

WORLD ENERGY ISSUES & POLICIES

PROCEEDINGS OF THE FIRST
OXFORD ENERGY SEMINAR

EDITED BY
ROBERT MABRO

World Energy Issues and Policies

**Proceedings of the First Oxford Energy Seminar
(September 1979)**

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The Oxford Energy Seminar forms part of the education and research that St. Catherine's College sponsors and accommodates during University vacation. It is a fully residential, educational conference designed for government officials, industrialists, managers and other professionals engaged in the field of energy. Its objectives are: to enhance the professional qualifications of participants; to improve the understanding of forces shaping the environment in which future investment and policy decisions will be made; to provide an opportunity for close contact and privileged debate between participants from petroleum exporting and importing countries.

The Oxford Energy Seminar is co-sponsored by OPEC and OAPEC. It ensures a balance among speakers and participants between nationals of petroleum exporting and importing countries.

The first Oxford Energy Seminar was held on 3rd-14th September 1979 and involved fifty-three participants and forty speakers. The Seminar is organized by a Board of Management consisting of the Secretary General of OPEC, the Secretary General of OAPEC, Mr. Wilfrid Knapp and Mr. Robert Mabro.

All the views expressed in this book are those of the respective authors, and do not necessarily reflect those of the governments, companies or institutions to which they belong. Nor do they necessarily reflect the views of the management of the Oxford Energy Seminar or of its sponsors.

ABBREVIATIONS, SYMBOLS AND UNITS

AGR	Advanced gas-cooled reactor
b	Barrel
B	Billion
Bcf	Billion cubic feet
b/d	Barrel per day
BNOC	British National Oil Company
boe	Barrel of oil equivalent
Btu	British thermal unit
BTX	Benzene, Toluene, Xylenes
BWR	Boiling water reactor
c	Velocity of light
CA	Communist area
CFP	Compagnie Française des Pétroles
CIA	Central Intelligence Agency (US)
CIEC	Conference on International Economic Co-operation
c.i.f.	Cost, insurance and freight
DAC	Development Assistance Committee (OECD)
DMT	Dimethyl terephthalate
e	Electronic charge
E	Energy (Physics)
EDC	Ethylene dichloride
EEC	European Economic Communities
ENI	Ente Nazionale Idrocarburi
FAO	Food and Agriculture Organization
f.o.b.	Free on board
GDP	Gross domestic product
GDR	German Democratic Republic
GNP	Gross national product
GRC	Gas Future Requirements Committee (US)
GRP	Gross regional product
GW	Gigawatt
GWe	Gigawatt (electricity)
h	Planck's constant
HDPE	High density polyethylene
HTGR	High temperature gas-cooled reactor
I	Intensity (electricity)

IBRD	International Bank for Reconstruction and Development, World Bank
IEA	International Energy Agency
IGAT	Iran gas trunkline
IIASA	International Institute for Applied Systems Analysis (Austria)
INFCE	International Fuel Cycle Evaluation
K	Kelvin (thermodynamic temperature)
Kcal	Kilocalories
Kgoe	Kilogram of oil equivalent
KWe, kWe	Kilowatt (electricity)
KWh, kWh	Kilowatt hour
λ	Wave length
LCC	Large crude carrier
LDC	Less developed countries
LDPE	Low density polyethylene
LMFBR	Liquid metal fast-breeder reactor
LNG	Liquefied natural gas
LOFT	Loss of fluid test
LP	Linear programming
LPG	Liquefied petroleum gas
LWR	Light water reactor
M	Million
M b/d	Million barrels per day
Mcf	Million cubic feet
Mcf/d	Million cubic feet per day
MNC	Multinational (oil) corporation
MSA	Most seriously affected countries
Mtce	Million tons of coal equivalent
Mtoe	Million tons of oil equivalent
MVC	Monovinyl chloride
MW	Megawatt
NGL	Natural gas liquids
NIOC	National Iranian Oil Company
NOC	National Oil Company
NOPEC	Non-OPEC developing countries
NPC	National People's Congress (China)
O	Oxygen
OAPEC	Organization of Arab Petroleum Exporting Countries
ODA	Official development aid
OECD	Organization for Economic Co-operation and Development
OIDC	Oil-importing developing countries
OPEC	Organization of the Petroleum Exporting Countries
OTEC	Ocean thermal energy conversion
P	Power (physics)
PP	Polypropylene
p.a.	Per annum
PIW	<i>Petroleum Intelligence Weekly</i>

xii *Abbreviations, Symbols and Units*

PJ	Petajoule
Pu	Plutonium
PVC	Polyvinyl chloride
PWR	Pressurised water reactor
R&D	Research and development
RD and D	Research, development and demonstration
SBM	Seabed moors
SBR	Styrene butadiene rubber
t	Ton, tonne
T	Temperature
tce	Tons coal equivalent
tcf	Trillion cubic feet
Th	Thorium
TMI	Three Mile Island
TPA	Terephthalic acid
TW	Terawatt
TWe	Terawatt (electricity)
TW yr	Terawatt year
U	Uranium
UAE	United Arab Emirates
UKCS	United Kingdom continental shelf
UKOOA	United Kingdom Offshore Operators Association Ltd.
UNCTAD	United Nations Conference for Trade and Development
UNIDO	United Nations Industrial Development Organization
UV	Ultra violet
VCM	Vinylchloride monomer
WOCA	World outside Communist areas

INTRODUCTION

Robert Mabro

The papers collected in this book were presented at the Oxford Energy Seminar, held at St. Catherine's College in September 1979. The Seminar provided a restricted number of participants with a privileged opportunity and a structured framework for a debate on the present problems and prospects of world energy. One distinctive feature of the Seminar was the balanced composition between nationals of oil-consuming and oil-producing countries. Another feature was the involvement of some 40 leading personalities — ministers, senior civil servants, industrialists and academics — as chairmen of sessions, speakers and panelists. The statements made at the conference were authoritative; and the dialogue, established in the formal sessions and continued late in the night in the College bar, was constructive.

The purpose of this book is to present to a wider audience a set of papers which survey a broad range of complex energy issues, the papers which formed the backbone of the Seminar debates. The book embraces a variety of views, and it is hoped that their publication side by side will enable the reader to gain a better understanding of the positions and objectives of parties from a different background, of approaches and interests which he may not share. In some way, the book, like the Seminar, may thus contribute to the bridging of gaps between the perceptions and attitudes of oil consumers and producers, and improve the chances of success of any future formal dialogue which Governments sooner or later will have to initiate.

The objective may thus be construed as political. But I have no apologies to offer, however disturbing or distasteful the thought of politics may be to many fellow academicians. The energy problem is, in the final analysis, political. Its solution — a solution on which the health of the world economy and the welfare of society in the next thirty years so crucially depend — is not hindered by technological difficulties, nor by a lack of ideas on how to design appropriate economic policies. The technology required for the

development of alternative sources of energy to oil is largely available; and engineers and scientists when provided with adequate resources rarely fail to produce new technological answers. Further, good energy policies can and have been conceived on paper. The shambles in which energy policy finds itself in the major industrialised countries is almost entirely attributable to powerful conflicts of interests between various constituencies in these countries which Governments find difficult to reconcile. Working for a solution of the energy crisis is, for all parties concerned, both domestically in each country and internationally between developed and developing countries, a matter of political will, a will that may be enhanced by improvements in the understanding of the energy problem.

The book is structured in seven parts. Parts I to III review recent developments and current problems of energy. Parts IV to VII consider the future — the prospects and the problems likely to challenge decision-makers in the medium and long term — and focus more explicitly on issues of policy.

The economic concepts of supply, demand and institutional structure provide a convenient framework for Parts I to III. In Parts IV to VII speculation about the future is followed by papers on the particular policy problems of four sets of nations: industrialized, Communist, non-oil producing, and oil-exporting nations of the third world. These distinctions, however, should not be stretched too far. There is a strong unity of themes in the book; and most, if not all, of the papers involve incursions into the future and significant discussions of policy. The reader should note, for example, that most chapters of Part I (mainly Chapters 2, 4, and 5 to 7), and all chapters of Part II, pose the energy issues faced by the industrialized, oil-importing world, namely those of alternative sources of supply and conservation in use.

Gaps are inevitable in such collections of papers. The reader will probably recognize that the attempt to achieve comprehensive coverage has gone very far. Yet, I would have liked to include a paper on the environment to balance the views presented in Chapter 6, which deals with nuclear energy. Further, a paper by a senior official from a major OECD country, preferably the US, would have been welcome. But many official speakers at the Seminar elected, and were indeed encouraged, to talk off the record. What was gained then in candour and substance more than compensate for what is lost in this book.

The long discussions which followed the presentation of the papers are not published here, simply because they were not

minuted. Privilege is essential for a frank dialogue. However, I have attempted in Chapter 29 to summarise the conclusions of the debate and to identify areas where agreement was reached and issues on which differences of opinion remained irreducible.

This book has not been heavily edited, but a measure of formal consistency in the presentation has been sought. A different editorial policy would have involved long publication lags, and may have robbed the papers of their original flavour. In a field where opinions, misunderstandings, and prejudices, alas, tend to prevail, it is essential to respect the integrity of authoritative statements, both in substance and in style. And in any sincere attempt at understanding somebody else's position much can be learned from the way in which the different point of view is put.

Having briefly introduced the objectives, structure and features of this publication I would like to turn to the very agreeable task of recording expressions of gratitude. The contributors to the book, who kindly and promptly authorised the publication of their papers or prepared revised versions, have made the Editor's task easy and pleasurable. Wilfrid Knapp provided well-humoured support throughout the preparation of the book, as he did for long months before when we jointly organized the Seminar. Judy Mabro and Ann Davison did valuable editorial work. Acknowledgements are due to the Editors of *Petroleum Intelligence Weekly* and of *Futures* for permission to reproduce in this book papers originating or relating to the Seminar which they managed to publish before us.

Finally I would like personally to thank Mr. Ali Attiga, Mr. René Ortiz, the speakers and the participants of the Seminar. They made it all worthwhile. Without their encouragement and moral support I would have not been able to marshall the energy needed to put together this book.

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Part I

ENERGY SUPPLY