Enabling Energy Sustainability In the 21st Century: Emerson Vision

Pamela Jackson

Vice President, Technology

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$24.8 Billion in sales (2008)

NYSE: EMR
Diversified global manufacturer and technology provider
141,000 employees
Headquarters in St. Louis, Mo.

- Manufacturing and/or sales presence in more than 150 countries
- 255 manufacturing locations, 165 outside the U.S.
- No. 111 on 2008 FORTUNE 500 list of America’s largest corporations
- Founded in 1890
Agenda

- Major Trends In The World
- Energy Efficiency Is A Huge Opportunity
- Emerson Solutions
- Opportunities For Collaboration
<table>
<thead>
<tr>
<th>Megatrends</th>
<th>Implications</th>
<th>Opportunities</th>
<th>Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environment</strong></td>
<td>Quality air/water Emissions</td>
<td>Processing Efficiency</td>
<td>Advanced Control</td>
</tr>
<tr>
<td><strong>Developing World</strong></td>
<td>Infrastructure Urbanization</td>
<td>Power &amp; Water Retail footprint</td>
<td>Alternative Fuels</td>
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<tr>
<td><strong>Increasing Wealth</strong></td>
<td>Purchasing power</td>
<td>Vehicles Climate system</td>
<td>Power Conservation</td>
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<tr>
<td><strong>Aging</strong></td>
<td>Healthcare automation</td>
<td>Healthcare &amp; Workplace</td>
<td>Infrastructure Food Chain Mgmt</td>
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<tr>
<td><strong>Mobility</strong></td>
<td>Transportation</td>
<td>Vehicles Roads</td>
<td>Air Quality</td>
</tr>
<tr>
<td><strong>Connectivity</strong></td>
<td>Wireless Network infrastructure</td>
<td>Network bandwidth Information</td>
<td>Comfort Systems</td>
</tr>
<tr>
<td><strong>Safety / Security</strong></td>
<td>Monitoring</td>
<td>Sensing Tracking</td>
<td>Storage Solutions</td>
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</tbody>
</table>

Note: The table outlines key megatrends and their associated implications, opportunities, and participation areas. Each megatrend is listed in bold, followed by the relevant implications, opportunities, and participation strategies.
Energy Demand will Increase 30% by 2020, But 70% of New Demand Could Be Offset by Efficiency Gains

2008 IEA World Energy Outlook

Demand - QBTU

422

2003

191

Growth

613

2020 w/o Efficiency

135

Efficiency

478

2020 w/ Efficiency

Emerson Offers Solutions To Enable Efficiency Gains In Many Different Markets

Emerson Participation

Residential 37%
Commercial 34%
Industrial 29%
**Residential: Enabling Consumers To Manage Their Energy Consumption**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Benefit</th>
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<tbody>
<tr>
<td>Effective operation</td>
<td>Energy efficiency</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Diagnostics Efficiency</td>
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<tr>
<td>Communication</td>
<td>Utility interface</td>
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<tr>
<td>Verification</td>
<td>Installation Operation levels</td>
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<tr>
<td>Integration</td>
<td>Alternative Energy Solar Panels Wind</td>
</tr>
<tr>
<td>Innovative Models</td>
<td>Step function improvement Efficiency Comfort Convenience</td>
</tr>
</tbody>
</table>
Commercial: Integrated Solutions for Proactive Facilities Management

Intelligent Store
Centralized facility management tool

Retail

Multiple Sites

Repair vs. Replace
Easy Maintenance
Easy Cost Savings

Refrigeration Racks
Refrigeration Units
Ventilation & A/C Units
Condenser
Case Control
Installation & Commission
Ice Machine
Monitoring Services
Lighting
Industrial: Enabling Operational Improvements At Power Plants To Increase Efficiencies

Advanced Coal Power Plants
Predictive Maintenance
Measurements Devices
Control Systems

Nuclear Power Plants
Analytical Equipment
Valves & Valve Automation

Emerson Systems Reduce Global CO₂ Emissions
Data Centers Are The Next Great Opportunity

Data Center – Emerson Solutions

- Generator
- Integrated Rack
- Automatic Transfer Switches
- Enterprise Monitoring System
- Uninterruptible Power Systems

Annual Usage
Billion KWh

Historical
Energy Projections

- Historical trend
- Current efficiency trend
- Improved ops
- Best practice
- State of the art

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<th>Energy use</th>
<th>Recommended strategy</th>
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<tr>
<td>Environmental control</td>
<td>Improved airflow</td>
</tr>
<tr>
<td></td>
<td>Water cooled chillers</td>
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<tr>
<td></td>
<td>Monitor temperature and humidity</td>
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<tr>
<td></td>
<td>Variable speed pumps and blowers</td>
</tr>
<tr>
<td>Power conversion</td>
<td>Efficiency upgrades</td>
</tr>
<tr>
<td>Backup power</td>
<td>Monitoring</td>
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</tbody>
</table>

- Storage and Network
- Servers
- Site infrastructure

Integrated Rack

Precision Cooling

Enterprise Monitoring System

Uninterruptible Power Systems

Automatic Transfer Switches

Generator
Summary & Opportunities for Collaboration

- Smart Pumps
- Energy Monitoring
- Achieving Net Zero Buildings
- Climate Systems for Transportation
- Energy Processing → Integration With the Grid
- Understanding Effects of A Changing Network Structure
  - Centralized Power Generation → Distributed Power Generation
- Solar Energy
- Effective Management Strategies
  - Storage & Monitoring