

NABC

news

Spring 2007 No. 34

*Providing an open forum
for exploring issues in
agricultural biotechnology*



NABC'S PRINCIPAL OBJECTIVES ARE TO:

- provide an open forum for persons with different interests and concerns to come together to speak, to listen, to learn, and to participate in meaningful dialogue and evaluation of the potential impacts of agricultural biotechnology
- define issues and public policy options related to biotechnology in the food, agricultural, biobased industrial product, and environmental areas
- promote increased understanding of the scientific, economic, legislative, and social issues associated with agricultural biotechnology by compiling and disseminating information to interested people
- facilitate active communication among researchers, administrators, policymakers, practitioners, and other concerned people to insure that all viewpoints contribute to the safe, efficacious and equitable development of biotechnology for the benefit of society
- sponsor meetings and workshops and publish and distribute reports that provide a foundation for addressing issues.

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Letter from the Chair....

What have you done for me lately? This is a question commonly asked of organizations during annual membership campaigns. If the response is hesitant or vague, it lends little confidence that the organization is functioning well or that its interests are being properly addressed.

To demonstrate that NABC is meeting the needs of its members, we put together a one-pager, *Benefits of NABC Membership*, which was sent to the Council Members in early February. It can be found at <http://nabc.cals.cornell.edu/>. This document highlights just some of the important contributions NABC has made in providing leadership in national and international discussions on agricultural biotechnology. The topics in our eighteen annual meetings have covered the spectrum from ethics in biotechnology to the environment, from industrial consolidation to international issues, from foods to fiber and energy. Additionally, NABC has made its voice heard by publishing a series of white papers that have had positive impact on the national agenda, promoting responsible stewardship of agricultural biotechnology research in member institutions. Our most recent paper has just been released: *Agriculture and Forestry for Energy, Chemicals and Materials: The Road Forward*. We hope it will have a major positive impact. Our 1998 paper *Vision for Agricultural Research and Development in the 21st Century* was used as the basis for Executive Order 13134 on bioproducts and bioprocessing, signed by President Clinton.

NABC 19 will continue to display our relevance since the topic is the much-discussed and complex issue of biofuels. Just this week while on sabbatical leave in New Zealand, I was asked to participate in a meeting with scientists and administrators at Lincoln University and colleagues from



TONY SHELTON
NABC CHAIR 2006-2007

an international petroleum company on how to collaborate on meeting the biofuels requirement that Prime Minister Helen Clark is initiating for New Zealand. However challenging and complex the issue of biofuels is in this country of 4 million, multiply that several fold for the US situation. Then think about what this will mean in the rest of the world, including the world's most populous countries of China and India. The economic, environmental and security impacts of biofuels will be enormous—making agricultural biofuels a most timely topic for NABC 19. Please plan on attending.

And next time anyone asks you what NABC has done for you lately, remember the one-pager, what you have learned from attending past NABC meetings, the focus of NABC 19, and the challenges and opportunities for agricultural biotechnology in the decades ahead.

View streaming video of NABC 18 presentations at
<http://www.nysaes.cornell.edu/ent/nabc/schedule.html>

Ex-Senator Tom Daschle and SD Governor Mike Rounds to speak at NABC 19 *Agricultural Biofuels: Technology, Sustainability, and Profitability*

Tom Daschle, US Senate majority leader 2001–2003, and South Dakota Governor Mike Rounds will be banquet/luncheon speakers at NABC’s nineteenth annual meeting. Jim Fischer—ex-NABC Council Member for Clemson University, recently of the US Department of Energy and now with the US Department of Agriculture’s Research Education and Economics Mission Area—is now confirmed as the second luncheon speaker. *Agricultural Biofuels: Technology, Sustainability, and Profitability* will convene at South Dakota State University, Brookings, SD, May 22–24, organized by John Kirby and colleagues.

Agriculture is in a period of transition, being driven primarily by high costs of petroleum and availability of starch (corn) and oil (soybean) for the production of ethanol and biodiesel, respectively. Initial targets for biofuel replacement of petroleum-based fuels range from 10% to 25% of the current ~180 billion gallons of fuel used for domestic transportation per year. Due to future limitations in corn-starch and relative inefficiency of its conversion to ethanol, additional sources of feedstock need to be developed to meet biofuel-production targets; it is expected that technologies that convert cellulose to ethanol and other fuel types will be required. Additionally, the conversion of corn to ethanol and plant oils to biodiesel will result in huge amounts of co-product for which uses must be found. Biotechnology promises to be a key component of the research portfolio necessary for the development of the technologies that will provide both the agricultural and forestry feedstocks and the economic processes for this growing industry.

These and related issues will be addressed at NABC 19, structured under three “umbrellas” as follows.

- Sustainability: Impacts and Issues
- Technology: Biomass, Fuels and Co-Products
- Economics and Sustainability

In addition to the banquet/luncheon speakers, an impressive list of experts will address these topics and subsets thereof. Presentations at the first session will be by Chris Somerville (Carnegie Institution), Suzanne Hunt (Worldwatch Institute), Steve Bantz (Union of Concerned Scientists) and Bill Richards (25×’25 Steering Committee). The second-session speakers will be Anna Rath (Ceres), Larry Smart (State University of New York College of Environmental Science and Forestry), Bill Gibbons (South Dakota State University), David Ramey (Environmental Energy, Inc.), Mark Bricka (Mississippi State University) and Kurt Rosentrater (USDA/ARS). And Wally Tyner (Purdue University), Roger Wyse (Burrill & Co.), “Bump” Kraeger (PRIME BioSolutions), Danny Le Roy (University of Lethbridge) and Maria Wellisch (National Research Council of Canada) will speak at the third session. Brief information on the speakers is provided on pages 4–7 of this newsletter.

Each plenary session will conclude with questions and comments from the audience. And, as is traditional for NABC meetings, participants will gather in smaller “breakout” workshops for further discussion of issues raised in the plenary sessions and to formulate recommendations for policymakers.

To increase graduate-student participation in NABC conferences, the *Student Voice at NABC* initiative will be launched at Brookings. NABC will provide one graduate student delegate (GSD) from each member institution with \$500 to assist with travel and lodging expenses, with the registration fee waived. The GSDs will be expected to attend NABC 19 sessions and workshops; in addition they will be requested to meet as a group on the evening of May 23 to identify a list of current and emerging issues in agricultural biotech (all areas, not just the focus of NABC 19). The list will be reported at the meeting and published in *NABC Report 19*.

NABC 19 will convene at SDSU’s Student Center at 1 PM on Tuesday May 22. On the Wednesday afternoon (day 2) , participants will tour a large-scale ethanol plant, a biodiesel facility, and co-product research facilities, and will have the opportunity to see biomass crops in the field. The day will conclude with a tour of the Ag Heritage and South Dakota Art Museum and a barbecue. The conference will close immediately after lunch on Thursday May 24.

NABC 19: Registration, Accommodations and Transportation

The conference will convene at the Student Center on the campus of South Dakota State University, Brookings, SD, at 1 PM on Tuesday May 22, and will close immediately after lunch on Thursday May 24. Further information on the conference is available at <http://nabc19.sdstate.org/>.

General Registration

Registration for the meeting may be done at the conference website <http://nabc19.sdstate.org/registration.cfm>. The early-bird registration fee of \$350 will apply until May 1, 2007, after which the full registration fee will be \$450. The registration fee will cover the banquet on Tuesday evening, the barbecue on Wednesday evening, and continental breakfasts, lunches and snacks on Wednesday and Thursday. The registration fee will also cover transportation to and from your hotel and the Student Center. Also covered are the conference materials and a copy of the proceedings volume scheduled for publication in March 2008.

Lodging expenses are not covered by the registration fee.

Student Registration¹

Student registration is free until May 1 and \$100 thereafter (<http://nabc19.sdstate.org/registration.cfm>). The student fee covers the same items and amenities as the general registration fee as described above; it does not include lodging. Proof of status will be required when registering at the meeting.

The Student Voice Program

The *Student Voice at NABC* initiative will be launched at Brookings. NABC will provide one graduate student delegate selected by each NABC member institution with \$500 to assist with travel and lodging expenses, with the registration fee waived. See page 2 of this newsletter for more information.

Accommodation

Reservations for residence hall lodging (Caldwell Hall) may be made as part of your online registration (<http://nabc19.sdstate.org/registration.cfm>). Blocks of rooms have also been reserved at reduced rates (mention "NABC meeting") at three local hotels (<http://nabc19.sdstate.org/Lodging.cfm>).

Attendees are urged to make their hotel reservations as early as possible.

Transportation

Most participants will fly into Sioux Falls or Brookings and may sign up for shuttle transportation from and to the applicable airport at <http://nabc19.sdstate.org/Transportation.cfm>.

For questions about the conference, please contact:

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¹ Except for participants in *The Student Voice*.

Banquet and Luncheon Speakers



Tom Daschle represented South Dakota for eight years in Congress and eighteen years in the Senate. Today, as an advisor to the law firm of Alston & Bird, he provides strategic advice on public-policy issues such as energy, healthcare and agriculture. He is also a distinguished fellow at the Center for American Progress.

Senator Daschle serves on the boards of InterMedia Partners, the Freedom Forum, CB Richard Ellis, the Mayo Clinic, the National Democratic Institute for International Affairs, and CaroLinks, Inc., and is a member of the Council on Foreign Relations. He is also a Visiting Professor at Georgetown University's Public Policy Institute.

From 1978, he served four terms in the House of Representatives then four terms in the Senate. He was appointed to the powerful Senate Finance Committee and in 1994 was appointed minority leader, and after Democrats gained control of the Senate in 2001 he held the position of majority leader until 2003. During that period, he worked with members of both parties in Congress and the administration in crafting the response to the attacks of 9/11/2001. He also served as a member of the Agriculture, Veterans Affairs, Indian Affairs, Finance and Ethics Committees.



Michael Rounds was sworn in as South Dakota's thirty-first governor in 2003. From 1990 to 2000, he served five terms in the state senate, representing District 24, including Pierre and the surrounding areas. In 1994, he was chosen by his peers to serve as senate majority leader, a post he held for six years.

The oldest of eleven children, he was born in Huron, SD, and is a lifelong resident of Pierre. He earned a BS in political science from South Dakota State University. He is part owner of Fischer, Rounds & Associates Inc., an insurance and real estate agency with offices in Pierre, Mitchell, Rapid City and Brandon. He previously served as board president of the Oahe YMCA, and vice president of the Home and School Association of St. Joseph School. He is married with four children.

Governor Rounds has proposed a plan to create a coalition of ethanol-producing states to ensure a sound national ethanol policy in order to maximize promotion of renewable fuels. Ethanol-producing states sometimes compete with their neighbors in the marketplace. In addition, potentially huge ethanol markets (e.g. California) have not been tapped due to perceived obstacles. A coalition can address issues such as reliability of supply during drought years and transportation costs.



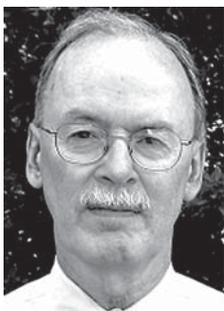
James Fischer has spoken nationally and internationally to diverse audiences on renewable energy production (wind, solar, geothermal, biomass) as well as on improving energy efficiency in agriculture.

In 2003, he was appointed to the board of directors for the Energy Efficiency and Renewable Energy Programs of the US Department of Energy. As senior technical advisor (academe) he developed innovative partnerships and models of collaboration, especially with land-grant universities, the US Department of Agriculture, foundations and the agricultural, industrial and business communities. In January 2007 with his wife, Sharon, he formed James R. Fischer and Associates, a company focused on technology and management issues at the nexus of agriculture and energy, assisting USDA Undersecretary Gale Buchanan coordinate energy science and education programs for

the Research, Education and Economics Mission Area of the USDA.

Fischer, who holds a PhD in agricultural engineering from the University of Missouri-Columbia, served as a USDA research engineer in the 1970s and as a faculty member at three universities: Missouri, Michigan State, Clemson. He has published more than a hundred papers, contributed book chapters, testified before Congress, and served on peer-review panels and advisory boards.

Plenary Speakers



Chris Somerville is the director of the Carnegie Institution Department of Plant Biology and a professor in the Department of Biological Sciences at Stanford University. He has published more than 200 scientific papers and patents in plant and microbial genetics, genomics, biochemistry, and biotechnology. His current research is focused on the characterization of proteins, such as cellulose synthase, implicated in plant cell wall synthesis and modification. He is involved in various public and private research activities associated with the development of a biofuels industry in the United States.

Dr. Somerville has been a member of scientific advisory boards of numerous academic institutions and private foundations in Europe and North America. He is a member of the US National Academy of Sciences, the Royal Society of London and the Royal Society of Canada and is the recipient of numerous scientific awards.

NATIONAL AGRICULTURAL BIOTECHNOLOGY COUNCIL



As director of the Worldwatch Institute's bioenergy program, **Suzanne Hunt** coordinated the landmark study, *Biofuels for Transportation: Global Potential and Implications for Sustainable Agriculture and Energy in the 21st Century*. Under her leadership, a team of international experts has assessed opportunities and risks of large-scale development of biofuels. She speaks frequently to diverse audiences from European Parliamentarians to farm associations, in places such as the World Bank, the United Nations, Yale University, Brussels, and Capitol Hill.

She has extensive environmental research, policy, education and planning experience. As a research fellow at Environmental Defense, her work focused on social and environmental safeguard policy reform at the International Finance Institutes.

Ms. Hunt adopted the use of biodiesel at her family's Hunt Country Vineyards, to make it more environmentally beneficial. As co-founder of SmartFuel, she teaches children principles of science and business through hands-on biodiesel production as fuel for their school-buses. She is a founding steering committee member of the BioEnergy Wiki, an information-sharing hub.

Hunt has a BS in environmental science from Penn State and a dual master's degree in international affairs and natural resource management from American University and the UN's University for Peace in Costa Rica.



As a senior engineer in the Clean Vehicles Program of the Union of Concerned Scientists (UCS), **Steven Bantz** analyzes and assesses transportation issues with a focus on biomass-based fuels and energy. He advocates for sustainable production and use of bioenergy in conjunction with aggressive increases in energy efficiency, reduced demand through conservation, and reforms in transportation and land-use policies (smart growth) to achieve timely reductions in greenhouse-gas emissions and dependence on fossil fuels.

Before joining UCS in August 2006, Mr. Bantz worked as a process control engineer for eighteen years with DuPont, and later Koch Industries, serving in various roles in operations support, R&D, project development in plant startups in Singapore, Brazil, China, Mexico, and the United States

He holds a BS in electrical engineering from the University of Illinois and in engineering and physics from Illinois College, and is finishing an MS in integrated science and technology at James Madison University. For his thesis, Bantz has developed a system-dynamics model to help understand the impacts of limited feedstock availability on the rapid expansion of the biodiesel industry.



William Richards served as chief of USDA's Soil and Conservation Service from 1990 to 1993. During his tenure, he initiated the highly successful National Alliance for Crop Residue Management and spearheaded a formal partnership agreement among SCS, the National Association of Conservation Districts and the National Association of State Conservation Agencies. Richards' commitment to conservation extends to his family farm in Circleville, OH, one of the first in the United States on which conservation tillage was adopted on the entire acreage.

Mr. Richards is a senior advisor on Farm Bill and agricultural policy. He is an Ohio Agriculture Hall of Fame inductee and recipient of distinguished service awards from Ohio State and Purdue Universities, the National Association of Conservation Districts, and the National Association of Farm Managers and Rural Appraisers.

A graduate of Ohio State University with a degree in agricultural economics, he currently serves as co-chair of the 25x'25 Steering Committee.



Anna Rath joined Ceres as director of business development in 2004, prior to which she was a consultant with McKinsey & Company. She holds a JD from the Yale Law School and an MS in human genetics from the University of Michigan.

Ceres is the leading developer of first-generation energy crops for cellulosic ethanol production, including switch grass, *Miscanthus*, sugar cane and poplar. Ceres has sequenced over 15,000 full-length genes of switch grass, and is scaling-up seed production for commercial release of its first varieties of enhanced switch grass, currently planned for 2009. Ceres is working to develop a portfolio of dedicated energy crops appropriate for a broad range of geographies and processing technologies. Its headquarters are in Thousand Oaks, California.



Lawrence Smart (associate professor in Environmental and Forest Biology, State University of New York College of Environmental Science and Forestry, Syracuse, NY) is a plant geneticist and physiologist and has been a leader of efforts in genetic improvement of willow at SUNY-ESF since 1998. He has assembled a large and diverse collection of willows, produced hybrid families through controlled pollination, selected high-yielding individuals, patented a number of those varieties, and transferred them to a commercial nursery for production of planting stock.

Smart received his PhD in genetics at Michigan State University in 1992 and was an NSF postdoctoral fellow at the University of California-Davis. Since 1996, he has taught courses in cell physiology, plant physiology, techniques in plant physiology, and a senior course in biotechnology at SUNY-ESF. In addition to *Salix* genetics, Dr. Smart's research includes studies of cuticular wax biochemistry, stomatal physiology, and drought tolerance.



William Gibbons received his PhD from South Dakota State University in 1987 in agronomy and microbiology. His graduate research focused on production of ethanol from grains and dedicated biomass crops such as fodder beets and sweet sorghum. This work was an outgrowth of SDSU's groundbreaking research on farm-scale ethanol production conducted in the late 1970s.

Upon receiving his PhD, Gibbons joined the Biology/Microbiology Department as an industrial microbiologist, focussing on using microbial metabolism to develop value-added products from agricultural materials as replacements for petroleum-based products. These projects have included production of ethanol, organic acids (acetic, lactic, propionic), biopolymers (gellan, scleroglucan, polyhydroxyalkanoate) and microbial protein, and have resulted in over thirty peer-reviewed publications.

He is the associate director for the Center for Bioprocessing Research and Development (CBRD), a partnership of researchers at SDSU, South Dakota School of Mines & Technology, and several bioprocessing companies. The CBRD mission is to develop and commercialize novel bioprocessing technology, while supplying the science and engineering pipeline with the high-quality graduates needed to support this emerging industry.



Mark Bricka is an associate professor in the Dave C. Swalm School of Chemical Engineering at Mississippi State University (MSU) and director of the Environmental Technology Research and Applications Laboratory. Priorly he served for 20 years as a research environmental engineer with the US Army Corps of Engineers and was employed as a process engineer at PPG Industries where he applied chemical engineering principals to solve environmental problems. He received his BS in chemical engineering from the University of Alabama in 1982, his MS in chemical engineering from MSU in 1988, and his PhD in environmental engineering from Purdue University in 1989.

His research interests include alternative energy and environmentally related aspects, including syngas production, cleanup, distributed power generation as well as pyrolysis oil production, stabilization and utilization. He has authored numerous technical papers in the environmental and alternative-energy areas.

Dr. Bricka received numerous army citations for outstanding research and recently was awarded the Sigma Xi Ralph Powel Award for Outstanding Research at MSU. He is director of the Mississippi Chapter of the Air and Waste Management Association and a member of the Mississippi Biomass Council and of the American Institute of Chemical Engineers.



Bioprocess engineer Kurt Rosentrater is a lead scientist with the United States Department of Agriculture/Agriculture Research Service, at the North Central Agricultural Research Laboratory in Brookings, SD, where he spearheads an initiative to develop value-added uses for co-product and residue streams resulting from biofuel-manufacturing operations. His areas of expertise include value-added product development, alternative recycling and reprocessing strategies for food and organic waste streams, modeling and simulation of food and organic processing systems, economic modeling, and physical and chemical characterization methods.

Dr. Rosentrater has investigated physical, nutritional, and chemical properties of corn masa, processing byproduct streams and swine slaughterhouse blood and blood components, and he has developed value-added livestock-feed applications for these waste streams by utilizing laboratory and pilot-scale extrusion processing techniques. Additionally, he has developed advanced computer models to simulate process and economic factors to aid the food industry in pursuing value-added recycling/reprocessing alternatives.

Formerly an assistant professor at Northern Illinois University, DeKalb, IL, in the Department of Engineering and Industrial Technology, Rosentrater taught research methods, manufacturing systems, engineering mechanics, and design. While in industry, he was responsible for process and equipment design as well as plant and site layout for large-scale agri-industrial facilities, including biodiesel-manufacturing plants.



Driving 10,000 miles cross-country without using a drop of gasoline, David Ramey arrived back in Ohio on August 17, 2005. Environmental scientist, agriculturalist, physicist, engineer and inventor, Ramey—founder and president of Environmental Energy, Inc. (EEI)—drove his unmodified 1992 Buick, using only butanol.

Ramey's butanol was produced by his own patented process, and for his pioneering efforts to bring this organically derived fuel to market, he was recognized as the 1996 Technologist of the Year by the Ohio Academy of Science.

Ramey has physics and mathematics degrees from California State University, San Diego. During the past several years he has been a researcher and an inventor in microbiology through a DOE/STTR grant and Ohio State University (OSU).

In collaboration with Dr. S.T. Yang at OSU's Chemical Engineering Department, he obtained a \$1 million grant through the USDA's SBIR program to research, develop and commercialize butanol fermentation.

EEI's Technology Development Center is building a pilot plant to produce 50–100 gallons per week of butanol, in order to characterize the process for scale-up. The first scale-up will use whey and produce 2 million gallons per year.

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Wallace Tyner's research at Purdue University is in energy, agricultural, and natural resource policy analysis and structural and sectoral adjustment in developing economies. His work in energy economics has encompassed oil, natural gas, coal, oil shale, biomass, ethanol from agricultural sources, and solar energy. His recent work has focused on economic and policy issues related to alternative energy sources. Most of his international work has focused on agricultural trade and policy issues in developing economies, particularly in the Middle East, North Africa, and West Africa.

Dr. Tyner and his students have received research awards from Purdue and the American Agricultural Economics Association (AAEA); in 2005 he received the AAEA Distinguished Policy Contribution Award. He teaches a graduate course in benefit-cost analysis and an undergraduate course in international economic development.

He has (co)authored three books: *Energy Resources and Economic Development in India*; *Western Coal: Promise or Problem*; and *A Perspective on U.S. Farm Problems and Agricultural Policy*.

Recent publications include "U.S. Ethanol Policy – Possibilities for the Future," Purdue Extension Publication ID-342, 2007; "Comparison of A Fixed and Variable Corn Ethanol Subsidy," *Choices* 21(3) 2006; and "Economics of Ethanol," Purdue Extension Publication ID-339, 2006.



Roger Wyse is managing director and general partner of Burrill & Company, a life-sciences merchant bank and leading venture-capital firm located in San Francisco. He joined Burrill in 1998 and has led the development of its agriculture, nutraceuticals, health and wellness, and industrial biotechnology-related activities in venture-capital investing, partnering and the spinout of technology from large companies. The firm has over \$850 million under management.

Dr. Wyse chairs or serves on the boards of eleven private companies. He is co-chairman of the newly formed \$150M Malaysian Life Capital Fund, and is a member of the International Advisory Panel for Biotechnology (BioIAP) for the prime minister of Malaysia. He was founder and chairman of the Alliance for Animal Genome Research. Immediately prior to joining Burrill, Wyse served for 5 years as dean of the College of Agricultural and Life Sciences at the University of Wisconsin-Madison, and from 1986 to 1992 he served as dean of research at Rutgers University.

His basic studies in plant biochemistry produced more than 150 scientific papers. He received the Arthur Flemming Award in 1982 as the Outstanding Young Scientist in the US Federal Service, and was elected a fellow of both the Crop Science Society of America and the American Society of Agronomy.



Mark "Bump" Kraeger, has a BS degree with a major in animal science and several years management experience in feedyards in the Nebraska/Kansas area including Mead Cattle Co. near Mead, NE. Currently he is chief operating officer of PRIME BioSolutions, Omaha.

PRIME BioSolutions' patented integrated biorefinery (IBR) system involves a number of factors that are intended to reduce the cost of ethanol production from corn, including placing the ethanol production facility adjacent to a cattle-feeding operation, using biogas from cattle manure to provide a significant portion of the energy needed to operate the ethanol facility, and feeding cattle with wet distiller's grain, a byproduct of ethanol production from corn, without incurring significant drying or transportation costs.

PRIME's business plan includes construction of ten IBR complexes within the next seven years.



Danny Le Roy is an assistant professor of Economics at the University of Lethbridge. He received his BA in economics in 1992 from Carleton University and his MSc and PhD in agricultural economics in 1994 and 2002 from the University of Guelph. He teaches courses in agricultural systems modeling, commodity marketing, agricultural policy and micro-economics.

The focus of Dr. Le Roy's research is livestock production, marketing and trade, emerging markets for irrigation water in Southern Alberta, and the impact of renewable energy policies on Canadian agriculture. He has been involved in numerous studies involving systems modeling of farms in Canada and assessments of agricultural policy and trade alternatives.

Le Roy has served as an executive member of the Alberta Agricultural Economics Association and the Tiffin Conference Organizing Committee. He has published in and reviewed papers for the *Canadian Journal of Economics*, *Current Agriculture, Food and Research Issues*, *Canadian Public Policy* and the *Western Economic Forum*.



Maria Wellisch graduated from McGill University in chemical engineering (1984) with a minor in environmental studies. She has spent over 20 years in environmental planning and lifecycle-management work for natural resource-based companies in Canada, originally for the forest-products industry and more recently in the development of new bioproducts and bioprocesses.

Ms. Wellisch joined Canada's public service in 2002, and is currently on secondment with the National Research Council as advisor for Bioresources Conversion and Sustainable Development. Her current work centers on strategic sustainable development of the new biobased economy, exploring the use of various sustainability planning and assessment tools in the evaluation and design of bio-pathways.

**NABC 19 — *Agricultural Biofuels:
Technology, Sustainability, and Profitability***

Earlybird Registration until May 1, 2007

South Dakota State University
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