

|   |    |
|---|----|
| CHAPTER ONE: INTRODUCTION .....                             | 1  |
| STUDY GOALS AND OBJECTIVES.....                             | 1  |
| REASONS FOR COMPLETING THIS STUDY .....                     | 1  |
| INTENDED AUDIENCE.....                                      | 2  |
| SCOPE OF REPORT AND METHODOLOGY .....                       | 2  |
| WORLDWIDE MARKETS.....                                      | 3  |
| <i>TABLE A LIST OF GLOBAL MARKETS CONSIDERED IN THIS</i>    |    |
| <i>STUDY</i> .....  | 3  |
| METHODOLOGY.....  | 3  |
| INFORMATION SOURCES .....                                   | 4  |
| <i>TABLE B RESEARCH INFORMATION SOURCES</i> .....           | 4  |
| ANALYST CREDENTIALS.....                                    | 4  |
| RELATED BCC REPORTS .....                                   | 5  |
| BCC ONLINE SERVICES.....                                    | 5  |
| DISCLAIMER .....  | 5  |
| CHAPTER TWO: EXECUTIVE SUMMARY.....                         | 6  |
| EXECUTIVE SUMMARY.....                                      | 6  |
| <i>SUMMARY TABLE GLOBAL MARKET FOR SOLAR-THERMAL</i>        |    |
| <i>TECHNOLOGIES (\$ MILLIONS)</i> .....                     | 7  |
| <i>SUMMARY FIGURE 1 GLOBAL RESIDENTIAL AND COMMERCIAL</i>   |    |
| <i>ST TECHNOLOGY SALES MARKET: WATER HEATING DETAIL (\$</i> |    |
| <i>MILLIONS)</i> .....                                      | 7  |
| <i>SUMMARY FIGURE 2 GLOBAL RESIDENTIAL AND COMMERCIAL</i>   |    |
| <i>ST TECHNOLOGY SALES MARKET: AIR HEATING DETAIL (\$</i>   |    |
| <i>MILLIONS)</i> .....                                      | 8  |
| CHAPTER THREE: OVERVIEW OF RESIDENTIAL AND COMMERCIAL       |    |
| SOLAR-THERMAL TECHNOLOGIES.....                             | 9  |
| WHAT ARE RESIDENTIAL AND COMMERCIAL SOLAR-                  |    |
| THERMAL TECHNOLOGIES? .....                                 | 9  |
| <i>TABLE 1 SOLAR-THERMAL TECHNOLOGIES CONSIDERED IN</i>     |    |
| <i>THIS REPORT</i> .....                                    | 10 |
| HISTORY OF SOLAR-THERMAL TECHNOLOGY .....                   | 10 |
| UNITED STATES .....   | 10 |
| EUROPE.....   | 11 |
| CHINA .....   | 12 |
| AUSTRALIA.....  | 12 |
| JAPAN .....   | 12 |
| ISRAEL.....   | 13 |
| SOLAR-THERMAL SYSTEMS AND REQUIREMENTS .....                | 13 |
| SOLAR-THERMAL SYSTEMS AND ... (CONTINUED) .....             | 14 |
| <i>TABLE 2 COMMON SOLAR-THERMAL SYSTEMS</i> .....           | 15 |
| SOLAR-THERMAL WATER HEATING SYSTEMS .....                   | 15 |
| Integral Collector-Storage (ICS) .....                      | 16 |

|  |           |
|--|-----------|
| Thermosiphon .....   | 17        |
| Three–season System .....  | 18        |
| Drain–Back/Drain–Down .....  | 19        |
| Recirculation .....  | 19        |
| Closed Loop .....  | 20        |
| Solar Pool–heating.....  | 20        |
| SOLAR–THERMAL AIR HEATING .....  | 21        |
| Solar–thermal Ventilation Preheating .....                                   | 21        |
| Solar–thermal Air Heating .....  | 22        |
| Solar Radiant Heating.....   | 22        |
| RESIDENTIAL AND COMMERCIAL SOLAR–THERMAL<br>TECHNOLOGIES.....                | 23        |
| <i>TABLE 3 SOLAR–THERMAL TECHNOLOGIES CONSIDERED IN<br/>THIS REPORT.....</i> | <i>24</i> |
| UNGLAZED SOLAR COLLECTOR.....  | 25        |
| System Requirements.....   | 25        |
| Initial and Maintenance Costs.....   | 26        |
| Economic Viability and Specific Applications .....                           | 26        |
| FLAT PLATE SOLAR COLLECTOR .....   | 26        |
| System Requirements.....   | 27        |
| Initial and Maintenance Costs.....   | 27        |
| Economic Viability and Specific Applications .....                           | 27        |
| EVACUATED TUBE SOLAR COLLECTOR .....   | 28        |
| System Requirements.....   | 28        |
| Initial and Maintenance Costs.....   | 29        |
| Economic Viability and Specific Applications .....                           | 29        |
| INTEGRAL COLLECTOR–STORAGE .....   | 29        |
| System Requirements.....   | 30        |
| Initial and Maintenance Costs.....   | 30        |
| Economic Viability and Specific Applications .....                           | 30        |
| CONCENTRATING SOLAR COLLECTOR.....   | 31        |
| System Requirements.....   | 31        |
| Initial and Maintenance Costs.....   | 32        |
| Economic Viability And Specific Applications.....                            | 32        |
| GLAZED SOLAR AIR COLLECTOR .....   | 32        |
| System Requirements.....   | 32        |
| Initial and Maintenance Costs.....   | 33        |
| Economic Viability and Specific Applications .....                           | 33        |
| TRANSPIRED SOLAR AIR COLLECTOR.....  | 33        |
| System Requirements.....   | 34        |
| Initial and Maintenance Costs.....   | 34        |
| Economic Viability and Specific Applications .....                           | 34        |
| EMERGING RESIDENTIAL AND COMMERCIAL SOLAR–<br>THERMAL TECHNOLOGIES .....     | 34        |

|   |    |
|---|----|
| <i>TABLE 4 EMERGING RESIDENTIAL AND COMMERCIAL SOLAR-THERMAL TECHNOLOGIES</i> ..... | 35 |
| Asphalt Solar Collector.....  | 35 |
| Asphalt Solar Collector (Continued) .....   | 36 |
| Volumetric Thermal Collector.....   | 37 |
| Tracking Concentrating Solar Collector.....   | 38 |
| BENEFITS OF SOLAR-THERMAL TECHNOLOGIES .....  | 39 |
| REDUCED ENERGY CONSUMPTION .....  | 39 |
| ENVIRONMENTAL BENEFITS.....   | 39 |
| Offset of Fossil Energy Usage with Renewable Energy.....                            | 40 |
| Greenhouse Gas Emissions Reduction .....  | 40 |
| Air and Water Quality Emissions Reduction .....                                     | 41 |
| Reduced Energy Extraction/Disposal Requirements .....                               | 42 |
| ENERGY SECURITY BENEFITS .....  | 42 |
| CURRENT INTEREST IN SOLAR ENERGY AND SOLAR-THERMAL TECHNOLOGIES.....                | 43 |

|  |    |
|--|----|
| CHAPTER FOUR: REGULATORY SUPPORT AND INCENTIVES FOR SOLAR-THERMAL ENERGY ..... | 44 |
| REGULATORY SUPPORT AND INCENTIVES FOR ... ..                                   | 44 |
| U.S. REGULATORY SUPPORT AND INCENTIVES.....                                    | 45 |
| FEDERAL.....   | 45 |
| The American Clean Energy and Security Act .....                               | 46 |
| Renewable Electricity Standard.....  | 46 |

|  |    |
|--|----|
| <i>TABLE 5 RETAIL ELECTRICITY SUPPLIER ANNUAL COMBINED TARGETS, 2012-2039 (RENEWABLE ENERGY + ENERGY EFFICIENCY) (%)</i> ..... | 47 |
| Energy Efficiency .....  | 47 |
| Major Cap-and-Trade Provisions.....  | 48 |

|   |    |
|---|----|
| <i>TABLE 6 SIMPLIFIED EMISSION ALLOWANCE DISTRIBUTION, 2016 (%)</i> ..... | 49 |
|---|----|

|   |    |
|---|----|
| <i>TABLE 7 SIMPLIFIED EMISSION ALLOWANCE DISTRIBUTION, 2030 (%)</i> .....       | 49 |
| Elimination of Covenants against ST Technologies .....                          | 50 |
| U.S. Internal Revenue Service .....   | 50 |
| Energy Efficient Commercial Buildings Tax Deduction .....                       | 50 |
| Energy Efficient ... (Continued).....   | 51 |
| Modified Accelerated Cost-Recovery System and Bonus Depreciation .....          | 52 |
| Residential Energy Conservation Subsidy Exclusion (Corporate or Personal) ..... | 52 |
| Business Energy Investment Tax Credit.....                                      | 53 |
| Advanced Energy Investment Tax Credit .....                                     | 54 |

|  |    |
|--|----|
| Energy-Efficient New Homes Tax Credit for Home Builders..... | 54 |
| Energy Saving Requirements.....                              | 55 |
| Certification.....   | 55 |
| Residential Renewable Energy Tax Credit.....                 | 55 |
| Residential ... (Continued) .....                            | 56 |
| Clean Renewable Energy Bonds .....                           | 57 |
| Qualified Energy Conservation Bonds.....                     | 58 |
| U.S. Department of Energy.....                               | 59 |
| U.S. DOE – Loan Guarantee Program.....                       | 59 |
| Temporary Loan Guarantee Program .....                       | 60 |
| Energy Efficiency and Conservation Block Grants .....        | 60 |
| Energy Goals and Standards for Federal Buildings .....       | 61 |

**TABLE 8 CUMULATIVE ANNUAL ENERGY CONSUMPTION**

|   |    |
|---|----|
| <i>REDUCTIONS, 2006-2015 (%)</i> .....  | 61 |
| U.S. Department of Agriculture.....   | 62 |
| USDA Rural Energy for America Program (REAP)—Grants and Loan Guarantees ..... | 62 |
| USDA Rural ... (Continued) .....  | 63 |
| U.S. Environmental Protection Agency.....                                     | 64 |
| ENERGY STAR Program .....   | 64 |
| Federal Housing Authority .....   | 65 |
| Energy Efficient Mortgages (EEM).....   | 65 |
| FHA Energy Efficient Mortgages.....   | 66 |
| Department of Veterans Affairs (VA) Energy Efficient Mortgages .....          | 67 |
| Energy Star EEMs .....  | 67 |
| Conventional EEMs .....   | 67 |

**NATIONAL SELECT STATE-LEVEL STANDARDS AND INCENTIVES.....**

|   |    |
|---|----|
| Arizona .....   | 68 |
| Non-Residential Solar and Wind Tax Credit (Corporate or Personal) ..... | 68 |
| Residential Solar and Wind Energy Systems Tax Credit .....              | 69 |
| Solar Energy Property Tax Assessment .....                              | 70 |
| Solar and Wind Equipment Sales Tax Exemption .....                      | 71 |
| Solar Design Standards for Public Buildings .....                       | 72 |
| Solar and Wind Equipment Certification .....                            | 72 |
| Renewable Energy Standard.....  | 73 |

**TABLE 9 AZ RENEWABLE ENERGY AND DISTRIBUTED**

|  |    |
|--|----|
| <i>RENEWABLE QUOTAS (RETAIL ELECTRICAL LOAD % [% OF RENEWABLE ENERGY QUOTA]) (%)</i> ..... | 74 |
| California .....   | 75 |

|   |    |
|---|----|
| California Solar Incentive .....  | 75 |
| CSI Incentives for Nonresidential Buildings<br>and Existing Homes .....         | 75 |
| Low-Income Programs .....   | 76 |
| Incentives for Non-PV Solar Technologies.....                                   | 76 |
| Pilot Solar Water heating Program .....   | 77 |
| Property Tax Exclusion for Solar Energy Systems .....                           | 78 |
| Solar Water Heating and Efficiency Act of 2007 .....                            | 79 |
| California State Energy Code / Title 24 .....                                   | 80 |
| Green Building Action Plan for State Facilities .....                           | 81 |
| Florida.....  | 82 |
| Renewable Energy Production Tax Credit .....                                    | 82 |
| Renewable Energy Property Tax Exemption.....                                    | 83 |
| Solar Energy Systems Equipment Sales Tax<br>Exemption.....                      | 84 |
| Renewable Energy Technologies Grants Program .....                              | 84 |
| Solar Energy System Incentives Program .....                                    | 85 |
| Energy Conservation in Public Buildings.....                                    | 86 |
| Solar Energy Equipment Certification .....                                      | 87 |
| Hawaii.....   | 88 |
| Solar and Wind Energy Credit (Corporate) .....                                  | 88 |
| Solar and Wind Energy Credit (Personal) .....                                   | 89 |
| Priority Permit Processing for Green Buildings.....                             | 90 |
| High Technology Business Investment Tax Credit .....                            | 90 |
| Solar Water heating Requirement for New<br>Residential Construction.....        | 91 |
| Solar ... (Continued) .....   | 92 |
| Renewables and Efficiency in State Facilities and<br>Operations.....            | 93 |
| Massachusetts .....   | 94 |
| Alternative Energy and Energy Conservation<br>Patent Exemption (Corporate)..... | 94 |
| Alternative Energy and Energy Conservation<br>Patent Exemption (Personal).....  | 95 |
| Excise Tax Deduction for Solar- or Wind-Powered<br>Systems .....                | 95 |
| Residential Renewable Energy Income Tax Credit.....                             | 96 |
| Renewable Energy Property Tax Exemption.....                                    | 96 |
| Renewable Energy Equipment Sales Tax<br>Exemption.....                          | 96 |
| MTC – SEED Initiative .....   | 97 |
| MTC – Matching Grants for Communities.....                                      | 98 |
| Energy Reduction Plan for State Buildings.....                                  | 98 |
| Energy ... (Continued) .....  | 99 |

|   |            |
|---|------------|
| INTERNATIONAL REGULATORY SUPPORT AND INCENTIVES: CANADA.....  | 100        |
| Turning the Corner: An Action Plan to Reduce Greenhouse Gases and Air Pollution .....                 | 100        |
| Offset System for Greenhouse Gases.....   | 101        |
| Trust Fund for Clean Air and Climate Change .....   | 102        |
| Green Municipal Funds.....  | 102        |
| Accelerated Capital Cost Allowance .....  | 103        |
| Federal Buildings Initiative.....   | 104        |
| EcoENERGY Programs.....   | 104        |
| EcoENERGY for Aboriginal and Northern Communities.....  | 104        |
| EcoENERGY for Renewable Heat.....   | 104        |
| EcoENERGY for Buildings and Houses.....   | 105        |
| EcoENERGY Retrofit – Homes .....  | 106        |
| EcoENERGY Retrofit – Small and Medium Organizations – Buildings.....                                  | 107        |
| INTERNATIONAL REGULATORY SUPPORT AND INCENTIVES.....  | 107        |
| EUROPE.....   | 107        |
| 20 20 by 2020: Europe’s Climate Change Opportunity.....   | 107        |
| An Energy Policy for Europe.....  | 108        |
| European Council Action Plan (2007 through 2009)  |            |
| Energy Policy for Europe .....  | 109        |
| Seventh Framework Program (FP7) for Research and Technological Development .....                      | 110        |
| <i>TABLE 10 ENERGY RESEARCH UNDER FP7.....</i>  | <i>110</i> |
| Strategic Energy Technology Plan: Toward a Low Carbon Future .....                                    | 111        |
| Directive on the Taxation of Energy Products and Electricity .....                                    | 111        |
| European Member States.....   | 112        |
| Austria.....  | 112        |
| Klima:Aktiv Program.....  | 112        |
| Federal Promotion of Extraordinary Efficiency in Buildings.....                                       | 113        |
| Energy Efficient Housing Programs – Constitutional Treaty between Austrian Federation and Länder..... | 113        |
| Belgium .....   | 114        |
| Flemish Government Second Climate Policy Plan .....   | 114        |
| Grants Supporting Solar Energy – Brussels Region.....   | 114        |

|   |     |
|---|-----|
| Grants for Solar–thermal, Micro–CHP and<br>Heat Pumps .....   | 115 |
| Tax Deductions for Investments in Energy<br>Efficiency and Renewable Energy –<br>Federal .....                | 116 |
| Soltherm – Wallonia .....   | 117 |
| Subsidies to Improve Energy Efficiency of<br>Public Buildings – Wallonia and Brussels<br>Capital Region ..... | 117 |
| France.....   | 117 |
| French National Energy Efficiency Action<br>Plan .....  | 117 |
| Plan for the Energy Performance of<br>Agricultural Exploitations .....  | 118 |
| Tax Credit for Energy–Saving and Renewable<br>Energy Equipment .....  | 119 |
| Livret de Developpement Durable:<br>Preferential Loans for Energy Saving<br>Measures.....                     | 120 |
| OSEO Innovation for SMEs – Support for<br>RD&D.....   | 121 |
| Germany.....  | 122 |
| Energy Efficiency Action Plan.....  | 122 |
| Energy ...(Continued).....  | 123 |
| Kreditanstalt für Wiederaufbau (KfW) Build<br>Ecologically Program.....                                       | 124 |
| Kreditanstalt für Wiederaufbau (KfW)<br>Housing Modernization Program .....                                   | 124 |
| Renewable Energies Heat Act.....  | 124 |
| Funding for Solar Power Development Center .....  | 125 |
| Solarthermie 2000Plus .....   | 125 |
| CO <sub>2</sub> Building Restructuring Program.....   | 125 |
| Market Incentive Program<br>(Marktanreizprogramm) .....   | 126 |
| Environment and Energy Saving Program .....   | 127 |
| Greece.....   | 128 |
| National Operational Program for<br>Competitiveness II.....   | 128 |
| Ireland.....  | 128 |
| Greener Homes Scheme.....   | 128 |
| Renewable Heat Deployment Program<br>(ReHeat) .....   | 129 |
| Renewable ...(Continued).....   | 130 |

|  |     |
|--|-----|
| Amendment of Part L of the Building Regulations .....  | 131 |
| Italy .....  | 132 |
| Solar Obligations in Italy .....   | 132 |
| Spain.....   | 133 |
| Solar Obligation of the Technical Buildings Code.....  | 133 |
| Sweden .....   | 134 |
| Support for Solar Heating Investments.....   | 134 |
| United Kingdom.....  | 135 |
| Low Carbon Buildings Program.....  | 135 |
| ISRAEL.....  | 136 |
| 27 Years of Solar Obligation in Israel .....   | 136 |
| ASIA AND AUSTRALIA.....  | 137 |
| Australia .....  | 137 |
| Energy Efficient Homes Package and Solar Hot Water Rebate .....                                  | 137 |
| Green Precincts Fund .....   | 138 |
| Solar Cities.....  | 138 |
| China.....   | 138 |
| National Climate Change Program.....   | 138 |
| Medium– and Long–Term Development Plan for Renewable Energy .....                                | 139 |
| Shandong Province One Million Rooftops Sunshine Plan .....                                       | 140 |
| Shandong Province Energy Fund.....   | 140 |
| India .....  | 141 |
| National Action Plan on Climate Change.....  | 141 |
| 11 <sup>th</sup> 5–Year Plan for Renewable Energy .....  | 141 |
| Japan.....   | 142 |
| 2010 Renewable Energy Targets.....   | 142 |
| Subsidy for Research and Development of New and Renewable Energy .....                           | 142 |
| New Zealand .....  | 143 |
| Emissions Trading Scheme .....   | 143 |
| Innovation Fund for Water Heating .....  | 143 |
| Republic of Korea.....   | 144 |
| Alternative Energy Business Tax Audit Exemption .....  | 144 |
| Basic Plan for New and Renewable Energy Technology Development, Utilization, and Deployment..... | 144 |
| Promoting Renewable Energy in Public Sector Buildings.....                                       | 145 |
| CHAPTER FIVE: INDUSTRY STRUCTURE .....   | 146 |



|  |            |
|--|------------|
| MAJOR FACTORS DETERMINING ST TECHNOLOGY INDUSTRY<br>SIZE, STRUCTURE, AND CONCENTRATION.....              | 146        |
| <i>TABLE 11 DETERMINATIVE FACTORS FOR THE RESIDENTIAL<br/>AND COMMERCIAL SOLAR-THERMAL INDUSTRY.....</i> | <i>147</i> |
| CLIMATE .....  | 147        |
| ENERGY PRICES.....   | 148        |
| GOVERNMENTAL REGULATION AND INCENTIVES.....  | 148        |
| TECHNOLOGY MATURITY.....   | 149        |
| SOLAR-THERMAL TECHNOLOGY INDUSTRY STRUCTURES .....   | 150        |
| UNGLAZED SOLAR COLLECTORS.....   | 150        |
| FLAT PLATE SOLAR COLLECTORS.....   | 151        |
| EVACUATED-TUBE SOLAR COLLECTORS.....   | 152        |
| CONCENTRATING SOLAR COLLECTORS .....   | 153        |
| COMPETITIVE RELATIONS AMONG SOLAR-THERMAL<br>TECHNOLOGY INDUSTRIES.....                                  | 154        |
| COMPETITIVE RELATIONS AMONG<br>SOLAR...(CONTINUED).....  | 155        |
| <i>TABLE 12 COMPETITIVE RELATIONS AMONG RESIDENTIAL AND<br/>COMMERCIAL ST TECHNOLOGIES.....</i>          | <i>156</i> |
| CHAPTER SIX: COMPANY PROFILES .....  | 157        |
| UNGLAZED SOLAR COLLECTORS .....  | 157        |
| AQUATHERM.....   | 157        |
| <i>TABLE 13 COMPANY OVERVIEW: AQUATHERM .....</i>  | <i>158</i> |
| FAFCO .....  | 158        |
| <i>TABLE 14 COMPANY OVERVIEW: FAFCO .....</i>  | <i>159</i> |
| HELIOCOL.....  | 159        |
| <i>TABLE 15 COMPANY OVERVIEW: HELIOCOL .....</i>   | <i>159</i> |
| MÓDULO SOLAR .....   | 160        |
| <i>TABLE 16 COMPANY OVERVIEW: MÓDULO SOLAR .....</i>   | <i>160</i> |
| PERFORMANCE SOLAR.....   | 160        |
| <i>TABLE 17 COMPANY OVERVIEW: PERFORMANCE SOLAR.....</i>   | <i>161</i> |
| SEALED AIR.....  | 161        |
| <i>TABLE 18 COMPANY OVERVIEW: SEALED AIR.....</i>  | <i>162</i> |
| SOLARTECH.....   | 162        |
| <i>TABLE 19 COMPANY OVERVIEW: SOLARTECH.....</i>   | <i>163</i> |
| SUNTREK .....  | 163        |
| <i>TABLE 20 COMPANY OVERVIEW: SUNTREK .....</i>  | <i>163</i> |
| TECHNO-SOLIS .....   | 164        |
| <i>TABLE 21 COMPANY OVERVIEW: TECHNO-SOLIS.....</i>  | <i>164</i> |
| WANLI PLASTIC.....   | 165        |
| <i>TABLE 22 COMPANY OVERVIEW: WANLI PLASTIC .....</i>  | <i>165</i> |
| FLAT PLATE SOLAR COLLECTORS.....   | 166        |
| ACR SOLAR INTERNATIONAL .....  | 166        |
| <i>TABLE 23 COMPANY OVERVIEW: ACR SOLAR INTERNATIONAL.....</i>   | <i>166</i> |

|   |     |
|---|-----|
| ALTERNATE ENERGY TECHNOLOGIES .....                                   | 167 |
| <i>TABLE 24 COMPANY OVERVIEW: ALTERNATE ENERGY TECHNOLOGIES</i> ..... | 167 |
| ARISTON THERMO .....  | 167 |
| <i>TABLE 25 COMPANY OVERVIEW: ARISTON THERMO</i> .....                | 168 |
| BOSCH THERMOTECHNIK .....   | 168 |
| <i>TABLE 26 COMPANY OVERVIEW: BOSCH THERMOTECHNIK</i> .....           | 169 |
| BUBBLING SPRINGS SOLAR .....  | 170 |
| <i>TABLE 27 COMPANY OVERVIEW: BUBBLING</i> .....                      | 170 |
| CALPAK .....  | 171 |
| <i>TABLE 28 COMPANY OVERVIEW: CALPAK</i> .....                        | 171 |
| CHIRYU HEATER .....   | 172 |
| <i>TABLE 29 COMPANY OVERVIEW: CHIRYU HEATER</i> .....                 | 172 |
| CHROMAGEN.....  | 172 |
| <i>TABLE 30 COMPANY OVERVIEW: CHROMAGEN</i> .....                     | 173 |
| EMMVEE SOLAR.....   | 173 |
| <i>TABLE 31 COMPANY OVERVIEW: EMMVEE SOLAR</i> .....                  | 174 |
| ENERWORKS .....   | 174 |
| <i>TABLE 32 COMPANY OVERVIEW: ENERWORKS</i> .....                     | 175 |
| ENOLAR SYSTEMS MARKETING PRIVATE LTD.....                             | 175 |
| <i>TABLE 33 COMPANY OVERVIEW: ENOLAR</i> .....                        | 176 |
| ENVIRONMENTAL SOLAR SYSTEMS.....                                      | 176 |
| <i>TABLE 34 COMPANY OVERVIEW: ENVIRONMENTAL SOLAR SYSTEMS</i> .....   | 176 |
| EZINÇ .....   | 177 |
| <i>TABLE 35 COMPANY OVERVIEW: EZINÇ</i> .....                         | 177 |
| GREENONETEC .....   | 177 |
| <i>TABLE 36 COMPANY OVERVIEW: GREENONETEC</i> .....                   | 178 |
| HELIODYNE.....  | 178 |
| <i>TABLE 37 COMPANY OVERVIEW: HELIODYNE</i> .....                     | 179 |
| INNO WATER HEATER .....   | 179 |
| <i>TABLE 38 COMPANY OVERVIEW: INNO WATER HEATER</i> .....             | 180 |
| INTEGRATED SOLAR .....  | 180 |
| <i>TABLE 39 COMPANY OVERVIEW: INTEGRATED SOLAR</i> .....              | 181 |
| JAYSOLAR.....   | 181 |
| <i>TABLE 40 COMPANY OVERVIEW: JAYSOLAR</i> .....                      | 182 |
| KOLLEKTORBAU BERLIN (KBB) .....                                       | 182 |
| <i>TABLE 41 COMPANY OVERVIEW: KBB</i> .....                           | 183 |
| MÓDULO SOLAR .....  | 183 |
| <i>TABLE 42 COMPANY OVERVIEW: MÓDULO SOLAR</i> .....                  | 184 |
| NIMROD INDUSTRIES .....   | 184 |
| <i>TABLE 43 COMPANY OVERVIEW: NIMROD INDUSTRIES</i> .....             | 185 |
| HAINING OUPAIRINENG SOLAR WATER HEATER CO., LTD. (ONOSI SOLAR).....   | 185 |

|   |     |
|---|-----|
| <i>TABLE 44 COMPANY OVERVIEW: ONOSI SOLAR</i> .....                   | 186 |
| RASHMI INDUSTRIES .....   | 186 |
| <i>TABLE 45 COMPANY OVERVIEW: RASHMI INDUSTRIES</i> .....             | 187 |
| RINNAI AUSTRALIA .....  | 187 |
| <i>TABLE 46 COMPANY OVERVIEW: RINNAI AUSTRALIA</i> .....              | 188 |
| SAMMLER SOLAR, SA .....   | 188 |
| <i>TABLE 47 COMPANY OVERVIEW: SAMMLER</i> .....                       | 189 |
| SCHÜCO INTERNATIONAL KG .....   | 189 |
| <i>TABLE 48 COMPANY OVERVIEW: SCHÜCO</i> .....                        | 190 |
| SILICON SOLAR INC. ....   | 190 |
| <i>TABLE 49 COMPANY OVERVIEW: SILICON SOLAR</i> .....                 | 191 |
| SOLAHART .....  | 191 |
| <i>TABLE 50 COMPANY OVERVIEW: SOLAHART</i> .....                      | 192 |
| SOLAR HOT .....   | 192 |
| <i>TABLE 51 COMPANY OVERVIEW: SOLAR HOT</i> .....                     | 193 |
| SOLAR SKIES.....  | 193 |
| <i>TABLE 52 COMPANY OVERVIEW: SOLAR SKIES</i> .....                   | 193 |
| STIEBEL ELTRON INTERNATIONAL GMBH .....                               | 194 |
| <i>TABLE 53 COMPANY OVERVIEW: STIEBEL ELTRON</i> .....                | 194 |
| SUNEARTH INC.....   | 195 |
| <i>TABLE 54 COMPANY OVERVIEW: SUNEARTH</i> .....                      | 195 |
| SUN MASTER ENERGY SYSTEMS GMBH.....                                   | 196 |
| <i>TABLE 55 COMPANY OVERVIEW: SUN MASTER</i> .....                    | 196 |
| JIANGSU SUNRAIN SOLAR ENERGY CO., LTD.....                            | 196 |
| <i>TABLE 56 COMPANY OVERVIEW: SUNRAIN</i> .....                       | 197 |
| TISUN.....  | 197 |
| <i>TABLE 57 COMPANY OVERVIEW: TISUN</i> .....                         | 198 |
| VAILLANT GROUP .....  | 198 |
| <i>TABLE 58 COMPANY OVERVIEW: VAILLANT GROUP</i> .....                | 199 |
| VELUX.....  | 199 |
| <i>TABLE 59 COMPANY OVERVIEW: VELUX</i> .....                         | 200 |
| VIESSMANN WERKE GMBH & CO KG .....                                    | 200 |
| <i>TABLE 60 COMPANY OVERVIEW: VIESSMANN</i> .....                     | 201 |
| WAGNER & CO. SOLARTECHNIK .....                                       | 201 |
| <i>TABLE 61 COMPANY OVERVIEW: WAGNER &amp; CO. SOLARTECHNIK</i> ..... | 202 |
| ZHUHAI TIANKE ENERGY-SAVING EQUIPMENT<br>MANUFACTURE CO., LTD.....    | 202 |
| <i>TABLE 62 COMPANY OVERVIEW: ZHUHAI TIANKE</i> .....                 | 202 |
| EVACUATED-TUBE SOLAR COLLECTORS.....                                  | 203 |
| AMERICAN SOLAR WORKS.....   | 203 |
| <i>TABLE 63 COMPANY OVERVIEW: AMERICAN SOLAR WORKS</i> .....          | 203 |
| AMK – SOLAC SYSTEMS .....   | 203 |
| <i>TABLE 64 COMPANY OVERVIEW: AMK – SOLAC SYSTEMS</i> .....           | 204 |
| APRICUS.....  | 204 |

|  |            |
|--|------------|
| Apricus (Continued).....                                     | 205        |
| <i>TABLE 65 COMPANY OVERVIEW: APRICUS</i> .....              | <i>206</i> |
| HAINING BAOGUANG HEAT COLLECTION TUBES CO.,<br>LTD.....      | 206        |
| <i>TABLE 66 COMPANY OVERVIEW: BAOGUANG</i> .....             | <i>207</i> |
| BAXI GROUP .....   | 207        |
| <i>TABLE 67 COMPANY OVERVIEW: BAXI GROUP</i> .....           | <i>208</i> |
| BOROSIL GLASS WORKS.....                                     | 208        |
| <i>TABLE 68 COMPANY OVERVIEW: BOROSIL GLASS WORKS</i> .....  | <i>209</i> |
| BTF SOLAR.....   | 209        |
| <i>TABLE 69 COMPANY OVERVIEW: BTF SOLAR</i> .....            | <i>210</i> |
| CALPAK .....   | 210        |
| <i>TABLE 70 COMPANY OVERVIEW: CALPAK</i> .....               | <i>211</i> |
| GS INC.....  | 211        |
| <i>TABLE 71 COMPANY OVERVIEW: GS INC</i> .....               | <i>211</i> |
| HEAT TRANSFER.....   | 212        |
| <i>TABLE 72 COMPANY OVERVIEW: HEAT TRANSFER</i> .....        | <i>212</i> |
| HIMIN SOLAR ENERGY GROUP CO., LTD.....                       | 213        |
| <i>TABLE 73 COMPANY OVERVIEW: HIMIN</i> .....                | <i>213</i> |
| JAYSOLAR INDUSTRIES .....                                    | 213        |
| <i>TABLE 74 COMPANY OVERVIEW: JAYSOLAR</i> .....             | <i>214</i> |
| LINUO PARADIGMA CO., LTD .....                               | 214        |
| <i>TABLE 75 COMPANY OVERVIEW: LINUO PARADIGMA</i> .....      | <i>215</i> |
| SG SIEGER-SOLAR.....   | 215        |
| <i>TABLE 76 COMPANY OVERVIEW: SG SIEGER SOLAR</i> .....      | <i>216</i> |
| SOLIMPEKS SOLAR ENERGY SYSTEMS CO. ....                      | 216        |
| <i>TABLE 77 COMPANY OVERVIEW: SOLIMPEKS</i> .....            | <i>217</i> |
| SUNDA SOLAR ENERGY TECHNOLOGY CO., LTD. ....                 | 217        |
| <i>TABLE 78 COMPANY OVERVIEW: SUNDA</i> .....                | <i>218</i> |
| SUNRAIN SOLAR ENERGY CO.,LTD.....                            | 218        |
| <i>TABLE 79 COMPANY OVERVIEW: SUNRAIN</i> .....              | <i>219</i> |
| TATA BP SOLAR .....  | 219        |
| <i>TABLE 80 COMPANY OVERVIEW: TATA</i> .....                 | <i>220</i> |
| THERMOMAX INDUSTRIES .....                                   | 220        |
| <i>TABLE 81 COMPANY OVERVIEW: THERMOMAX INDUSTRIES</i> ..... | <i>221</i> |
| TSINGHUA SOLAR.....  | 221        |
| <i>TABLE 82 COMPANY OVERVIEW: TSINGHUA SOLAR</i> .....       | <i>222</i> |
| VIESSMANN WERKE GMBH & CO KG .....                           | 222        |
| <i>TABLE 83 COMPANY OVERVIEW: VIESSMANN</i> .....            | <i>223</i> |
| INTEGRAL COLLECTOR-STORAGE UNITS.....                        | 223        |
| ECO SOLAR SYSTEM.....  | 223        |
| <i>TABLE 84 COMPANY OVERVIEW: ECO SOLAR SYSTEM</i> .....     | <i>224</i> |
| INTEGRATED SOLAR .....                                       | 224        |
| <i>TABLE 85 COMPANY OVERVIEW: INTEGRATED SOLAR</i> .....     | <i>225</i> |

|   |     |
|---|-----|
| SUNEARTH .....  | 225 |
| <i>TABLE 86 COMPANY OVERVIEW: SUNEARTH</i> .....                          | 226 |
| THERMAL CONVERSION TECHNOLOGY.....  | 226 |
| <i>TABLE 87 COMPANY OVERVIEW: THERMAL CONVERSION<br/>TECHNOLOGY</i> ..... | 227 |
| CONCENTRATING SOLAR COLLECTORS .....                                      | 227 |
| CALPAK .....  | 227 |
| <i>TABLE 88 COMPANY OVERVIEW: CALPAK</i> .....                            | 228 |
| LINUO PARADIGMA .....   | 228 |
| <i>TABLE 89 COMPANY OVERVIEW: LINUO PARADIGMA</i> .....                   | 229 |
| RITTER SOLAR .....  | 229 |
| <i>TABLE 90 COMPANY OVERVIEW: RITTER SOLAR</i> .....                      | 230 |
| SOLARGENIX.....   | 230 |
| <i>TABLE 91 COMPANY OVERVIEW: SOLARGENIX</i> .....                        | 231 |
| SONNENKRAFT ÖSTERREICH VERTRIEBS GMBH.....                                | 231 |
| <i>TABLE 92 COMPANY OVERVIEW: SONNENKRAFT</i> .....                       | 232 |
| GLAZED SOLAR AIR COLLECTOR.....   | 232 |
| ARCTIC SUNLIGHT INNOVATION.....   | 232 |
| <i>TABLE 93 COMPANY OVERVIEW: ARCTIC SUNLIGHT<br/>INNOVATIONS</i> .....   | 232 |
| CANSOLAIR.....  | 233 |
| <i>TABLE 94 COMPANY OVERVIEW: CANSOLAIR</i> .....                         | 233 |
| ENVIRONMENTAL SOLAR SYSTEMS.....  | 234 |
| <i>TABLE 95 COMPANY OVERVIEW: ENVIRONMENTAL SOLAR<br/>SYSTEMS</i> .....   | 234 |
| GRAMMER SOLAR .....   | 234 |
| <i>TABLE 96 COMPANY OVERVIEW: GRAMMER SOLAR</i> .....                     | 235 |
| NINGBO ZIHONG SOLAR ENERGY.....   | 235 |
| <i>TABLE 97 COMPANY OVERVIEW: NINGBO ZIHONG SOLAR ENERGY</i> ...          | 236 |
| SHENZHEN COMMONPRAISE SOLAR.....  | 236 |
| <i>TABLE 98 COMPANY OVERVIEW: SHENZHEN COMMONPRAISE<br/>SOLAR</i> .....   | 237 |
| SOLAR-MAX HEATING SYSTEMS .....   | 237 |
| <i>TABLE 99 COMPANY OVERVIEW: SOLAR-MAX HEATING SYSTEMS</i> ....          | 238 |
| SOLARVENTI .....  | 238 |
| <i>TABLE 100 COMPANY OVERVIEW: SOLARVENTI</i> .....                       | 239 |
| SUNSIARAY.....  | 239 |
| <i>TABLE 101 COMPANY OVERVIEW: SUNSIARAY</i> .....                        | 239 |
| U.S. SOLAR HEATING .....  | 240 |
| <i>TABLE 102 COMPANY OVERVIEW: U.S. SOLAR HEATING</i> .....               | 240 |
| YOUR SOLAR HOME.....  | 240 |
| <i>TABLE 103 COMPANY OVERVIEW: YOUR SOLAR HOME</i> .....                  | 241 |
| TRANSPIRED SOLAR AIR COLLECTOR.....                                       | 241 |
| ATAS INTERNATIONAL.....   | 241 |

|  |     |
|--|-----|
| <i>TABLE 104 COMPANY OVERVIEW: ATAS INTERNATIONAL</i> .....    | 242 |
| CONSERVAL ENGINEERING .....                                    | 242 |
| <i>TABLE 105 COMPANY OVERVIEW: CONSERVAL ENGINEERING</i> ..... | 243 |
| CHAPTER SEVEN: MAJOR MARKETS, ASSESSMENT, AND ANALYSIS .....   | 244 |
| ST WATER HEATING SYSTEMS .....                                 | 244 |
| UNGLAZED SOLAR COLLECTORS.....                                 | 244 |
| Unglazed Solar Collectors (Continued).....                     | 245 |
| Growth Potential .....   | 246 |
| <i>TABLE 106 GLOBAL MARKET FOR UNGLAZED SOLAR</i>              |     |
| <i>COLLECTORS, BY REGION (SQ. FT./THOUSANDS)</i> .....         | 247 |
| Projected Trends .....   | 247 |
| <i>TABLE 107 GLOBAL UNGLAZED SOLAR COLLECTOR REVENUE, BY</i>   |     |
| <i>REGION (\$ MILLIONS)</i> .....                              | 248 |
| <i>FIGURE 1 GLOBAL UNGLAZED ST COLLECTOR SALES, 2005–2014</i>  |     |
| <i>(SQ. FT.)</i> .....   | 248 |
| SATURATION AND OTHER MARKET                                    |     |
| CONSIDERATIONS .....   | 248 |
| FLAT PLATE SOLAR COLLECTOR .....                               | 249 |
| Growth Potential .....   | 250 |
| <i>TABLE 108 GLOBAL MARKET FOR FLAT PLATE SOLAR</i>            |     |
| <i>COLLECTORS, BY REGION (SQ. FT./THOUSANDS)</i> .....         | 251 |
| Projected Trends .....   | 251 |
| <i>TABLE 109 GLOBAL REVENUE FOR FLAT PLATE SOLAR</i>           |     |
| <i>COLLECTORS, BY REGION, THROUGH 2014 (\$ MILLIONS)</i> ..... | 252 |
| <i>FIGURE 2 GLOBAL MARKET FOR FLAT PLATE ST COLLECTORS,</i>    |     |
| <i>2005–2014 (SQ. FT)</i> .....                                | 253 |
| Saturation and Other Market Considerations .....               | 253 |
| <i>FIGURE 3 CUMULATIVE INSTALLED FLAT PLATE AND</i>            |     |
| <i>EVACUATED TUBE COLLECTOR AREA PER 1,000 INHABITANTS,</i>    |     |
| <i>BY REGION, 2007 (SQ. FT. OF ST COLLECTOR SURFACE PER</i>    |     |
| <i>1,000 INHABITANTS)</i> .....                                | 254 |
| EVACUATED TUBE SOLAR COLLECTORS.....                           | 255 |
| Growth Potential .....   | 256 |
| <i>TABLE 110 GLOBAL MARKET FOR EVACUATED TUBE SOLAR</i>        |     |
| <i>COLLECTORS, BY REGION, THROUGH 2014 (SQ.</i>                |     |
| <i>FT./THOUSANDS)</i> .....                                    | 257 |
| Projected Trends .....   | 257 |
| <i>TABLE 111 GLOBAL REVENUES FOR EVACUATED TUBE SOLAR</i>      |     |
| <i>COLLECTORS, BY REGION, THROUGH 2014 (\$ MILLIONS)</i> ..... | 258 |
| <i>FIGURE 4 GLOBAL MARKET FOR EVACUATED TUBE ST</i>            |     |
| <i>COLLECTOR, 2005–2014 (SQ. FT.)</i> .....                    | 259 |
| Saturation and Other Market Considerations .....               | 259 |
| INTEGRAL COLLECTOR–STORAGE .....                               | 259 |
| Growth Potential .....   | 260 |

|   |     |
|---|-----|
| <i>TABLE 112 GLOBAL MARKET FOR INTEGRAL COLLECTOR-STORAGE, BY REGION, THROUGH 2014 (SQ. FT./THOUSANDS)</i> .....      | 261 |
| Projected Trends .....  | 261 |
| <i>TABLE 113 GLOBAL REVENUES FOR INTEGRAL-COLLECTOR STORAGE, BY REGION, THROUGH 2014 (\$ MILLIONS)</i> .....          | 262 |
| <i>FIGURE 5 GLOBAL MARKET FOR INTEGRAL-COLLECTOR STORAGE, 2005-2014 (SQ. FT.)</i> .....                               | 262 |
| Saturation and Other Market Considerations .....  | 263 |
| CONCENTRATING SOLAR COLLECTORS .....  | 263 |
| Growth Potential .....  | 264 |
| <i>TABLE 114 GLOBAL MARKET FOR CONCENTRATING SOLAR COLLECTORS, BY REGION, THROUGH 2014 (SQ. FT. THOUSANDS)</i> .....  | 264 |
| Projected Trends .....  | 265 |
| <i>TABLE 115 GLOBAL REVENUES FOR CONCENTRATING SOLAR COLLECTORS, BY REGION, THROUGH 2014 (\$ MILLIONS)</i> .....      | 266 |
| <i>FIGURE 6 GLOBAL MARKET FOR CONCENTRATING SOLAR COLLECTORS, 2005-2014 (SQ. FT.)</i> .....                           | 266 |
| Saturation and Other Market Considerations .....  | 267 |
| ST AIR HEATING SYSTEMS .....  | 267 |
| GLAZED SOLAR AIR COLLECTORS .....   | 267 |
| Growth Potential .....  | 268 |
| <i>TABLE 116 GLOBAL MARKET FOR GLAZED SOLAR AIR COLLECTORS, THROUGH 2014 (SQ. FT./THOUSANDS)</i> .....                | 269 |
| Projected Trends .....  | 269 |
| <i>TABLE 117 GLOBAL REVENUES FOR GLAZED SOLAR AIR COLLECTORS, BY REGION, THROUGH 2014 (\$ MILLIONS)</i> .....         | 270 |
| <i>FIGURE 7 GLOBAL MARKET FOR GLAZED ST AIR COLLECTORS, 2005-2014 (SQ. FT.)</i> .....                                 | 270 |
| <i>FIGURE 7 (CONTINUED)</i> .....   | 271 |
| Saturation and Other Market Considerations .....  | 271 |
| TRANSPIRED SOLAR AIR COLLECTORS.....  | 271 |
| Growth Potential .....  | 272 |
| <i>TABLE 118 GLOBAL MARKET FOR TRANSPIRED SOLAR AIR COLLECTORS, BY REGION, THROUGH 2014 (SQ. FT./THOUSANDS)</i> ..... | 272 |
| Projected Trends .....  | 272 |
| <i>TABLE 119 GLOBAL REVENUES FOR TRANSPIRED SOLAR AIR COLLECTORS, BY REGION, THROUGH 2014 (\$ MILLIONS)</i> .....     | 273 |
| <i>FIGURE 8 GLOBAL MARKET FOR TRANSPIRED ST AIR COLLECTORS, 2005-2014 (SQ. FT.)</i> .....                             | 274 |
| Saturation and Other Market Considerations .....  | 274 |
| FACTORS DETERMINING DEMAND .....  | 275 |

|   |     |
|---|-----|
| ENVIRONMENTAL POLLUTION ISSUES AND CLIMATE CHANGE .....   | 275 |
| GOVERNMENT INCENTIVES.....  | 276 |
| ENERGY COSTS – ELECTRICITY AND FOSSIL FUELS.....  | 277 |
| THE GREEN MOVEMENT – RENEWABLE ENERGIES.....  | 278 |
| OVERVIEW OF THE RESIDENTIAL AND COMMERCIAL ST TECHNOLOGY MARKET .....   | 279 |
| OVERVIEW OF THE RESIDENTIAL AND ... (CONTINUED).....  | 280 |
| <i>TABLE 120 GLOBAL MARKET FOR ST TECHNOLOGY, BY REGION (\$ MILLIONS)</i> .....   | 281 |
| <i>FIGURE 9 GLOBAL RESIDENTIAL AND COMMERCIAL ST TECHNOLOGY SALES MARKET: WATER HEATING DETAIL, 2005-2014 (\$ MILLIONS)</i> ..... | 281 |
| <i>FIGURE 10 GLOBAL RESIDENTIAL AND COMMERCIAL ST TECHNOLOGY SALES MARKET: AIR HEATING DETAIL, 2005-2014 (\$ MILLIONS)</i> .....  | 282 |
| APPENDIX I: REFERENCES .....  | 283 |
| REFERENCES.....   | 283 |
| REFERENCES (CONTINUED) .....  | 284 |
| REFERENCES (CONTINUED) .....  | 285 |
| APPENDIX II: ACRONYMS AND ABBREVIATIONS OF MEASUREMENTS .....   | 286 |
| ACRONYMS AND ABBREVIATIONS OF MEASUREMENTS.....   | 286 |
| ACRONYMS AND ABBREVIATIONS ... (CONTINUED) .....  | 287 |
| ACRONYMS AND ABBREVIATIONS ... (CONTINUED) .....  | 288 |
| ACRONYMS AND ABBREVIATIONS ... (CONTINUED) .....  | 289 |
| ACRONYMS AND ABBREVIATIONS ... (CONTINUED) .....  | 290 |
| APPENDIX III: HYBRID PV/T TECHNOLOGIES.....   | 291 |
| HYBRID PV/TRANSPIRED ST AIR COLLECTOR.....  | 291 |
| HYBRID PV/T LIQUID COLLECTORS .....   | 292 |