

ENERGY MANAGEMENT INFORMATION SYSTEMS: GLOBAL MARKETS



EGY052C
October 2012

Andrew McWilliams
Project Analyst

ISBN: 0-89336-169-0

bcc | Research
Market Forecasting

BCC Research
49 Walnut Park, Building 2
Wellesley, MA 02481
866-285-7215, 781-489-7301
www.bccresearch.com
Custom Reports: carol.laverty@bccresearch.com

TABLE OF CONTENTS

TOPIC	PAGE NO.
CHAPTER 1 INTRODUCTION	1
STUDY GOALS AND OBJECTIVES	1
INTENDED AUDIENCE	2
SCOPE AND FORMAT	2
METHODOLOGY	3
AUTHOR'S CREDENTIALS	3
RELATED PUBLICATIONS	3
BCC ON-LINE SERVICES	3
DISCLAIMER	4
CHAPTER 2 SUMMARY	6
SUMMARY TABLE GLOBAL EMIS MARKET, THROUGH 2017 (\$ MILLIONS)	6
SUMMARY FIGURE GLOBAL EMIS MARKET, 2011-2017 (\$ MILLIONS)	6
CHAPTER 3 OVERVIEW	9
GENERAL DESCRIPTION	9
TECHNOLOGY SEGMENTS	9
DATA ACQUISITION, STORAGE AND PROCESSING HARDWARE	9
SOFTWARE	10
METERS AND SENSORS	10
Smart Meters	10
Other Meters and Sensors	11
USER INTERFACES AND DECISION SUPPORT TECHNOLOGIES	11
ACTUATORS AND CONTROLLERS	12
COMMUNICATIONS	12
SERVICES	12
END USERS	12
MARKET SUMMARY	13
U.S. MARKET	13
TABLE 1 U.S. EMIS MARKET BY TYPE OF EQUIPMENT/SERVICE, THROUGH 2017 (\$ MILLIONS)	13
FIGURE 1 U.S. EMIS MARKET, 2011-2017 (\$ MILLIONS)	14
FIGURE 2 U.S. EMIS EQUIPMENT/SERVICE MARKET SHARES, 2011-2017 (%)	14
TABLE 2 U.S. EMIS MARKET BY END-USER SEGMENT, THROUGH 2017 (\$ MILLIONS)	16
FIGURE 3 U.S. EMIS EQUIPMENT/SERVICE MARKET SHARES, 2011-2017 (%)	16
GLOBAL MARKET	17
TABLE 3 GLOBAL EMIS MARKET BY GEOGRAPHICAL SEGMENT, 2011-2017 (\$ MILLIONS)	17
FIGURE 4 GLOBAL EMIS GEOGRAPHICAL MARKET SHARES, 2011-2017 (%)	17
CHAPTER 4 ECONOMIC AND FINANCIAL ENVIRONMENT	20
SUMMARY	20
UTILITIES	20
AVAILABILITY OF CAPITAL FUNDING	20
FIGURE 5 U.S. SHAREHOLDER-OWNED UTILITIES' CAPITAL EXPENDITURES, 2005-2014 (\$ BILLIONS)	20
INCENTIVES TO INVEST IN SMART GRID TECHNOLOGIES	21

TOPIC	PAGE NO.
<i>FIGURE 6 ANNUAL GROWTH IN U.S. ELECTRICITY CONSUMPTION, 2001-2015 (%)</i>	21
COMMERCIAL/MANUFACTURING FIRMS AND GOVERNMENT	22
COMMERCIAL/MANUFACTURING FIRMS	23
Electricity Prices	23
<i>FIGURE 7 TRENDS IN COMMERCIAL/MANUFACTURING ELECTRICITY PRICES, 2005-2011 (% CHANGE VS. PREVIOUS YEAR)</i>	23
Private Non-Residential Construction	23
<i>FIGURE 8 TRENDS IN VALUE OF U.S. PRIVATE, NON-RESIDENTIAL CONSTRUCTION PUT IN PLACE, 2005-2017 (\$ BILLIONS)</i>	24
Investment Trends	24
<i>FIGURE 9 TRENDS IN VALUE OF U.S. GROSS PRIVATE NON-HOUSEHOLD INVESTMENT, 2005-2012 (\$ BILLIONS)</i>	24
GOVERNMENT	25
Public Construction	25
<i>FIGURE 10 TRENDS IN VALUE OF U.S. PUBLIC NON-INFRASTRUCTURE CONSTRUCTION PUT IN PLACE, 2005-2017 (\$ BILLIONS)</i>	26
Public Investment	26
<i>FIGURE 11 TRENDS IN VALUE OF U.S. PUBLIC INVESTMENT, 2005-2012 (\$ BILLIONS)</i>	26
CONSUMERS	27
RESIDENTIAL ELECTRICITY PRICES	27
<i>FIGURE 12 TRENDS IN RESIDENTIAL ELECTRICITY PRICES, 2005-2012 (% CHANGE VS. PREVIOUS YEAR)</i>	28
ENVIRONMENTAL CONCERNS	28
<i>FIGURE 13 TRENDS IN U.S. PUBLIC CONCERNS ABOUT GLOBAL WARMING, 2001-2012 (%)</i>	28
RESIDENTIAL CONSTRUCTION	29
New Construction	29
<i>FIGURE 14 TRENDS IN U.S. HOUSING STARTS, 2005-2017 (MILLION STARTS)</i>	30
Renovations	30
<i>TABLE 4 REMODELING MARKET INDEX TRENDS, 2005-2012 (RMI)</i>	31
CONSUMER EXPENDITURES	32
<i>FIGURE 15 RECENT TRENDS IN U.S. CONSUMER SPENDING, 2003-2010 (AVERAGE % INCREASE/DECREASE VS. PREVIOUS YEAR)</i>	32
CHAPTER 5 EMIS STANDARDS, LEGISLATION, REGULATION AND POLICY ENVIRONMENT	34
ENERGY MANAGEMENT STANDARDS	34
AMERICAN NATIONAL STANDARD ON ENERGY MANAGEMENT ANSI/MSE 2000-2008	34
ISO 50001 ENERGY MANAGEMENT STANDARD	34
ENERGY AND ENVIRONMENTAL LAWS, REGULATIONS AND POLICIES	34
LEGISLATION	35
Energy Policy Act of 2005	35
Energy Independence and Security Act of 2007	35
Section 1301. Statement of Policy on Modernization of Electricity Grid	36
Section 1302. Smart Grid System Report	36
Section 1303. Smart Grid Advisory Committee and Smart Grid Task Force	36
Section 1304. Smart Grid Technology Research, Development and Demonstration	37
Section 1305. Smart Grid Interoperability Framework	37
Section 1307. State Consideration of Smart Grid	37

TOPIC	PAGE NO.
Section 1308. Study of the Effect of Private Wire Laws on the Development of Combined Heat and Power Facilities	37
Section 1309. DOE Study of Security Attributes of Smart Grid Systems	38
Emergency Economic Stabilization Act of 2008	38
American Recovery and Reinvestment Act of 2009	38
FEDERAL REGULATIONS	38
Rulings Expanding Use of Demand Response	38
Assessment of Demand Response and Advanced Metering 2008	39
Executive Orders	39
Executive Order 13123	39
Executive Order 13423	39
Executive Order 13514	40
Other Federal Programs	40
Federal Energy Management Program	40
Energy Savings Performance Contracts	40
Department of Energy Industrial Technologies Program	41
STATE LEGISLATION AND REGULATION	41
Arizona	41
California	41
Oregon	42
Pennsylvania	42
Texas	43
Vermont	43
CHAPTER 6 EMIS IN OPERATION	45
EMIS IN OPERATION	45
<i>FIGURE 16 EMIS IN OPERATION</i>	46
ENERGY MANAGEMENT CONTROL PROCESS	49
<i>FIGURE 17 ENERGY MANAGEMENT CONTROL PROCESS</i>	49
CHAPTER 7 UTILITY EMIS	54
SUMMARY	54
<i>FIGURE 18 U.S. MARKET FOR UTILITY ENERGY MANAGEMENT INFORMATION SYSTEMS, 2011-2017 (\$ MILLIONS)</i>	54
TECHNOLOGIES	55
DATA ACQUISITION, STORAGE AND PROCESSING HARDWARE	55
METERS AND SENSORS	55
USER INTERFACES	56
<i>TABLE 5 INTERFACE AND DECISION SUPPORT TECHNOLOGIES FOR THE SMART GRID</i>	57
WIRING AND NETWORKING	57
Neighborhood Area Networks	58
<i>TABLE 6 ENABLING TECHNOLOGIES FOR SMART GRID HOME AREA NETWORKS</i>	58
Backbone Communications	58
SUPPLIERS	59
<i>TABLE 7 UTILITY EMIS TECHNOLOGY PROVIDERS</i>	59
MARKET	60
<i>TABLE 8 U.S. MARKET FOR UTILITY EMIS BY TYPE OF TECHNOLOGY, THROUGH 2017 (\$ MILLIONS)</i>	60

TOPIC	PAGE NO.
<i>FIGURE 19 U.S. UTILITY EMIS TECHNOLOGY MARKET SHARES, 2011-2017 (%)</i>	61
DATA ACQUISITION, STORAGE AND PROCESSING HARDWARE	61
<i>TABLE 9 U.S. MARKET FOR UTILITY EMIS IT HARDWARE, THROUGH 2017 (\$ MILLIONS)</i>	61
SOFTWARE	62
<i>TABLE 10 U.S. MARKET FOR UTILITY EMIS SOFTWARE, THROUGH 2017 (\$ MILLIONS)</i>	62
METERS AND SENSORS	62
<i>TABLE 11 U.S. MARKET FOR AUTOMATICALLY READ AND SMART ELECTRIC METERS, THROUGH 2017 (\$ MILLIONS)</i>	63
AMR Meters	63
<i>TABLE 12 U.S. MARKET FOR AMR METERS, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)</i>	63
Smart Meters	64
<i>TABLE 13 U.S. MARKET FOR SMART METERS, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)</i>	64
USER INTERFACES	64
<i>TABLE 14 MARKET FOR INTERFACE AND DECISION SUPPORT TECHNOLOGIES FOR SMART GRID APPLICATIONS, THROUGH 2017 (\$ MILLIONS)</i>	65
WIRING AND COMMUNICATIONS	65
<i>TABLE 15 U.S. MARKET FOR AMR AND SMART GRID COMMUNICATIONS TECHNOLOGIES, THROUGH 2017 (\$ MILLIONS)</i>	65
Neighborhood Area Networks	65
<i>TABLE 16 MARKET FOR SMART GRID NAN COMMUNICATION TECHNOLOGIES, THROUGH 2017 (MILLION CONNECTIONS/\$ MILLIONS)</i>	66
Backbone	66
<i>TABLE 17 MARKET FOR SMART GRID BACKBONE COMMUNICATION TECHNOLOGIES, THROUGH 2017 (\$ MILLIONS)</i>	66
SERVICES	66
<i>TABLE 18 U.S. MARKET FOR EMIS WIRING AND COMMUNICATIONS TECHNOLOGIES USED IN COMMERCIAL/INDUSTRIAL/GOVERNMENT, THROUGH 2017 (\$ MILLIONS)</i>	67
CHAPTER 8 COMMERCIAL/INDUSTRIAL/GOVERNMENT EMIS TECHNOLOGY	69
SUMMARY	69
<i>FIGURE 20 U.S. MARKET FOR COMMERCIAL/INDUSTRIAL/GOVERNMENT ENERGY MANAGEMENT INFORMATION SYSTEMS, 2011-2017 (\$ MILLIONS)</i>	69
TECHNOLOGIES	69
DATA ACQUISITION, STORAGE AND PROCESSING HARDWARE	69
SOFTWARE	70
Analysis and Modeling	70
METERING AND SENSORS	71
USER INTERFACES	71
ACTUATORS AND OUTPUT DEVICES	71
WIRING AND COMMUNICATIONS	72
SUPPLIERS	72
<i>TABLE 19 SUPPLIERS OF EMIS PRODUCTS AND SERVICES TO THE CIG SECTOR</i>	73
MARKETS	73
<i>TABLE 20 U.S. MARKET FOR COMMERCIAL/MANUFACTURING/GOVERNMENT EMIS BY TYPE OF TECHNOLOGY, THROUGH 2017 (\$ MILLIONS)</i>	74
<i>FIGURE 21 U.S. COMMERCIAL/MANUFACTURING/GOVERNMENT EMIS TECHNOLOGY MARKET SHARES, 2011-2017 (%)</i>	75
DATA ACQUISITION, STORAGE AND PROCESSING HARDWARE	75

TOPIC	PAGE NO.
<i>TABLE 21 U.S. CIG MARKET FOR DATA ACQUISITION, STORAGE AND PROCESSING HARDWARE, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)</i>	76
SOFTWARE	76
<i>TABLE 22 U.S. CIG MARKET FOR EMIS SOFTWARE, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)</i>	76
METERS AND SENSORS	76
<i>TABLE 23 U.S. CIG MARKET FOR EMIS METERS AND SENSORS, THROUGH 2017 (\$ MILLIONS)</i>	76
USER INTERFACES	76
<i>TABLE 24 U.S. CIG MARKET FOR EMIS INTERFACE AND DECISION SUPPORT TECHNOLOGIES, THROUGH 2017 (\$ MILLIONS)</i>	77
WIRING AND COMMUNICATIONS	77
<i>TABLE 25 U.S. MARKET FOR EMIS WIRING AND COMMUNICATIONS TECHNOLOGIES USED IN CIG, THROUGH 2017 (\$ MILLIONS)</i>	77
SERVICES	77
<i>TABLE 26 U.S. MARKET FOR EMIS WIRING AND COMMUNICATIONS TECHNOLOGIES USED IN CIG, THROUGH 2017 (\$ MILLIONS)</i>	78
CHAPTER 9 RESIDENTIAL EMIS	80
SUMMARY	80
<i>FIGURE 22 U.S. RESIDENTIAL ENERGY MANAGEMENT INFORMATION SYSTEMS MARKET, 2011-2017 (\$ MILLIONS)</i>	80
TECHNOLOGIES	80
DATA ACQUISITION, STORAGE AND PROCESSING HARDWARE	81
Programmable Communicating Thermostats	81
METERS AND SENSORS	82
USER INTERFACES	82
In-Home Displays	82
Web-Based Interfaces	83
ACTUATORS AND OUTPUT DEVICES	83
Remote Actuators	83
Integrated Actuators	83
Plug-in Actuator	83
WIRING AND NETWORKING	84
SUPPLIERS	84
<i>TABLE 27 PROVIDERS OF AUTOMATED HOME ENERGY MANAGEMENT SYSTEMS, DEVICES AND RELATED TECHNOLOGIES</i>	84
MARKETS	85
<i>TABLE 28 U.S. RESIDENTIAL EMIS EQUIPMENT AND SERVICES MARKET, THROUGH 2017 (\$ MILLIONS)</i>	85
<i>FIGURE 23 U.S. RESIDENTIAL ENERGY MANAGEMENT INFORMATION SYSTEMS MARKET SEGMENTS, 2011-2017 (%)</i>	85
DATA ACQUISITION, STORAGE AND PROCESSING HARDWARE	86
<i>TABLE 29 U.S. MARKET FOR PROGRAMMABLE COMMUNICATING THERMOSTATS METERS, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)</i>	87
METERS AND SENSORS	87
<i>TABLE 30 MARKET FOR RESIDENTIAL ENERGY CONSUMPTION MONITORING SENSORS, THROUGH 2017 (\$ MILLIONS)</i>	88
USER INTERFACES	88

TOPIC	PAGE NO.
<i>TABLE 31 U.S. MARKET FOR HOME ENERGY MANAGEMENT INTERFACES, THROUGH 2017 (\$ MILLIONS)</i>	88
In-Home Displays	88
<i>TABLE 32 MARKET FOR DEDICATED IN-HOME ENERGY DISPLAYS, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)</i>	89
Web-Based Interfaces	89
<i>TABLE 33 MARKET FOR WEB-BASED ENERGY CONSUMPTION MONITORING DEVICES*, THROUGH 2017 (\$ MILLIONS)</i>	90
ACTUATORS AND OUTPUT DEVICES	90
<i>TABLE 34 U.S. MARKET FOR REMOTE APPLIANCE ACTUATORS, THROUGH 2017 (\$ MILLIONS)</i>	90
Integrated Actuators	90
<i>TABLE 35 MARKET FOR HOME ENERGY MANAGEMENT INTEGRATED ACTUATORS, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)</i>	91
Plug-in Actuators	91
<i>TABLE 36 U.S. MARKET FOR HOME ENERGY MANAGEMENT PLUG-IN ACTUATORS, THROUGH 2017 (\$ MILLIONS)</i>	92
WIRING AND NETWORKING	92
<i>TABLE 37 U.S. MARKET FOR HOME ENERGY AUTOMATION WIRING AND NETWORKING, 2011-2017 (\$ MILLIONS)</i>	92
CHAPTER 10 TRANSPORTATION EMIS	94
SUMMARY	94
<i>FIGURE 24 U.S. MARKET FOR TRANSPORTATION EMIS, 2011-2017 (\$ MILLIONS)</i>	94
TECHNOLOGIES	94
SUPPLIERS	95
<i>TABLE 38 SUPPLIERS OF TRANSPORTATION EMIS EQUIPMENT AND SERVICES</i>	95
MARKETS	95
<i>TABLE 39 U.S. TRANSPORTATION ENERGY MANAGEMENT INFORMATION SYSTEMS MARKET, THROUGH 2017 (\$ MILLIONS)</i>	96
<i>FIGURE 25 U.S. TRANSPORTATION ENERGY MANAGEMENT INFORMATION SYSTEMS MARKET SEGMENTS, 2011-2017 (%)</i>	97
CHAPTER 11 INTERNATIONAL ASPECTS	99
GLOBAL ECONOMIC AND FINANCIAL ENVIRONMENT	99
GDP TRENDS	99
<i>FIGURE 26 TRENDS IN WORLD GDP, 2007-2013 (ANNUAL PERCENTAGE CHANGE)</i>	99
TRENDS IN ELECTRICITY CONSUMPTION AND PRICES	100
Electricity Consumption	100
<i>FIGURE 27 PROJECTED GROWTH IN ELECTRICITY CONSUMPTION, THROUGH 2017 (CAGR%)</i>	100
Electricity Prices	101
INVESTMENT TRENDS	102
<i>FIGURE 28 GLOBAL INVESTMENT TRENDS, 2007-2017 (GLOBAL INVESTMENT AS A PERCENTAGE OF GDP)</i>	102
GLOBAL TRENDS IN CONSTRUCTION	103
GLOBAL STANDARDS AND POLICY ENVIRONMENT	103
ENERGY MANAGEMENT STANDARDS	103
National Standards	103
International Standards	104

TOPIC	PAGE NO.
International Organization for Standardization (ISO) Standards	104
<i>TABLE 40 ISO/PC 242 MEMBER COUNTRIES</i>	105
European Union Standards	105
INTERNATIONAL AGREEMENTS	106
United Nations Framework Convention on Climate Change	106
<i>TABLE 41 PARTIES TO THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE</i>	106
The Kyoto Protocol	107
<i>TABLE 42 UNFCCC ANNEX I COUNTRIES</i>	107
2011 Durban Conference	108
LEGISLATION AND REGULATION	108
Australia	108
Canada	109
China	109
Japan	109
South Korea	110
Turkey	110
GOVERNMENT STIMULUS PROGRAMS	111
<i>TABLE 43 LARGEST SMART GRID STIMULUS INVESTMENT PROGRAMS BY COUNTRY (\$ BILLIONS)</i>	111
GLOBAL MARKETS	112
<i>TABLE 44 GLOBAL MARKET FOR EMIS EQUIPMENT AND SERVICES BY COUNTRY/REGION, THROUGH 2017 (\$ MILLIONS)</i>	112
<i>FIGURE 29 GLOBAL MARKET FOR EMIS EQUIPMENT AND SERVICES, 2011-2017 (%)</i>	113
<i>TABLE 45 GLOBAL EMIS MARKET BY EQUIPMENT/SERVICE, THROUGH 2017 (\$ MILLIONS)</i>	114
<i>FIGURE 30 GLOBAL EMIS MARKET EQUIPMENT/SERVICE SHARES, 2011-2017 (%)</i>	114
<i>TABLE 46 GLOBAL EMIS MARKET BY END-USER SEGMENT, THROUGH 2017 (\$ MILLIONS)</i>	115
<i>FIGURE 31 GLOBAL EMIS EQUIPMENT/SERVICE MARKET SHARES, 2011-2017 (%)</i>	115
CHAPTER 12 APPENDIX A: COMPANY PROFILES	118
EMIS SERVICES	118
ABB LTD.	118
AMERESCO INC.	118
ECOVA	118
BLACK & VEATCH	119
ENERWISE GLOBAL TECHNOLOGIES INC.	119
GE ENERGY	119
HEWLETT-PACKARD CO.	119
HITACHI CONSULTING CORP.	120
NAVIGANT CONSULTING INC.	120
N.V. NUON	120
PEPCO ENERGY SERVICES INC.	120
PJM INTERCONNECTION LLC	120
PROLIANCE ENERGY LLC	121
TETRA TECH EM INC.	121
U.S. ENERGY SERVICES INC.	121
WESTINGHOUSE ELECTRIC LLC	121
EMIS EQUIPMENT AND SOFTWARE	122
ADVANCED TELEMETRY LLC	122

TOPIC	PAGE NO.
AGILEWAVES INC.	122
ALLEGRO DEVELOPMENT CORP.	122
ALSTOM	123
ALVARION INC.	123
AMBIENT CORP.	123
ATMEL CORP.	124
BADGER METER INC.	124
BPL GLOBAL LTD.	124
COMVERGE INC.	124
COOPER INDUSTRIES INC.	125
CURRENT GROUP LLC	125
DYNAMIC ENERGY SYSTEMS	126
ECHELON CORP.	126
ECOBEE	126
ELSTER LLC	126
EMBER CORP.	127
EMETER CORP.	127
E-MON LP	127
ENERGATE INC.	128
ENERGENO LTD.	128
ENERGYICT INC.	129
ENERNOC	129
GAINSPAN CORP.	129
GENERAL ELECTRIC CO.	129
GOOGLE.ORG	130
GREEN ENERGY OPTIONS LTD.	130
GREENBOX TECHNOLOGY	130
GRID NET INC.	131
HOME AUTOMATION INC.	131
HONEYWELL AUTOMATION AND CONTROL SOLUTIONS	131
INTERGRAPH CORP.	131
INTERNATIONAL BUSINESS MACHINES	132
ITRON INC.	132
LANDIS+GYR AG	133
LIVEDATA INC.	133
LUCID DESIGN GROUP LLC	133
MAIN.NET POWER LINE COMMUNICATIONS INC.	133
MILSOFT INTEGRATED SOLUTIONS	134
MMB RESEARCH INC.	134
ONZO LTD.	134
PEOPLINET COMMUNICATIONS CORP.	135
POWERIT SOLUTIONS	135
POWERWORLD CORP.	135
RADIO THERMOSTAT COMPANY OF AMERICA	135
ROCKWELL AUTOMATION	136
RUGGEDCOM INC.	136
SATEC INC.	136

TOPIC	PAGE NO.
SCHNEIDER ELECTRIC SA	137
SENSUS METERING SYSTEMS	137
SEQUENTRIC ENERGY SYSTEMS LLC	137
SIEMENS	138
Siemens Building Technologies Ltd.	138
Siemens Building Technologies Inc.	138
Siemens Energy & Automation Inc.	138
SIGMA DESIGNS INC.	138
SIGNATURE ENERGY MANAGEMENT	139
SILVER SPRING NETWORKS	139
SMARTSYNCH	140
SPACE-TIME-INSIGHT	140
TELKONET INC.	140
TENDRIL NETWORKS INC.	141
TOSHIBA CORP.	141
TRILLIANT NETWORKS	141
CHAPTER 13 APPENDIX B: PATENT ANALYSIS	143
<i>TABLE 47 U.S. EMIS PATENTS ISSUED THROUGH SEPT. 20, 2012, BY TECHNOLOGY TYPE (NUMBER OF PATENTS)</i>	143
<i>FIGURE 32 U.S. EMIS PATENT SHARES BY TYPE OF TECHNOLOGY (%)</i>	143
<i>TABLE 48 ASSIGNEES BY NUMBER OF PATENTS (NUMBER OF U.S. EMIS PATENTS ISSUED AS OF SEPT. 1, 2012)</i>	144
<i>TABLE 49 EMIS PATENTS ISSUED THROUGH SEPT. 20, 2012 BY NATIONALITY OF ASSIGNEE (NUMBER OF U.S. EMIS PATENTS ISSUED AS OF SEPT. 1, 2012)</i>	145
<i>FIGURE 33 EMIS PATENTS ISSUED THROUGH SEPT. 20, 2012 BY NATIONALITY OF ASSIGNEE (%)</i>	146

LIST OF TABLES

TABLE HEADING	PAGE NO.
SUMMARY TABLE GLOBAL EMIS MARKET, THROUGH 2017 (\$ MILLIONS)	6
TABLE 1 U.S. EMIS MARKET BY TYPE OF EQUIPMENT/SERVICE, THROUGH 2017 (\$ MILLIONS)	13
TABLE 2 U.S. EMIS MARKET BY END-USER SEGMENT, THROUGH 2017 (\$ MILLIONS)	16
TABLE 3 GLOBAL EMIS MARKET BY GEOGRAPHICAL SEGMENT, 2011-2017 (\$ MILLIONS)	17
TABLE 4 REMODELING MARKET INDEX TRENDS, 2005-2012 (RMI)	31
TABLE 5 INTERFACE AND DECISION SUPPORT TECHNOLOGIES FOR THE SMART GRID	57
TABLE 6 ENABLING TECHNOLOGIES FOR SMART GRID HOME AREA NETWORKS	58
TABLE 7 UTILITY EMIS TECHNOLOGY PROVIDERS	59
TABLE 8 U.S. MARKET FOR UTILITY EMIS BY TYPE OF TECHNOLOGY, THROUGH 2017 (\$ MILLIONS)	60
TABLE 9 U.S. MARKET FOR UTILITY EMIS IT HARDWARE, THROUGH 2017 (\$ MILLIONS)	61
TABLE 10 U.S. MARKET FOR UTILITY EMIS SOFTWARE, THROUGH 2017 (\$ MILLIONS)	62
TABLE 11 U.S. MARKET FOR AUTOMATICALLY READ AND SMART ELECTRIC METERS, THROUGH 2017 (\$ MILLIONS)	63
TABLE 12 U.S. MARKET FOR AMR METERS, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)	63
TABLE 13 U.S. MARKET FOR SMART METERS, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)	64
TABLE 14 MARKET FOR INTERFACE AND DECISION SUPPORT TECHNOLOGIES FOR SMART GRID APPLICATIONS, THROUGH 2017 (\$ MILLIONS)	65
TABLE 15 U.S. MARKET FOR AMR AND SMART GRID COMMUNICATIONS TECHNOLOGIES, THROUGH 2017 (\$ MILLIONS)	65
TABLE 16 MARKET FOR SMART GRID NAN COMMUNICATION TECHNOLOGIES, THROUGH 2017 (MILLION CONNECTIONS/\$ MILLIONS)	66
TABLE 17 MARKET FOR SMART GRID BACKBONE COMMUNICATION TECHNOLOGIES, THROUGH 2017 (\$ MILLIONS)	66
TABLE 18 U.S. MARKET FOR EMIS WIRING AND COMMUNICATIONS TECHNOLOGIES USED IN COMMERCIAL/INDUSTRIAL/GOVERNMENT, THROUGH 2017 (\$ MILLIONS)	67
TABLE 19 SUPPLIERS OF EMIS PRODUCTS AND SERVICES TO THE CIG SECTOR	73
TABLE 20 U.S. MARKET FOR COMMERCIAL/MANUFACTURING/GOVERNMENT EMIS BY TYPE OF TECHNOLOGY, THROUGH 2017 (\$ MILLIONS)	74
TABLE 21 U.S. CIG MARKET FOR DATA ACQUISITION, STORAGE AND PROCESSING HARDWARE, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)	76
TABLE 22 U.S. CIG MARKET FOR EMIS SOFTWARE, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)	76
TABLE 23 U.S. CIG MARKET FOR EMIS METERS AND SENSORS, THROUGH 2017 (\$ MILLIONS)	76
TABLE 24 U.S. CIG MARKET FOR EMIS INTERFACE AND DECISION SUPPORT TECHNOLOGIES, THROUGH 2017 (\$ MILLIONS)	77
TABLE 25 U.S. MARKET FOR EMIS WIRING AND COMMUNICATIONS TECHNOLOGIES USED IN CIG, THROUGH 2017 (\$ MILLIONS)	77
TABLE 26 U.S. MARKET FOR EMIS WIRING AND COMMUNICATIONS TECHNOLOGIES USED IN CIG, THROUGH 2017 (\$ MILLIONS)	78
TABLE 27 PROVIDERS OF AUTOMATED HOME ENERGY MANAGEMENT SYSTEMS, DEVICES AND RELATED TECHNOLOGIES	84
TABLE 28 U.S. RESIDENTIAL EMIS EQUIPMENT AND SERVICES MARKET, THROUGH 2017 (\$ MILLIONS)	85
TABLE 29 U.S. MARKET FOR PROGRAMMABLE COMMUNICATING THERMOSTATS METERS, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)	87
TABLE 30 MARKET FOR RESIDENTIAL ENERGY CONSUMPTION MONITORING SENSORS, THROUGH 2017 (\$ MILLIONS)	88
TABLE 31 U.S. MARKET FOR HOME ENERGY MANAGEMENT INTERFACES, THROUGH 2017 (\$ MILLIONS)	88

TABLE HEADING	PAGE NO.
TABLE 32 MARKET FOR DEDICATED IN-HOME ENERGY DISPLAYS, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)	89
TABLE 33 MARKET FOR WEB-BASED ENERGY CONSUMPTION MONITORING DEVICES*, THROUGH 2017 (\$ MILLIONS)	90
TABLE 34 U.S. MARKET FOR REMOTE APPLIANCE ACTUATORS, THROUGH 2017 (\$ MILLIONS)	90
TABLE 35 MARKET FOR HOME ENERGY MANAGEMENT INTEGRATED ACTUATORS, THROUGH 2017 (MILLION UNITS/\$ MILLIONS)	91
TABLE 36 U.S. MARKET FOR HOME ENERGY MANAGEMENT PLUG-IN ACTUATORS, THROUGH 2017 (\$ MILLIONS)	92
TABLE 37 U.S. MARKET FOR HOME ENERGY AUTOMATION WIRING AND NETWORKING, 2011-2017 (\$ MILLIONS)	92
TABLE 38 SUPPLIERS OF TRANSPORTATION EMIS EQUIPMENT AND SERVICES	95
TABLE 39 U.S. TRANSPORTATION ENERGY MANAGEMENT INFORMATION SYSTEMS MARKET, THROUGH 2017 (\$ MILLIONS)	96
TABLE 40 ISO/PC 242 MEMBER COUNTRIES	105
TABLE 41 PARTIES TO THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE	106
TABLE 42 UNFCCC ANNEX I COUNTRIES	107
TABLE 43 LARGEST SMART GRID STIMULUS INVESTMENT PROGRAMS BY COUNTRY (\$ BILLIONS)	111
TABLE 44 GLOBAL MARKET FOR EMIS EQUIPMENT AND SERVICES BY COUNTRY/REGION, THROUGH 2017 (\$ MILLIONS)	112
TABLE 45 GLOBAL EMIS MARKET BY EQUIPMENT/SERVICE, THROUGH 2017 (\$ MILLIONS)	114
TABLE 46 GLOBAL EMIS MARKET BY END-USER SEGMENT, THROUGH 2017 (\$ MILLIONS)	115
TABLE 47 U.S. EMIS PATENTS ISSUED THROUGH SEPT. 20, 2012, BY TECHNOLOGY TYPE (NUMBER OF PATENTS)	143
TABLE 48 ASSIGNEES BY NUMBER OF PATENTS (NUMBER OF U.S. EMIS PATENTS ISSUED AS OF SEPT. 1, 2012)	144
TABLE 49 EMIS PATENTS ISSUED THROUGH SEPT. 20, 2012 BY NATIONALITY OF ASSIGNEE (NUMBER OF U.S. EMIS PATENTS ISSUED AS OF SEPT. 1, 2012)	145

LIST OF FIGURES

FIGURE TITLE	PAGE NO.
SUMMARY FIGURE GLOBAL EMIS MARKET, 2011-2017 (\$ MILLIONS)	6
FIGURE 1 U.S. EMIS MARKET, 2011-2017 (\$ MILLIONS)	14
FIGURE 2 U.S. EMIS EQUIPMENT/SERVICE MARKET SHARES, 2011-2017 (%)	14
FIGURE 3 U.S. EMIS EQUIPMENT/SERVICE MARKET SHARES, 2011-2017 (%)	16
FIGURE 4 GLOBAL EMIS GEOGRAPHICAL MARKET SHARES, 2011-2017 (%)	17
FIGURE 5 U.S. SHAREHOLDER-OWNED UTILITIES' CAPITAL EXPENDITURES, 2005-2014 (\$ BILLIONS)	20
FIGURE 6 ANNUAL GROWTH IN U.S. ELECTRICITY CONSUMPTION, 2001-2015 (%)	21
FIGURE 7 TRENDS IN COMMERCIAL/MANUFACTURING ELECTRICITY PRICES, 2005-2011 (% CHANGE VS. PREVIOUS YEAR)	23
FIGURE 8 TRENDS IN VALUE OF U.S. PRIVATE, NON-RESIDENTIAL CONSTRUCTION PUT IN PLACE, 2005-2017 (\$ BILLIONS)	24
FIGURE 9 TRENDS IN VALUE OF U.S. GROSS PRIVATE NON-HOUSEHOLD INVESTMENT, 2005-2012 (\$ BILLIONS)	24
FIGURE 10 TRENDS IN VALUE OF U.S. PUBLIC NON-INFRASTRUCTURE CONSTRUCTION PUT IN PLACE, 2005-2017 (\$ BILLIONS)	26
FIGURE 11 TRENDS IN VALUE OF U.S. PUBLIC INVESTMENT, 2005-2012 (\$ BILLIONS)	26
FIGURE 12 TRENDS IN RESIDENTIAL ELECTRICITY PRICES, 2005-2012 (% CHANGE VS. PREVIOUS YEAR)	28
FIGURE 13 TRENDS IN U.S. PUBLIC CONCERNS ABOUT GLOBAL WARMING, 2001-2012 (%)	28
FIGURE 14 TRENDS IN U.S. HOUSING STARTS, 2005-2017 (MILLION STARTS)	30
FIGURE 15 RECENT TRENDS IN U.S. CONSUMER SPENDING, 2003-2010 (AVERAGE % INCREASE/DECREASE VS. PREVIOUS YEAR)	32
FIGURE 16 EMIS IN OPERATION	46
FIGURE 17 ENERGY MANAGEMENT CONTROL PROCESS	49
FIGURE 18 U.S. MARKET FOR UTILITY ENERGY MANAGEMENT INFORMATION SYSTEMS, 2011-2017 (\$ MILLIONS)	54
FIGURE 19 U.S. UTILITY EMIS TECHNOLOGY MARKET SHARES, 2011-2017 (%)	61
FIGURE 20 U.S. MARKET FOR COMMERCIAL/INDUSTRIAL/GOVERNMENT ENERGY MANAGEMENT INFORMATION SYSTEMS, 2011-2017 (\$ MILLIONS)	69
FIGURE 21 U.S. COMMERCIAL/MANUFACTURING/GOVERNMENT EMIS TECHNOLOGY MARKET SHARES, 2011-2017 (%)	75
FIGURE 22 U.S. RESIDENTIAL ENERGY MANAGEMENT INFORMATION SYSTEMS MARKET, 2011-2017 (\$ MILLIONS)	80
FIGURE 23 U.S. RESIDENTIAL ENERGY MANAGEMENT INFORMATION SYSTEMS MARKET SEGMENTS, 2011-2017 (%)	85
FIGURE 24 U.S. MARKET FOR TRANSPORTATION EMIS, 2011-2017 (\$ MILLIONS)	94
FIGURE 25 U.S. TRANSPORTATION ENERGY MANAGEMENT INFORMATION SYSTEMS MARKET SEGMENTS, 2011-2017 (%)	97
FIGURE 26 TRENDS IN WORLD GDP, 2007-2013 (ANNUAL PERCENTAGE CHANGE)	99
FIGURE 27 PROJECTED GROWTH IN ELECTRICITY CONSUMPTION, THROUGH 2017 (CAGR%)	100
FIGURE 28 GLOBAL INVESTMENT TRENDS, 2007-2017 (GLOBAL INVESTMENT AS A PERCENTAGE OF GDP)	102
FIGURE 29 GLOBAL MARKET FOR EMIS EQUIPMENT AND SERVICES, 2011-2017 (%)	113
FIGURE 30 GLOBAL EMIS MARKET EQUIPMENT/SERVICE SHARES, 2011-2017 (%)	114
FIGURE 31 GLOBAL EMIS EQUIPMENT/SERVICE MARKET SHARES, 2011-2017 (%)	115
FIGURE 32 U.S. EMIS PATENT SHARES BY TYPE OF TECHNOLOGY (%)	143
FIGURE 33 EMIS PATENTS ISSUED THROUGH SEPT. 20, 2012 BY NATIONALITY OF ASSIGNEE (%)	146