

MARK DOWNING

Agricultural Economist, Senior Scientist
Oak Ridge National Laboratory
PO Box 2008
Oak Ridge, Tennessee 37831-6422
Phone: 865.576.8140
Fax: 865.576.9939
Email: downingme@ornl.gov

Adjunct Professor
Department of Agricultural Economics
and Rural Sociology
Institute of Agriculture
University of Tennessee
Knoxville, Tennessee
Email: m Downing@utk.edu

Education

1992 Texas A&M, Ph.D. Agricultural Economics
1987 University of Tennessee, M.S. Ag Economics
1977 University of Vermont, B.S. Agriculture

Identification of Current Research & Activities

- Team Lead for ORNL Bioenergy Program in support of the DOE EERE Office of the Biomass Program responsible for oversight of the integration of science and research in the areas of feedstock resource analysis, engineering and logistics modeling, GIS data management, environmental effects research, international environmental and resource analysis, and for NEPA project support for the Integrated Biorefinery
- Management co-leader (with Idaho National Laboratory) for DOE/USDA Sun Grant Regional Feedstock Partnerships
- Intergovernmental and industry relations support for DOE Office of Vehicle Technologies
- Direct support to DOE Golden Field Office on Biomass Team
- Inter-office cross-cut research initiatives lead with Offices of Vehicle Technologies, Industrial Technologies, and Biomass Program – specific pursuit of multiple value streams from biorefinery lignin

Refereed and other Publications

Dale, Virginia, Lynn Wright, Keith Kline, Mark Downing, Robert Perlack, and Robin Graham. 2008 forthcoming. *Interactions Between Bioenergy Feedstock Choices, and Landscape Dynamics, and Land use*. Ecological Applications as part of an Invited Feature from the Ecological Society of America's Conference on the Ecological Dimensions of Biofuels held in March 2008 in Washington, D.C.

Davis, Ethan, Henriette Jager, Tristram West, Robert Perlack, Craig Brandt, Stan Wullschleger, **Mark Downing**, and Erin Wilkerson. 2008 forthcoming. *Exploring Potential U.S. Switchgrass Production for Cellulosic Ethanol Using Empirical Modeling Approaches*. ORNL/TM-2007/183

- Downing, Mark, et al. 2007. *Grass is Greener*. Audubon Magazine. September 2007.
- Downing, Mark, et al. 2007. *The Business of Biomass*. Oak Ridge National Laboratory Review, Oak Ridge, TN. Vol. 40, No. 1.
- Downing, Mark. 2007. *ORNL Visualization Center is Bioenergy Research Tool*. Science and Technology Highlights, Oak Ridge National Laboratory, 2007, No. 1.
- Downing, Mark. *Harvesting Our Meadows for Biofuel?* Letter to Science 23 June 2006: Vol. 312. no. 5781, pp. 745 – 1746.
- Lawler, J.S., J.W. McKeever, Mark Downing, et al. 2005. *Application for Dual Mode Inverter Control to Commercially Available Radial-Gap Permanent Magnet Motors*. CRADA Final Report – Volume I: ORNL 04-0691, Oak Ridge National Laboratory.
- Otaduy, P.J, J.C. Conklin, Mark Downing, et al. 2005. *Graphite Foam as a Heat Transfer Agent in Hydride Storage*. Abstract only of CRADA Final Report – Volume II: ORNL 04-0691, Oak Ridge National Laboratory.
- Downing, Mark, Timothy Volk, and Dean Schmidt. 2005. *Development of New Generation Cooperatives in Agriculture for Renewable Energy Demonstration and Development Projects*. Journal of Biomass and Bioenergy: Elsevier. 28:425-434.
- Downing, Mark, Steve Taff, and Dean Schmidt. 2004. *Hybrid Poplar Production on a Large Scale*. Published proceedings from Farm Foundation Conference, June 2004, Arlington, VA.
- Downing, Mark, Timothy Volk, and Dean Schmidt. 2004. *Development of New Generation Cooperatives in Agriculture for Renewable Energy Demonstration and Development Projects*. Published proceedings from Farm Foundation Conference, June 2004, Arlington, VA.
- Bain, R. L., W. A. Amos, M. Downing, and R. L. Perlack. 2003. *Highlights of Biopower Technical Assessment: State of the Industry and the Technology*. Golden, CO - National Renewable Energy Laboratory Technical Report. NREL/TP-510-33502.
- Netzer, Dan, Don Riemenschneider, Dan Langseth, and Mark Downing. 2002. *Use of Plastic Mulch as an Alternative to Herbicides in Large-scale Populus Plantations in the Mid-West United States*. International Conference on Forest Vegetation Management, Nice, France.
- Kszos, Lynn, Mark Downing, Lynn Wright, Janet Cushman, Sandy McLaughlin, Ginny Tolbert, Jerry Tuskan, and Marie Walsh. 2000. *Bioenergy Feedstock Development Program Status Report*. ESD Publication No. 549. ORNL/TM-2000/92.
- Volk, T.A., L.P. Abrahamson, E.H. White, and M. Downing, 1999. *Developing a Willow Biomass Crop Enterprise in the United States*. Published in ORNL TM/2000/311. Eds.:Christersson, Lars and Lynn Wright, IEA Bioenergy: Task 17 Auburn, AL.

- Downing, Mark, Terry Flum, Stephanie Gripne, and Carolyn Hunsaker. 1999. *Evaluation of Factors Influencing Fish Assemblages in the Minnesota River*. JIEE Report 99-02. Joint Institute for Energy and Environment, Knoxville, Tennessee.
- Downing, Mark. 1998. *The Economics of Bioenergy Production and Use: A Report on the Economic Realities of Bioenergy Crop Production and Conversion, and Prospects for the Future*. Journal of Soil and Water Conservation, Vol 53, No. 2, pp 0157-0183.
- Turhollow, Anthony, Mark Downing, and James Butler. 1998. *Forage Harvest and Transport Costs*. ORNL/TM-13724. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Graham, R.L., W. Liu, Mark Downing, C.E. Noon, M. Daly, and A. Moore. 1997. *The Effect of Location and Facility Demand on the Marginal Cost of Delivered Wood Chips from Energy Crops: A Case Study of the State of Tennessee*. Biomass and Bioenergy 13(3):117-123.
- Downing, Mark. 1997. *Minnesota Agricultural Wood Energy Scale-up Project. p. 5-4. Resource Conservation and Development Partnerships: Serving America's Communities*. National Association of Resource Conservation & Development Councils National Conference, St. Paul, Minnesota, June 15-18, 1997. National Association of Resource Conservation & Development Councils, Inc., Washington, D.C.
- Downing, Mark, Ron Stoffel, Thomas Kroll, and Daniel Langseth. 1997. *Minnesota Wood Energy Scale-up Project 1995 and 1996 Establishment Cost Data*. ORNL/TM-13393. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Downing, Mark. 1997. *Facilitating Market Development*. Energy Crops Forum. Fall 1997. p. 2.
- Jakus, Paul, Mark Downing, Mark S. Bevelhimer, and J. Mark Fly. 1997. *Do Sportfish Consumption Advisories Affect Reservoir Anglers' Site Choice?* Agricultural and Resource Economics Review. Vol. 26, No. 2., October. pp. 196-204.
- Downing, Mark. 1997. *From Hot War to Cold War to Budget Wars*. FORUM for Applied Research and Public Policy. Vol. 12, No.2. Summer 1997. p. 158.
- Downing, Mark and Robin Graham. 1996. *The Potential Supply and Cost of Biomass from Energy Crops in the Tennessee Valley Authority Region*. Biomass and Bioenergy. Vol 11, No. 4., pp. 283-303.
- Downing, Mark and Teofilo Ozuna, Jr. 1996. *Testing the Reliability of the Benefit Function Transfer Approach*. Journal of Environmental and Economic Management. Vol 30, No. 3, May. pp. 316-322.
- Graham, Robin, Mark Downing and Marie Walsh. 1996. *A Framework to Assess Regional Environmental Impacts of Dedicated Energy Crop Production*. Environmental Management. Vol 20, No 4. pp.475-485.
- Downing, Mark, Marie Walsh and Sandy McLaughlin. 1995. *Perennial Grasses for Energy Conservation: Evaluating Some Ecological, Agricultural and Economic Issues*. pp. 217-224. Environmental Enhancement Through Agriculture. Editor,

- William Lockeretz. Environmental Enhancement Through Agriculture, Tufts University, Boston, Massachusetts, November 15 - 17, 1995. Center for Agriculture, Food and Environment, School for Nutrition Science and Policy, Tufts University, Medford, Massachusetts.
- Downing, Mark. 1995. *It's Not Just Food and Fiber Anymore*. MidAmerica Farmer Grower. Vol 12, Issue 44. November 3, 1995. pp. 1 and 6.
- Downing, Mark. 1995. *To Market, To Market, To Sell Biomass Crops...But Where, and When?* Energy Crops Forum. Fall 1995. p. 3.
- Graham, R.L. and Mark Downing. 1995. *Potential Supply and Cost of Biomass from Energy Crops in the TVA Region*. ORNL-6858, Environmental Sciences Division Publication Number 4306. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Downing, Mark, Rick Pierce and Thomas Kroll. 1994. *1994 Establishment Cost Data - Minnesota Wood Energy Scale-up Project*. ORNL/TM-12914. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Downing, Mark. 1993. *Resource Assessment for the TVA Region*. Energy Crops Forum. September 1993. p 2.
- English, Burton C., Robert R. Alexander, Robin Graham, Mahadev G. Bhat, and Mark Downing. 1992. *Supply of Short Rotation Woody Crop Biomass to the Watts Bar Power Facility*. University of Tennessee Department of Agricultural Economics and Rural Sociology, Knoxville, Tennessee.
- Downing, Mark and Teofilo Ozuna, Jr. 1992. *Testing the Feasibility of Intertemporal Benefits Transfer Within and Across Geographic Regions*. TA-30619, Texas Agricultural Experiment Station, Texas A&M University, College Station, Texas.
- Downing, Mark and Teofilo Ozuna, Jr. 1992. *Testing the Feasibility of Intergeographic Benefit Function Transferability*. TA-30660, Texas Agricultural Experiment Station, Texas A&M University, College Station, Texas.
- Downing, Mark. 1992. *Benefits Transfer in Nonmarket Resource Valuation*. **Unpublished Ph.D. Dissertation**. Department of Agricultural Economics. Texas A&M University. College Station, TX.
- Downing, Mark and Roland K. Roberts. 1991. *Estimating Visitor Use-Value of Arboreta: The Case of the University of Tennessee Arboretum*. pp 207-210. Journal of Environmental Horticulture. Vol 9, No. 4.
- Downing, Mark and Roland K. Roberts. 1989. *Consumer Use Valuation of the University of Tennessee Arboretum*. pp 111-122. Leisure Science. Vol. 11, No. 2.
- Downing, Mark and Roland K. Roberts, 1989. *Use-value of the University of Tennessee Arboretum as Public Garden*. pp 14-18. Tennessee Farm & Home Science Bulletin Bulletin. Bulletin 152, Fall 1989.
- Goodwin, H.L., Mark Downing and Steve Fuller. 1989. *A Marketing Profile of Wholesale Operations in the Texas Green Industry*. Department of Agricultural

Economics Staff Paper Series, July 1989. Texas A&M Department of Agricultural Economics, College Station, Texas.

Downing, Mark. 1987. *Consumer Use Valuation of the University of Tennessee Arboretum*. Unpublished Master's Thesis, Department of Agricultural Economics and Rural Sociology, University of Tennessee – Knoxville, TN.

Popular Press Contributions

Downing, Mark. 2008 forthcoming. *Where are we in our Quest for Renewable Energy Options?* Kiplinger Energy Newsletter.

Downing, Mark, and Mike Casler. 2008 forthcoming. *Forage for Fuel*. Progressive Farmer. Des Moines, IA.

Downing, Mark, et al. 2008. *Bacterium Gets Wheels Turning on Ethanol Fuel*. Washington Post, March 10, 2008.

Downing, Mark, et al. 2007. *Disappointing Yields Dampen Switchgrass Enthusiasm*. BioPact, March 21, 2007.

Downing, Mark. 2007. *In-Demand Switchgrass Costs Nearly Twice as Much as Corn*. Washington Post, March 18, 2007.

Published Proceedings & Invited Presentations

Downing, Mark. 2008. *DOE Investment in Bioenergy Research; and Biomass Feedstock Resource Analysis*. American Paulownia Association Annual Meeting, Pulaski, TN.

Downing, Mark. 2008. *DOE Funded Biorefinery Research and Development: Funding and Deploying the Biorefinery*. Appalachian Regional Commission Conference: Renewable Energy and Energy Efficient Technologies, Rome, GA.

Downing, Mark. 2008. *DOE Integrated Biorefinery Research, and NEPA Compliance and Determination*. California Energy Commission – UC Davis Sustainability Conference, Sacramento, CA.

Downing, Mark, et al. 2008. *ORNL Bioenergy Program in Support of the DOE Office of the Biomass Program*. Presentation to General Motors, and Sandia National Laboratory, Oak Ridge National Laboratory, Oak Ridge, TN

Downing, Mark, et al. 2008. *Overview of ORNL Bioenergy Program Resource Analysis with Respect to Toyota NA*. Toyota Motor Engineering & Manufacturing Research Facility. Ann Arbor, MI

Downing, Mark, et al., 2007. *Leveraging Partnerships to make the Tennessee Biofuels Initiative a Success*. Invited presentation at *TN Biofuels: The Governor's Conference on Biofuels*. Presentation at American Society of Agricultural and Biological Engineers, Montgomery Bell State Park, Burns, TN.

- Downing, Mark. 2007. ***DOE, USDA, and Sun Grant Regional Feedstock Partnerships.*** Presentation at American Society of Agricultural and Biological Engineers, Louisville, KY.
- Downing, Mark, Martin Keller, and Brian Davison. 2007. ***The ORNL Bioenergy Science Center; and DOE EERE, and Office of Science Funded Research: Deployment of the Biorefinery.*** Appalachian Woody Biomass to Ethanol, Shepherdstown, WV.
- Downing, Mark, Richard Hess, Kelly Ibsen, Seth Snyder, and Jim Hettenhaus. 2007. ***National Laboratory System Roundtable.*** Next Generation Biofuels for a “Twenty in Ten” World, Financial Research Associates, LLC, New York, NY.
- Downing, Mark, *et al.* 2007. ***Regional Feedstock Partnerships.*** Presentation at the World Congress on Industrial Biotechnology and Bioprocessing. Orlando, FL.
- Downing, Mark. 2007. ***The Tennessee Biofuels Initiative, the Federal Role, and Partnerships for Tennessee Farmers.*** Presentation to the Tennessee Farm Bureau Presidents, Franklin, TN.
- Downing, Mark. 2006. ***The Tennessee Bioenergy Strategic Summit.*** Presentation to the ORNL, The University of Tennessee, and to State of Tennessee Officials. Oak Ridge National Laboratory, Oak Ridge, TN.
- Downing, Mark, John Ferrell, Terry Nipp, and Don Erbach. 2006. ***Regional Bioenergy Feedstock Partnership Development for the Future of the Biorefinery.*** Presentation to the Tennessee Alternative Fuels Working Group, National Transportation Research Center, Oak Ridge National Laboratory.
- Downing, Mark. 2006. ***USDA/DOE R&D Activities in Support of Commercialization of Biobased Industries in the U.S.*** Presentation at American Society of Agricultural and Biological Engineers, Louisville, KY.
- Downing, Mark. 2006. ***A Summary of Switchgrass Research and Discussion of Wildlife and Energy Benefits .*** Invited Presentation for Discussion with the National Wildlife Federation, Washington, D.C.
- Downing, Mark. 2006. ***Transportation Research at Oak Ridge National Laboratory; Overview of the ORNL Bioenergy Program.*** Invited presentation at North Carolina A&T State University, Greenville, NC.
- Downing, Mark. 2006. ***Opportunities for Using Biodiesel in Selected Diesel Applications in the Oak Ridge National Laboratory Fleet.*** Presentation to Facilities Division Management, Oak Ridge National Laboratory.
- Downing, Mark. June 2006. ***An Overview of ORNL, and the ORNL Bioenergy Program.*** Presentation to Toyota Corporation, Oak Ridge National Laboratory.
- Downing, Mark. 2005. ***A Comparative Assessment of Alternative Transportation Fuels.*** Presentation for Oak Ridge Institute for Continued Learning (ORICL), Oak Ridge, TN.

- Downing, Mark. 2005. *Bioenergy Science, Biomass Research, and Global Warming*. Southern Alliance for Clean Energy, Pellissippi State University Lecture, Knoxville, TN.
- Downing, Mark. 2005. *Transportation Fuels – An Overview*. Tellico Plains Kiwanis Club Presentation, Tellico Plains, TN.
- Downing, Mark. 2005. *Preliminary Results - Cost-benefit Analysis: Adoption of Biodiesel in Diesel Fuel Applications for the State of Maine*. University of Tennessee Department of Agricultural Economics invited Seminar. UT – Knoxville, TN.
- Downing, Mark. 2005. *Renewables Portfolio Standards*. Building a Biobased Industry: A Workshop on Biomass-related Incentives for Kentucky and the Southern U.S. Cincinnati-Northern Kentucky Airport, Hebron, KY.
- Downing, Mark. 2005. *Fundamental Science of Crop Production Technologies*. Growing the Bioeconomy, Iowa State University, Ames, IA.
- Perlack, Robert and Mark Downing. 2005. *Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion-Ton Annual Supply*. Energy Frontiers International, Charleston, SC.
- Downing, Mark, and John Ferrell. 2004. *Policy and Legislation from the 108th Congress*. Presentation at Short Rotation Operations Working Group – IEA Bioenergy Task 30. Charleston, SC.
- Downing, Mark. 2004. *Dedicated Woody Biomass Crops: Overcoming barriers to production, harvest and utilization of biomass feedstocks for production of bioethanol and biobased products*. World Congress on Industrial Biotechnology and Bioprocessing, Orlando, FL.
- Downing, Mark. 2003. *Economic, Environmental, and Social Benefits of Bioenergy Development: A Case Study of Hybrid Poplar in Alexandria, Minnesota*. Forest Science in Practice: Society of American Forester's National Convention, Buffalo, NY.
- Nobel, Carolyn, Jonathan Scurlock, and Mark Downing. 2003. *Biomass, Bioenergy, and Biobased Products: The Role of Farmers and Engineers*. Chattanooga Engineers Club, Chattanooga, TN.
- Edick, Stacie, and Mark Downing, 2002. *Cooperative Business Structure for Willow Biomass Cooperatives in New York*. Proceedings of Bioenergy 2002, September 22-26, 2002Boise, Idaho.
- Downing, Mark, Dan Langseth, Terri Lundblad, Rick Pierce, and Ron Stoffel. 1999. *Minnesota Wood Energy Scale-up Project: A Progress Report 5 Years after Establishment*. p. 1703. Biomass: A Growth Opportunity in Green Energy and Value-Added Products, Vol II. Edited by R. P. Overend and E. Chornet. Elsevier Science Ltd., Kidlington, Oxford.
- Volk, Timothy, Stacie Edick, Steve Brown, and Mark Downing. 1999. *Community Outreach and Education: Key Components of the Salix Consortium's Willow Biomass Project*. p. 1733. Biomass: A Growth Opportunity in Green Energy and

- Value-Added Products, Vol II. Edited by R. P. Overend and E. Chornet. Elsevier Science Ltd., Kidlington, Oxford.
- Downing, Mark, Rick Pierce, and Ron Stoffel. 1999. *Hybrid Poplar on Conservation Reserve Program Land: Farm Producer Information and Education*. p. 1765. Biomass: A Growth Opportunity in Green Energy and Value-Added Products, Vol II. Edited by R. P. Overend and E. Chornet. Elsevier Science Ltd., Kidlington, Oxford.
- Downing, Mark. 1999. *Toward a Concept of Integrated Opportunities: The Case of Hybrid Poplar in West Central Minnesota*. Sixth Conference on Agroforestry in North America, Hot Springs, Arkansas June 12-16, 1999. Association for Temperate Agroforestry, University of Missouri – Columbia.
- Downing, Mark, Christian Demeter, Martin Braster, Chris Hanson, Greg Larson, and Timothy Volk. 1998. *Agricultural Cooperatives and Marketing Bioenergy Crops: Case Studies of Emerging Cooperative Development for Agriculture and Energy*. pp. 100. Expanding Bioenergy Partnerships: Proceedings of Bioenergy '98, Vol I. Great Lakes Regional Biomass Energy Program, Chicago, IL.
- Langseth, Dan, Greg Larson, Ron Stoffel, Tom Kroll, and Mark Downing. 1997. *Seven Steps in Establishment to Assure Successful Hybrid Poplar Plantings*. pp. 215. Making a Business from Biomass in Energy, Environment, Chemicals, Fibers, and Materials, Vol I. Edited by Ralph P. Overend and Esteban Chornet. Redwood Books, Trowbridge, Wiltshire.
- Hines, Daniel J., and Mark Downing. 1997. *Bioenergy Education and Information: A Framework for a Comprehensive Education Effort*. p. 295. Making a Business from Biomass in Energy, Environment, Chemicals, Fibers, and Materials, Vol I. Edited by Ralph P. Overend and Esteban Chornet. Redwood Books, Trowbridge, Wiltshire.
- Brummer, Charles, Lee Burras, Michel Duffy, Ken Moore, Mark Downing, and Sandy McLaughlin. 1997. *Integration of Technical Aspects of Switchgrass Production in Iowa*. p. 1445. Making a Business from Biomass in Energy, Environment, Chemicals, Fibers, and Materials, Vol II. Edited by Ralph P. Overend and Esteban Chornet. Redwood Books, Trowbridge, Wiltshire.
- Hines, Daniel J., and Mark Downing. 1997. *Market Development for Bioenergy: The Role of Targeted Communications*. p. 1481. Making a Business from Biomass in Energy, Environment, Chemicals, Fibers, and Material, Vol II. Edited by Ralph P. Overend and Esteban Chornet. Redwood Books, Trowbridge, Wiltshire.
- Bransby, D.I., S.E. Sladden, and M. Downing. 1996. *Yield Effects on Bale Density and Time Required for Commercial Harvesting and Baling Switchgrass*. pp. 9-13. Bioenergy '96 - Partnerships to Develop and Apply Biomass Technologies, Vol I. Seventh National Bioenergy Conference, Nashville, Tennessee, September 15-20, 1996, Southeastern Regional Biomass Energy Program, Muscle Shoals, AL.
- Downing, Mark, Richard Bain, and Ralph Overend. 1996. *Economic Development Through Biomass Systems Integration: U.S. Department of Energy Feasibility Studies*. pp. 30-36. Bioenergy '96 - Partnerships to Develop and Apply Biomass Technologies, Vol I. Seventh National Bioenergy Conference, Nashville,

- Tennessee, September 15-20, 1996, Southeastern Regional Biomass Energy Program, Muscle Shoals, AL.
- Turhollow, Anthony, Mark Downing, and James Butler. 1996. *The Cost of Silage Harvest and Transport Systems for Herbaceous Crops*. pp. 451-458. Bioenergy '96 - Partnerships to Develop and Apply Biomass Technologies, Vol I. Seventh National Bioenergy Conference, Nashville, Tennessee, September 15-20, 1996, Southeastern Regional Biomass Energy Program, Muscle Shoals, AL.
- Downing, Mark, Dan Langseth, Ron Stoffel, and Thomas Kroll. 1996 *Large-scale Hybrid Poplar Production Economics: 1995 Alexandria, MN Establishment Cost and Management*. pp.467-471. Bioenergy '96 - Partnerships to Develop and Apply Biomass Technologies, Vol I. Seventh National Bioenergy Conference, Nashville, Tennessee, September 15-20, 1996, Southeastern Regional Biomass Energy Program, Muscle Shoals, AL.
- Downing, Mark and Greg Larson. 1995. *Minnesota Hybrid Poplar Scale-up Project*. American Energy Crop Association Annual Meeting, St. Louis, MO.
- Tolbert, Virginia and Mark Downing. 1995. *Environmental Effects as a Result of Planting Energy Crops At Larger Scales on Agricultural Lands*. pp. 1628-1635. Second Biomass Conference of the Americas: Energy, Environment, Agriculture and Industry. NREL/CP-200-8098. Second Biomass Conference of the Americas, August 21-24, 1995. Portland, Oregon. National Renewable Energy Laboratory, Golden, Colorado.
- Downing, Mark and Gerald Tuskan. 1995. *Clonal Selection and Variation in Large-scale Short Rotation Intensive Culture Biomass Plantings*. pp. 207-215. Second Biomass Conference of the Americas: Energy, Environment, Agriculture and Industry. NREL/CP-200-8098. Second Biomass Conference of the Americas, August 21-24, 1995, Portland, Oregon. National Renewable Energy Laboratory, Golden, Colorado.
- Downing, Mark, Sandy McLaughlin, and Marie Walsh. 1995. *Energy, Economic and Environmental Implications for Production of Grasses as Biomass Feedstocks*. pp. 284-297. Second Biomass Conference of the Americas: Energy, Environment, Agriculture and Industry. NREL/CP-200-8098. Second Biomass Conference of the Americas, August 21-24, 1995, Portland, Oregon. National Renewable Energy Laboratory, Golden, Colorado.
- Kroll, Thomas and Mark Downing. 1995. *Large-scale Biomass Plantings: The Minnesota Wood Energy Scale-up Project in Perspective*. pp. 21-29. Second Biomass Conference of the Americas: Energy, Environment, Agriculture and Industry. NREL/CP-200-8098. Second Biomass Conference of the Americas, August 21-24, 1995, Portland, Oregon. National Renewable Energy Laboratory, Golden, Colorado.
- Graham, Robin, Wei Liu, Mark Downing, Alison Moore, Charles Noon and Mike Daly. 1995. *The Effect of Location and Facility Demand on the Marginal Cost of Delivered Wood Chips from Energy Crops: A Case Study of the State of Tennessee*. pp. 1324-1333. Second Biomass Conference of the Americas: Energy, Environment, Agriculture and Industry. NREL/CP-200-8098. Second Biomass Conference of the Americas, August 21-24, 1995, Portland, Oregon. National Renewable Energy Laboratory, Golden, Colorado.

- Ugoretz, Steven, Ken Rineer, and Mark Downing. 1995. *Priorities for Ecological Research on Energy Crops in the North Central Region*. pp. 357-365. Second Biomass Conference of the Americas: Energy, Environment, Agriculture and Industry. NREL/CP-200-8098. Second Biomass Conference of the Americas, August 21-24, 1995, Portland, Oregon. National Renewable Energy Laboratory, Golden, Colorado.
- Downing, Mark 1995. *Crucial Research Papers Published from the Biomass Feedstock Development Program at Oak Ridge National Laboratory*. DOE Bioenergy Systems Division Quarterly Review, July 10, 1995. Washington, D.C.
- Downing, Mark 1995. *ORNL Feedstock Studies at the Biofuels Feedstock Development Program*. Biomass Power Program Review, National Renewable Energy Laboratory, June 21, 1995. Golden, Colorado.
- Downing, Mark. 1995. *The Biofuels Feedstock Development Program at Oak Ridge National Laboratory*. WesMin Resource Conservation and Development Council Meeting, May 8-11, 1995. Alexandria, MN.
- Downing, Mark. 1995. *Role of Feedstocks Research in the End-Use Sector in Relationship to the Regional Biomass Energy Programs*. Regional Biomass Energy Program Review, May 3-4, 1995. Washington, D.C.
- Downing, Mark. 1995. *Biomass Feedstocks Overview*. American Energy Crops Association, March 7-8, 1995. Peoria, IL.
- Downing, Mark. 1995. *Assessment of Systems Integration in NREL Feasibility Studies*. Project Review Meeting, Economic Development Through Biomass Systems Integration in Holton, Kansas, Feb. 23, 1995. Topeka, KS.
- Downing, Mark. 1995. *Biomass Production Economics*. Woody Crops Roundtable, WesMin Resource Conservation and Development Council, Feb 15, 1995. Alexandria, MN.
- Downing, Mark. 1995. *Scale-up Feasibility and Demonstration of Biomass Crops at Oak Ridge National Laboratory*. American Corn Grower's Association Annual Meeting, Feb 2-5. 1995. Kansas City, MO.
- Downing, Mark and Ed Gray. 1994. *Integrated Biomass Energy Systems for Puerto Rico*. Biomass Information and Technical Meeting, Dec 14-15, 1995. University of Mayaguez, P.R.
- Downing, Mark 1994. *Rural Development, Sustainable Energy: Electric Power from Biomass*. Oct 25, 1994. U.S. Department of Energy, Burlington, VT.
- Downing, Mark. 1994. 1) *Minnesota Wood Energy Scale-up Project*, 2) *The NREL Feasibility Studies*, 3) *Bridging Demand and Supply Through Commercialization*. Annual BFDP Subcontractor s Meeting, Oct 17-22. 1994. Syracuse NY
- Downing, Mark. 1994. *An Overview of the Biofuels Feedstock Development Program*. Energy Division, Oak Ridge National Laboratory, June 14, 1994. Oak Ridge, TN.

- Downing, Mark. 1994. *Developing Utility Biomass: Priorities For Education and Promotion*. Utility Biomass Energy Commercialization Association First Annual Meeting, June 1-2, 1994. Washington, D.C.
- Graham, Robin, and Mark Downing. 1993. *The Environmental Implications of Energy Crops*. Southern Appalachian Man and Biosphere Conference, November 10, 1993, Gatlinburg, TN.
- Downing, Mark. 1993. *An Evaluation of Nonmarket Resources Benefit Transfer Procedures*. Energy Division, Oak Ridge National Laboratory, Nov 8, 1993, Oak Ridge, TN.
- Downing, Mark 1993. *Development of Energy Crop/Cost Supply Relationships*. Annual Contractors Workshop of the Biofuels Feedstock Development Program, Sept 27-30, 1993. Auburn, Alabama.
- Graham, Robin, and Mark Downing. 1993. *Evaluating a Biomass Resource: The TVA Region-Wide Biomass Resource Assessment Model*. pp. 54-67. First Biomass Conference of the Americas - Energy, Environment, Agriculture, and Industry, Vol I. NREL/CP-200-5768. First Biomass Conference of the Americas, August 30 - September 2, 1993, Burlington, Vermont. National Renewable Energy Laboratory, Golden, Colorado.
- Downing, Mark, and Robin Graham. 1993. *The Role of Natural Resource and Environmental Economics in Determining the Trade-offs in Consumption and Production of Energy Inputs*. 2pp. 1802-1817. First Biomass Conference of the Americas - Energy, Environment, Agriculture, and Industry, Vol III. NREL/CP-200-5768. First Biomass Conference of the Americas, August 30 - September 2, 1993, Burlington, Vermont. National Renewable Energy Laboratory, Golden, Colorado.
- Graham, Robin, and Mark Downing. 1993. *Renewable Biomass Energy: Understanding Regional Scale Environmental Impacts*. pp. 1566-1581. First Biomass Conference of the Americas - Energy, Environment, Agriculture, and Industry, Vol III. NREL/CP-200-5768. First Biomass Conference of the Americas, August 30 - September 2, 1993, Burlington, Vermont. National Renewable Energy Laboratory, Golden, Colorado.
- Downing, Mark and Teofilo Ozuna, Jr. 1993. *Investigating the Causes of Observed Structural Change in Geographically Contiguous Recreation Demand Functions*. American Agricultural Economics Association Annual Meeting, August 1-4, 1993. Orlando, FL
- Graham, Robin, and Mark Downing. 1993. *Renewable Biomass Energy: Understanding Regional Scale Environmental Impacts*. United States Landscape Ecology Eighth Annual Symposium, March 1993. Oak Ridge, TN
- Downing, Mark. 1992. *Benefits Transfer Feasibility in Non-market Resource Valuation*. University of Tennessee Department of Agricultural Economics and Rural Sociology Seminar Series, Knoxville, TN.
- Graham, Robin, and Mark Downing. 1992. *Projecting the Environmental Impacts of Energy Crop Development in the TVA Region*. Southern Appalachian Man and Biosphere Conference, Nov 10, 1992. Gatlinburg, TN.

Downing, Mark and Teofilo Ozuna, Jr. 1992. *Testing the Feasibility of Recreation Benefit Function Transferability*. American Agricultural Economics Association Annual Meeting, August 1992. Baltimore, MD

Downing, Mark and John Stoll. 1991. *Baseline Values for Habitat Protection, Enhancement, and Restoration: The Case of Recreational Fishing in the Gulf of Mexico*. American Fisheries Society Annual Meeting, San Antonio, TX

Downing, Mark, and Harold Goodwin, Jr. 1989. *A Survey of Blueberry Producers in Eastern Texas and Western Louisiana*. Food Distribution Research Society Annual Meeting, November 1989. Albuquerque, NM.

Downing, Mark, and Harold Goodwin, Jr. 1988. *A Survey of the Texas Greenhouse Industry*. Texas Greenhouse Growers' and Interiorscapers Conference, November 1988. College Station, TX.

Downing, Mark and Roland Roberts. 1988. *Non-market Valuation of Arboreta: The Case of the University of Tennessee*. Northeastern Regional Meeting of the American Association of Botanical Gardens and Arboreta, Inc., Kennett Square, PA

Downing, Mark and Roland Roberts. 1988. *Non-market Valuation of the University of Tennessee Arboretum*. Southern Agricultural Economics Association Annual Meeting, New Orleans, LA.

Professional Activities

Senior Technical Advisor for several Laboratory Directed Research and Development Projects and Applications at Oak Ridge National Laboratory

Member, Society of Automotive Engineers.

Technical Advisor to Tennessee Clean Cities organizations in Memphis, Nashville, and Knoxville.

Invited Member – Iowa State University Agronomy Endowment Review Committee, Iowa State University March 2005.

Adjunct Professor of Agricultural Economics, Department of Agricultural Economics and Rural Sociology. Institute of Agriculture, University of Tennessee, Knoxville, TN.

SAE Government/Industry Meeting 2004-2008. Facilitative Manager and Steering Committee Representative for DOE Office of Vehicle Technologies, Washington, DC.

2003. Senior Research Advisor to CSREES Utility Biomass Research Project with University of Tennessee Department of Agricultural Economics Staff.

Bioenergy Workshop, March 2002. Organization and Invited Facilitation with Cumberland Mountain Resource Conservation and Development Council, Oak Ridge, TN.

Distinguished Technical Art Award for Living Bioenergy Crop Display with Tom Walker, awarded by East Tennessee Chapter of the Society for Technical Communications April 2002.

Academic Judge for College of Agricultural Sciences and Natural Resources 2002-2005 Exhibition of Undergraduate Research and Creative Achievement, University of Tennessee, Knoxville.

Technical and Editorial Reviewer for
Biomass and Bioenergy
Journal of Environmental Economics and Management (JEEM) Journal of
Environmental Quality (JEQ)
Land Economics
Journal of Environmental and Resource Economics.

Invited Paper Session Chair 1993. *Issues of Benefits Transfer in Nonmarket Resource Valuation*. Annual Meeting of the American Economics Association, Orlando, FL.

Master's Thesis Committees and Advising

Rhonda Lindenbach-Gibson. M.S. University of Saskatchewan, An Economic Application of Agroforestry in Saskatchewan.

Walter L. Waters, M.S. University of Tennessee, Reservoir Fishing Benefits Across Tennessee Regions.

Laurianne E. Whinstanley, M.S. Agricultural Economics, University of Tennessee, Estimating the Demand for Reservoir Fishing in East Tennessee.