

Energy for the Year 2000

ETTORE MAJORANA INTERNATIONAL SCIENCE SERIES

Series Editor:

Antonino Zichichi

European Physical Society

Geneva, Switzerland

(PHYSICAL SCIENCES)

Volume 1 INTERACTING BOSONS IN NUCLEAR PHYSICS

Edited by F. Iachello

Volume 2 HADRONIC MATTER AT EXTREME ENERGY DENSITY

Edited by Nicola Cabibbo and Luigi Sertorio

**Volume 3 COMPUTER TECHNIQUES IN RADIATION TRANSPORT
AND DOSIMETRY**

Edited by Walter R. Nelson and T. M. Jenkins

**Volume 4 EXOTIC ATOMS '79: Fundamental Interactions and Structure
of Matter**

Edited by Kenneth Crowe, Jean Duclos, Giovanni Fiorentini, and
Gabriele Torelli

Volume 5 PROBING HADRONS WITH LEPTONS

Edited by Giuliano Preparata and Jean-Jacques Aubert

Volume 6 ENERGY FOR THE YEAR 2000

Edited by Richard Wilson

Energy for the Year 2000

Edited by

Richard Wilson

Harvard University
Cambridge, Massachusetts

Plenum Press · New York and London

Library of Congress Cataloging in Publication Data

International School of Energetics, 3d, Erice, Italy, 1979.

Energy for the year 2000.

(Ettore Majorana international science series: Physical sciences; 6)

"Proceedings of the Third International School of Energetics, held at the Ettore Majorana Center for Scientific Culture, Erice, Sicily Italy, September 1–11, 1979."

Includes index.

1. Power resources—Congresses. I. Wilson, Richard, 1926-

II. Title. III. Series.

TJ163.15.I567 1979

333.79

80-18623

ISBN-13: 978-1-4613-3155-1 e-ISBN-13:978-1-4613-3153-7

DOI: 10.1007/978-1-4613-3153-7

Proceedings of the Third International School of Energetics, held at the Ettore Majorana Center for Scientific Culture, Erice, Sicily, Italy, September 1–11, 1979.

© 1980 Plenum Press, New York
Softcover reprint of the hardcover 1st edition 1980
A Division of Plenum Publishing Corporation
227 West 17th Street, New York, N.Y. 10011

All rights reserved

No part of this book may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, microfilming, recording, or otherwise, without written permission from the Publisher

PREFACE

The Third International School on Energetics was devoted to the subject of Energy for the Year 2000. By this title we hoped to avoid discussion of such matters as the role of OPEC in raising oil prices. In one sense, therefore, our task was made easier; we could merely look into our crystal balls.

The choice of lecturers was made with the idea that no reasonable source of energy can be overlooked. We omitted detailed lectures on oil and natural gas because we took it as a given fact that we would continue to use as much of these fuels as we can get at a reasonable price.

To give us an overview we started the School by discussing U.S. energy policy and possible U.S. energy scenarios. As might be expected, there was some disagreement about the current energy program in the U.S., but little disagreement about the facts presented.

Various energy options were examined. They included nuclear power and the breeder reactor where the lecturers focused primarily on controlling various problems inherent in using fission power for energy production. There were lectures on coal--a source which will, hopefully, be used in more and more environmentally superior ways, and two sets of talks on solar energy--one a general survey and the other a detailed discussion of photovoltaics. The talks on solar energy were realistic about the current state-of-the-art and very optimistic for long-term research and application. Energy production using waves was a topic scheduled but was not presented due to illness. However, the lectures do appear in this volume as originally prepared.

Richard Wilson

CONTENTS

Energy Futures: Strategies for the U.S.A.	1
Chauncey Starr	
Solar Photovoltaic Energy Conversion	15
H. Ehrenreich	
Solar Energy: The Quest and the Question	51
Melvin K. Simmons	
Energy from the Sea Waves	121
A. Blandino, A. Brighenti, and P. Vielmo	
The Role of Electric System in the Diversifi- cation of Energy Sources	149
Luigi Paris	
United States Nuclear Energy and Non- Proliferation Policy	213
Daniel P. Serwer	
United States Energy Policy	219
Daniel P. Serwer	
Energy Scenarios for the U.S.	227
Richard Wilson	
Fast Breeder Reactors - Lecture 1	251
W. Marshall and L.M. Davies	
Fast Breeder Reactors - Lecture 2	263
W. Marshall and L.M. Davies	
Fast Breeder Reactors - Lecture 3	275
W. Marshall and L.M. Davies	
Fast Breeder Reactors - Lecture 4	287
W. Marshall and L.M. Davies	

Fast Breeder Reactors - Lecture 5	303
W. Marshall and L.M. Davies	
How Reactor Safety is Assured in the United States	315
Robert J. Budnitz	
The Role of Quantitative Risk Assessment in Reactor Safety	325
Robert J. Budnitz	
Coal Conversion: Advanced Technologies	335
Burkhard Bock	
List of Lecturers	389
List of Participants	389
Index	391