activities

1990 to 1991

MERCK PHARMACEUTICAL COMPANY, WEST POINT, PENNSYLVANIA

July 1990 to July 1991

Senior Process Engineer

Process development and support of commercial recombinant vaccine production line; including improvements to downstream recovery of the Recombivax™ hepatitis B vaccine from yeast

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PROFESSIONAL EXPERIENCE (CONT'D)	W.R. GRACE & CO CORPORATE RESEARCH DIVISION, COLUMBIA, MARYLAND February 1985 to July 1990
1989 to 1990	Senior Research Engineer Responsible for the development and testing of new membrane filtration devices for use in bioprocessing in conjunction with W.R. Grace's Amicon Division.
1987 to 1989	Research Engineer Responsible for development and scale up enzyme recovery step in process for l-aspartame synthesis
1985 to 1987	Senior Engineer Responsible for bioprocess development activities, including the scale up of phenylpyruvic acid production as a precursor for l-phenylalanine production
	RADIAN CORPORATION, MCLEAN, VIRGINIA June 1979 to June 1982 Chemical Engineer Responsible for environmental analysis of energy technologies for EPA and DOE
OTHER EXPERIENCE	DOUGLAS COUNTY SCHOOL DISTRICT RE-1 BOARD OF EDUCATION, CASTLE ROCK, COLORADO November 1993 to November 2005
EDUCATION	Master of Science in Chemical Engineering Lehigh University, Bethlehem, Pennsylvania September 1982 to February 1985  Masters Thesis: <i>Evaluation of the Operating Characteristics of a Hollow Fiber Microporous Filter for Concentration of Cell Suspensions</i>
	1979 Bachelor of Science and Engineering in Chemical and Biochemical Engineering University of Pennsylvania, Philadelphia, Pennsylvania September 1975 to May 1979  Spring Semester 1978 at Université de Technologie de Compiègne, Compiègne, FRANCE
SKILLS	 Ability to work effectively with DOE clients and other stakeholders  Excellent written and oral communication skills  Ability to lead multidisciplinary and multi-institutional teams  Ability to collect and incorporate broad based stakeholder concerns  Advanced computer skills in life cycle assessment, project management. word processing, spreadsheet, graphics and presentation software  Skilled life cycle practitioner

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Selected Publications

Sheehan, J. "Biofuels and the conundrum of sustainability. *Current Opinions in Biotechnology*. In Press.

Lynd, L.; Larson, E.; Greene, E.; Laser, M.; Sheehan, J.; Dale, B.; McLaughlin, S.; Wang, M. "The role of biomass in America's energy future: Framing the analysis". *Biofuels, Bioproducts and Biorefining*. 3:113-123 (2009).

Lynd, L. Laser, M., Bransby, D., Dale, B., Davison, B., Hamilton, R., Himmel, M., Keller, M., McMillan, J., Sheehan, J., Wyman, C.. "How biotech can transform biofuels." *Nature Biotechnology* 26, 169 - 172 (2008).

Pena, N. and J. Sheehan, "Biofuels and Transportation." *CDM Investment Newsletter: A joint initiative of BEA International and the Climate Business Network*. No 3, pp 3-10 (2007).

Office of Energy Efficiency and Renewable Energy, *Projected Benefits of Federal Energy Efficiency and Renewable Energy Programs: FY 2008. Budget Request*. Prepared by National Renewable Energy Laboratory, Golden, CO (2007). http://www1.eere.energy.gov/ba/pba/gpra_estimates_fy08.html

Sheehan, J. "Putting 'Sustainable' before 'Energy': Biofuels in a Sustainable Energy Future." *Viewpoints Americas*. Americas Society and the Council of the Americas, New York, NY (2007). <http://www.americas-society.org/article.php?id=522>

Sheehan, J. "Potential Carbon Emissions Reductions from Biofuels by 2030." In *Tackling Climate Change in the U.S.: Potential Carbon Emissions Reductions from Energy Efficiency and Renewable Energy* (Kutscher, C., ed.). American Solar Energy Society (2007). www.ases.org/climatechange

Graham, R.; Nelson, R.; Sheehan, J.; Perlack, R.; Wright, L. "Current and Potential U.S. Corn Stover Supplies." *Agronomy Journal*, Vol 99, pp. 1-11 (2007).

Office of Energy Efficiency and Renewable Energy, *Projected Benefits of Federal Energy Efficiency and Renewable Energy Programs: FY 2007. Budget Request*. Prepared by National Renewable Energy Laboratory, Golden, CO (2006). http://www1.eere.energy.gov/ba/pba/gpra_estimates_fy07.html

Paustian, K.; Antle, J.; Sheehan, J.; Paul, E. *Agriculture's Role in Greenhouse Gas Mitigation*. Pew Center on Global Climate Change. Arlington, Virginia (2006).

Sheehan, J.; Paustian, K.; Walsh, M.; Nelson, R. "Energy and Environmental Aspects of Using Corn Stover for Fuel Ethanol?" *Journal of Industrial Ecology*, Vol. 7, Nos. 3-4, p 117-146 (2003).

Nelson, R.G., Marie E. Walsh, John J. Sheehan, and Robin L. Graham. 2003. "Methodology to Estimate Removable Quantities of Agricultural Residues for Bioenergy and Bioproduct Use." *Applied Biochemistry and Biotechnology*, Vol. 113 pp. 13-26.

Sheehan, J.; Himmel, M. "Outlook for Bioethanol Production from Lignocellulosic Feedstocks: Technology Hurdles." *Agro-Industry*, Vol 12, No. 5. pp. 54-57 (2001).

Sheehan, J. "The Road to Bioethanol: A Strategic Perspective of the U.S. Department of Energy's National Ethanol Program." *ACS Symposium Series 769: Glycosyl Hydrolases for Bioconversion*. American Chemical Society, Washington, D.C., pp. 2-25 (2001).

Wooley, R.; Ruth, M.; Glassner, D.; Sheehan, J. "Process Design and Costing of Bioethanol Technology: A tool for Determining the Status and Direction of Research and Development." *Biotechnology Progress*, Vol 15, pp. 794-803 (1999)

Sheehan, J.; Himmel, M. "Enzymes, Energy and the Environment: A Strategic Perspective on the U.S. Department of Energy's Research and Development Activities for Bioethanol." *Biotechnology Progress*, Vol 15, pp. 817-827 (1999)

John Sheehan; Camobreco, V.; Duffield, J.; Graboski, M.; Shapouri, H. *Life Cycle Inventory of Biodiesel and Petroleum Diesel for Use in an Urban Bus: Final Report*. National Renewable Energy Laboratory, Golden, CO (1998).

Sheehan, J.; Tyson, K. S.; Duffield, J.; Shapouri, H.; Camobreco, V.; Graboski, M. "Life Cycle Inventories of Biodiesel and Petroleum Diesel. *BioEnergy '98: Expanding Bioenergy Partnerships—Proceedings, Vol 2*, pp. 1230-1239 (1998). Report No. NREL/SR-580-24089.

Sheehan, J.; Dunahay, T.; Benemann, J.; Roessler, P. *A Look Back at the U.S. Department of Energy's Aquatic Species Program—Biodiesel from Algae*. Prepared for the U.S. Department of Energy Office of Fuels Development. National Renewable Energy Laboratory, Golden, CO (1998). Report No NREL/TP-580-24190.

Himmel, M.E.; Adney, W.S.; Baker, J.O.; Elander, R.; McMillan, J.D.; Nieves, R.A., Sheehan, J.J.; Thomas, S.R.; Vinzant, T.B.; Zhang, M. "Chapter 1: Advanced Bioethanol Production Technologies: A Perspective." In *ACS Symposium Series: Fuels and Chemicals from Biomass*, pp 2-45 (1997). American Chemical Society, Washington, DC.

Sheehan, J. "Bioconversion for Production of Renewable Transportation Fuels in the United States: A Strategic Perspective." *ACS Symposium Series No. 566: Enzymatic Conversion of Biomass for Fuels Production* (Himmel, M et al, ed.) American Chemical Society, Washington, D.C., pp. 1-52 (1994).

Sheehan, J.; Levy, P. "Performance Characteristics of Polysulfone and Cellulose Membranes for the Ultrafiltration of Biological Streams." *BioPharm*, Vol 4, No. 4, (1991).

Sheehan, J.; Hamilton, B.; Levy, P. "Pilot Scale Membrane Filtration of an Extracellular Bacterial Protease." *ACS Symposium Series No. 419: Downstream Processing and Bioseparations* (Hamel, J.-P. et al, ed). American Chemical Society, Washington, D.C., pp. 130-155 (1990).

Kargi, F.; Curme, J.; Sheehan, J. "Solid Substrate Fermentation of Sweet Sorghum to Ethanol." *Biotechnology and Bioengineering*; Vol 27. pp. 34-40 (1985).

Recent Presentations

Algae for biofuels production. Presented at CTSI Clean Technology Conference, Boston, MA. June 6, 2008

The life cycle of biofuels—the nitrogen problem. Presented to the US Environmental Protection Agency Science Advisory Board's Integrated Nitrogen Committee, Washington, DC. April 11, 2008.

Defining sustainable biofuels—or, "It isn't easy being green". Presented at Ecological Society of America Workshop on the Ecological Dimensions of Biofuels. Washington, DC, March 10, 2008.

A US perspective on the economic sustainability of biofuels. Presented at US-EC Task Force on Biotechnology Research Workshop on Biotechnology for the Development of Sustainable Bioenergy, San Francisco, CA. February 22, 2008.

Algae—an "end-run" around the food-vs-fuel debate? Presented at the Sixth Legislative Agriculture Chairs Summit, St. Louis, MO. January 20, 2008.

Impacts of policy mechanisms on biofuels and agriculture. Presented at NREL Energy Policy Forum, Golden, CO. November 27, 2007.

Algae for biofuels. Presented at Platt's Renewable Diesel Conference, Houston, TX, November 2007.

Algae as a source of jet fuel. Presented at Consortium for Alternative Aviation Fuels Initiative, Washington, DC. November 7, 2007.

The renaissance of algae as a vital element of long term biofuels production. Presented at National Biodiesel Board Biodiesel Technical Workshop (Invitation Only), Chicago, IL, October 18, 2007. (First prize winner for best talk).

Agriculture and climate change. Presented at the National Association of State Departments of Agriculture National Meeting, Seattle, Washington, September 25, 2007.

Algae: biofuel of the future?. Inside CleanTech Webinar September 18, 2007.
www.media.cleantech.com

**Low Carbon Fuel Standard
Expert Workgroup Member Application Form
Please submit a CV along with this form**

APPLICANT: John Joseph Sheehan
 First Middle Last

Employer: Institute on the Environment, University of Minnesota

Current Job Title: Program Coordinate, Biofuels and Global Sustainability

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Minneapolis, MN 55113

Telephone # - Work: (612) 626-1143

Telephone # - Cell: (303) 921-8514

Telephone # - Fax: (612) 626-5555

Email: sheeh179@umn.edu

Broad Areas of Expertise:

Biofuels/biotechnology; Life cycle assessment; biochemical engineering; cellulosic ethanol process technology, algae to biofuels technology; indirect land use change modeling; system dynamics modeling for biofuels supply chains.

Years of Relevant Experience: 19 years

Comments: For much of my career, I have been engaged in process development, engineering analysis, and life cycle assessment for biofuels technology. My life cycle studies on soy to biodiesel and corn stover to ethanol are both groundbreaking studies that have served as the basis of much of the published literature on biofuels LCA. My experience in LCA has also expanded by knowledge into areas of broader global and social sustainability issues for biofuels, especially with regard to land use change issues.

Please return to:

Ms. Manisha Singh, Air Pollution Specialist
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