WILLIAM F. MARTIN RYUKICHI IMAI HELGA STEEG

MAINTAINING ENERGY SECURITY IN A GLOBAL CONTEXT

A Report to The Trilateral Commission

Authors: WIL

WILLIAM F. MARTIN

Chairman, Washington Policy and Analysis, Inc.;

former U.S. Deputy Secretary of Energy

RYUKICHI IMAI

Distinguished Research Fellow, Institute for International Policy Studies, Tokyo; former Japanese Ambassador to Kuwait, Mexico and the Conference on Disarmament in Geneva

HELGA STEEG

Former Executive Director, International Energy Agency

> published by The Trilateral Commission New York, Paris and Tokyo September 1996

The Trilateral Commission was formed in 1973 by private citizens of Western Europe, Japan, and North America to foster closer cooperation among these three democratic industrialized regions on common problems. It seeks to improve public understanding of such problems, to support proposals for handling them jointly, and to nurture habits and practices of working together among these regions.

© Copyright, 1996. The Trilateral Commission All Rights Reserved.

Library of Congress Cataloging-in-Publication Data

Martin, William Flynn, 1950-

Maintaining Energy Security in a Global Context: a report to the Trilateral Commission/by William F. Martin, Ryukichi Imai, Helga Steeg

p. cm. — (The Triangle papers: 48) Includes bibliographical references

ISBN 0-930503-73-2

1. Energy policy. 2. Petroleum industry and trade—Government policy. 3. Nuclear industry. 4. Energy industries—Environmental aspects. I. Imai, Ryukichi, 1929- . II. Steeg, Helga. III. Trilateral Commission. IV. Title. V. Series. HD9502.A2M3515 1996 333.79—dc20

96-28121 CIP

Manufactured in the United States of America

THE TRILATERAL COMMISSION

345 East 46th Street New York, NY 10017 c/o Japan Center for International Exchange 4-9-17 Minami-Azabu Minato-ku Tokyo, Japan 35, avenue de Friedland 75008 Paris, France This report was prepared for the Trilateral Commission and is distributed under its auspices. A draft was discussed at the Trilateral Commission meeting in Vancouver, British Columbia, on April 20-22, 1996. The authors—from Europe, North America and Japan—have been free to present their own views. The opinions expressed are put forth in a personal capacity and do not purport to represent those of the Commission or of any organization with which the authors are associated.

The Authors

WILLIAM F. MARTIN served as U.S. Deputy Secretary of Energy, Executive Secretary of the National Security Council in the White House, and Special Assistant to President Ronald Reagan. In 1992, he was Executive Director of the Republican Party National Platform Committee. During the second oil crisis, Mr. Martin was Special Assistant to the Executive Director of the International Energy Agency, Ulf Lantzke. He also held positions in the Department of State and MIT's Workshop on Alternative Energy Strategies headed by Carroll L. Wilson. Today, he is Chairman of Washington Policy and Analysis, Inc., an international energy consulting firm. He holds degrees from the University of Pennsylvania and MIT. Mr. Martin is a member of the Board of the World Resources Institute, and a member of the Council on Foreign Relations, New York.

RYUKICHI IMAI is Professor of Social Sciences at Kyorin University Graduate School; a visiting Professor at Sophia University; and a Distinguished Research Fellow at the Institute of International Policy Studies in Tokyo. Previously, he served as Japan's Ambassador to the Conference on Disarmament in Geneva, to Kuwait, and to Mexico. Before joining the Ministry of Foreign Affairs, he was General Manager for Engineering at the Japan Atomic Power Company. He holds degrees from the University of Tokyo (including a Ph.D. in nuclear engineering), the Fletcher School of Law and Diplomacy, and Harvard. His books include: Science and Nation, Nuclear Energy and Nuclear Proliferation (with Henry Rowen), Nuclear Disarmament, and Post-Cold War Nuclear Weapons Management.

HELGA STEEG was the Executive Director of the International Energy Agency from 1984 to 1994. Before joining the International Energy Agency, she held several senior positions with the Federal Republic of Germany's Economic Ministry in the fields of money, credit, trade, and economics. From 1973 to 1984, she was the Director General (Ministerialdirektor) of the Department of Foreign Economic Policy. From 1964 to 1967, she was the German Alternate Executive Director of the World Bank. Today, she teaches International Energy Policy at the Ruhr-University Bochum. Ms. Steeg received her training in the fields of international law and economics at the Universities of Bonn and Lausanne.

The Trilateral Process

The report which follows is the joint responsibility of three authors, with William Martin serving as lead author. Although only the authors are responsible for the analyses and conclusions, they have been aided in their work by many others. The authors would like to express particular appreciation to Antony Barton (a Canadian citizen), Director of Research at Washington Policy and Analysis, who carried out the fresh research required for the preparation of this report and served as rapporteur during the study. Amelia Barton of Washington Policy and Analysis assisted Mr. Martin with the Global Energy Supply and Demand Model and designed most of the visuals in the report. The authors would also like to express appreciation to Charles Heck, North American Director of the Trilateral Commission, for drafting and editing assistance.

The authors were enlisted and work begun on this report in the late spring and summer of 1995. Martin and Imai met for a preliminary discussion in Washington on September 10, and Steeg and Imai in Berlin on September 16. The first full authors' meeting was on October 10-11 in Tokyo, where Steeg also spoke at the World Energy Conference. Martin had prepared an extensive discussion paper for the Tokyo meeting, in effect a somewhat skeletal first draft of the report. The authors next met in Bonn on January 27-29, 1996, focusing on Martin's next draft and its main themes. The succeeding draft was circulated to Trilateral Commission members in early April and discussed at the Commission's 1996 annual meeting in Vancouver on April 20-22. Final revisions for publication were completed in late July.

As the following list indicates, the authors consulted extensively in the course of their work. Martin's Washington consultations were concentrated in December, January and February—including discussions at the Department of Energy, Central Intelligence Agency, National Security Council, Department of State, World Bank and World Resources Institute, among others. In January he traveled to New Mexico for discussions at the Los Alamos National Laboratory. In February he traveled to Ottawa for consultations with Canadian government officials (both active and former), representatives from private industry, and several Canadian Trilateral Commission members. In March he traveled to Dallas for a discussion of the world energy outlook with several persons on the planning staff of the

Exxon Corporation. In Europe, Steeg talked about the project with former colleagues at the International Energy Agency in Paris in October 1995—a number of persons from the IEA have been most helpful throughout this project. She returned to Paris for consultations on June 11-12, 1996, with French government ministries, Electricité de France, the French Atomic Energy Commission, and the planning staff of Elf Aquitaine. In Germany, all three authors participated in meetings on January 29, 1996, at the Economics Ministry and Deutsche Gesellschaft für Auswärtige Politik. Steeg traveled to London on January 11 and to Rome on January 15 for discussions with government officials, business leaders, energy experts and Trilateral Commission members. Imai's consultations in Japan included a range of persons from government ministries, energy companies and industry associations, universities and research institutes. More specifically, the Committee for Energy Policy Promotion devoted evening meetings to discussion of drafts of the report, and provided valuable advice from the point of view of the private energy sector. The Institute of Energy Economics, where Imai is a research advisor, provided valuable advice and data. Government officials at various levels of the Science and Technology Agency and the Ministry of International Trade and Industry were consulted by Imai in his capacity as Counsellor of the Atomic Energy Commission and as a member of various MITI advisory bodies. The Japan Atomic Industrial Forum provided extensive support regarding the role of nuclear power.

The many persons consulted in the preparation of this report spoke for themselves as individuals and not for any institutions with which they are associated. The authors express their appreciation to them all. They include:

North American Consultations

- Edward Arthur, Project Leader, Nuclear Materials, Los Alamos National Laboratory
- Carl Beard, Technical Staff Member, Systems Engineering and Integration, Analysis and Assessment Division, Los Alamos National Laboratory
- Robert Berls, Jr., Special Assistant, Office of the Secretary, U.S. Department of Energy
- Ben Bonk, National Intelligence Officer for Near East and South Asia, National Intelligence Council, U.S. Central Intelligence Agency
- John Brodman, Director, Office of International Science and Technology Cooperation, Office of Policy, U.S. Department of Energy

- Zbigniew Brzezinski, Former National Security Advisor to President Carter; Counselor, Center for Strategic and International Studies
- John Buksa, Team Leader, Reactor Design and Analysis Group, Los Alamos National Laboratory
- Julie-Ann Canepa, Earth and Environmental Sciences Directorate, Los Alamos National Laboratory
- Mike Cleland, Assistant Deputy Minister, Natural Resources Canada
- E. Philip Cockshutt, Energy Council of Canada
- Gary Coene, Acting Director of Slavic and Eurasian Analysis, U.S. Central Intelligence Agency
- Richard N. Cooper, Chairman, National Intelligence Council, U.S. Central Intelligence Agency
- Marshall Crowe, Former Chairman of the National Energy Board of Canada
- Charles Curtis, U.S. Deputy Secretary of Energy
- Ian Deans, Chairperson, Public Service Staff Relations Board of Canada; former Member of Parliament
- John Deutch, Director, U.S. Central Intelligence Agency
- Peter Dobell, Director, Parliamentary Centre for Foreign Affairs and Foreign Trade, Ottawa
- Ulrich Dollwet, Staff Planning Analyst, Corporate Planning Department, Exxon Corporation
- Shaun Donnelly, Deputy Assistant Secretary for Energy, Sanctions, and Commodities, U.S. Department of State; Chairman of the Standing Group on Long-Term Cooperation, International Energy Agency
- Roger Dower, Program Director of Climate, Energy, and Pollution Program, World Resources Institute
- Mose Dunning, Coordinator, Energy and Industry Analysis, Corporate Planning Department, Exxon Corporation
- Joseph Gilling, Senior Energy Economist, Power Development, Efficiency and Household Fuels, Industry and Energy, The World Bank
- Sue Goff, Program Manager, Energy Supply and the Environment, Los Alamos National Laboratory
- William Hancox, Vice President, Strategic Development, Atomic Energy of Canada Limited
- J.P. Harris, General Manager, Corporate Planning Department, Exxon Corporation
- John Havenstrite, Senior Planning Advisor, Corporate Strategy Division, Exxon Corporation
- Sigfried Hecker, Director, Los Alamos National Laboratory
- Michael Houts, Team Leader, Criticality, Reactor, and Radiation Physics, Nuclear Systems Design and Analysis, Los Alamos National Laboratory

Jeffrey Hughes, Assistant to the Deputy Secretary, U.S. Department of Energy

John Ireland, Deputy Division Director, Technology and Safety Assessment Division, Los Alamos National Laboratory

Shirley Jackson, Chairman, U.S. Nuclear Regulatory Commission

Colin Kenny, Vice-Chair, Energy Committee of Canadian Senate

Robert Krakowski, Systems Engineering and Integration Group, Technology and Safety Assessment Division, Los Alamos National Laboratory

Kjell Kristiansen, Counselor for Energy, Royal Norwegian Embassy, Washington, D.C.

Joseph Laia, Director of Environmental Technologies, Los Alamos National Laboratory

Jonathan Lash, President, World Resources Institute

Winston Lord, U.S. Assistant Secretary of State for East Asian and Pacific Affairs

Robert Lyman, Director, Oil Division, Energy Supply Branch, Natural Resources Canada

James MacKenzie, Senior Associate of Climate, Energy, and Pollution Program, World Resources Institute

Wilfred W. Martin Jr., Independent Oil Producer

Jessica Tuchman Mathews, Senior Fellow, Council on Foreign Relations Robert McFarlane, Former National Security Advisor to President Reagan; Chairman of McFarlane Associates, Inc.

Neil McKeowen, Energy Security Branch, U.S. Central Intelligence Agency

Robert S. McNamara, Former U.S. Secretary of Defense and Past President of the World Bank

C.W. Myers, Division Director, Earth and Environmental Sciences Directorate, Los Alamos National Laboratory

Hazel O'Leary, U.S. Secretary of Energy

Willy Olsen, Vice President, Corporate Planning, Statoil Group, Norway Daniel Poneman, Special Assistant to the President for Non-Proliferation Affairs, U.S. National Security Council

Mary Preville, Senior Analyst, International Energy Division, Natural Resources Canada

William Ramsey, Deputy Assistant Secretary for Energy, Sanctions and Commodities, U.S. Department of State

Glenn Rase, Director of the Office of International Energy Policy, U.S. Department of State

David Reed, Staff Planning Advisor, Corporate Planning Department, Exxon Corporation

- Roger Robinson, Former Chief Economist for the U.S. National Security Council; President, RWR, Inc.
- Yoshiyuki Sakakibara, Chief Representative, Federation of Electric Power Companies of Japan
- James Schlesinger, Former U.S. Secretary of Energy; former Director of Central Intelligence and former Secretary of Defense
- Jitendra Shah, Environment and Natural Resources Division, Asia Technical Department, World Bank
- Richard Stern, Director, Energy and Industry Department, The World
 Bank
- Ian Stewart, Former Canadian Deputy Minister of Energy and of Finance Maurice Strong, Chairman, Earth Council
- Nicholas Swales, Executive Assistant, Canadian Group, Trilateral Commission
- Mike Telson, Special Assistant to the Deputy Secretary, U.S. Department of Energy
- Sam Thompson, Deputy Director-General, Nuclear Energy Agency
- Peter Trinkle, Senior Advisor, Public Affairs Department, Exxon Corporation
- Enzo Viscusi, ENI Representative for the Americas
- Ted Williams, Office of Policy, U.S. Department of Energy
- Peter Witte, Assistant to the North American Director, Trilateral Commission
- Daniel Yergin, President, Cambridge Energy Research Associates

European Consultations

- Lisette Andreae, German Society for Foreign Policy (DGAP), Bonn Lord Armstrong, Director, The R.T.Z. Corporation, London; former Chief Cabinet Secretary to the Prime Minister
- Craig Bamberger, Legal Counsel, International Energy Agency
- Piero Bassetti, Chairman, Chamber of Commerce and Industry of Milan; former Member of Italian Chamber of Deputies
- Klaus Becher, German Society for Foreign Policy (DGAP), Bonn
- Elmar Becker, Director General, German Federal Economics Ministry; Chairman of the International Energy Agency Governing Board
- Jean Bergougnoux, Former Director General, Electricité de France (French Electricity Board), Paris; former Chairman, SNCF (French State Railways)
- Ulf Böge, Director, German Federal Economics Ministry; Deputy Chairman of the International Energy Agency Governing Board
- Marcel Boiteux, Honorary Chairman, Electricité de France (French Electricity Board), Paris

Burghard Brock, German Federal Economics Ministry

Umberto Cappuzzo, Member of the Defense Committee, Italian Senate; former Chief of Staff of the Army

Giuseppe Carta, Director D.P.S., ENEL, Rome

Guy Caruso, Director, Office of Non-Member Countries, International Energy Agency, Paris

Fausto Cereti, Chairman and Chief Executive Officer, Alitalia, Rome

Umberto Colombo, Chairman, LEAD Europe, Rome; former Italian Minister for Universities, Science and Technology

Philippe Coste, Director for European Economic Cooperation, Ministry of Foreign Affairs, Paris

Yves Cousin, Executive Vice President Head of the Engineering and Construction Division, Electricité de France (French Electricity Board), Paris

Wilfried Czernie, Director, Ruhrgas, Essen

Thierry Dujardin, Executive Deputy Director, Division for International Affairs, Commissariat à l'Energie Atomique (French Atomic Energy Commission), Paris

Tim Eggar, Member of the British Parliament; Minister for Energy

Christoph Eitner, Director, Energy Research Department, German Federal Ministry for Education, Sciences, Research and Technology, Bonn

Maren Ernst-Vogel, Mineralölwirtschaftsverband (Oil Industrial Federation), Bonn

Ugo Farinelli, Director of Studies, ENEA, Rome

John Ferriter, Deputy Executive Director, International Energy Agency, Paris

Kenneth Friedman, Head of Energy Technology Policy Division, International Energy Agency, Paris

Tristan Garel-Jones, Member of British Parliament; former Minister of State at the Foreign Office (European Affairs)

Sergio Garribba, Director of the Energy Department, ENEA, Rome

Helmut Giesecke, WSA/Deutscher Industrie and Handelstag (DIHT), Bonn

John Gilbert, Member of British Parliament; former Treasury, Transport and Defense Minister; Chairman of John Gilbert and Associates, London

Roland Götz, BIOst, Cologne

Antoine Guéroult, Deputy Director General for Energy and Raw Materials, Ministry of Industry, Paris

Marcello Guidi, Chairman, ISPI, Milan; former Ambassador of Italy

Erwin Häckel, German Society for Foreign Policy (DGAP), Bonn

Wolf Häfele, Rossendorf Nuclear Research Centre, Germany

Paul Haseldonckx, DEMINEX, Essen

Rolf Hempelmann, Member of the German Bundestag

Charles Henderson, Deputy Secretary for Energy, Department of Trade and Industry, London

Petra Holtrup, Jülich Nuclear Research Centre, Germany

Wolfgang Ischinger, Director for Political Affairs, German Federal Ministry of Foreign Affairs

Sir Michael Jenkins, Vice Chairman, Kleinwort Benson Group, London; former British Ambassador

Reimut Jochimsen, President, Central Bank of Northrhine-Westphalia, Düsseldorf; Member of the Central Bank Council of the Deutsche Bundesbank

Klaus Johanssen, Energy Department, German Federal Economics Ministry, Bonn

Hans Kausch, Head of Non-Member Countries Division, Europe, Middle East and Africa, International Energy Agency, Paris

Malcolm Keay, Division Head for Alternative Energy Resources, International Energy Agency, Paris

Guido Knoff, Economics Council, CDU Party, Bonn

Hans Jürgen Koch, Director, Energy Technology, Research and Development, International Energy Agency, Paris

Otto Graf Lambsdorff, Member of the German Bundestag; Honorary Chairman and Chief Economic Spokesman, Free Democratic Party; former Federal Minister of Economy

Werner Lamby, President, German Society for Foreign Policy (DGAP), Bonn

Franz Lamprecht, Energiewirtschaftliche Tagesfragen, Düsseldorf

Alan Lee Williams, Director, The British Atlantic Council; former Member of British Parliament

Arrigo Levi, Political Columnist, Corriere della Sera, Rome

Alfonso Limbruno, Chief Executive Officer, ENEL, Rome

Jürgen Louis, VIAG, Bonn

Carlo Mancini, Director, International Relations Department, ENEA, Rome

Claude Mandil, Director General for Energy and Raw Materials, Ministry of Industry, Paris

Karl Manshaus, Secretary-General, Royal Norwegian Ministry of Industry and Energy

Cesare Merlini, Chairman of the Executive Committee, Council for the United States and Italy; Chairman, Institute for International Affairs, Rome John Mitchell, Chairman of the Energy and Environmental Programme, The Royal Institute of International Affairs, London

Gian Marco Moratti, President, Unione Petrolifera, Rome; President, Saras-Raffinerie Sarde, Milan

Friedemann Müller, Stiftung Wissenschaft und Politik, Ebenhausen

Sir Edwin Nixon, Deputy Chairman, National Westminster Bank, London

Sean O'Dell, Head of Economics, Statistics and Information Systems, International Energy Agency, Paris

Takashi Okano, Office of Energy Technology, Research and Development, International Energy Agency, Paris

Gerhard Ott, World Energy Council, Essen

Sir Michael Palliser, Vice Chairman, Samuel Montagu and Company, London; former British Permanent Under-Secretary of State, Foreign and Commonwealth Office

Arne Paulson, Special Assistant to the Deputy Executive Director, International Energy Agency, Paris

Mark Pellew, Foreign and Commonwealth Office, London

Elizabeth Pond, Writer, Bonn

Robert Priddle, Executive Director, International Energy Agency, Paris Alexander Rahr, German Society for Foreign Policy (DGAP), Bonn Stefan Reindl, VEBA, Düsseldorf

Paul Révay, European Director, Trilateral Commission

Alfred Richmann, Deutscher Industrie und Handelstag (DIHT), Bonn

Derek Riley, Chief Economist, Corporate Planning, Elf Aquitaine, Paris

Ettore Rossini, Director, General Directorate of Energy, Italian Ministry of Industry, Trade and Crafts

Walter Sandtner, Head of Division for Renewable Energies, German Federal Ministry for Education, Sciences, Research and Technology

Tore Sandvold, Director-General, Ministry of Industry and Energy, Norway

François Sauzey, European Press Officer, Trilateral Commission, Paris Reinhard Schlagintweit, German Society for Foreign Policy (DGAP), Bonn

Dieter Schmitt, Professor, University of Essen

Peter Schutterle, Secretary General, The Energy Charter Treaty, Brussels Giuseppe Sfligiotti, Chairman, Italian Chemical Society

Peter Shore, Member of British Parliament

Robert Skinner, Director, Office of Long-Term Energy Policy, International Energy Agency, Paris

Tohihiro Taniguchi, Director, Office of Oil Markets and Emergency Preparedness, International Energy Agency, Paris Sir Peter Tapsell, Member of British Parliament

Michel Valais, Senior Energy Advisor, Corporate Planning, Elf Aquitaine, Paris

Yves Vandenboomgaerde, Executive Deputy Director, Division of Strategy and Evaluation, Commissariat à l'Energie Atomique (French Atomic Energy Commission), Paris

Ernesto Vellano, Secretary-Treasurer of the Italian Group of The Trilateral Commission, Turin

Angelika Volle, Executive Editor, Internationale Politik, German Society for Foreign Policy (DGAP), Bonn

Karel Vosskühler, Dutch Embassy, Bonn

Lord Wakeham, Former British State Secretary for Energy; Chairman of the Press Complaints Commission, London

Hans Christian Winkler, Economics Department, German Federal Ministry of Foreign Affairs

Giovan Battista Zorzoli, Chief Executive Officer, T & M

Japanese Consultations

Kazuya Fujime, Managing Director, Institute of Energy Economics, Japan

Wataru Fukazawa, Director, Japan National Oil Company

Tomoo Funaki, Managing Director, Electric Power Development Corporation, Japan

Shigeo Hiramatsu, Professor, Kyorin University

Funao Kifune, Assistant Professor, Nagoya University

Kiyoshi Koumura, Director and General Manager, Industrial Planning, Idemitsu Kosan Company

Hideo Matsui, Director, Nuclear Industry, Ministry of International Trade and Industry

Naoya Minami, Managing Director, Tokyo Electric Power Company

Kazuhisa Mori, Managing Director, Japan Atomic Industrial Forum

Takayuki Nagano, Director for International Cooperation, Atomic Energy Bureau, Science and Technology Agency

Tsuruhiko Nannbu, Professor, Gakushuin University

Takashi Nonouchi, Senior Managing Director, Hitachi; former Director General for Resources and Energy, Ministry of International Trade and Industry

Kazuo Shimoda, Managing Director, Committee for Energy Policy Promotion

Shunji Shimoyama, Auditor and former Managing Director, Japan Atomic Power Company

Mamoru Sueda, Executive Vice President, Committee for Energy Policy Promotion

Kenichi Suganuma, Director, International Energy, Ministry of Foreign Affairs

Keigo Takahashi, Director, Nippon Steel Corporation

Tosihide Takesita, TECNOVA

Masaru Taketomi, Director, Industrial Bank of Japan

Tsutomu Toichi, Director General for Research, Institute of Energy Economics, Japan

Toshiaki Ushijima, Professor, Nagoya City University; former Advisor to President, Mitsubishi Oil Company

Masao Wakazono, Managing Director, Sakharin Oil Storage Company

Kenji Yamaji, Professor, University of Tokyo

Tadashi Yamamoto, Japanese Director, Trilateral Commission

Table of Contents

	Introduction: The Three Faces of Energy Security			1
I.	Persian Gulf Exporters and International Markets			6
	A.	Persian Gulf Exporters and World	6	
	D	Oil Supplies The World Economy's Dependence on Oil	10	
		The World Economy's Dependence on Oil More Producers, in a Traditional		
		Commodity Market	11	
	D.	The Integration of Interests	12	
II.	Coord	inated Responses to Emergency Situations		13
	A.	The First Oil Shock	14	
	B.	The Second Oil Shock and the Beginning		
		of the Iran-Iraq War	15	
	C.	The "Tanker War" and the Gulf War	16	
	D.	Looking to the Future	16	
III.	Securi	ty in the Persian Gulf		18
	A.	Arab-Israeli Peace Process	19	
	B.	External Threats	19	
	C.	Internal Threats	21	
IV.	Trilate	ral Countries: Governments and Markets		23
	Α	North America	25	
		European Union Countries	31	
		Japan	35	
V.	Energy	/ Investment in Russia, Central Asia,		
•	and the Caucasus			39
		Overview of Russian Energy Sector	39	
	В.	Foreign Investment in the Russian		
	·>=	Energy Sector	42	
	C.	Pipeline Politics in Central Asia and		
		the Caucasus	44	

VI. Energy Dynamics of Rapidly Industrializing Countries		50		
A. Energy Infrastructure ExpansionB. Energy Developments in ChinaC. Energy Developments in East Asia	53 56 60 63			
D. Other Regions	63	67		
VII. Nuclear Energy and Long-Term Energy Security				
A. United States	69			
B. Canada	72			
C. OECD Europe	73			
D. Japan	76			
E. China and Developing East Asia	79			
F. Central and Eastern Europe and				
the Former Soviet Union	82			
VIII. The Environmental Challenge				
A. Global Climate Change	86			
B. Acid Deposition	89			
C. Urban Air Pollution	93			
D. Medium-Term and Long-Term				
Technological Options	96			
Summary of Policy Conclusions		100		
* * *				
Appendix A: Energy Charter Treaty 11				
Appendix B: Shared Goals, International Energy Agency				
Statement of Ministers, June 1993				
Appendix C: Description of the GEMS Global				
Energy Supply and Demand Model		115		