

UNIVERSITY OF ILLINOIS
AT CHICAGO

Energy Resources Center (MC 156)
College of Engineering
1309 South Halsted Street, 2nd Floor
Chicago, Illinois 60607

September 18, 2009

Ms. Manisha Singh, Air Pollution Specialist
Alternative Fuels Section
Air Resources Board
1001 I Street, 6th floor
Sacramento, California 95814

Subject: Participation in Expert Working Group

Dear Ms. Singh:

Attached please find my Application Form as well as my CV in support of my desired participation in the Low Carbon Fuel Standard Expert Working Group. All major studies and sponsors of my work are listed in my CV. I have a total of 12 years experience in the energy and environmental field, working both in the private as well as the academic sector. Furthermore, I have spent the last 6 years studying biofuels production pathways.

I believe that California's Low Carbon Fuel Standard is a very innovative and significant step in the fight against global warming. I would like to offer my knowledge to assure successful implementation of this critical environmental standard.

If you have any further questions, please do not hesitate to call me at 312-355-3982 or email me at muellers@uic.edu.

Best,



Steffen Mueller, PhD

Dr. Muller Biography

Dr. Mueller is the Principal Economist for the Energy Resources Center at the University of Illinois at Chicago (UIC-ERC) where he is directing research in the biofuels and bioenergy area. Steffen holds a PhD in Public Policy (Energy Policy) from the University of Illinois at Chicago, an MBA and a BS in Environmental Engineering.

The following areas are the focus of Dr. Mueller's research:

Biofuels

Steffen's interest in this area focus on resource assessments for biofuel and bioenergy production as well as life cycle analyses of emissions related to different production pathways. This research includes assessments of corn ethanol plant technologies and their impact on greenhouse gas emissions, land use change associated with biofuels production, and greenhouse gas emissions from production agriculture.

Energy System Technologies

Steffen Mueller has broad experience with a diverse set of industrial energy systems fueled by diverse feedstocks including natural gas, coal, biomass, and biogas. He has worked for six years for the US Department of Energy Midwest Combined Heat and Power Application Center (a DOE program located at UIC). As part of this Center he has performed numerous engineering and economic assessments to evaluate the feasibility of distributed energy systems for industrial and commercial clients.

Environmental Compliance

Steffen Mueller's research also includes air emissions and other regulatory compliance requirements for electric generating facilities. He has authored a Guidebook on environmental permitting requirements for small distributed generating systems. Most recently, he has authored another Guidebook on permitting requirements for coal gasification projects.

Energy Infrastructure Resource Assessment

Steffen Mueller has authored various economic studies that assess the resource potential for various distributed energy systems. Most notably, he has co-authored a key study in support of the Illinois Renewable Portfolio Standard titled "The Economic and Environmental Impacts of Clean Energy Development in Illinois."

Prior to joining UIC, he was manager of business development for Calpine Corporation/Skygen Energy where he oversaw energy sales, natural gas procurement, and developed financial analyses for merchant power/co-generation projects.

Research Sponsors:

Over the last 3 years Steffen Mueller has received funding for his research from the following sponsors: US Department of Energy, Illinois Department of Commerce and Economic Opportunity, Illinois Clean Coal Institute, Illinois Corn Growers Association, Iowa Department of Natural Resources, Monsanto, Terra Vista, Shaw E&I.

Prior to joining UIC, he was manager of business development for Calpine Corporation/Skygen Energy where he oversaw energy sales, natural gas procurement, and developed financial analyses for merchant power/co-generation projects.

Curriculum Vitae

Steffen Mueller
Principal Economist
Energy Resources Center
University of Illinois at Chicago
<http://www.erc.uic.edu/staff/smueller.htm>

Educational Background

Ph.D.

May 2004, Public Policy Analysis
University of Illinois at Chicago, Chicago, Illinois.
Dissertation title: *Missing the Spark: An Investigation into the Energy Paradox for Combined Heat and Power Technologies*

The dissertation work was funded by the National Science Foundation's Integrative Graduate Education Research and Training program (IGERT).

Master of Business Administration

May 1995, Finance and Marketing, Keller Graduate School of Management, Chicago, Illinois.

Bachelor of Science

October 1991, Radiation Protection Engineering, Technical Academy Karlsruhe, Germany.

Certificate

May 1998, Financial Markets and Energy Trading, Illinois Institute of Technology, Chicago, Illinois.

Relevant Teaching Qualifications

Illinois College Teaching Certificate

Teaching Experience

- Graduate Course ME494, Fall 2004-2009: Distributed Generation and Onsite Power Generation.
- City of Chicago, Green Tech University: Architect and Engineers Green Building Certification Program, Guest Lecturer, 2005-2006.
- Honors College HON105: Introduction to Environmental Science, Guest Lecturer, 2004.

Other

- Proficiency in MS Office, SPSS, Crystal Ball, Mapland, ERDAS Imagine.
- Languages: German, English, and some French
- US and German Citizenship

Professional Experience

2001-present

Principal Economist, Energy Resources Center, University of Illinois at Chicago

Special Term Appointment Faculty Appointee, Energy Systems Division, Argonne National Laboratory (2009-Present)

Research Fellow, Institute for Environmental Science and Policy, University of Illinois at Chicago (2003-2004)

Founding Partner, Life Cycle Associates, San Jose, California (2007-2008)

Selected Recent Studies:

USE OF REMOTE SENSING TO DETERMINE THE ACCURACY OF LAND USE CHANGE FROM BIOFUELS PRODUCTION

Using satellite imagery with different resolutions and published confidence values for different remote sensors, the study determines the limits and possibilities of using remote sensing to determine land use change from biofuels production. This study was funded by the Illinois Corn Marketing Board.

RESEARCH INVESTIGATION FOR THE POTENTIAL USE OF COMBINED HEAT AND POWER AT NATURAL GAS AND COAL FIRED DRY MILL ETHANOL PLANTS

The payback of combined heat and power systems differs based on the region and the fuel feedstocks. The study assesses the expected payback periods for coal and natural gas fired chp systems installed at corn ethanol plants across eight Midwestern states. The study was funded by the US Department of Energy.

AN ANALYSIS OF MODERN CORN ETHANOL TECHNOLOGIES

This study assesses emerging technologies that reduce the energy consumption and the Global Warming Impact (GWI) of corn ethanol production including technology advances in corn agriculture and ethanol processing. Funding for this study was provided by the Illinois Corn Marketing Board.

GLOBAL WARMING AND LAND USE IMPACT OF CORN ETHANOL PRODUCED AT THE ILLINOIS RIVER ENERGY CENTER

The study includes a survey of land management practices within the corn draw area of the Illinois River Energy Center and combines the survey results with satellite crop land data layers and an ethanol plant energy balance to determine the global warming and land use impact of corn ethanol production. This study was funded by the Illinois Corn Marketing Board.

COAL GASIFICATION PERMITTING GUIDEBOOK

The study addresses all major regulatory compliance requirements (including air emissions and waste water discharge) associated with the construction and

operation of large-scale (600 MW) coal gasification plants. The study was funded by the Illinois Clean Coal Institute.

Two Part Study:

1) AN ANALYSIS OF THE PROJECTED GLOBAL WARMING IMPACT OF CORN ETHANOL PRODUCTION (YEARS 2010-2030)

and

2) AN ANALYSIS OF THE PROJECTED ENERGY USE OF FUTURE DRY MILL CORN ETHANOL PLANTS (2010-2030)

Improvements to the energy systems at biorefineries as well as improvements to current agricultural practices will further reduce the global warming intensity (GWI) of corn ethanol. Using Argonne's GREET and Life Cycle Associates' BEACCON model, the study quantifies the expected GWI reductions for ethanol during the years 2015 through 2030. The study was funded by the Illinois Corn Marketing Board.

EXPECTED GHG EMISSIONS FROM CEMENT USE DURING IRAQ RECONSTRUCTION EFFORTS

Using published literature on current and past cement demand in Iraq as well as established protocols to calculate GHG emissions from cement production, this study assesses the overall increase in GHG emissions attributable to the current reconstruction efforts. This study was funded by Life Cycle Associates, Inc.

THE USE OF WOOD BIOMASS FOR DISTRIBUTED ENERGY GENERATION IN IOWA

The study utilizes biomass supply curves and GIS software to determine regions in Iowa where distributed energy systems fueled by waste wood are feasible. The study looks at biomass combustion and gasification systems. The study was funded by the Iowa Department of Natural Resources.

RESEARCH INVESTIGATION FOR THE POTENTIAL USE OF COMBINED HEAT AND POWER AT NATURAL GAS AND COAL FIRED DRY MILL ETHANOL PLANTS

The payback of combined heat and power systems differs based on the region and the fuel feedstocks. The study assesses the expected payback periods for coal and natural gas fired chp systems installed at corn ethanol plants across eight Midwestern states. The study was funded by the US Department of Energy.

ENVIRONMENTAL IMPACT FROM SUSTAINABLE ENERGY PROVISION IN THE MIDWEST UTILIZING ECONOMIC DISPATCH ANALYSIS

The study quantifies the decrease of criteria pollutants and carbon dioxide from implementing a renewable portfolio standard in Illinois. The project was funded by Shaw, E&I Inc.

THE ECONOMIC AND ENVIRONMENTAL IMPACTS OF CLEAN ENERGY DEVELOPMENT IN ILLINOIS

The project was funded by the Illinois Department of Commerce and Economic Opportunity in support of the emerging renewable portfolio standard in the state. As the principal author of the renewable energy generation section, I performed

economic analyses on the capacity potential, the cost, and the deployment potential of renewable electricity generating technologies.

ENVIRONMENTAL PERMITTING GUIDEBOOK FOR DISTRIBUTED GENERATION AND COMBINED HEAT AND POWER APPLICATIONS

I authored this booklet to provide an overview of the air emissions, water discharge, and other regulatory requirements associated with the installation of distributed generating projects. The project was funded by the US Department of Energy.

Current Studies and Other Activities:

- Currently conducting a study titled “Determining the Land Use Impact of Two Midwestern Corn Ethanol Plants.” The study is funded by the Illinois Corn Marketing Board.
- Currently developing a model (dLUC-Mapper) to determine direct emissions from land use change in the vicinity of corn ethanol plants. The model includes a time accounting function.
- Currently conducting a study titled “Monitoring of Greenhouse Gas Emissions from Subsurface Sources Using Remote Sensing.” The study is coordinated with the Illinois State Geological Survey and the SoyFACE project at the University of Illinois at Urbana Champaign. Funding is provided by the Illinois Clean Coal Institute.
- Currently conducting a life cycle greenhouse gas analysis on the use of corn stover as an energy feedstock at ethanol plants. The study is sponsored by Monsanto.
- Currently managing a grant program for the Illinois Department of Commerce and Economic Opportunity titled “Renewable Energy Resources – Biogas and Biomass to Energy Grant Program.” The program provides financial assistance for engineering studies and installations of energy systems at farms and waste water treatment facilities.
- Co-developer of the BEACCON model, a spreadsheet based model that assesses the connection between production cost and global warming impact of distributed energy systems. The model also utilizes, in modified form, the GREET 1.8b lifecycle methodology. Version 1.0 of the BEACCON model can be downloaded at www.lifecycleassociats.com.
- Technical support contractor to the US Department of Energy’s Vision2020 Innovative Energy Systems Challenge program. The intent of this effort is to stimulate high-risk energy efficiency R&D projects in the chemicals process industry. Drafted the Request for Proposal document and served on the Merit Review panel to select the winning proposal.

- Technical support contractor to the US Department of Energy's Save Energy Now program. Currently preparing "Custom Generated Technology Briefings" for the energy savings audit program. To date, 104 Technology Briefings have been generated.
- Conducted feasibility studies assessing the technical and economic viability of distributed generation projects at industrial and commercial facilities.
- Organized workshops with representatives from all Midwestern utility regulatory commissions on interconnection standards and standby-rate design for distributed electric generating facilities.

1997-2001

Manager, Business Development, SkyGen Energy / Calpine Corporation, Northbrook, Illinois

- Developed bid proposals for natural gas fired cogeneration and peaking power plants serving several utilities including co-development on a winning proposal that resulted in the construction of a 500 MW natural gas fired combustion turbine plant in the Midwest USA.
- Selected sites and executed site option and purchase agreements with land-owners for new power generation facilities in the United States. Worked closely with electric utility companies, local economic development departments, elected community officials, and the zoning and planning departments to support new projects.
- Structured and negotiated power purchase and electric interconnection agreements with several utilities, electric cooperatives and power marketers. Negotiated and executed a 75 MW, 10 year power purchase agreement with a Midwestern utility.
- Performed electricity supply and demand analyses (based on US Energy Information Administration load duration data files) to identify the need and dispatch patterns of new electricity capacity additions across various regions and states. Authorized and directed electricity/natural gas market studies conducted by ICF Kaiser International, C.C. Pace Consulting, R.W. Beck, Jaakko Pöyry Consulting, and Navigant Consulting.
- Principal financial analyst for the financing of a 150 MW merchant cogeneration plant in New England, resulting in financial closing of the project in June 1998.

1992-1997

Engineer, Research and Development Department, Landauer Inc., Glenwood, Illinois

- Assisted in the development of a technology transfer program between a German Federal Research Center and Landauer Inc.
- Modified Landauer's environmental monitoring devices (radiation dosimeters) for the measurement of radiation to conform to German code and standards.
- Provided consulting and customer support regarding radiation monitoring programs to nuclear power plants, Department of Energy Facilities, universities and hospitals.

1988-1991

Student Engineer, Radioactive Waste Treatment Facility, University Hospital of Heidelberg, Germany

- Calibrated the waste treatment facility's radiation dosimetry equipment.
- Monitored radiation level of radioactive waste.

1990

Student Engineer, Neutron Research Reactor Site, Institut Laue- Langevin, Grenoble, France

- Assisted in the routine radiation dosimetry programs at the institute.

Magazine Articles

- "Global Warming Intensity of Ethanol - Determining Climate Benefits"; BioCycle Magazine, January 2008, together with Richard Plevin.
- "Producing Ethanol for Low-Carbon Fuel Markets"; Ethanol Producer Magazine, May 2007, together with Richard Plevin.

Reviewed Journal Publications

- Steffen Mueller, and Copenhaver, Kenneth "Use of Remote Sensing to Measure Land Use Change from Biofuel Production, published in "The bulletin of the Program in Arms Control, Disarmament, and International Security"; University of Illinois at Urbana-Champaign, Volume XVII / No. 2 / Summer 2009.
- "The Effect of CO2 Regulations on the Cost of Corn Ethanol Production"; Environmental Research Letters 3 (2008) 024003, with Richard Plevin, University of California, Berkeley.
- "Manure's Allure: Variation of the Financial, Environmental, and Economic Benefits from Combined Heat and Power Systems Integrated with Anaerobic Digesters at Hog Farms across Geographic and Economic Regions"; Renewable

Energy , Volume 32, Issue 2 , February 2007, pp. 248-256.

- “Missing the Spark: An Investigation into the Low Adoption Paradox of Combined Heat and Power Technologies”; Energy Policy, Volume 34, Issue 17, November 2006, pp. 3153-3164.
- “Prioritizing Regulatory Barriers To Combined Heat and Power Adoption Using Selected Case Studies”; Cogeneration and Distributed Generation Journal; Volume 20, NO. 4, Fall 2005.

Professional Activities

- Interview on FarmRadio’s AgriTalk on the impact of California’s Low Carbon Fuel Standard on Midwestern corn ethanol. The segment aired in March, 2009.
- Interview with WTTW, Channel 11 on the use of cow manure for electricity generation in Illinois. The segment aired in September, 2008.
- Induction into the Environmental Hall of Fame. Ceremony was held in December, 2008 in Chicago.
- Review of Research Proposals, US Department of Energy, Vision 2020 Innovative Energy Systems Challenge for the Chemicals Industry, Denver, Colorado (2006)
- Review of Research Proposals, Fellowship Applicants, National Science Foundation Environmental Management and Manufacturing Program, Chicago, Illinois (2004)
- Review of Research Proposals, Power Systems, New York State Energy Research and Development Authority (NYSERDA), Buffalo, New York (2004)
- Research Fellow, Environmental Manufacturing Management Program at the Institute for Environmental Science and Policy, University of Illinois at Chicago (2002-2003)
- Participant, German-American Work-Study Program, Carl Duisberg Society, New York (1992)

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

APPLICANT: Steffen Mueller
First Middle Last

Employer: University of Illinois at Chicago

Current Job Title: Principal Economist

Address: University of Illinois at Chicago, Energy Resources Center
Mail Code 156, 1309 South Halsted Street, Chicago, IL 60607

Telephone # - Work: () 312-355-3982

Telephone # - Cell: () 312-316-3498

Telephone # - Fax: () 312-996-5620

Email: muellers@uic.edu

Broad Areas of Expertise: Land use change from biofuels production,
new corn ethanol production technologies, energy engineering
GREET life cycle greenhouse gas analysis for ethanol production,
time accounting for greenhouse gas emissions, farming practices

Years of Relevant Experience: 12

Comments: For additional information and reports, please visit
my website at: www.erc.uic.edu/staff/smueller.htm

Please return to:
Ms. Manisha Singh, Air Pollution Specialist
Alternative Fuels Section
Air Resources Board
1001 I Street, 6th floor
Sacramento, California 95814
or, email: mansingh@arb.ca.gov

9/16/09