

BOOK REVIEWS

Petroleum Economics: Issues and Strategies of Oil and Natural Gas Production by RÖGNVALDUR HANNESSON. (Westport, CT: Quorum Books, 1998), 163 pages. ISBN 1-56720-220-9.

This is a short book of high quality. Rögnvaldur Hannesson prepared it from a course in petroleum economics he has given for several years at the Norwegian School of Economics and Business Administration. Chapter 1 reviews the vital role of oil in industrial countries. Hannesson rightly states "Oil in modern society is like blood in the human body. Without it modern society as we know it would cease to exist." Chapter 2 discusses world markets for oil, natural gas, and coal. Here Hannesson analyses substitution among fossil fuels induced by changes in their relative prices. He reviews world trade in oil and gas, and the heavy dependence of the United States, Western Europe, and Pacific Asia on imported oil. Of course the Middle East is the largest oil exporting region, followed by Africa and the Former Soviet Union. The international market for natural gas is much smaller than that for oil, and Hannesson explains why. He also reviews the geographic distribution of oil and gas reserves and production. In 1996, the Middle Eastern countries held 65% of the world's oil reserves, North America (including Mexico) 8.3%, South and Central America, 7.6%, and Western Europe a scant 2.0%.

Chapter 3 focuses on natural gas. Hannesson clearly spells out the costs of transporting natural gas by pipeline and in liquified form over varying distances. Average and marginal costs increase linearly with increasing distance.

How do unit costs vary with different volumes shipped a given distance? Most of the cost of transporting gas by pipeline is fixed capital cost. In the United States, for example, fixed costs of acquiring land and laying the pipeline account for more than 90% of total transportation costs. The consequence is straightforward: Declining average fixed cost combines with decreasing average variable cost of larger volumes to create a natural monopoly in gas transmission. These cost conditions create an opportunity for transmission companies to charge their customers a two-part tariff: The first fee is the customers' payment to use the pipeline (an access fee); the second is payment for shipping costs.

As a regulated monopoly, a pipeline company sold a "bundle" of services to its customers: transportation, storage, and the gas itself. However, as gas markets have become deregulated in the United States and United Kingdom, pipeline companies were required to unbundle these services to make clear what costs are due to transportation, storage, and the gas itself. Hannesson discusses in clear English and then in simple linear models how unbundling has been achieved and how it works.

Chapter 4 is devoted to oil production. Here Hannesson sets forth the physical principles that cause a given reservoir's oil production rate to decline. He includes a lucid explanation of general hyperbolic decline curves, and their special cases: harmonic and exponential decline. He briefly touches on the effects of rock permeability, oil viscosity, and declining reservoir pressure on the oil production rate. Hannesson also analyses the common property problem when oil in a given reservoir can be produced from wells located on different people's land. If land ownership above an oil reservoir is fragmented, each landowner has an incentive to drill fast and produce hard. This practice of "stealing your neighbors' oil before he steals yours" is wasteful, because it prevents maximum recovery of oil originally in place.

Chapter 5 discusses Hotelling's model of production and price for an exhaustible resource, but with far gentler math than in Hotelling's original work. Hannesson rigorously derives the familiar Hotelling rule (with no new discoveries): the price of the exhaustible resource will rise over time according to the real rate of interest. He then carefully explains the reasons why this elegant theoretical result is seldom found in real world markets.

Chapter 6 centers on ways used by governments to tax oil (gas) production: license fees whose values can be determined by competitive bidding; royalties; and taxes on private firms' profits from production. His case study of Norwegian petroleum taxes is a model of clear writing. Chapter 7 is a crystal clear essay on proper management of a petroleum fund designed to benefit a region's inhabitants. Proper management boils down to creating inter-generational equity. Oil and gas produced today cannot be produced in the future. So how can the rents obtained from producing these depletable resources today be invested in physical capital and education that will benefit future generations as well as today's? Hannesson explains how, using as an example the Alaska Permanent Fund.

Rögnvaldur Hannesson has written a first-class book for economics and business students. He covers a wide range of important topics. His writing is admirably succinct. And because of succinctness, the book is short. The next time I teach an energy economics course, Hannesson's *Petroleum Economics* will be the main text.

John R. Moroney
Texas A&M University

Designing Competitive Electricity Markets edited by HUNG-PO CHAO AND HILLARD HUNTINGTON. (Boston: Kluwer Academic Publishers, 1998), 224 pages. ISBN 0-7923-8282-X.

This volume of papers, originally presented at Stanford in March 1997 in a conference sponsored by the Electric Power Research Institute, examines

several questions about the restructuring and deregulation of electricity markets. Its stated goal is to present guiding principles for evaluating proposals to restructure the U.S. electric power industry. While a collection of essays is perhaps not the best place to lay out guiding principles, the volume does contain a great deal of learning about restructuring.

The first essay is a reprint of Paul Joskow's excellent article in the *Journal of Economic Perspectives*. Most readers of *The Energy Journal* will be familiar with Joskow's views, which I will not repeat here. I will, however, take the opportunity to make some comments. Joskow's basic concern, which dates at least from his classic book with Richard Schmalensee (1983), is that restructuring threatens to take away the efficiencies generated by horizontal and vertical integration. In particular, the rules by which Independent System Operators (ISOs) are to be governed remain hazy, and regulators have little direction on how to oversee these newly formed creatures.

Joskow's concerns are well founded. Yet I found myself with two thoughts: First, can we learn anything from the experience in the several countries where restructuring has already taken place? Obviously, the power generation grids "work" in those countries, though to what degree of efficiency is unclear. Second, would it be possible for system operators to be owned by distribution companies, with such companies divested completely out of the generation business? This would seem to create the best of both possible worlds. Joskow hints at an answer to these questions when he notes that in the U.S. certain solutions are difficult because restructuring deals with private firms that have (implicitly) political power, rather than the government-owned corporations in other countries. Unfortunately, this is not quite an economic answer.

An essay by William Hogan on the debate between zonal and locational pricing is next. Like all such discussions, the text gets very complicated very fast. One longs for the day when such issues can be explained cogently to the average regulator (and perhaps below-average book reviewer). Hogan, however, makes two interesting points that may add to the debate.

First, in crunch time zonal pricing may become locational pricing. Hogan tells the story of what occurred in the Pennsylvania-New Jersey-Maryland (PJM) grid in June 1997. When the system became constrained under zonal pricing, the predicted inefficiencies occurred. To alleviate the problem, the ISO operator had to quickly change the rules of the transmission grid to locational pricing. Thus, if zonal pricing will collapse into locational pricing during periods of difficulty, why have zonal pricing at all?

Second, Hogan, I suggest correctly, asserts that zonal pricing would actually generate more market power problems than locational pricing. I believe the key intuition on this point, which Hogan does not state clearly, is that locations will compete against each other for customers. By wrapping several locations in a zone, zonal pricing will serve to reduce that competition.

In a short note, Paul Kleindorfer lists the various governance schemes which other countries that have restructured have used to govern system operation, access to the market for power, and transmission ownership and pricing. This, of course, creates a whole series of questions. Which governance programs work best? And how do we define the word "best" in this context?

One difficulty with the book, as well as the debate in the U.S., is that it fails to draw adequately upon the international experience. Unlike airline deregulation, Americans are not the leaders in the game of electricity restructuring. The advantage of this is we can draw upon the experience in many other countries. Regrettably, with the exception of some research conducted on the market in England and Wales, we have not done so.

In his chapter, Shmuel Oren lays out the potential areas over which an ISO could have authority. In the end, what authority to give to the ISO depends on one's confidence in market forces versus one's confidence in centralized authority. Oren does suggest that an important trade-off exists between long-run efficiency (represented by a minimal ISO) and short-run efficiency (generated by a maximal ISO). This may have particular importance in a world where regulators have short-run political interests. The political imperative would seem to imply a maximal ISO, and a degradation of long-run investment in exchange for short-run lower prices.

Unfortunately, there will be more than one price in a fully restructured market. Robert Wilson's short essay lays out the problems caused by other prices. In particular, Wilson focuses on the market for reliability. To ensure that the supply of electric power remains stable, firms will have to be compensated. As Wilson points out, devising that compensation scheme is not simple, and may conflict with the desire to keep power prices as low as possible. Put another way, we do not know (at least yet) what the demand for reliability is. Given this, it is difficult to give instructions to a system operator on how much reliability to purchase.

The chapter by Stephen Rassenti and Vernon Smith is both intriguing and disappointing. It starts by asserting that bilateral trading should never be allowed, implying that a mandatory pool should be established. The rationale for this position (hidden at the end of the chapter) is that pool trading creates a positive information externality. Given this, however, one wonders why bilateral trading should be allowed in other markets, say the markets for flour or Microsoft stock. Rassenti and Smith also present interesting ideas on the ownership of transmission lines (through a jointly owned network) and bidding strategies (by requiring demanders to bid as well as suppliers). Unfortunately, these ideas are not fleshed out.

The second part of the Rassenti and Smith essay reviews the experimental literature on electricity markets. Such learning can be very important in designing markets. Unfortunately, there is no adequate summary

of the literature. Given this, it is difficult to know what to take away from the reading. Overall, far too much is crammed into this chapter.

A reduction in regulation may increase the incentives for technological innovation. Martin Baughman suggests a number of ways by which costs of transmitting and storing electricity may be reduced. Perhaps unfortunately, there is now reduced funding from the historical sources of research grants in this area. Baughman suggests that electricity and gas producers be required to contribute to a fund that will generate research and development. One wonders, however, why this should be the only industry in the economy where firms are required to make such a commitment, and what would be the incentives for the body that received these funds. Perhaps what may be more important would be to create a regulatory system that generates profits for successful innovation.

Robert Wilson returns to the volume with a chapter on institutional design. In it, he lays out the pros and cons of, for example, bilateral trading versus a mandatory pool. This is a well-written chapter of various alternatives regulators have in restructuring. What again would perhaps be helpful would be a presentation of some method of determining which system is "best."

To end the volume, Hung-Po Chao and Stephen Peck present an extension of their earlier work in the *Journal of Regulatory Economics* showing how markets for transmission rights would work in a transmission grid of three points. The presentation is clear, and convinces at least this reader that a market system in transmission involving three nodes is feasible. Unfortunately, the number of paths grows quickly with the number of nodes. Thus, three nodes imply three paths, but eight nodes imply 28 paths. (The relevant formula is $N(N-1)/2$, where N is the number of nodes.) It might be interesting to apply this model to a real, but relatively simple transmission grid, say in New Zealand or Chile, before tackling this problem in the U.S.

Together, the book says a great deal about the economic issues surrounding restructuring. While the book promises to be accessible, regrettably much of it is not. But perhaps this is inevitable. Fifteen years ago game theory was accessible only to high theorists. Today, as the rash of game theory textbooks makes evident, game theory can be taught to undergraduates. While today's work on deregulated electricity markets is not terribly clear, it is still a young field. Let us hope that in fifteen years it will have evolved in the same way the presentation of game theory has.

Andrew N. Kleit

Department of Energy, Environmental, and Mineral Economics
The Pennsylvania State University

Reference

Joskow, Paul L. and Richard Schmalensee (1983). *Markets for Power: An Analysis of Electric Utility Deregulation*. Cambridge: Massachusetts Institute of Technology Press.

Managing the Oil Wealth: OPEC's Windfalls and Pitfalls by JAHANGIR AMUZEGAR (London: I. B. Tauris & Co Ltd.; New York: St. Martin's, 1999), 266 pages. ISBN 1 86064 292 6.

This book is literally and figuratively the epitome of the vast literature on the ramifications of energy economics. In particular, Amuzegar, modestly termed on the dust jacket as a distinguished economist, surveys the work on the consequences of oil windfalls on the OPEC countries. As his bibliography shows, the author seeks to recapitulate numerous studies of the impacts of oil revenues on the OPEC countries. Several studies each exist on most OPEC members.

This literature, in fact, is part of an even broader one that treats all the issues related to world oil. Numerous books deal with the politics. These include works assessing the implications for the rest of the world,¹ others simply examining the countries,² and still others exploring various issues.³

Amuzegar tries first to render the essence of OPEC in a short space. He starts with an effort simply to characterize the objectives of OPEC. This concludes with a list of the alleged OPEC-wide goals for sustainable development and national security. Many complaints can be directed at this vision. The fatal one is that the rest of the book makes clear that the countries showed little signs of coherent decision making. One does not have to be as libertarian as I am to recognize that what is implicitly being covered by Amuzegar is yet another example of the failure of central planning. (His silence on this point is yet more evidence that economists are too shy about expressing their inherent distrust of central planning. Writers less concerned than Amuzegar about the defects of planning are aware that a nod to Hayek is appropriate).

He next presents (and does not really use) a short "Framework of Analysis." This proves a melange of assorted observations of wildly variable validity. His discussion of revenues begins with the howler that the allocation of revenues to governments depends on land ownership, as if he had never heard of severance taxes. He does recognize that real governments fall short of the idealizations raised in favor of redistributive policies. His third chapter is an even more superficial and unsatisfactory review of the history of OPEC. The

1. Such studies continue to emerge. The Oxford Institute for Energy Studies has a continuing series that has already covered Venezuela, Nigeria, Indonesia, and Libya.

2. For example, Geoffrey Kemp and Robert E. Harkavy, *Strategic Geography and the Changing Middle East*. Washington: Carnegie Endowment for International Peace with The Brookings Institution. They deal with the nonoil security issues, the prospects in the former Soviet states, and Middle East oil problems.

3. For example, Naji Abi-Aad and Michel Grenon, *Instability and Conflict in the Middle East, People Petroleum and Security Threats*. London: Macmillan and New York: St. Martin's. Each chapter treats a separate problem arising in the region.

For example, The Emirates Center for Strategic Studies and Research's 1999 anthology *Privatization and Deregulation in the Gulf Energy Sector*.

treatment repeats standard questionable slogans and, like the rest of the book, lacks any economic framework.

Then (p. 48), Amuzegar starts the heart of his study. The remainder of the book examines the use of oil revenues. In chapter IV, he presents a synopsis of the policy climate in each of the thirteen OPEC countries treated. The group includes the countries that exited OPEC. Then chapter V gives surveys of economic performance in each of these countries. The combined treatments are thus less than ten pages per country. Chapter VI presents comparisons of country performance in eight areas from "physical and social infrastructure" to care of the environment. The next chapter examines performance in additional realms. Then a summary is provided. By the time he is done, Amuzegar has recognized that the high hopes that he approvingly discussed in early chapters were not realized. Everything critics of the world oil price rises warned about came true. The countries frittered away their incomes.

Clearly, this is a great deal to pack into the space, and it shows. What is provided is evidence country by country and then criterion by criterion, that the ambitious ambitions were not attained. Ironically, he leads his last chapter, the summary, with the assertion "No outcome in the annals of this century's economic forecasts humiliated (even if it did not humble) renowned soothsayers so much as OPEC's fate." This is doubly wrong. The failures to recognize the depth of the Great Depression and the persistent expectations of a repetition after World War II surely far exceed the supposedly universal fears of OPEC. Second, "orthodox" economists, particularly Adelman whom Amuzegar lists in the bibliography but not in the index, saw OPEC as a cartel prone to the weaknesses of all cartels. Adelman also made the patent weaknesses of the OPEC country governments the center of his normative criticisms of the income transfers produced by higher oil prices. Amuzegar goes on to list the failures as stressing domestic opportunities, haste, overstress of industrialization, lack of policy coordination, excessive military expenditure, and overoptimism.

As already suggested, this is a topic that is decidedly secondary to energy economics. Ultimately, the story, at best, is more journalism than economics. My prior comments imply that Amuzegar has failed to overcome the intrinsic drawbacks of venturing into the topic. Indeed, by not adopting a rigorous economic framework, he has made the presentation even weaker. However, on balance, his deliberate superficiality is the book's most attractive feature. He provides a quick overview and an extensive bibliography. This then is a book for those who want a quick introduction to the efforts and can overlook the defective analysis.

Richard L. Gordon
The Pennsylvania State University

REFEREE ACKNOWLEDGMENTS

All papers received and published by *The Energy Journal* are regularly sent to international referees for anonymous peer review. Without the help of hundreds of expert reviewers, the quality and standards of this journal could not be maintained. Below is a list of referees who have volunteered their time and talents to appraise submissions during 1998-99. The editors sincerely thank all referees for their efforts.

Eric Ackerman	Edison Electric Institute
François Ailleret	Electricité de France
Knut H. Alfsen	CICERO, University of Oslo
A.F. Alhajji	University of Oklahoma
Kym Anderson	University of Adelaide
Werner Antweiler	University of British Columbia
Oscar Arnedillo	National Economic Research Associates Inc
Ross Baldick	The University of Texas at Austin
Andrea Baranzini	International Academy of the Environment
Terry Barker	University of Cambridge
Robert Bartels	University of Sydney, Australia
Martin L. Baughman	The University of Texas at Austin
William J. Baumol	New York University, CV Starr Center
Barry Bayus	Kenan-Flagler Business School, University of North Carolina
Micheal Beenstock	The Hebrew University of Jerusalem
Bruce L. Benson	Florida State University
Douglas Berg	Sam Houston State University
Sanford V. Berg	PURC, University of Florida
Ernst Berndt	Massachusetts Institute of Technology
Paul Bernstein	Charles River Associates
Geoffrey Bertram	Victoria University of Wellington
Peter D. Blair	Sigma Xi Scientific Research Society
Douglas Bohi	Resources for the Future
Glenn Booth	National Energy Board, Canada
Friedel Bolle	Europa Universität Viadrina
Alain Bousquet	University of Toulouse
James Boyd	Resources for the Future
Marilyn A. Brown	Oak Ridge National Laboratory
Stephen Brown	Federal Reserve Bank of Dallas
Clark Bullard	University of Illinois
Philip Burns	London Economics
Dallas Burtraw	Resources for the Future
James Bushnell	University of California Energy Institute
Robert D. Cairns	McGill University
Yannis D. Caloghirou	National Technical University of Athens

Jeffrey L. Callen	New York University
Ray Canterbury	Florida State University
Timothy Cason	University of Southern California
Guido Cervigni	Universita Commerciale L. Bocconi
Ujjayant Chakravorty	University of Hawaii at Manoa
Hing Lin Chan	Hong Kong Baptist University
Hung-Po Chao	Electric Power Research Institute
Benjamin Cheng	Southern University, Baton Rouge
Janie Chermak	University of New Mexico
Jean-Marie Chevalier	University of Paris IX-Dauphine
Rosemary Clarke	University of Birmingham
Cutler Cleveland	Boston University
John Cochener	Gas Research Institute
Timothy Collett	U.S. Geological Survey
Roger Colton	Fisher, Sheehan and Colton
George Combs	UX Consulting Company
Klaus Conrad	University of Mannheim
Ignacio Contin	Universidad Publica de Navarra
Chris Cooper	Rand Afrikaans University
William Cooper	University of Texas at Austin
Kenneth Costello	National Regulatory Research Institute
Simon Cowan	Worcester College, Oxford
Thomas Cowing	State University of New York at Binghamton
John Creedy	University of Melbourne
Carol Dahl	Colorado School of Mines
Joyce Dargay	Transport Studies, University of Oxford
Joel Darmstadter	Resources for the Future
Gopal Das Varma	Fuqua School of Business, Duke University
Jesse David	National Economic Research Associates
Richard Deaves	McMaster University
Arthur De Vany	University of California, Irvine
Cees Diks	University of Amsterdam
David E. Dismukes	Louisiana State University
Antony W. Dnes	Business School, University of Hertfordshire
David Dorenfeld	Exxon Ventures (CIS)
Khosrow Doroodian	Ohio University
Joseph A. Doucet	Laval University, Quebec
Malcolm Dowling	University of Melbourne
Max Duckworth	Constellation Power Source
Joseph Dukert	Energy Consultant, Bethesda
Joy Dunkerley	Congress Office of Technology Assessment
Per Ove Eikeland	Fridtjof Nansen Institute
Denny Ellerman	Massachusetts Institute of Technology
Walter Enders	Iowa State University
Molly Espey	University of Nevada
Joseph Eto	Lawrence Berkeley Laboratory

Marie N. Fagan	Cambridge Energy Research Associates
Samuel Fankhauser	The World Bank
Scott Farrow	Carnegie Mellon University
Frank Felder	The Economics Resource Group Inc
Henk Folmer	Landbouwniversiteit Wageningen
Michelle Foss	University of Houston
Roger Fouquet	Imperial College of Science Technology & Medicine
Mark French	Board of Governors of the Federal Reserve
Caroline Freund	Board of Governors of the Federal Reserve
Peter Fusaro	Global Change Associates
Landis Gabel	INSEAD, France
Rossana Galli	Universita della Svizzera Italiana
Paul Gardner	Garrad Hassan and Partners Ltd
James E. Garen	University of Kentucky
Andrew Garrad	Garrad Hassan and Partners Ltd
Dermot Gately	New York University
Tor Ragnar Gerholm	Stockholm University
Joseph Gilling	The World Bank, Energy Unit
Heinz Glueck	Oesterreichische National Bank
Victor P. Goldberg	Columbia University Law School
Rolf Golombek	SNF, Oslo, Norway
Constantine Gonatas	ENRON, Houston
Quentin Grafton	University of Ottawa, University of Otago
Robert Graniere	National Regulatory Research Institute
Richard Green	University of Cambridge
David L. Greene	Oak Ridge National Laboratory
James Griffin	Texas A&M University
Willem J.H. Groenendaal	Tilburg University, The Netherlands
Shawna Grosskopf	Southern Illinois University
S. Gurcan Gülen	University of Houston-Downtown
Harsh K. Gupta	National Geophysical Research Institute, India
Reinhard Haas	Technical University of Vienna
Douglas Hale	Energy Information Administration, U.S. DOE
Darwin Hall	California State University
Stephen Hall	London School of Business
Viv B. Hall	Victoria University of Wellington
James Hamilton	University of California, San Diego
Geoff P. Hammond	University of Bath
Philip Hanser	The Brattle Group
Winston Harrington	Resources for the Future
Glenn Harrison	University of South Carolina
Raymond Hartman	Cambridge Economics, Inc.
Jonathan Haughton	Suffolk University and Beacon Hill Institute
Torlief Haugland	ECON center for economic analysis
Andrew Haugwout	Woodrow Wilson School, Princeton University
Jerry Hausman	Massachusetts Institute of Technology

Andrew Henley	University of Wales Aberystwyth
David A. Hensher	University of Sydney
Joseph Herriges	Iowa State University
James Hewlet	EIA, U.S. Department of Energy
Eric Hirst	Consulting in Electric-Industry Restructuring
Lennart Hjalmarsson	Goteborg University
Benjamin Hobbs	Johns Hopkins University
Michael Hoel	University of Oslo
Thomas Hoff	Pacific Energy Group, Stanford
William W. Hogan	Harvard University, Kennedy School of Government
Thomas Hogarty	Reston, Virginia
Mark Hooker	U.S. Federal Reserve Board
Jean Charles Hourcade	CIRED, Montrouge
Douglas Houston	University of Kansas
Richard Howarth	University of California, Santa Cruz
David Huettner	University of Oklahoma
William Hughes	Charles River Associates
Hillard Huntington	Energy Modeling Forum, Stanford University
Marc Ivaldi	University of Toulouse
R. Narayana Iyer	College of Engineering, Trivandrum, India
Mark Jaccard	Simon Fraser University
Gary Jefferson	Brandeis University
David Jeffries	National Grid Group plc
Tor Johnsen	Harvard Center for Business and Government
Blake Johnson	Energy Modeling Forum, Stanford University
Clifton T. Jones	Stephen F. Austin State University
Russell Jones	American Petroleum Institute
Dale Jorgenson	Harvard University
Frederick L. Joutz	The George Washington University
Boyan Jovanovic	New York University
Chulho Jung	Ohio University
William Kaempfer	University of Colorado
Edward Kahn	Analysis Group, Economics
Matthew E. Kahn	Columbia University NY
Stephen Karlson	Northern Illinois University
Robert Kaufmann	Boston University
Yoichi Kaya	Keio University
Alexander Kemp	University of Aberdeen
Madu Khanna	University of Illinois Urbana-Champaign
Daniel Khazzoom	San Jose State University, California
Brendan Kirby	Oak Ridge National Laboratory
Laurence Kirsch	Christensen Associates
Sverre Kittelsen	SNF, Oslo, Norway
David Kline	National Renewable Energy Laboratory
Christopher Knittel	Boston University
Ahmet Kocagil	The Pennsylvania State University

Gary Koop	The University of Edinburgh
George Korenko	National Economic Research Associates
Richard Kosobud	University of Illinois at Chicago
Jeffrey Krautkraemer	Washington State University
Itzhak Krinsky	Bankers Trust Research, New York
Snorre Kverndokk	Statistics Norway
Sumner La Croix	University of Hawaii at Manoa
Jean-Jacque Laffont	Institut Universitaire de France
Frederic Lantz	Institut Français du Pétrole
Pierre Lasserre	Université du Québec à Montréal
Lester B. Lave	Carnegie Mellon University
Donna Lee	University of Florida
Jonathan Leightner	Augusta State University
Jonathan Lesser	Green Mountain Power Corp.
Gary Libecap	International Centre for Economic Research, Torino
Donald Lien	University of Kansas
Koon Ong Lim	Universiti Sains Malaysia
Gaines H. Liner	University of North Carolina Charlotte
David Lineweber	Hagler Bailly Inc
Douglas Logan	Resource Data International, Colorado
Knox Lovell	University of Georgia
Michael C. Lynch	Massachusetts Institute of Technology
Andrew B Lyon	University of Maryland
Thomas P. Lyon	University of Indiana
Alan MacFadyen	University of Calgary
Alan Manne	Stanford University
Fred Mannering	University of Washington
Donald Marron	University of Chicago
Dominic Maratukulam	Electric Power Research Institute
Robert M. Margolis	Woodrow Wilson School, Princeton University
Chris Marnay	Lawrence Berkeley Laboratory
Rumi Masih	Goldman, Sachs & Co., Global Investment Research
Charles F. Mason	University of Wyoming
Jean Masseron	Institut Français du Pétrole-ENSPM
Kenichi Matsui	Institute of Energy Economics, Japan
Isamu Matsukawa	Musashi University
Mark McCabe	Georgia Institute of Technology
Katherine McClain	Pennsylvania State University
Stephen L. McDonald	University of Texas at Austin
Ross McKittrick	University of Guelph
Stuart McMenamin	Regional Economic Research Inc
Robert McNown	University of Colorado
Gil Mehrez	Georgetown University
Gilbert Metcalf	Tufts University
Atle Midttun	Norwegian School of Management
Michael R. Milligan	National Renewable Energy Laboratory

Paul R. Milgrom	Stanford University
Catherine Mitchell	Science Policy Research Unit, University of Sussex
C. Mar Molinero	University of Southampton
Imad Moosa	La Trobe University
Shunsuke Mori	Science University of Tokyo
Knut Anton Mork	Handelsbanken Norway
John Moroney	Texas A&M University
Peter Morris	Applied Decision Analysis, Inc
Catherine Morrison	University of California, Davis
Jay Morse	CPUC, Office of Ratepayer Advocates
Poul Erik Morthorst	RISØ National Laboratory
Dean Mountain	McMaster University
Timothy Mount	Cornell University
Andrew Muller	McMaster University
Lena Neij	Lund University
Charles R. Nelson	University of Washington
David Newbery	University of Cambridge
Richard G. Newell	Resources for the Future
Shawn Ni	University of Missouri-Columbia
Albert Nichols	National Economic Research Associates
Lars J. Nilsson	Lund University
Robert Noland	U.S. Environmental Protection Agency
William Nordhaus	Yale University
Peter Odell	Erasmus University Rotterdam
Per Invar Olsen	Norwegian School of Management
Ole Jess Olsen	Roskilde University
Ren Orans	Energy & Environmental Economics Inc
Shmuel Oren	University of California, Berkeley
Anthony D. Owen	University of New South Wales
Michael T. Ozog	Fort Collins, Colorado
R.K. Pachauri	Tata Energy Research Institute, India
Karen Palmer	Resources for the Future
Frank Parra	Frank Parra Associates
John Parsons	Charles River Associates
Robert Patrick	Rutgers University
David Pearce	CSERGE, University College London
Stephen C. Peck	Electric Power Research Institute
Terry M. Peterson	Electric Power Research Institute
Robert S. Pindyck	Massachusetts Institute of Technology
Ronald Planting	American Petroleum Institute
André Plourde	University of Alberta, Edmonton
Karen R. Polenske	Massachusetts Institute of Technology
Michael Pollitt	University of Cambridge
David Popp	University of Kansas
Edward Porter	American Petroleum Institute
Michael Pratt	Energy Security Analysis Inc

Steve Puller	University of California at Berkeley
Kevin G. Quinn	St. Norbert College
Marian Radetzki	SNS Energy, Stockholm
Hamid Rafizadeh	Dayton Power & Light Co.
P. Raman	Tata Energy Research Institute
Michael Rauscher	Rostock University
Hossein Razavi	The World Bank
Grant Read	University of Caterbury
Ali M. Reza	VHF Advisory Services
Michael Rieber	University of Arizona
Mark J. Roberts	Pennsylvania State University
Matthew C. Rogers	Booz, Allen & Hamilton Inc.
Adam Rose	Pennsylvania State University
Kenneth Rose	National Regulatory Research Institute
Knut Rosendahl	Statistics Norway
Dale Rothman	University of British Columbia
Geoffrey Rothwell	Stanford University
Michael Rothkopf	Rutgers University
Jan Rouwendal	Landbouwniversiteit Wageningen
Richard Rozek	National Economic Research Associates Inc
Jonathan Rubin	University of Tennessee
Jeffrey Russell	University of Chicago
Alexsandr Rudkevich	Tellus Institute
Thomas Rutherford	University of Colorado
Ben Russo	University of North Carolina Charlotte
Djavad Sahehi-Isfahani	Virginia Polytechnic Institute & University
Ranil Salgado	International Monetary Fund
Hossein Samiei	International Monetary Fund, Research Dept.
David Sappington	University of Florida
Harry Saunders	Decision and Risk Analysis Inc
Thomas C. Schelling	University of Maryland
Lee Schipper	Lawrence Berkeley National Laboratory
Richard Schmalensee	Massachusetts Institute of Technology
Dieter Schmitt	University of Essen, Germany
Leo Schrattenholtzer	IIASA, Laxenburg, Austria
Peter Schwarz	University of North Carolina Charlotte
Fred Sebold	Regional Economic Research Inc
Apostolos Serletis	The University of Calgary
Deepak Sharma	University of Technology, Sydney
Steven Shmanske	Berkeley, California
Siamack Shojai	Manhattan College
R. David Simpson	Resources for the Future
Fereidoon Sioshansi	Convactor Consulting Inc
Margaret Slade	University of British Columbia
Yves Smeers	Catholic University of Louvain, CORE
Clare Smith	University of Plymouth

James L. Smith	Southern Methodist University
V. Kerry Smith	Duke University
Ronald Smith	Birkbeck College, University of London
Vernon Smith	University of Arizona
Patrick Soderholm	Massachusetts Institute of Technology
Daniel Sperling	University of California, Davis
Robert Stavins	John Kennedy School, Harvard University
Thomas Sterner	University of Göteborg
Steven Stoft	The Brattle Group, Washington
Kevin Stork	Argonne National Laboratory
Kenneth Stollery	University of Waterloo
Michael Stoppard	Oxford Institute for Energy Studies
Susan Subak	Natural Resources Defense Council
Jiwu Sun	Turku School of Economics
John Surrey	SPRU, University of Sussex
Ronald Sutherland	American Petroleum Institute
Steven Suranovic	George Washington University
Gert Tinggaard Svendsen	Aarhus School of Business
Richard D. Tabors	Tabors, Caramanis and Associates
Lester Taylor	University of Arizona
Thomas Taylor	Duke Energy Company
Thomas J. Teisberg	Teisberg Associates
Asher Tishler	Tel Aviv University
Tom Titenberg	Colby College
Sigve Tjøtta	University of Bergen
Michael Toman	Resources for the Future
Thomas F. Torries	West Virginia University
Kenneth Train	University of California, Berkeley
John Elting Treat	Booz Allen & Hamilton Inc
John Tschirhart	University of Wyoming
Juan A. Vega-Cervera	University of Extremadura
Ed Vine	Lawrence Berkeley Laboratory
Daniel Violette	Hagler Bailly Consulting Inc
Kip W. Viscusi	Harvard University, Law School
Nils-Henrik von der Fehr	University of Oslo
Catherine Waddams	Warwick Business School
Chris Warfel	Entech Engineering
Campbell Watkins	Law & Economics Consulting Group, Inc
William Watson	United States Geological Survey
Micheal Webb	London Economics Limited
William Weber	Southeast Missouri State University
Jonathan Welch	Northeastern University
Gregory J. Werden	U.S. Department of Justice
Halbert White	University of California, San Diego
Mette Wier	National Environmental Research Institute, Denmark
Bart J. Wilson	U.S. Federal Trade Commission

Franz Wirl

Ryan Wiser

Catherine Wolfram

Chi-Keung Woo

Alan Woodland

Eric Charles Woychick

Adonis Yatchew

Gary W. Yohe

Mine K. Yucel

Georges Zaccour

Otto-von-Guericke University of Magdeburg

Lawrence Berkeley National Laboratory

Harvard University

Energy and Environmental Economics, Inc.

The University of Sydney

Strategy Integration

University of Toronto

Wesleyan University

Federal Reserve Bank of Dallas

Ecole des Hautes Etudes Commerciale, Montreal