

Table of Contents

ACKNOWLEDGEMENTS	I
WHO PLAYS AND WHO DECIDES: THE STRUCTURE AND OPERATION OF THE COMMERCIAL BUILDING MARKET	III
Introduction	iii
Major Findings	iii
Recommendations	iv
EXECUTIVE SUMMARY	VII
Introduction	vii
Trends that will influence commercial buildings	viii
Decision-making	xi
Target the few to influence the many	xiii
Office sub-market summary	xiii
Retail and service sub-market summary	xv
Lodging sub-market summary	xvi
Food sales and services sub-market summary	xviii
Healthcare sub-market summary	xxi
Warehousing sub-market summary	xxi
Education sub-market summary	xxii
An articulated and integrated approach to energy efficiency in commercial buildings	xxiii
Recommendations	xxiv
TABLE OF CONTENTS	XXIX
LIST OF FIGURES	XXXVII
LIST OF TABLES	XLI
CHAPTER 1 INTRODUCTION	1

Approach	1
The organization and content of this report	4
CHAPTER 2 TRENDS THAT WILL INFLUENCE BUILDINGS IN THE FUTURE	7
Introduction	7
Forces at work	7
Communications	8
Energy	8
Transportation/logistics	9
Biotechnology/nanotechnology	9
Manufacturing	9
Materials	11
Drivers summary	12
The “office” of the future	14
Increased installation of computers and electronics	14
Telecommuting and the rise of home offices	17
Future trends for the office market	19
The corporate headquarters of the future	20
Future trends in the retail market	21
Micro-segmentation	21
Declines in traditional retail segments	22
Growing sophistication of direct selling	22
Shopping as entertainment	23
Changing consumer demographics	25
Growth of on-line shopping	25
Changes in key market players	25
Future trends for restaurants	26
The “Restaurant of the Future”	27
Future trends in food sales	29
Trends in on-line ordering and delivery	29
More upscale displays	30
More emphasis on “health” in groceries	30
Supermarkets as a place of learning	31
Future trends in the healthcare segment	31
Technical advances	31
Shifts in direction	32
Future trends in the lodging market	33
Trends in the warehouse segment	34
Future trends in education	35
Trends in private for-profit post-secondary institutions	35
For-profit institutions	36
Virtual institutions	37

Summary, conclusions, and recommendations	38
CHAPTER 3 DECISION-MAKING IN THE COMMERCIAL BUILDING SEGMENT	41
The decision makers	41
Capital providers	41
Developers	43
Organization of property development companies	43
Developer investment strategies	45
Users	46
Building professionals	49
The traditional architect driven plan/design/build model	49
The design/build model	51
The collaborative process model	52
Community regulatory interests	53
Networks — paths of influence	54
An example of networking analysis	55
The Limited brands	55
A public building cluster	58
Summary and Conclusions	60
CHAPTER 4 A STATISTICAL PROFILE OF THE COMMERCIAL BUILDING MARKET	63
Introduction	63
Definition of commercial space	63
Size and scope of the commercial market in the United States	63
Buildings and square footage	64
Age of buildings	65
Ownership of commercial buildings	66
The value of commercial buildings and construction through time	68
Construction and remodeling in the commercial building sector	69
Types of buildings in the commercial sector	72
Energy use in commercial buildings	74
End-use intensity by sub-market	75
Historical change in energy intensity	76
Energy intensity and floor space in the commercial sub-markets	77

Summary and conclusions	78
CHAPTER 5 THE OFFICE SUB-MARKET	81
An overview of the office sub-market	81
Owner and non-owner occupied office buildings	83
The Leased office sub-sector	85
Classes of office buildings in the commercial lease sub-sectors	87
Volatility in the commercial office sector	89
Energy end-use in the office sub-market	91
Heating and cooling equipment	92
Lighting equipment	94
Efficiency measures	94
Office sub-market summary	95
CHAPTER 6 THE RETAIL AND SERVICE SUB-MARKET	97
Introduction	97
The ownership, size, and age of other retail service establishments	98
Retail and services roles in the U.S. economy	100
The mall sub-markets	102
Mall redevelopment	105
The top firms owning and managing retail properties	106
The top retailers	110
Trends in retail construction	117
The physical characteristics of retail construction	118
Throwaway buildings	121
Energy end-use intensities in retail buildings	122
Energy using technologies in the retail sub-market	122
Efficiency measures in commercial buildings	125
Summary and conclusions	126

CHAPTER 7 THE FOOD SALES AND SERVICES SUB-MARKET	129
Introduction	129
The changing structure of the food sales and services sub-market	131
Market composition	132
Food processing industry	132
Food wholesaling industry	134
Food services	138
Food services demographics	140
Growing rise in takeout foods	141
The players in the market	143
Trends in the restaurant industry	148
Energy end-use intensities and equipment in the food services market	148
Food sales	152
Supermarkets	152
Supermarket buildings and energy use	164
Energy end-use intensities in the food sales sub-market	165
Energy using and saving equipment in the food sales sub-market	166
Convenience stores	168
Summary and conclusions for food sales and services	171
Food processing	171
Food wholesaling	171
Food services	172
Food sales	173
The bottom line	173
CHAPTER 8 THE LODGING SUB-MARKET	175
Introduction	175
Size and scope	175
Segments within the market	175
Ownership and operation	175
Target market or market segment	176
Price segments	176
A second approach to segmentation leisure versus business travel	178
Location	179
The top lodging companies	180
Independently owned hotels	184
Construction trends	187
Operating costs	188
Lodging trends	188

End-use intensities in the lodging market	189
Energy using technologies in the sub-market	190
Lighting equipment	191
Refrigeration equipment	191
Water heating	192
Penetration of efficient technologies	192
Summary and conclusions	193
Segmentation within the industry	193
Construction trends	194
The future	194
Energy end-use	194
The key findings from the lodging industry	195
CHAPTER 9 THE HEALTH CARE SUB-MARKET	197
Inpatient healthcare services in the United States	197
The players in the in-patient healthcare market	199
Outpatient services	201
Changes in the way healthcare is delivered that will influence buildings	206
New construction trends	209
Energy end-use intensities and energy using equipment in the healthcare sub-market	209
Summary and conclusions	214
CHAPTER 10 WAREHOUSE SUB-MARKET	217
Introduction	217
Market composition	217
Changing market conditions	221
The warehouse of the future	221
Energy intensity and energy end-use technologies	222
Summary and conclusions	225
CHAPTER 11 THE EDUCATION SUB-MARKET	227
Introduction	227
The K-12 Market	227
Enrollment patterns	228
Enrollment projections	229
The largest school districts	230
Uses of technology	234
The rise of the virtual K-12 school	236
Trends affecting school energy consumption	237

New school construction	237
Post-secondary education	239
Enrollment patterns in post-secondary institutions	240
Largest colleges and universities in the U.S.	242
Trends in post-secondary education	246
For-profit institutions	247
Virtual institutions	247
Energy end-use in the education sub-market	249
Energy technologies in the sub-market	253
Summary, conclusions, and recommendations	257
CHAPTER 12 SUMMARY AND RECOMMENDATIONS	261
Introduction	261
A heterogeneous market with many sub-markets	261
A key theme	262
Buildings in the future	263
Decision-making	265
Commercial building market overview	266
The office sub-market	267
The retail and service sub-market	268
Food sales and service	270
Food services	270
Food sales	271
The lodging sub-market	273
The healthcare sub-market	275
The warehouse sub-market	277
The education sub-market	278
An articulated and integrated approach to energy efficiency in commercial buildings	279
APPENDIX A 281	
Description of CBECS Building Types	281