

**Research Participation Program
U.S. Environmental Protection Agency
Office of Research and Development
National Risk Management Research Laboratory
Cincinnati, Ohio**

EPA-ORD/NRMRL-STD-2010-4

Agent-Based Models for Sustainable Biofuel Supply Chain Design

Project Description:

A postdoctoral research project is available at the U.S. Environmental Protection Agency's (EPA) National Risk Management Research Laboratory (NRMRL) in Cincinnati, Ohio. A current program in NRMRL is the Design of Sustainable Biofuel Supply Chains. This effort has many facets, one of which is the use of agent-based models to describe biofuel supply chains and evaluate supply chain design alternatives. Agent-based models have found use in supply chain optimization wherein the main aim is to satisfy production requirements, while optimizing the economic objectives. In an agent-based model, the actions and interactions of autonomous "agents" are simulated to assess the effect of those actions/interactions on the whole system. Elements of game theory, complex systems, emergent properties, computational sociology, multi-agent systems, geographic information systems, and evolutionary algorithms may be used to develop such a model.

In this effort, the participant will develop and apply agent-based models to biofuel supply chains, using financial criteria for infrastructure investment decisions and environmental sustainability criteria as optimization factors. The traditional corn-to-ethanol supply chain will be the initial model system with future work anticipated for supply chains related to advanced biofuels such as cellulosic ethanol. The supply chains cover diverse processes including corn and biomass farming, fertilizer and pesticide production and application, harvesting and any associated processing, transport, biorefinery production, and biofuel distribution, storage and use. The participant will integrate life cycle assessment (LCA) and other sustainability information with material flow (i.e., system dynamics) information to evaluate the sustainability of biofuel supply chains within the context of existing petroleum fuel supply chains.

Products of this research will include agent-based corn-to-ethanol and biomass-to-ethanol supply chain models, advances in the art of agent-based modeling, and peer-reviewed publications. The participant will have latitude in exercising independent initiative and judgment in the research commensurate with the level of training. EPA will review completed papers for adherence to NRMRL principles and policies, quality, and soundness of scientific conclusions.

Qualifications:

Applicants should have received a doctoral degree in chemical engineering or a related discipline within five years of the starting date, or completion of all requirements for the degree should be expected prior to the starting date. Applicants should have extensive experience in object oriented programming, computer modeling, and high performance computing.

The appointment is full time for one year and may be renewed upon recommendation of NRMRL and subject to availability of funds for up to two additional years. The participant will receive a

monthly stipend commensurate with educational background and experience. Funding may be made available to reimburse the participant's travel expenses to present the results of his/her research at scientific conferences. No funding will be made available to cover travel costs for interviews, relocation costs, costs of tuition/school fees, or a participant's health insurance.

The participant will be selected based on academic records, recommendations, research interests, compatibility of background and interests with research programs and projects at NRMRL, and the availability of funds, staff, programs, and equipment.

The program is open to all qualified individuals without regard to race, sex, religion, color, age, physical or mental disability, national origin, or status as a Vietnam era or disabled veteran. U.S. citizenship or lawful permanent resident status is preferred (but can also hold an appropriate visa status, however, an H1B visa is not appropriate). The participant must show proof of health and medical insurance. **The participant does not become an EPA employee.**

Technical Information:

The participant will be mentored by Leland Vane. For technical information, he may be contacted at vane.leland@epa.gov.

How to Apply:

The Research Participation Program for EPA is administered by the Oak Ridge Institute for Science and Education. ***Please reference Project #EPA-ORD/NRMRL-STD-2010-03 when calling or writing for information.*** For additional information and application materials contact: Research Participation Program/NCEA-RTP, Attn: Betty Bowling, Oak Ridge Institute for Science and Education, P. O. Box 117, Oak Ridge, Tennessee 37831-0117, Phone: (865) 576-8503, FAX: (865) 241-5219, e-mail: betty.bowling@ornl.gov.

An application can be found at http://www.ornl.gov/partform/EPA/EPA_Application.pdf.