Seizing Opportunity:
Forestry & the BioEconomy

September 20-21, 2007
Ruttger's Sugar Lake Lodge, Grand Rapids, MN

Presenter Backgrounds

And

Abstracts

BLANDIN FOUNDATION™
PUBLIC POLICY & ENGAGEMENT

Bill Berguson

Program Director, Applied Forestry, University of Minnesota, Natural Resources Research Institute

Duluth, MN

Background

Bill Berguson is a Program Director of Applied Forestry at the University of Minnesota, Natural Resources Research Institute, Center for Applied Research and Technology Development. The NRRI-CARTD conducts research to improve the economy of Minnesota and is involved in forestry, geologic exploration and mining, peat development and energy research. Since coming to the NRRI in 1986, Berguson has developed a research program focused on many facets of forest management including aspen productivity and silviculture, hybrid poplar genetic improvement and energy crop production as well as productivity and management of Red Pine plantations. Berguson has conducted biomass productivity research since the early 1980s funded by the federal Department of Energy as well as the State of Minnesota. He is the Chair of the Minnesota Forest Productivity Research Cooperative, a joint program of the University of Minnesota, the US Forest Service and Minnesota's industrial and public land management agencies. Berguson has served on several state committees concerning forest management and impacts on soils and long-term productivity and participated recently in development of guidelines related to biomass harvesting on Minnesota's forestlands. Also, he has contributed his expertise to the federally-sponsored 30X30 energy policy development process.

Presentation Abstract

"Minnesota's Woody Biomass Resources and Opportunities in the Emerging Energy Industry"

Recent developments in the field of alternate energy present new opportunities to expand the economy of northern Minnesota. Understanding biomass feedstock availability is critical to development of an emerging energy industry as well as the stability of the existing forest products industry. Issues related to wood supplies to the current forest products industry are presented. In addition to the traditional forest resource, other sources of biomass such as forest harvest residues, brushlands, pine thinnings and hybrid poplar plantations may provide biomass for energy applications. Data on estimated available biomass tonnage and issues related to harvesting the various biomass sources are presented. Using data published by the National Renewable Energy Laboratory adjusting for local wood prices, breakeven production prices for ethanol are estimated. Also, costs and efficiency of electric and ethanol-based transportation are compared.

Douglas Cameron

Chief Scientific Officer, Khosla Ventures

Menlo Park, California

Background

He a director of LS9, Gevo, LanzaTech and Segetis, all companies focused on fuels and chemicals from renewable resources. From 1998 to 2006 he was director of biotechnology at Cargill, Inc. in Minneapolis, MN where he built the Cargill Biotechnology Development Center. From 1986 to 1998, Cameron was a professor of chemical engineering and an affiliate of the molecular biology program at the University of Wisconsin, Madison and did pioneering research in the field of metabolic engineering and the microbial production of chemicals. He is a fellow of the Society for Industrial Microbiology (SIM) and the American Institute for Medical and Biological Engineering (AIMBE). He is on the managing board of the Society for Biological Engineering (SBE), the board of directors of the Biobusiness Alliance of Minnesota and the outside advisory board of the Iowa Center for Biocatalysis and Bioprocessing. Cameron is on the editorial board of the journals Metabolic Engineering, Process Biochemistry and Biofuels, Bioproducts & Biorefining (Biofpr).

Dean Current

Program Director, Center for Integrated Natural Resources and Agricultural Management, University of Minnesota.

Minneapolis, Minnesota

Background

Dean Current is Program Director for the Center for Integrated Natural Resources and Agricultural Management (CINRAM) at the University of Minnesota, a position he has held since 2002. CINRAM is a partner based organization that unites a multidisciplinary group of University faculty and students with public and private sector landowners, resource management groups, agency representatives and natural resource professionals striving to promote more diverse, economically viable and sustainable natural resource use.

Current has spent the majority of his career working on natural resource based management and development issues in Latin America and the US. He has led multinational and interdisciplinary research teams carrying out projects in Central America and the Peruvian and Brazilian Amazon. He has worked with the World Bank, the Center for International Forestry Research, the Inter-American Development Bank as well as private consulting firms in the US. His work has concentrated on Economic, Social and Policy issues and their impacts on natural resource management.

Dr. Current earned a Ph.D. in Forest Economics from the University of Minnesota in 2000, an MA in Anthropology from the University of Minnesota in 1997, an M.S. in Forest Economics from the University of Minnesota in 1985, and a B.S. in Forest Management from the University of Missouri - Columbia in 1975.

Presentation Abstract

"Highest and Best (Sustainable) Use: Economic Considerations"

The current interest in biofuels has generated interest in the potential to use forest resources as a source of biomass for energy and bioproducts. Estimates of biomass available from such diverse sources as brushlands, forest harvest residue, forest thinnings, hazardous fuel removal, short rotation woody crops and timber stand improvement activities abound. The biomass for energy market also offers opportunities to improve forest management and forest productivity. To take advantage of those opportunities requires a clear understanding of the costs of removing biomass compared to the potential benefits from their use for energy. In some cases the removal of biomass may be more expensive than the value of the delivered biomass product.

There are also opportunities to improve the profitability of forest management through payments for environmental services such as a payment for carbon sequestered and stored on forested or reforested lands. This presentation will explore the potential for extracting biomass from forest areas as well as some of the economic issues that need addressing before moving into a discussion of carbon sequestration and the potential for receiving carbon credits from forested lands. Currently, Minnesotans have an opportunity to help define a carbon trading program for the state that can potentially help forest land owners and managers take advantage of this developing market.

Robert Elde

Dean of the College of Biological Sciences, University of Minnesota
St. Paul, Minnesota

Background

Robert Elde was named dean of the University of Minnesota's College of Biological Sciences in October, 1995. A 1969 honors graduate of North Park College in Chicago, Elde received his Ph.D. from the University of Minnesota in 1974. He joined the University faculty in 1977 and is the J. B. Johnston Land Grant Professor of Neuroscience in the Department of Neuroscience. Elde received an honorary Doctor of Medicine degree from the Karolinska Institute in Stockholm, Sweden, in 1996.

During Elde's tenure as dean, he has worked to improve the quality of education and research at the College, and to apply research to enhance human health, the environment, and agriculture in Minnesota and beyond. Among his accomplishments, Dean Elde has:

- Led reorganization of the University's biological sciences programs to strengthen and refocus education and research.
- Created Biodale, a "shopping mall" of advanced research services available to local companies as well as faculty and students.
- Created several programs to improve the undergraduate experience, including Nature of Life, a summer orientation program for freshmen.
- Increased the number and caliber of students at the College of Biological Sciences.
- Partnered with government and industry to create a biotechnology research park near the University.
- Led efforts to create University Enterprise Laboratories, a privately funded incubator for start-up biotech companies.
- Led efforts to create the University's Initiative for Renewable Energy and the Environment and now serves as Chair of the Executive Committee.
- Created a program to recruit and retain K-12 science teachers for underserved schools in greater Minnesota.

Presentation Abstract

"Opportunities in the Emerging Bioeconomy:
Seeing the Forest Through a Different Lens"

Robert Elde, dean of the University of Minnesota's College of Biological Sciences and executive chair of the Initiative for Renewable Energy and the Environment (IREE), will be giving the keynote presentation titled "Opportunities in the Emerging Bioeconomy: Seeing the Forest Through a Different Lens". Dean Elde's presentation will highlight the need for forest-based biofuels and bioproducts, examples of success stories from other countries, and a discussion of the "forest biorefinery". An overview of University of Minnesota renewable energy research and a vision of the future bioeconomy will also be presented.

Allison Hellman

Policy Advisor, Wisconsin Division of Forestry

Wisconsin

Background

Allison Hellman is the Senior Policy Analyst for the Wisconsin Division of Forestry. She has held this position since 2003. In this position she is responsible for managing Division-wide emerging policy issues as well as

developing and nurturing partnerships within and outside the Department of Natural Resources (WDNR).

She earned a B.S. in Forestry from the University of Wisconsin – Madison in 1991 and has been with the Wisconsin Department of Natural Resources since graduating. She has served in varying staff, managerial and supervisory positions. Recent projects she has been involved in include Wisconsin Department of Agriculture, Trade and Consumer Protection's Wisconsin Working Lands Initiative and the Wisconsin Academy's Future of Farming and Rural Life in Wisconsin initiative. Currently, she is heavily involved in the Governor's Task Force on Global Warming, carbon sequestration, ecosystem services and woody biomass.

Presentation Abstract

"What is cutting edge in Wisconsin?"

Wisconsin is different from its neighboring states in the makeup of its industry. This unique make up impacts how Wisconsin will position itself to compete in the bio-energy markets.

John Hurley

Senior Research Analyst, University of North Dakota Energy and Environmental Research Center

Grand Forks, ND

Background

Born and raised in Grand Forks, Hurley received his Bachelor of Science Degree in Physics from the University of North Dakota and Ph.D. in Materials Science with a specialty in fuels from Penn State University. He has worked at the Energy and Environmental Research Center for 20 years as a program manager and principal investigator on research and development programs ranging from the interactions of fuel inorganics during firing, materials corrosion and development of new materials for use in power systems, the development of systems for the conversion of biomass-to-liquid fuels, and methods of purifying hydrogen at very high pressure.

Presentation Abstract

The University of North Dakota Energy and Environmental Research Center is developing smaller-scale technologies for individual companies or small communities to convert biomass directly to electricity and heat or into liquid fuels for use off-site. The systems can be small enough to mount on trailers for transport to remote sites or mounted permanently at a specific site. The technology is based on a simple down-fired gasifier that can be modified to handle fuels containing up to 40% moisture. For on-site power production, the gas produced can be fed to a diesel generator to replace up to 85% of the diesel

fuel. To produce liquids, the gas is compressed and fed into a reactor containing several possible types of catalysts to produce diesel-like fuels or alcohols of various weights. The system is designed for rapid start-up and shutdown and very low labor operation so that it is best used in conjunction with other labor-requiring activities such as sawmills, pellet plants, or small-wood clearing crews. The technology, applications, and economics of these systems will be discussed.

Amy Johnson

Senior Project Manager, BioBusiness Alliance of Minnesota

St. Louis Park, Minnesota

Background

Amy Johnson joined The BioBusiness Alliance of Minnesota in August, 2006. She is responsible for the agri-bio and bio-industrial subject areas and is currently facilitating the Renewable Energy Analysis Team for Destination 2025. Amy has a dual degree in Biology and Environmental Studies from Macalester College. She received a Masters in Public Administration with a concentration in Environmental Law and Policy from the University of Colorado at Denver. Her work experience is primarily in the government sector. She served as a Public Affairs Specialist for the U.S. Food and Drug Administration in Minneapolis for almost five years. Amy also worked for the U.S. Department of the Interior and the State Department in Washington D.C., and the U.S. Fish and Wildlife Service in Colorado.

Dan Juhl

CEO, Juhl Energy Development, Inc.

Woodstock, Minnesota

Background

Mr. Juhl has pioneered conservation and renewable energy technologies, particularly wind power, in the Midwest for over 30 years. During his tenure in the wind industry, Dan's activities have covered every aspect of the technology including R&D, design, manufacturing, development, installation, and O&M. He has also been instrumental in helping to form public policy by working with legislators and regulators on the workings and benefits of utilizing renewables in the energy mix, and is considered to be one of the nation's leading experts on community owned renewable distributive generation. Through his activities he has developed over 150 Megawatts of Community Based windfarms and currently owns and manages several companies active in the renewable energy business. DanMar & Associates which operates and manages 72.5 MW of generation assets for Edison Capital, , Juhl Energy Development, Inc. which is the point company in the development of commercial scale windfarms for communities and local businesses, and Woodstock Windfarms, a 10.2 Mw windfarm on the Buffalo Ridge in Southwest Minnesota.

Presentation Abstract

Community Based Energy Development (C-BED) is a grassroots organization of farmers and landowners, main-street business people and bankers, wind developers, contractors, and component fabricators, local units of government, educators, renewable energy advocates, and other members of our local communities who share a desire to develop wind and other renewable energy resources in a way that optimizes local economic development for the communities in which we live and work. Its mission is to foster, promote and secure the local economic development and environmental benefits attached to renewable energy production facilities that are owned by organizations and ordinary people rooted in the local community. These renewable production facilities can come in many sizes and different resources like solar, wind, biomass, and conservation. The object of Community Based Energy Development is to keep out energy dollars in our state and communities, and create long term revenue streams and good paying jobs.

Jim Kochevar

General Manager, Hibbing Public Utilities

Hibbing, Minnesota

Background

Jim Kochevar is the General Manager of the Hibbing Public Utilities, a member of the Board of Directors and Past President of the Minnesota Municipal Utilities Association and a member of the Board of Directors of the Midwest Consortium of Municipal Utilities. He is a licensed Professional Engineer in Minnesota, and holds a bachelors of Mechanical Engineering Degree from the University of Minnesota. He is presently the General Manager of the Hibbing Public Utilities, responsible for all aspects of the Utility's steam, water, natural gas and electrical departments, and the power plant. In his fourteen years at the Hibbing Public Utilities, he has also served as the Director of Power Production. Prior to his employment at the Hibbing Public Utilities, he was employed as a Mechanical Engineer for Northern States Power Company.

Presentation Abstract

"Laurentian Energy Authority"

Jim will introduce Laurentian Energy Authority, and talk about their experiences with fuel supply issues (biomass). He will explain how they protect their existing investments, and touch on unintended consequences of biomass use.

Jerry Nagel

President, Northern Great Plains

Fargo, North Dakota

Background

Jerry Nagel is a fourth generation North Dakotan. He spent his winters attending school in Bismarck, North Dakota and his summers at his grandparent's farm on the edge of Millarton, ND (pop. 15). Jerry graduated from high school in 1969 and then began a rather long college career adhering to the perspective that schooling should never interfere with his education. Jerry finally received an MA in economics from the University of North Dakota in 1984.

Currently Jerry serves as the President of Northern Great Plains Inc. a non-profit applied research, demonstration and convening organization. The mission of NGP is to make a positive difference in the future of rural communities and businesses by helping them successfully adapt to changing market and social forces. Jerry is coauthor of several NGP publications including "The New Marketplace in European Agriculture: Environmental and Social Values within the Food Chain", "Private Sector Protocols: Threats and Opportunities for American farmers", and *Towards New Horizons: Trends in Transportation and Trade – Moving the Northern Great Plains Region to a Stronger Economic Future*. He was an editor of *Renewing the Countryside-North Dakota*. Jerry also coauthored *Talking Wires*, a history of North Dakota's rural telephone cooperatives and authored "Aid to the Poor: Am I My Brothers Keeper", a humanities study guide. Jerry has also attended the Senior Executives in State and Local Government program at Harvard University as a Fannie Mae Foundation Fellow. He is also a Donella Meadows Leadership Fellow.

Eric Norberg

Senior Vice President – Strategy and Planning, Minnesota Power

Duluth, Minnesota

Background

Eric is a native of Tower. He holds a BS Electrical Engineering Degree from the University of Minnesota and a Masters of Management Degree from the College of St. Scholastica. He is a Professional Engineer. He holds the position of Senior Vice President – Strategy and Planning. He is a member of the Executive Team responsible for MP's resource planning, including renewable energy and carbon planning.

Presentation Abstract

Minnesota public policy continues to encourage renewable energy development and views responsible, sustainable biofuel use as one of the key contributors to

this end. Minnesota Power plans to use a balanced development of hydroelectric, wind, and biomass resources to meet our renewable energy objectives. Minnesota Power biomass plans includes: 1) expanding our existing biomass facilities, 2) partnering with our wood products customers to optimize their biomass facilities, and 3) exploring adding new biomass generation facilities. Minnesota Power appreciates the BioEconomy Conference dialogue to discuss the opportunities and challenges for biofuel use in Minnesota.

Shri Ramaswamy

Professor and Department Head, Bioproducts and Biosystems Engineering, University of Minnesota

St. Paul, Minnesota

Background

Dr. Shri Ramaswamy is professor and head of the Department of Bioproducts and Biosystems Engineering at the University of Minnesota; he is also a graduate faculty in the Department of Mechanical Engineering. He has degrees in paper science and engineering and chemical engineering and over nine years of experience in forest products industry in various areas including process engineering, process research and development, and chemical applications technology development.

In addition to teaching unit operations of bio-based products manufacturing and paper making processes, Dr. Ramaswamy is very active in conducting research in topics related to transport through porous media, structure-property relationships, bio-based polymers properties and performance and integrated biorefining. Dr. Ramaswamy is a member of the Technical Association of Pulp and Paper Industry (TAPPI), Paper Industry Management Association (PIMA) and American Institute of Chemical Engineers (AICHE).

Presentation Abstract

Dr. Ramaswamy will present the key findings of a report commissioned by Blandin Foundation and Iron Range Resources and written by Dovetail Partners, Inc., *An Assessment of the Potential for Bioenergy and Biochemicals Production from Forest-Derived Biomass in Minnesota*. The report can be found in conference participant packets, and will be available soon at: www.dovetailinc.org.

Alan Rudie

Project Leader, US Forest Service, Forest Products Laboratory

Madison, Wisconsin

Background

Dr. Rudie is the Project Leader for the Fiber and Chemical Sciences Research Work Unit at the USDA, Forest Service, Forest Products Laboratory in Madison, WI. He has 28 years experience in pulping and bleaching process technology including 11 years with International Paper Company's Corporate Research Center and 13 years on the faculty of the Institute of Paper Science and Technology. At IPST, Dr. Rudie served as the Faculty Chair from 1998 to 2002 and chaired the Reaccreditation Committee that successfully renewed the Institute's accreditation with the Southern Association of Colleges and Schools in 2002. Dr. Rudie received his Ph.D. in Inorganic Chemistry from the Massachusetts Institute of Technology in 1978. He has expertise in mineral scale (trace metal) management, receiving the TAPPI David Whetherhorn Award for a paper in 2003 on process modeling of trace metals in mills and in 2006 for a paper on minimizing barium sulfate scale in bleach plants. Since taking the position at the Forest Products Laboratory 2003, Dr. Rudie has carried out research on prehydrolysis prior to kraft pulping for bleach paper applications and prehydrolysis prior to thermomechanical pulping for both newsprint and medium density fiberboard applications. Dr. Rudie has served as principal advisor to 6 doctoral students, 12 masters students and has over 50 career publications.

Bob Ryan

President, Sunrise Agra Fuels, LLC

Bird Island, Minnesota

Background

Robert Ryan is an entrepreneur, consultant, public servant, and specialist in rural development. He is currently President of Sunrise Agra Fuels, LLC, which includes a co-op, market development, and research components. He has led the development of several companies, including a regional waste business, heavy duty truck repair business, waste oil and oil filter recycling business, fireplace and stove business, and over-the-road tracking business. As Renville County Commissioner, Mr. Ryan led the completion of several major public projects; including Renville County's first recycling program, a $3.5 million public storm water system, an underground natural gas pipeline, and a next-generation agricultural drainage system. As lobbyist for Prime West Health System, he lobbied the state legislature to create County-Based Purchasing healthcare networks in western Minnesota. Mr. Ryan has also worked closely with the Northwest Area Foundation to develop community project awards related to poverty reduction in rural areas. He has been an active member of the

Minnesota Association of Counties, and was appointed to the National Association of Counties Agriculture and Rural Affairs Committee.

Dale Wahlstrom

CEO, The BioBusiness Alliance of Minnesota™

St. Louis Park, Minnesota

Background

Dale serves as the CEO for The BioBusiness Alliance of Minnesota. The Alliance is an organization dedicated to the advancement of bioscience based businesses in the state of Minnesota. Most recently Dale served as Vice President of Cardiac Rhythm Disease Management Venture Programs. Prior to this he served as Vice President/General Manager of the Cardiac Rhythm Management Therapy Delivery business. Before Medtronic, he held management and sales positions at Litton Microwave and Burroughs Corporation. Dale received his M.S. in Manufacturing Systems from the University of St. Thomas in 1994, and his B.S. in Engineering and Technology with focus in Electronic Engineering from St. Cloud State University in 1978. He is currently a member of several industrial advisory and governors boards for different universities and companies. In 1988 he was a recipient of the Medtronic Star of Excellence Award, and in 1997 he received the Wallin Leadership Award. In 2002, Dale was recognized as the outstanding graduate of the year by the engineering department of St. Cloud State University. He currently has seven patents in medical device technology with several more pending.

Presentation Abstract

The BioBusiness Alliance of Minnesota will describe the Destination 2025 project and their collaboration with partners across the state to develop a strategic vision and roadmap for the state's biobusiness industries. The presentation will cover the progress of the renewable energy strategic modeling initiative.

Theodore Wegner

Assistant Director, U.S. Forest Service, Forest Products Laboratory

Madison, Wisconsin

Background

Dr. Theodore Wegner is Assistant Director of the USDA Forest Service, Forest Products Laboratory (FPL)--a position he has held since 1989. Prior to joining FPL in 1977, Wegner worked as a researcher for E. I. DuPont. Wegner's academic degrees are in Chemical Engineering having earned his Bachelor of Science degree from the University of Wisconsin and his Master of Science and Ph.D. from the University of Illinois.

Dr. Wegner has helped define the Forest Service research agenda for forest biomass to liquid transportation fuels. He is helping lead a consortium in developing the science and technologies needed to economically produce fuel

ethanol from woodchips extracted prior to pulping--while still being able to produce a commercially-acceptable pulp. The consortium organized and approved by the American Forest and Paper Association's (AF&PA) Agenda 2020 Technology Alliance, involves partnering with five pulp and paper companies, two enzyme companies, four universities, a non-profit economic development group, and a DOE national laboratory. In addition, Wegner oversees FPL research in pioneering new strains of yeasts that effectively ferment both five and six carbon sugars to ethanol; developing new and novel extraction processes for removing carbohydrates from wood at high yield without the production of inhibitors to fermentation; is a participant in a biorefinery deployment consortium; and has recently served on the organizing committee for an international forest biorefinery technical conference.

Dr. Wegner also has been a leader in advancing nanotechnology within the forest products industry. He serves as Forest Service representative on the $1.244 billion National Nanotechnology Initiative (NNI); has been influential in helping the US forest products industry form a liaison group with the NNI; co-led efforts to develop a nanotechnology roadmap for the forest products industry; and served as co-chair of three international conferences on nanotechnology for the forest products industry.

Wegner serves as FPL's representative on the AF&PA Agenda 2020 Technology Alliance Chief Technology Officers Committee. He is a Fellow of the Technical Association of the Pulp and Paper Industry and is a member of the Forest Products Society, The Society of Wood Science and Technology, the Pulp and Paper Education and Research Alliance, the American Institute of Chemical Engineers, the American Chemical Society, the Materials Research Society, Sigma Xi Research Society, and Alpha Chi Sigma—Chemistry and Chemical Engineering Fraternity.

Presentation Abstract

"Cellulosic Ethanol Biofuels—A Nation and Regional Perspective"

The President's Advanced Energy Initiative calls for making cellulosic ethanol cost competitive by 2012; replacing 75% of our Middle East oil imports with alternative fuels by 2025; and meeting 30 percent of our nation's fuels needs with alternative energy sources by 2030. For transportation fuels this means replacing approximately 60 billion gallons of gasoline and diesel oil equivalent each year. To achieve these goals, cellulosic ethanol needs to become cost competitive in the fuels market and biomass from America's 750 million acres of forest lands needs to make a significant contribution as a cellulosic ethanol feedstock.

Cellulose–derived ethanol from forest biomass can be produced via two pathways—a biochemical pathway and a thermochemical pathway. Both routes have their advantages and challenges. The U.S. Department of Energy has set future production cost targets for cellulosic ethanol, which can serve to assess

economic requirements for wood feedstock for biofuels and production costs. Currently, the same cost target for the year 2012 is applied to both the biochemical and thermochemical conversion pathways.

In the short term, cellulosic ethanol will need to compete with corn derived ethanol. In addition, a number of other economic risks and uncertainties must be considered. These include (but are not limited to) the price of crude oil; government subsidies for ethanol production; improvements in cellulose to liquid fuels technologies; infrastructure within the nation to transport ethanol; and the numbers of vehicles able to use ethanol content in excess of 10 percent. In the near term, production of ethanol from forest biomass will most likely be feasible in a biorefinery-type processing plant, where other products in addition to ethanol are produced.

Dave Zumeta

Executive Director, Minnesota Forest Resources Council

St. Paul, Minnesota

Background

Dave Zumeta has served as Executive Director of the Minnesota Forest Resources Council (MFRC) since 2001. The MFRC is a 17-member body appointed by the governor and the MN Indian Affairs Council to advise the governor, legislature, and federal, state, and county governments on forest policy issues. The MFRC recently developed the first guidelines in the U.S. for sustainable harvest of woody biomass for energy. From 1981-2001, Dave worked for the Minnesota Department of Natural Resources in various managerial, supervisory and senior staff positions. He earned a Ph.D. in Forest Policy from the University of Minnesota (1995); an M.S. in Forestry from the University of California, Berkeley (1977); and a B.S. in Environmental Studies from Haverford College in Pennsylvania (1973).

Presentation Abstract

"What's the Cutting Edge?"

In addition to introducing panel members and providing some brief introductory remarks to frame the panel presentations, I will briefly summarize the forest and brushland/open land biomass harvesting guidelines recently developed by the Minnesota Forest Resources Council as two additional chapters in "*Sustaining Minnesota Forest Resources; Voluntary Site-Level Forest Management Guidelines*" (MFRC 2004). The Council is in the process of finalizing the chapters for printing and distribution later this fall. These will be the first state-level guidelines for sustainable removal of woody biomass for energy in the United States.