OMRON’s Initiatives in the Environmental Business

July 30, 2013
Shizuto Yukumoto
Environmental Solutions Business HQ
## Personal Introduction

### Career History

<table>
<thead>
<tr>
<th>Year</th>
<th>Position</th>
<th>Department</th>
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</thead>
<tbody>
<tr>
<td>1985</td>
<td>Entered OMRON Corporation</td>
<td>Sales</td>
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<tr>
<td>1999</td>
<td>Companywide Grand Design 2010 Project</td>
<td>Corporate Strategy HQ</td>
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<tr>
<td>2000</td>
<td>Industrial Automation Business Planning HQ</td>
<td>Planning HQ</td>
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<tr>
<td>2005</td>
<td>OMRON Europe B.V.</td>
<td>Senior General Manager, Planning HQ</td>
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<tr>
<td>2009</td>
<td>OMRON Europe B.V.</td>
<td>CEO</td>
</tr>
<tr>
<td>2012</td>
<td>Environmental Solutions Business HQ</td>
<td>Senior General Manager</td>
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</tbody>
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Shizuto Yukumoto
Executive Officer, Senior General Manager, Environmental Solutions Business HQ
Our Vision for the Environmental Business

Contribute to maximizing our customers’ energy efficiency using our energy conversion and control technologies

- Customers’ first choice
  We want to be the first to be named when customers consider their energy efficiency.

- Conversion and control technologies
  The logo represents the two “C”s of energy conversion and control, Symbolizing our contribution to maximizing our customers’ energy efficiency based on these two technologies.

- Support for our customers’ businesses
  We contribute to maximizing energy efficiency in the business activities of customers including power generators, systems integrators and panel manufacturers.

First Choice for your Energy Innovation
Three Domains of the Environmental Business

Expand as area strategy

Supplement with engineering in four core categories

- Inverter/Converter
- Energy control
- Power sensing
- Power storage control

Energy conversion

Energy sensing

Energy storage
OMRON’s Various Environmental Businesses

Business development in each business segment to maximize energy efficiency

Maximizing provision of clean energy
- Solar power generation
  - Grid connection
  - PV(Photovoltaic) Inverter
  - O&M(Operation & Maintenance)

Achieving both productivity and energy savings
- Energy-saving automated control
  - Factories
  - Facilities

Promoting the spread of automobiles with reduced environmental impact
- In vehicles
  - Battery management

Contribute to maximizing our customers’ energy efficiency
First choice for your Energy Innovation

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High Growth Rate of Environmental Business (FY2012 Results)

159% | Growth rate of environmental business sales
(Solar power generation-related sales)

194% | Growth rate of sales of PV Inverters

162% | Growth rate of sales of power measurement sensors

Market share 33% | Residential PV Inverters
Number one share in Japan

Note: OMRON estimate

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Change in OMRON’s PV Inverters Production Volume

Monthly Shipments of Indoor and Outdoor PV Inverters (from 2007)

- **January 2007**
  - Start of in-house production on consignment
    - April 2010
  - Start of purchases at ¥48/kWh
    - November 2009
  - Start of subsidies
    - April 2009

- **200701**
  - Start of full-amount feed-in tariff purchases for industry
    - July 2012

- **200704**
  - Completion of variable-cost production system
    - April 2013

- **200707**
  - Impact of floods in Thailand
    - from November 2011

- **200710**
  - Heavy rain in northern Kyushu
    - 12 July 2012

- **200801**
  - Tornado damage in China
    - from May 2012

- **200804**
  - Start of full-amount feed-in tariff purchases for industry
    - July 2012

- **200807**
  - Impact of floods in Thailand
    - from November 2011

- **200810**
  - Heavy rain in northern Kyushu
    - 12 July 2012

- **200901**
  - Tornado damage in China
    - from May 2012

- **200904**
  - Great East Japan Earthquake
    - March 2011

- **200907**
  - Heavy rain in northern Kyushu
    - 12 July 2012

- **200910**
  - Tornado damage in China
    - from May 2012

- **201001**
  - Start of full-amount feed-in tariff purchases for industry
    - July 2012

- **201004**
  - Impact of floods in Thailand
    - from November 2011

- **201007**
  - Heavy rain in northern Kyushu
    - 12 July 2012

- **201010**
  - Tornado damage in China
    - from May 2012

- **201101**
  - Start of subsidies
    - April 2009

- **201104**
  - Great East Japan Earthquake
    - March 2011

- **201107**
  - Heavy rain in northern Kyushu
    - 12 July 2012

- **201110**
  - Tornado damage in China
    - from May 2012

- **201201**
  - Start of in-house production on consignment
    - April 2010

- **201204**
  - Start of purchases at ¥48/kWh
    - November 2009

- **201207**
  - Start of full-amount feed-in tariff purchases for industry
    - July 2012

- **201210**
  - Completion of distribution warehouse
    - December 2012

- **201301**
  - Completion of variable-cost production system
    - April 2013

- **201304**
  - Start of subsidies
    - April 2009

- **201307**
  - Great East Japan Earthquake
    - March 2011

OMRON’s long history with PV Inverters for solar power generation began with their launch in 1994. We are the authority on PV Inverters in Japan.
Japan’s PV Inverters Market: Growth Potential and Objectives

Japan’s PV market trend: Dramatic growth
(Middle market will continue to grow in FY2013)
We focus on the noteworthy residential market, which is not subject to the full-amount feed-in tariff system, and the low-voltage middle market of less than 50kW

<table>
<thead>
<tr>
<th>Surplus buyback (less than 10kW)</th>
<th>Feed-in tariff (full amount) (10kW or more)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential (~10kW)</td>
<td>Low-voltage middle (less than 50kW)</td>
</tr>
<tr>
<td>Surplus buyback (less than 10kW)</td>
<td>Complex housing/stores/small offices/idle land, etc.</td>
</tr>
<tr>
<td>Residences/ Detached housing (New/existing 3-5kW range)</td>
<td>High-voltage middle (50kW or more)</td>
</tr>
<tr>
<td>Medium-sized factories, etc. (50kW-500kW)</td>
<td>Mega, large-scale (500kW or more)</td>
</tr>
<tr>
<td>Power generation plants, etc.</td>
<td>(500kW~)</td>
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PV Installed Capacity in Japan
Source: 2012 Fuji-Keizai Group Market Forecast

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First choice for your Energy Innovation

1. Further strengthen our advantages to capture a predominant market share

2. Deploy our advantages in products and services to ensure economic scale and develop our domain

3. Strengthen our foundation for future growth
OMRON’s Current Situation and Plan

Residential PV Inverter Market in Japan

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<thead>
<tr>
<th></th>
<th>FY12</th>
<th>FY13</th>
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<tbody>
<tr>
<td>No. 1</td>
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<tr>
<td>Market Share</td>
<td>33%</td>
<td>35%</td>
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<tr>
<td>growth</td>
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Introduction of new products for new residential construction

Low-Voltage Middle Solar Power Market

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<tr>
<th></th>
<th>FY12</th>
<th>FY13</th>
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<tbody>
<tr>
<td>No. 3</td>
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AICOT®-equipped outdoor PV Inverters

- AICOT® for up to 6kW
- Stable supply
- Quiet

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OMRON’s Strength

**AICOT®**: The Industry’s First Grid Connection Technology

High-speed method eliminates mutual interference
No limit on the number of units connected because detection is possible beyond transformers

**Low-speed** detection (0.5~1 second)
- Reactive power feed volume is small and long-term
- Possible interference
- Without going beyond the utility pole transformer, tests can be conducted on **up to 10 units** under the transformer

**High-speed** detection (0.2 second)
- Reactive power feed volume is large and short-term
- **No limit** on units connected beyond the transformer because variations in frequency can be detected
- Goes beyond the transformer

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OMRON’s Strength
Commercialization over an Eight-Year Period

Japan’s first project to demonstrate clustered grid-interconnection

Conducted the Demonstrative Project on Grid-Interconnection of Clustered Photovoltaic Power Generation Systems for an entire town since 2002

Established AICOT® to achieve one of the world’s largest multi-unit interconnections with a total of 553 houses and a total output of 2,129kW

Pal Town Josai-no-Mori, Ota City, Gunma Prefecture

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OMRON’s Strength
Strengthening Engineering Capabilities at the
“Solar Power Generation Dojo in Aso”

In pursuit of construction technology
Improving construction technology

Solar Power Generation Dojo in Aso
(Aso Solar Power Generation Training Center)

In pursuit of reliability

In pursuit of maintenance monitoring

In pursuit of application technology

Strengthening know-how and resources

Field service engineering
Nationwide bases/staff
140 / 1,200

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Enhancing Our Strength
Achievement of Core Technology for Next-Generation PV Inverters

- Completion of small-size, high-efficiency PV Inverter technology for new power devices
- Establishment of a platform for next-generation PV Inverters (small size, high efficiency)

Trial manufacture/technology complete
- Silicon carbide devices for high frequency and low loss
- Achieving high frequency enables smaller size
- Heat radiating, low electromagnetic interference design
- Sealed construction and moisture-resistant design with an IP34 rating
Demand response will be necessary to achieve a balance of supply and demand.

Hybrid control (microgrid control) will be necessary for power creation/storage/saving for home consumption.

- **Supply/demand control system**
  - Power plant to Electricity market
  - Power generation to Power purchase

- **Grid connection on premises**
  - Output generated after suppression of voltage fluctuation

**Large-scale power consumers**
- Large
- Medium
- Zero

**Charge/discharge control value**
- Storage battery charge/discharge

**Home consumption control that stores energy**
- Match demand to supply (peak power cuts)

**Prototype**
- PV-PCS 3.3 Kw
- PCS 5.6kW for SCiB™
Preparing for the Future
A Profitable Production Strategy

Variable cost-based production

Use of platform development to reduce variable costs

Monthly production of 30,000 units
(300% compared with 1H of FY12)
5-7% reduction in variable costs
Thank you for your confidence in our future growth.