

## ABOUT THE AUTHORS

**JOHANNES C. BOLLEN** is an environmental economist at the Dutch National Institute of Public Health and the Environment (RIVM) in Bilthoven, the Netherlands. He has held that position since 1992. His current research interests include the economics of climate change. Previously, he worked in cooperation with the World Bank on their environmental action programme for Central and Eastern Europe (1996). He has a MS degree in econometrics from the University of Amsterdam.

**JOSEPH G. BOYER** is currently working as a research associate in the Department of Economics at Yale University. He has collaborated with Professor William Nordhaus on global warming research. He obtained his MA in economics from Yale University.

**PAUL M. BERNSTEIN** is a senior associate in Charles River Associates' environmental practice. Over the past three years, he has been participating in studies that assess the economic impacts of carbon abatement policies on different countries and industries. He holds a PhD in operations research from Stanford University where his dissertation advisor was Professor Alan S. Manne.

**STEPHEN BROWN** manages the global change program within the Australian Bureau of Agricultural and Resource Economics (ABARE). Since joining ABARE he has worked extensively on developing and applying ABARE's global trade and environment model (GTEM), with a particular focus on analysis of the economic impacts of international climate change policy. Before joining ABARE, he worked as a general equilibrium modeling specialist with the Australian Industry Commission, where he was part of the research team that developed the SALTER world trade model.

**ADRIAN COOPER** is Managing Director of Oxford Economic Forecasting (OEF). He is responsible for coordinating and managing OEF's world economic forecasting activities, and overseeing its team of economists based in Oxford, Philadelphia, the United States, and Basel, Switzerland. Mr. Cooper was educated at the University of Bristol and at the London School of Economics.

**JAMES A. EDMONDS** is a senior staff scientist and the technical leader of economics programs at the Pacific Northwest National Laboratory (PNNL). He has been associated with PNNL since 1986 during which time he has developed programs in the area of global change and sustainable development. He heads an international global change research program at PNNL with active collaborations in more than a dozen institutions and countries. His duties include scientific and programmatic direction, communication and research. He has co-authored three books, the most recent of which won a science book of the year award at the Lawrence Livermore National Laboratory.

**BRIAN S. FISHER** is Executive Director of the Australian Bureau of Agricultural and Resource Economics (ABARE). He has held this position since November 1988. During 1984–85 he was chief research economist, then deputy director, of the former Bureau of Agricultural Economics. He was appointed to the Chair in agricultural economics at the University of Sydney in 1985, becoming Dean of the faculty of agriculture at the University in 1987. In 1993 he was appointed one of the experts completing the socioeconomic assessment of climate change for the U.N. *IPCC Second Assessment Report*. More recently, he played an integral role in the international climate change negotiations as economic adviser to Australia's negotiating team at Kyoto in 1997 and Buenos Aires in 1998. He is currently one of the experts completing the *IPCC's Third Assessment Report*. He holds a PhD in agricultural economics from the University of Sydney.

**ARJEN GIELEN** is a policy advisor on climate change at the Dutch Ministry of Economic Affairs. He has held that position since August, 1998. Previously, he worked as an economist at the CPB-Netherlands Bureau for Economic Policy Analysis. The CPB provides independent forecasts and analysis for policy decisions of government and other organizations. He obtained his MS (doctorandus) degree in economics from Tilburg University in 1993.

**HENRY D. JACOBY** is the William F. Pounds Professor of Management at Massachusetts Institute of Technology. At present he is Co-director of the MIT joint program on the science and policy of global change, and environmental fellow of the American Council on Capital Formation. He has served as Director of the Harvard water program and the Harvard environmental systems program, Director of the MIT Center for Energy and Environmental Policy Research, and Associate Director of the MIT Energy Laboratory. He holds a Bachelors in mechanical engineering from the University of Texas at Austin and a PhD in economics from Harvard University.

**MIKIKO KAINUMA** is a member of the research staff at the National Institute for Environmental Studies (NIES) in Japan. Since 1977, she has served with the Environment Agency of Japan as a researcher, senior researcher, and as head of the global warming response team, all at the NIES. Her fields of interest are modeling, estimation and control of environmental systems. She received her BS, MS, and PhD degrees, all in applied mathematics and physics, from Kyoto University.

**SON H. KIM** is a senior research scientist at the Pacific Northwest National Laboratory (PNNL) and has been associated with PNNL since 1993. His focus is on the development of energy-economic models at PNNL, and the utilization of such models to understand the global impact of technologies on the reduction of carbon emissions. He cooperates with foreign visiting scholars and international institutes to better represent all regions in the modeling effort. He has a BS in nuclear engineering from University of California, Berkeley, and a PhD in nuclear engineering from Massachusetts Institute of Technology.

**ATSUSHI KUROSAWA** is a senior researcher at the Institute of Applied Energy (IAE) in Tokyo, Japan. His research interests include energy economics, technology assessment, and R&D policies. This work involves using integrated assessment models of climate change. He has held visiting positions at Stanford University and the Research Institute of Innovative Technology for the Earth (RITE). He received his MS in nuclear engineering from the Tokyo Institute of Technology.

**JAEKYU LIM** is a senior research officer in the trade and international policy branch at the Australian Bureau of Agricultural and Resource Economics (ABARE). His main area of research is the interaction between trade, economic growth and environment, and the application of a computable general equilibrium model. He joined ABARE in March 1998, where his research has concentrated on the development of GTEM and the analysis of issues relating to climate change policies. He holds an honors degree from the University of Sydney and a PhD in economics from the University of New South Wales.

**SCOTT LIVERMORE** is an international economist with Oxford Economic Forecasting (OEF), a consulting firm founded in 1981 by a group of academics and professional forecasters. He holds a BA from St. Edmund Hall, Oxford and a MSc in economics from University College, London.

**CHRISTOPHER N. MACCRACKEN** is a senior research scientist in the Washington, D.C. office of the Pacific Northwest National Laboratory (PNNL). Since joining the Laboratory in 1993, his research has focused on the development and use of the second generation model, an economic model developed at PNNL to examine the costs and energy-sector impacts of reducing greenhouse gas emissions. He has a BA in economics from the University of California and an MBA from Carnegie Mellon University.

**ALAN S. MANNE** is Professor Emeritus of Operations Research, Stanford University. He received his AB in 1943 and his PhD in economics in 1950 from Harvard University. Subsequently, he taught at Harvard and Yale, and worked at the RAND Corporation. During most of the years between 1961 and 1992, he was professor of operations research at Stanford University until his retirement in 1992. He is co-organizer of the International Energy Workshop, and the author or coauthor of seven books and 120 papers. His most recent book, coauthored with Richard Richels, is titled *Buying Greenhouse Insurance - the Economic Costs of CO<sub>2</sub> Emission Limits*. (MIT Press, 1992).

**YUZURU MATSUOKA** is a professor in the Department of Environmental Engineering, Graduate School of Engineering, Kyoto University. His fields of research cover environmental modeling of local air pollution and global warming problems. He was a research associate with the Department of Sanitary and Environmental Engineering, Kyoto University from 1976-82, and a researcher at NIES from 1982-83. He worked as an associate professor at Kyoto University during 1985-94, and as a professor in the Department of Geotechnical and Environmental Engineering of Nagoya University from 1995-97. He received his BS, MS and PhD degrees, all in sanitary and environmental engineering from Kyoto University.

**WARWICK J. MCKIBBIN** is Executive Director of the Economics Division of the Asia Pacific School of Economics and Management and Convenor of the Economics Division in the Research School of Pacific and Asian Studies at the Australian National University. He is also a non-resident senior fellow at the Brookings Institution, and President of McKibbin Software Group Inc. He has published widely in journals and books and has been a consultant for international agencies and national governments on macroeconomic policy, international trade and finance and greenhouse policy. He is renowned for his contribution to multi-country economic modeling and research on the MSG and G-Cubed multi-country models. He obtained his PhD from Harvard University.

**W. DAVID MONTGOMERY** has been Vice President of Charles River Associates since 1991. He currently directs Charles River Associates' environment practice. He previously held a number of senior positions in the U.S. Department of Energy and Congressional Budget Office, and was on the faculty of the California Institute of Technology. He holds a PhD from Harvard University.

**TSUNEYUKI MORITA** is head of the environmental economics program at the National Institute for Environmental Studies (NIES) in Japan. He is also a professor at the Graduate School of Decision Science & Technology, Tokyo Institute of Technology, and an adjunct professor at the Institute of Advanced Studies, United Nations University, both located in Tokyo. His fields of research cover environmental modeling analysis, environmental economics and environmental policy studies. He is currently working for IPCC as a coordinating lead author. He received his BS, MS, and PhD degrees from Tokyo Institute of Technology.

**WILLIAM D. NORDHAUS** is the A. Whitney Griswold Professor of Economics at Yale University and on the staff of the Cowles Foundation at Yale. Recently his research has focused on the economics of global warming, including the construction of integrated economic and scientific models to determine the efficient path for coping with climate change. He is the current or past editor of several journals, and the author of several books including *The Efficient Use of Energy Resources*, *Reforming Federal Regulation*, *Managing the Global Commons*, and (joint with Samuelson) the classic textbook *Economics*. He received his PhD from the Massachusetts Institute of Technology.

**HOM PANT** is a principal research officer in the global change program at the Australian Bureau of Agricultural and Resource Economics. Since joining ABARE he has worked on the development of ABARE's global trade and environment model (GTEM). Previously, he was a research fellow at the Centre for Regional Economic Analysis (CREA), University of Tasmania. He contributed substantially to the development and application of different versions of FEDERAL, which is CREA's multiregion general equilibrium model of the Australian economy. He has also worked at the Australian National University, where he contributed to the construction of computable general equilibrium models of Thailand and the Philippines. He holds a PhD in economics from the Australian National University.

**STEPHEN C. PECK** has been Vice President Environment at EPRI since 1995, and has recently been appointed, in addition, Vice President for Public Sector Activities. He joined EPRI in 1976 and has served in a number of positions of increasing responsibility related to energy systems analysis and environmental studies. From 1976-82 he served with the systems program, from 1982-86 he was Director of the energy and environment integration staff, and from 1986-95 he served as Director of the environment division. Prior to joining EPRI he was a member of the economics faculty of the University of California, Berkeley. He holds a MA degree in mechanical sciences from Cambridge University (1965), a MSc from the London School of Economics (1967), a MBA from the University of Chicago (1967) and a PhD in business economics from the University of Chicago (1973). He currently serves on the editorial board of *The Energy Journal*.

**CAIN POLIDANO** is a senior research officer in the trade and international policy branch at the Australian Bureau of Agricultural and Resource Economics (ABARE). Since joining ABARE in 1997, he has undertaken economic research into the economic impacts of greenhouse emission reductions. Such research has been focused on analysing the effects of greenhouse emission abatement policy on global trade, agricultural production and employment and has been conducted using GTEM. He has an honors degree in agricultural and resource economics from the La Trobe University and a Masters degree in agricultural economics from the University of Sydney.

**RICHARD RICHEL**s directs global climate change research at the Electric Power Research Institute (EPRI) in Palo Alto, California. Previously, he directed EPRI's energy analysis, environmental risk, and utility planning research activities. He has served on a number of national and international advisory panels, including committees of the U.S. DOE, the EPA and the National Research Council. He has served as an expert witness at the DOE's hearings on the national energy strategy and testified at Congressional hearings on priorities in global climate change research. More recently, he served as a principal lead author for the IPCC. He received his PhD from Harvard University's division of applied sciences. He is a co-author (with Alan Manne) of *Buying Greenhouse Insurance - the Economic Costs of CO<sub>2</sub> Emission Limits*.

**MARTIN ROSS** is an economist at the United States Environmental Protection Agency. His research interests include computable general equilibrium modeling of international trade and investment, with an emphasis on the economic effects of climate change policies. He received his PhD from the University of Colorado.

**VANESSA ROSSI** is a senior international economist with Oxford Economic Forecasting (OEF). She has 20 years experience in the construction and application of econometric and financial models in the government, university and private sectors. She gained her first degree in mathematics, economics and statistics from Birmingham University (1975) followed by a Masters degree in economics from Warwick University (1976) and postgraduate research at Princeton University.

**THOMAS F. RUTHERFORD** is an associate professor of economics at the University of Colorado where he has taught since 1992. He previously taught economics at the University of Western Ontario. His research interests include the formulation and analysis of large-scale economic equilibrium models. His applied work ranges from the analysis of the effects of trade and economic growth to the economic effects of carbon emissions restrictions in response to global warming. He holds a PhD in operations research from Stanford University where his dissertation advisor was Alan S. Manne.

**RONALD D. SANDS** is a senior economist in the Washington, D.C., office of Pacific Northwest National Laboratory (PNNL). Since joining the Laboratory in 1986, his research has focused on energy demand in buildings and the development of economic models to estimate the cost of reducing greenhouse gas emissions. Recently, he has used the second generation model, an energy-economy model developed at PNNL, for several studies of the cost of reducing carbon emissions. He holds a Bachelor of electrical engineering degree from the University of Minnesota, and a PhD in economics, also from the University of Minnesota.

**ROBERT SHACKLETON** is an economist at the United States Environmental Protection Agency in Washington, DC. His principal area of research is the economic effects of environmental and energy policy, particularly climate change policy. He received his PhD from the University of Maryland, College Park.

**THOMAS TEISBERG** is President of Teisberg Associates, a consulting firm which specializes in the use of computer-based optimization techniques to solve strategic and managerial problems, for a wide range of business and public clients. Formerly, he was a senior economist at Natomas Company (an international energy company), and an assistant professor of economics at the Massachusetts Institute of Technology. He holds a BA in economics from the University of Minnesota, a Masters in public policy from Harvard University, and a PhD in economics from the University of California, Berkeley.

**HANS TIMMER** is head of the international modelling division at the Netherlands Bureau for Economic Policy Analysis. He specializes in the construction of medium-term and long-term world models. He contributed to several scenario studies, such as *The World in 2020* (OECD, 1997) and *Scanning the Future* (CPB, 1992). He represents The Netherlands in Project LINK, which establishes a formal linkage of 80 macroeconomic country models.

**KOJI TOKIMATSU** is a researcher at the Research Institute of Innovative Technology for the Earth (RITE). His main research interests are long-term sustainability of energy supplies, CO<sub>2</sub> abatement technologies and policies, and equity/efficiency issues of developing/developed countries. He is currently engaged in evaluating CO<sub>2</sub> abatement technologies and economic mechanisms by use of integrated assessment models, as well as evaluating economies, energy gain, and CO<sub>2</sub> emissions of nuclear fusion reactors. He obtained a PhD in electrical engineering from the University of Tokyo in 1998.

**RICHARD S.J. TOL** is an economist and statistician working as a researcher at the Institute for Environmental Studies, Vrije Universiteit, Amsterdam. He is also a visiting associate professor at the Center for Integrated Study of the Human Dimensions of Global Change, Carnegie Mellon University, Pittsburgh. His work focuses on climate change, particularly detection and attribution, impact and adaptation, integrated assessment modeling, and decision analysis. He has played an active role in international bodies such as the Stanford Energy Modeling Forum, the Intergovernmental Panel on Climate Change, and the European Forum on Integrated Environmental Assessment.

**VIVEK TULPULÉ** has recently taken up the position of branch head in the portfolio strategies group at Environment Australia. Previously he was a senior research economist at the Australian Bureau of Agricultural and Resource Economics, where he led research on international trade and policy issues, participated in international conferences, and was responsible for overseeing research on the economics of climate change policy. This research drew extensively on ABARE's dynamic general equilibrium model of the world economy, GTEM. He has published on a wide range of topics, including the benefits of scientific research, international trade and economics of climate change policy. He holds honors and MS degrees in economics from the Australian National University.

**JOHN WALKER** is Chairman and chief economist of Oxford Economic Forecasting, which he founded in 1981. He has headed Oxford's move into international modelling and forecasting, and has developed strong links with economists around the globe and coordinated the development of the PC versions of OEF models which are widely used in the UK and the rest of the world. He holds a MA from Balliol College, Oxford where he studied chemistry and a MSc in economics from the London School of Economics.

**JOHN P. WEYANT** is a professor of engineering-economic systems and Director of the Energy Modeling Forum (EMF) at Stanford University. His current research focuses on analysis of global climate change policy options, and models for strategic planning. He was convening lead author of the chapter on Integrated Assessment in the IPCC's *Second Assessment Report*, and is co-coordinating lead author of the Scoping chapter of the Mitigation Working Group and a lead author "Synthesis" chapter of the Impacts and Adaptation Working Group in the *Third Assessment Report*. He has a PhD in management science with minors in economics, operations research, and organization theory from University of California at Berkeley.

**PETER J. WILCOXEN** is an assistant professor of economics at the University of Texas at Austin and a non-resident senior fellow at the Brookings Institution. His principal area of research is the effect of environmental and energy policy on economic growth, international trade, and the performance of individual industries. He has published more than a dozen articles on the subject and has co-authored a book on the design and construction of large scale economic models. His past positions include visiting fellow at the Brookings Institution, visiting scholar at Harvard University and senior research fellow at the University of Melbourne in Australia. He has also been a consultant to the U.S. Environmental Protection Agency. He received his PhD from Harvard University.

**ALAN WILSON** is a senior economist with Oxford Economic Forecasting. He graduated from Cambridge University in economics in 1983, and later obtained a MSc from Birkbeck College, London. Before joining OEF he spent more than 12 years in the UK Government Economic Service working for a number of departments on a wide range of economic issues.

**IAN SUE WING** is a doctoral student at the Massachusetts Institute of Technology and a research assistant in the MIT Joint Program on the Science and Policy of Global Change. He is currently pursuing research in induced technical change in computable general equilibrium energy-economy models. He holds a Bachelor of engineering from Dartmouth College and a MSc in economics for development from Oxford University.

**HIROSHI YAGITA** is a senior researcher at the Research Institute of Innovative Technology for the Earth (RITE). He obtained a Masters degree in applied chemistry from Tokyo University in 1986, and received a Doctor of engineering in applied chemistry from Tokyo University in 1989. He was previously a researcher at the National Institute for Resources and Environment (NIRE) from 1992-1996.

**YUKIO YANAGISAWA** is a professor at the Department of Environmental System Engineering, Graduate School of the Environment, University of Tokyo. He was awarded Doctor of engineering in chemical engineering from the University of Tokyo in 1981. Since 1984 he has been an associate and adjunct professor at Harvard School of Public Health. His research interests include system analysis of global environmental problems, technology assessment of measures to mitigate global climate change, and the relationship between air pollution and its health effects, especially indoor air pollution. His major research topic is exposure and risk assessment for multi-chemical sensitivity.

**GUI-FANG YANG** is a senior associate at Charles River Associates. She conducts research on different topics in international trade and development economics, as well as the economic impacts of carbon abatement policies. She holds a PhD in economics from the University of Colorado.

**WEISHENG ZHOU** is a senior researcher at the Research Institute of Innovative Technology for the Earth (RITE). Previously he has been a research fellow at the New Energy and Industrial Technology Development Organization (NEDO), and an associate professor at Dalian University of Technology. He has a Bachelors degree from Zhejiang University, a Masters in power engineering from Dalian University of Techonology, and a Doctor of engineering physics from Kyoto University in 1995.