

ENERGY EFFICIENCY

Building a Clean, Secure Economy

James L. Sweeney

HOOVER INSTITUTION



SHULTZ-STEPHENSON TASK FORCE ON

Energy Policy



**Precourt Energy
Efficiency Center**
STANFORD UNIVERSITY

HOOVER INSTITUTION PRESS

Stanford University

Stanford, California

Contents

List of Figures and Tables	vii
Foreword by <i>George P. Shultz</i>	ix
Acknowledgments	xiii
Introduction	xv
Chapter 1. The Policy Context for Energy Efficiency	1
Energy Efficiency as an Energy Policy Strategy	2
The Environment	3
Security	4
The Economy	5
Some Terminology: Energy Efficiency, Energy Conservation, Energy Intensity, Energy Productivity	6
Barriers to Energy Efficiency	10
Chapter 2. Energy Efficiency Is All Around Us	15
New or Improved Technologies	16
Lighting	16
Refrigeration	22
Cars and Light Trucks	24
Aircraft	38
Computing	42
Changed Adoption of Energy-Efficient Technologies	44
Building Insulation	44
Other Technologies in Buildings	45
Efficiency in Federal Government Buildings	49
Changed Company Practices	50
Reducing Energy Usage as a Profit/Cost Strategy	50
Data-Driven Industrial Energy Management	52
Airline Capacity Factor Management	54
Behavioral Strategies	60
Commercial Building Retrofits	62
Contracts/Collaborations to Overcome Split Incentive Problems	63
Incentives: Internal Carbon Pricing	70
In Summary	73

Chapter 3. Energy Efficiency and Aggregate Energy Intensity in the United States—1950 through 2014	75
The Pre-Energy-Crisis Period: 1950 to 1973	75
The Energy Crisis: 1973–74	78
Energy-Consumption Growth Expectations during the Early 1970s	83
Energy Use after the 1973–74 Crisis	84
US Domestic Energy Production in the Post-Energy-Crisis Period	91
Domestic Energy Supply and Energy Demand Together	94
Chapter 4. Energy-Efficiency Benefits: Environment and Security	97
Decarbonization of the US Economy	98
US Net Energy Imports	105
Chapter 5. Sectoral Disaggregation of Energy Consumption	111
Industrial, Transportation, Residential, Commercial Sectors	111
Structural Shifts and the Industrial Sector	116
Energy Efficiency and the Rebound Effect	120
Chapter 6. Amplifying Energy Efficiency	127
Information/Labeling/Nudges	127
Changed Energy-Efficiency Regulations	137
Utility Customer-Funded Programs	147
Financial Incentives	150
Energy Research and Development	154
Energy Policy and Advocacy Organizations	158
Chapter 7. Policy Lessons from the Past Forty Years: What Has Led to Increased Energy Efficiency?	163
Going Forward: The President’s Goal	165
Going Forward: Will the President’s Goal Be Met?	168
Going Forward: Will Energy-Efficiency Progress Stop?	173
Appendix A: Conversion Efficiency in Electricity Generation	179
Appendix B: Calculation of Carbon Intensity of Energy Consumption	181
About the Author	185
Shultz-Stephenson Task Force on Energy Policy	187
Index	189