TIMOTHY J. CONSIDINE

The Pennsylvania State University
Energy and Mineral Engineering
125 Hosler Building
University Park, PA 16802

Phone: (814) 863-0810 ◆ Fax: (814) 865-3248 ◆ Email: cpw@psu.edu

EDUCATION

1977-1981	Ph.D., Natural Resource Economics, Cornell University, Ithaca, NY
1975-1977	M.S., Agricultural Economics, Purdue University, West Lafayette, IN
1971-1975	B.A., Economics (with honors), Loyola University, Chicago, IL

EXPERIENCE

Positions held:

2003-present	Professor of Natural Resource Economics, Energy and Mineral Engineering, The Pennsylvania State University, University Park, PA
1986-2003	Professor, Department of Energy, Environmental, & Mineral Economics, The Pennsylvania State University, University Park, PA
1983-1986	Economist, Economics & Policy, Bank of America, San Francisco, CA
1981-1983	Associate Analyst, Natural Resources and Commerce Division, U.S. Congressional Budget Office, Washington, DC

Visiting positions held:

2002	Visiting Fellow, Resources for the Future, Washington, DC
1994-1995	Visiting Professor, Department of Economics, American University, Washington, DC
1993-1994	Director and Professor, Australian Centre for Mineral and Energy Economics, University of Newcastle, Callaghan, New South Wales, Australia

RESEARCH AND TEACHING FIELDS

Research:	Energy economics, environmental economics, industrial organization, applied econometrics.
Teaching:	Undergraduate: Energy Economics and History & Economics of Oil Industry Graduate: Energy and Mineral Project Investment Evaluation.

HONORS AND AWARDS

American Statistical Association/Energy Information Administration Fellowship, 2003

Gilbert F. White Postdoctoral Fellowship, Resources for the Future, 2002

MICASU Faculty Fellowship, The Pennsylvania State University, 2000-2003

National Science Foundation/Lucent Industrial Ecology Fellowship, 1997

Department of Interior Young Scholar Award, 1991

Silbert Award for Best U.S. Economic Forecast, 1986

U.S. Congressional Budget Office Outstanding Service Award, 1983

Honorable Mention, Ph.D. Dissertation, American Association of Agricultural Economics, 1982

PUBLICATIONS AND PAPERS

Refereed journal articles:

"Peak oil in a carbon constrained world," *International Review of Environmental and Resource Economics* (forthcoming)

"The environment as a factor of production," *Journal of Environmental Economics and Management*, 52, 3, (2006), 645-662.

"Is the strategic petroleum reserve our ace in the hole?" *The Energy Journal*, 27, 3, (2006), 91-112.

"The value of hurricane forecasts to oil and gas producers in the Gulf of Mexico," *Journal of Applied Meteorology*, 43, 9, (2004), 328-336.

"Markup pricing in petroleum refining: A multiproduct framework," *International Journal of Industrial Organization* 19, 10 (2001), 1499-1526.

"Uncertainty and the convenience yield in crude oil price backwardations," with D.F. Larson, *Energy Economics* 23, 5 (2001), 533-548.

"Risk premiums on inventory assets: The case of crude oil and natural gas," with D. Larson, *Journal of Futures Markets* 21, 2 (2001), 109-126.

"Price and inventory dynamics in petroleum product markets," with Eunnyeong Heo, *Energy Economics* 22, 5 (2000), 527-548.

"The impacts of weather variations on energy demand and carbon emissions," *Resource and Energy Economics* 22, 4 (2000), 295-312.

"Cost structures for fossil fuel-fired electric power generation," *The Energy Journal* 21, 2 (2000), 83-104.

PUBLICATIONS AND PAPERS (cont.)

"Inventories under joint production: An empirical analysis of petroleum refining," *The Review of Economics and Statistics* 79, 3 (1997), 493-502.

"An empirical analysis of exposure-based regulation to abate toxic air pollution," with Marakovits, Donita M., *Journal of Environmental Economics and Management* 31, 2 (1996), 337-351.

"Technological change under residual risk regulation," *Environmental & Resource Economics* 3 (1993), 15-33.

"A short-run model of petroleum product supply," *The Energy Journal* 13, 2 (1992), 61-91.

"Economic and technological determinants of the material intensity of use," *Land Economics* 67, 1 (1991), 99-115.

"Symmetry constraints and variable returns to scale in logit models," *Journal of Business and Economic Statistics* 8, 3 (1990), 347-353.

"Estimating the demand for energy and natural resource inputs: Trade-offs in global properties," *Applied Economics* 21 (1989), 931-945.

"Separability, functional form, and regulatory policy in models of interfuel substitution," *Energy Economics* 11, 2 (1989), 82-94.

"Oil price volatility and U.S. macroeconomic performance," *Contemporary Policy Issues* VI, 3 (1988), 83-96.

"Interfuel substitution and cyclical volatility in U.S. natural gas markets," *The Journal of Energy and Development* 10, 1 (1985), 97-109.

"The use of linear logit models for dynamic input demand systems," with T.D. Mount, *The Review of Economics and Statistics* LXVI, 3 (1984), 434-443.

"A regional econometric analysis of energy prices and economic activity," with T.D. Mount, *Environment and Planning A* 15 (1983), 1027-1041.

Other refereed publications:

"The Transformation of the North American Steel Industry: Drivers, Prospects, and Vulnerabilities," *American Iron and Steel Institute*, www.steel.org, 54 pages, April 2005.

"Can Electricity Restructuring Survive? Lessons from California and Pennsylvania," in *Electric Choices: Deregulation and the Future of Electric Power*, Andrew Kleit, editor, The Independent Institute, 2007, with Andrew Kleit.

Retooling manufacturing: Bridging design, materials, and production, co-author, National Research Council, The National Academies Press, (2004).

PUBLICATIONS AND PAPERS (cont.)

"Climate change: Impact on the demand for energy," *Encyclopedia of Energy*, Cutler J. Cleveland, editor, Elsevier Science, (2004), 393-400.

"Industrial ecology: Challenges and opportunities for economics," in T. Tietenberg, and H. Folmer, editors, *International Yearbook of Environmental and Resource Economics*, (2002), 90-122.

Understanding natural gas price decontrol, Congressional Budget Office, January 1983, Chapters 2 & 4.

Natural gas wellhead pricing policies: Implications for the federal budget, Congressional Budget Office, April 1983, 1-53.

Other publications:

The U.S. Chemical Industry at Risk: Climate Change Legislation and Higher Natural Gas Prices, *Chemical Week*, August 2007.

"Systematic Bias in EIA Oil Price Forecasts: Concerns and Consequences." with F. Clemente *World Oil*, August 2007.

"Betting on Bad Numbers: How EIA Forecasts for Natural Gas Markets Contain Systematic Bias," with F. Clemente *Public Utilities Fortnightly*, forthcoming, July 2007.

Technologies to Reduce, Capture and Store Carbon Dioxide Emissions, National Coal Council, Report to the U.S. Secretary of Energy, forthcoming July 2007, Chapters 1 & 5.

Coal: The Energy Future, with Frank Clemente, et. al, National Coal Council Report to the U.S. Secretary of Energy, April 2006.

"Oil markets and the Strategic Petroleum Reserve," *Regulation*. The Cato Institute, May/June 2005, 18-25.

"A real options analysis of hydrogen research and development," conference paper, 15th *National Hydrogen Conference*, Hollywood, CA, April 2004.

"Understanding the world crude oil market," *Middle East Geopolitics*, Al Dosari International, February 2004, 7-33.

"Political economy of natural gas: Strategic implications for the Middle East," *Middle East Geopolitics*, Al Dosari International, February 2004, 61-88.

"Green economics*," Research Penn State,* Vol. 23, Issue 2, May 2002.

"Economies of scale and asset values in power production," *The Electricity Journal*, December 1999, 37-42.

"The costs and benefits of coke oven emission controls," *Environmental Policy Modeling* (Boston, MA: Kluwer Publishing), 1994, 103-122.

PUBLICATIONS AND PAPERS (cont.)

"Technical change, relative prices and intermaterial substitution," in *International Commodity Market Models*, Guvenen, O., W.C. Labys, and J.B. Lesourd, Chapman and Hall, London, (1991), 139-156.

"Recent trends in material consumption: The role of technology and economics," *Materials and Society*, Vol. 14, No. 2, 1990, 167-182.

"Energy demand models: Global properties and dynamic adjustments," John G. Rowse, ed., *World Energy Markets: Coping with Instability*, July 1987, 627-637.

"Lessons from the recent turmoil in energy markets," *Earth and Mineral Sciences*, Vol. 56, No. 4, Summer 1987, 60-64.

"Atrophy in metal demand?," *Materials and Society*, Vol. 10, No. 3, 1987, 529-538.

"Why is U.S. productivity growing so slowly?" *U.S. Economic Report*, World Information Services, Bank of America, July 1986, 2-5.

"Investment spending: A new era?" *U.S. Economic Report*, World Information Services, Bank of America, June 1985, 2-4.

"Federal budget deficits: Economic impacts and alternative solutions," *California Corporate Report*, Bank of America, Winter 1985, 1-5.

"Energy pricing, employment and economic growth: An econometric analysis of the New York state economy," *A. E. Research 84*, no. 13, Cornell University, July 1984, 1-29.

"An econometric analysis of the effects of a fuel shortfall on state level economic activity," in *A guidebook for analysis of state level economic impacts of an energy shortfall*, Forrest Gunnison, ed., Argonne National Laboratory, ANL/CNSV-TM-70, 1981, 36-62.

"Planning models for the assessment of utility applications of solar electric technologies," Chapter 4, in *Economic assessment of grid-connected solar electric technologies: A review of methods*, S.E.R.I., November 1979, 55-89.

Book reviews:

"The Economics of Industrial Ecology," edited by Jeroen van den Bergh and Marco A. Janssen, *The Journal of Industrial Ecology*, (forthcoming).

"Economic Growth, Material Flows And the Environment," by Rutger Hoekstra, *The Journal of Industrial Ecology*, (forthcoming).

"Demand, prices and the refining industry," by Robert Bacon, et al., *The Energy Journal*, December 1990.

PUBLICATIONS AND PAPERS (cont.)

"Money to burn? The high costs of energy subsidies," by Mark Kosmo, *Journal of Energy and Development*, Autumn 1988.

"The econometrics of energy demand: a survey of applications," by William A. Donnelly, *The Energy Journal*, January 1988.

"Consumer durable choice and the demand for electricity," by Jeffrey A. Dubin, *The Energy Journal*, January 1988.

Reports to project sponsors:

Considine, T.J. R. Entler, and F. Clemente, "The Economic Impacts of Fortuna Energy, Inc." December 2006.

"The value of hurricane forecast information to energy producers in the Gulf of Mexico," with C. Jablonowski, B. Posner, and C. Bishop, Final report to National Science Foundation, ATM-9908963, January 2003.

"Comparing electricity deregulation in California and Pennsylvania: Implications for the Appalachian Region," with A. Kleit, Appalachian Regional Commission, ARC contract number CO-12884, February 2002.

"The environment and new technology adoption in the U.S. steel industry," with C. Jablonowski, and D. Considine, final report to National Science Foundation and Lucent Technologies, BES-9727296, May 2001.

"The industrial ecology of particulate materials, with Frank J. DeNapoli M. Lanagan, H. Lewis, M. Silsbee, B. Scheetz E. Snyder, final report to National Science Foundation, MUSE-0223958, November 2004.

Working papers and manuscripts:

"Evaluating Forecasts of Natural Gas Markets: Implications for Modeling and Policy Analysis," June 2007.

"New technology Assessment and Material Flows: A Case Study of Steel production," February 2008.

Clemente, Frank, and T. Considine, "Coal: China's Energy Imperative," September 2006.

Clemente, Frank, and T. Considine, "Out of Poverty: The Role of Coal in Economic Development."

T. Considine, "Arizona's Energy Future: The Economic Impacts of Alternative Renewable Energy Paths."

T. Considine, D. Larson, and M. Hassan "The Role of Carbon Regulation in Inter-fuel substitution in the European Electricity Industry."

FUNDED RESEARCH

"Moving to Sustainability: Improving and Valuing Materials Flow of the Metal Casting Industry," *National Science Foundation*, co-principal investigator with principal investigator F. Cannon and co-principals, Frank Clemente, Robert C. Voigt, Sridhar Komarneni, August 2005 – September 2009, $1,247,250.

"Nanotechnology and its Publics" *National Science Foundation*, co-principal investigator with principal investigator R. Geiger and co-principal P. Hallacher, July 15, 2004-June 30, 2005, $199,887

"Future Fill," *Rustwell LLC* co-principal investigator with B. Scheetz , & Civil & Environmental Engineering, January 2004-December 2004, $75,000.

"Multilevel cycles, models, and scenarios for the iron-alloying elements," *National Science Foundation*, Materials Use, Science, Engineering, and Society (MUSES), co-principal investigator with T. Graedel, principal investigator R. Lefset (co-pi), R. Gordon (co-pi) (Yale University), September 2003 to September 2007, $177,945 (Penn State share).

"An empirical analysis of markets for tradable pollution permits," *The World Bank,* September 2002 to October 2003, $30,000.

"The industrial ecology of particulate materials," *National Science Foundation*, Materials Use, Science, Engineering, and Society (MUSES), principal investigator with co-principals M. Silsbee, F. DeNapoli, M. Lanagan, H. Lewis, B. Scheetz, and E. Snyder (The Pennsylvania State University), August 2002 to August 2004, $110,000.

"Empirical models of SO_2 permit banking," *The World Bank*, March 2001 to September 2001, $20,000.

"The impacts of electricity deregulation on the Appalachian region," co-principal investigator with A. Kleit, *Appalachian Regional Commission*, June 2000 to May 2001, $89,000.

"The efficiency gains from probabilistic weather forecasts: A case study of oil and gas producers in the Gulf of Mexico," co-principal investigator with C. Bishop, Office of Atmospheric Research, *National Science Foundation*, April 2000 to October 2001, $118,000.

"Regional energy demand forecasting," principal investigator, *AIG Trading*, June to October 1997, $25,000.

"Uncertainty and the price of crude oil reserves," principal investigator, *The World Bank*, July 1994 to July 1995, $30,000.

"Technology and environmental impacts of steel production in China," principal investigator, *Department of Foreign Affairs and Trade, Australia*, June 1994 to June 1995, $20,000.

FUNDED RESEARCH (cont.)

"Modeling short-run energy markets," principal investigator, *Energy Information Administration* (*EIA*), September 1994 to August 1995, $25,000.

"A monthly model of natural gas markets for EIA's short term integrated forecasting system," principal investigator, *EIA*, January to October 1993, $30,000.

"Regional gasoline demand models for EIA's short term integrated forecasting system," principal investigator, *EIA*, March to August 1993, $30,000.

"Clean air proposals and steel markets: An integrated analysis," principal investigator, Department of the Interior, June 1990 to June 1992, $15,000.

"Price and inventory behavior in refined petroleum product markets," principal investigator, Energy Information Administration, January to December 1991, $20,000.

"The supply and demand for steel in the United States," principal investigator, Mining and Mineral Research Institute, June 1989 to October 1989, $50,000.

"Production technology and dynamic adjustments in the demand for inputs," principal investigator, Faculty Research Fund, July 1986 to July 1987, $2,000.

OTHER RESEARCH SUPPORT

American Iron and Steel Institute, Applied economic research.

Peabody Energy, Political economy of world energy markets and economic impacts of coal energy conversion.

Fortuna Energy, Inc., Economic impacts of natural gas development in the Trenton Black River Formation

CONSULTING

The Communications Institute — Forecasting Arizona Energy Sector

Peabody Energy — Local economic impacts of carbon regulation

The World Bank — economics of carbon permit & offset trading

Eco Energy Ltd.— energy demand forecasting for Israel.

Federal Energy Regulatory Commission — electricity pricing issues.

ICF Consulting/U.S. Department of Energy — strategic petroleum reserve.

McKinsey & Company — steel market analysis.

Pennsylvania Propane Association — market outlook.

CONSULTING (cont.)

Pennsylvania Attorney General — gasoline pricing and electricity mergers.

Freehill, Hollingdale, & Page — merger analysis & contract issues.

U.S. Department of Energy — model review.

Bechtel Corporation — new technology adoption in metals industries.

Australian Industry Commission — advanced materials.

Normandy Poseidon — gold mine feasibility study.

INVITED WORKSHOPS

"Evaluating Forecasts of Natural Gas Markets: Implications for Modeling and Policy Analysis," International Energy Workshop, Stanford University, June 2007.

"Annual steel advisory meeting," Yale University, New Haven. CT, March 2004 & March 2005.

"Environmentally benign manufacturing," National Science Foundation, Birmingham, AL, January 2003.

"The economic value of improved weather and climate information," National Aeronautical and Space Administration, Space Policy Institute, The George Washington University, March 2002.

"Reinventing the use of materials," National Science Foundation, Princeton University, February 2002.

"Industrial transformation," International Human Dimensions Programme, Boston University, October 1998.

PROFESSIONAL SERVICE AND APPOINTMENTS

Review Panel, National Science Foundation, Electric Power Networks Efficiency and Security Review Panel, April 2003

National Research Council, National Academies, Panel on bridging design and manufacturing, 2002 to 2004.

Science Advisory Board, U.S. Environmental Protection Agency, March 2001.

Green Engineering Theme Committee, *Environmental Consortium*, The Pennsylvania State University, September 2000.

Associate Editor, *Energy Economics*, September 2000.

PROFESSIONAL SERVICE AND APPOINTMENTS (cont.)

National Science Foundation & Environmental Protection Agency, Technology for a Sustainable Environment Review Panel, December 1999.

Chair, Independent Review Panel, Life-Cycle Stressor Effects Assessment Framework, Steel Recycling Institute, January 1999.

PRESENTATIONS

"Evaluating Forecasts of Natural Gas Markets: Implications for Estimating the Impacts of Carbon Regulation," U.S. Senate Committee on Public Works, Washington DC, November 2007.

"The economics of peak oil," invited, Department of Industrial and Manufacturing Engineering, Penn State University, February 2006.

"The transformation of the North American steel industry," invited, Capitol Hill Club, Washington, DC, April 2005.

"The environment as a factor of production," invited, Natural Resource and Environmental Economics Workshop, Boulder, Colorado, July 2003.

"Economic analysis of pollution permit trading," invited, Department of Economics and Business, Colorado School of Mines, April 2003.

"Economic and environmental metrics in new technology assessment," invited, Department of Economics, Georgia Institute of Technology, April 2003.

"Economic models of material flows," invited, Yale University Workshop on Iron Alloys, February 2003.

"Industrial ecology: Implications for environmental economics," invited, Portland State University, January 2003.

"The economics of industrial ecology," Millennium lecture series, U.S. Environmental Protection Agency, Washington, DC, November 2002.

"The value of hurricane forecast information to energy producers in the Gulf of Mexico," Resources for the Future, Washington, DC, October 2002.

"The environment as a factor of production," Electricity Working Group, U.S. Energy Information Administration, Washington, DC, October 2002.

"The value of climate information to the energy sector," Space Policy Institute, The George Washington University, Washington, DC, March 2002.

"Inventories and market power in the world crude oil market," International Society of Inventory Research, Atlanta, GA, January 2002.

PRESENTATIONS (cont.)

"Industrial ecology of steel," invited presentation, Helsinki Symposium on Material Flows and Industrial Ecology, Helsinki, Finland, August 2000.

"Integrating life cycle assessment and economic analysis," invited presentation, Bell Labs, Murray Hill, NJ, February 2000.

"Markup pricing in petroleum refining," invited presentation, Society for Inventory Research, AAAS, Boston, MA, January 2000.

"The economics of propane," invited, PA Propane Association, July 1998.

"The firm and the environment," invited lecturer, two day workshop on environmental issues, University of Chile, Santiago, Chile, November 1998.

"Suboptimal capital in electric power generation," invited, Advanced Workshop in Regulation and Competition, Network Industries in Transition, Vergennes, Vermont, May 1998.

"A monthly econometric analysis of natural gas markets," International Symposium on Economic Modeling," Washington DC, June 1994.

"Environmental issues in regional steel production and trade," Minerals and Energy Forum, Pacific Economic Cooperation Council, Beijing, China, March 1994.

"Curriculum development in mineral and energy economics," The University of New England, Department of Agricultural and Resource Economics, New South Wales, Australia, September 1993.

"Technological change under residual risk regulation," Operations Research Society of America, Orlando, Florida, April 1992.

"Regulatory policy issues on coke oven emissions," Mineral Economics and Management Society, Washington, DC, March 1992.

"A monthly econometric model of U.S. petroleum product markets," Symposium on Forecasting Short-Run Energy Markets, Energy Information Administration, Washington, DC, November 1991.

"An econometric model of the petroleum refining industry," Economic Modeling Symposium, University of London, United Kingdom, July 1991.

"Inventories, marginal cost, and competition in refined petroleum product markets," The Econometric Society, Washington, DC, December 1990.

"Symmetry constraints and variable returns to scale in logit models," American Association of Agricultural Economists, Vancouver, British Columbia, August 1990.

"Price and inventory behavior in refined petroleum product markets," International Association of Energy Economists, Denmark, June 1990.

PRESENTATIONS (cont.)

"Markets for recycled plastics: Lessons from secondary metals industries," Workshop on Natural Resource Market Mechanisms, Association of Environmental and Resource Economists, Madison, Wisconsin, June 1990.

"Economic and technological determinants of the material intensity of use," Eastern Economic Association, Cincinnati, Ohio, March 1990.

"Energy demand models: global properties and dynamic adjustments," International Association of Energy Economists, Calgary, Alberta, July 1987.

"Oil price volatility and U.S. macroeconomic performance," Western Economic Association, Vancouver, British Columbia, July 1987.

"The macroeconomics of natural gas deregulation," International Association of Energy Economists, Denver, Colorado, November 1982.

RECENT PRESS INTERVIEWS

*The Communications Institute, "*Energy, the Environment, and the Economy," June 2007 (video interview for web posting).

Associated Press, "AK Steel Lock-Out & the World Steel Industry," Cincinnati Bureau, September 28, 2006.

Canadian Broadcasting System, "Super-Cycles in Metals Prices," The Morning Program, September 13, 2006.

New York Times, "Mining Boom Stirs Wave of Mergers and Talk of a Slump," World Business Section, August 29, 2006.

Bloomberg, "Outlook for oil prices," August 7, 2006.

Christian Science Monitor, "Impacts of Alaskan Oil Shortfall," August 5, 2006.

Toledo Blade, "Pipeline planners assure gas users prices would fall," March 17, 2006.

Bloomberg Radio, "Interview about the Alaskan Natural Gas Pipeline Project," February 23, 2006.

Investor's Business Daily, "Steel Business Toughens Up: Industry Thriving, but it's preparing for downturn, foreign competition," February 6, 2006.

Research Penn State, "The price of power: Can hydrogen stack up to the competition?" Fall 2005.

Christian Science Monitor, "Katrina and energy prices," August 31, 2005

The Calgary Herald, "Adviser urges sale of strategic reserve: Early advocate of stockpile doubts efficacy," August 27, 2005.

RECENT PRESS INTERVIEWS (cont.)

The Philadelphia Inquirer, "Paying through the hose," August 18, 2005.

Pittsburg Tribune Review, "Steel industry's future bright," June 30, 2005.

The Associated Press, "Consolidation of the steel industry," June 29, 2005.

The Blade, "Environmentalists are wary of proposed steel coking plant near Toledo, Ohio," February 27, 2004.

Slate Magazine, "Why not import more Non-OPEC oil," September 26, 2003.