

# **Energy Disclosed: Abundant Resources and Unused Technology**

A book on energy technology and options available to make our country stronger and the world a better place.

By

Galen J. Suppes, Ph.D., P.E. (Associate Professor)

Truman S. Storvick, Ph.D., P.E. (Professor Emeritus)

Department of Chemical Engineering

The University of Missouri-Columbia

2004



Renewable Alternatives, LLC

Publishers

Columbia, Missouri U.S.A.



Renewable Alternatives, LLC  
410 S. Sixth St.  
Suite 203  
Columbia, MO 65211  
<http://www.renewablealternatives.com>

COPYRIGHT © 2004 by Galen J. Suppes and Truman S. Storvick

All rights reserved.

All reproductions must properly reference this work and acknowledge the authors.

ISBN 0-9749522-3-0 1a

Suppes, Galen J. and Truman S. Storvick

Energy disclosed: abundant resources and unused technology/Galen J.  
Suppes, Truman S. Storvick.---1<sup>st</sup> edition

Printed in the United States of America

1<sup>st</sup> printing, Edition 1a.

# CONTENTS

CONTENTS.....	iii
Preface .....	v
Organization of the Book.....	vi
Acknowledgements.....	vii
CHAPTER I. INTRODUCTION.....	1
A. Energy in Today’s World.....	1
B. Clash of Public Good versus Corporate Status Quo.....	3
CHAPTER II. THE HISTORY OF ENERGY.....	10
A. Energy.....	10
B. Nature’s Methods of Storing Energy.....	11
C. Man’s Interaction with Nature’s Stockpiles and Renewable Energies.....	13
D. Industrial Revolution and Establishment of Energy Empires.....	15
E. Environmental Impact.....	24
F. Energy in Today’s Industrial and Political Arena.....	29
CHAPTER III. ENERGY RESERVES AND RENEWABLE ENERGY SOURCES.....	30
A. Fossil Fuel Reserves.....	30
B. Cosmic History of Fossil Energy Reserves.....	35
C. Nuclear Energy.....	41
D. Recent Solar Energy.....	53
CHAPTER IV. HISTORY OF CONVERSION OF THERMAL ENERGY TO WORK.....	60
A. Use of Thermal Energy.....	61
B. Work and Efficiency in Fuel Cells.....	102
C. Recommended Reading.....	107
CHAPTER V. TRANSPORTATION.....	108
A. Transportation Before Petroleum Fuels.....	108
B. Petroleum Fuels: Their Evolution, Specification, and Processing.....	109
C. Alternative Fuels.....	115
D. Vehicular Fuel Conservation and Efficiency.....	122
E. Conclusions.....	128
CHAPTER VI. PRODUCTION OF ELECTRICITY.....	129
A. History of Production.....	129

B. Recommended Reading.....	141
CHAPTER VII. ENERGY IN HEATING, VENTILATION, AND AIR CONDITIONING.....	142
A. The Heating, Ventilation and Air Conditioning Industry.....	142
B. Air Conditioning.....	147
C. Heating.....	149
D. Peak Load Shifting and Storing Heat.....	151
E. The Role of Electrical Power in HVAC to Reduce Greenhouse Gas Emissions.....	155
F. The Attainable Dream.....	156
CHAPTER VIII. CORPORATE PROFITABILITY VERSUS NATIONAL BENEFIT.....	157
A. Impact of Regulations, Taxes and Social Costs.....	158
B. Corporate Profitability.....	159
C. Taxes and Social Cost.....	164
D. What is Free Trade?.....	170
E. The Real Problem.....	173
CHAPTER IX. Emerging Fuel Technologies and Factors Driving Technology.....	174
A. Politics of Change in the Energy Industry.....	174
B. Cost of Feed Stock Resources.....	175
C. Corporate Lobbying Retrospect.....	179
D. Diversity as a Means to Produce Market Stability.....	181
E. The Details are Important.....	183
F. Environmental Retrospect.....	185
G. Energy Wildcards.....	187
H. Dumping of Farm Commodities and Land Utilization.....	190
I. Global Warming.....	192
CHAPTER X. BY HAPPENSTANCE OR DESIGN.....	194
A. Happenstance or Design.....	197
B. Alternatives Based on 20% ROI.....	198
C. In the Midst of Crisis: The Importing of Crude Oil.....	202
D. Full Circle.....	206
E. Fixing Capitalism, Fixing the Energy Infrastructure.....	208
F. A Bright Future.....	216
G. Extended Implications.....	218
REFERENCES.....	219

You may purchase at:

\$20.00 + S&H

University BookStores  
University of Missouri-Columbia  
573-882-7611

To Return To Outline of Book

<http://www.missouri.edu/~suppesg/book.htm>