Mitsubishi Electric Transportation Systems
—Road to No.1 transportation systems integrator—

Takahiro Kikuchi
Executive Officer,
Group President of Public Utility Systems

4 December 2014
1. Business Overview
2. Business Environment
3. Business Targets
4. Growth Strategy
5. Production & Service Network
6. Sales & Marketing Network
7. Conclusion
1. Business Overview

- Strong track record of rolling stock systems since 1922, exports since 1960’s
- Only manufacturer in the world who can drive, stop, and control rolling stocks
- Delivery record of ground-based systems, mainly in Japan

Rolling stock systems

- Control
  - TCMS
- Stop
  - On-board safety equipment
  - Brake control equipment
- Drive
  - Propulsion control systems
  - Traction motor
  - APS

Service equipment

- HVAC
- Train Vision

Network between systems

Ground-based systems

- Transportation system substation
- Traffic control system
- Station & platform equipment

TCMS: Train Control and Monitoring System
HVAC: Heat, Ventilation and Air Conditioning
APS: Auxiliary Power Supply
2. Business Environment

Solid growth in global transportation systems market

**Annual transportation system market:** JPY 25T*

### Growing markets
- Europe
- Asia
- North America

### Change in customer needs
- Export -> Local production
- System package projects

### Fierce competition
- Industry consolidation
- New entrants

### Higher exchange risks

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**Market for us**

2011-13 2017-19 (UNIFE World Rail Market Study)

**JPY 21T**

<table>
<thead>
<tr>
<th>Region</th>
<th>2011-13</th>
<th>2017-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>7.3</td>
<td>8.1</td>
</tr>
<tr>
<td>Asia</td>
<td>5.6</td>
<td>7.2</td>
</tr>
<tr>
<td>Americas</td>
<td>4.2</td>
<td>5.4</td>
</tr>
<tr>
<td>CIS</td>
<td>2.6</td>
<td>2.8</td>
</tr>
<tr>
<td>Middle East &amp; Africa</td>
<td>1.3</td>
<td>1.3</td>
</tr>
</tbody>
</table>

CAGR:
- Europe: 1.8%
- Asia: 4.1%
- Americas: 4.0%
- CIS: 1.3%
- Middle East & Africa: 0%

**JPY 4T**

<table>
<thead>
<tr>
<th>Year</th>
<th>Electrical equipment for rolling stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-13</td>
<td>2.0</td>
</tr>
<tr>
<td>2017-19</td>
<td>2.6</td>
</tr>
</tbody>
</table>

**JPY 5T**

<table>
<thead>
<tr>
<th>Year</th>
<th>Operation control systems, Transportation system substations, etc</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-13</td>
<td>2.0</td>
</tr>
<tr>
<td>2017-19</td>
<td>2.4</td>
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</table>
### 3. Business Targets

**JPY 320 billion revenue, more than 5% operating margin in FY2020**

<table>
<thead>
<tr>
<th>Achievements</th>
<th>Targets</th>
</tr>
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<tbody>
<tr>
<td>- Higher growth than market average</td>
<td>- Japan: Meet customer needs, and expand business scope</td>
</tr>
<tr>
<td>- Share &gt; 50% in Japan</td>
<td>- Overseas: Double revenue</td>
</tr>
<tr>
<td>- Doubled overseas sales (FY2008 vs FY2014)</td>
<td></td>
</tr>
</tbody>
</table>

**Achievements (FY2008 vs FY2014)**

- Higher growth than market average
- Share > 50% in Japan
- Doubled overseas sales

**Targets**

- Japan: Meet customer needs, and expand business scope
- Overseas: Double revenue

**CAGR (FY2008 vs FY2014)**

- **Total sales:** +5.3%
- **Overseas sales:** +13.3%
  (market average: +2%)

**Graph:**

- **2008 to 2014:**
  - Total sales: +5.3%
  - Overseas sales: +13.3%
  (market average: +2%)
- **2020 Target:**
  - Overseas: 320 billion
  - Japan: +5.3%

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4. Growth Strategy

Road to No.1 transportation system integrator

A) No.1 equipment manufacturer

- Market share expansion;
  - Innovative products
  - M&A, strategic alliances

B) Rolling stock systems integrator

- Packaging rolling stock systems

C) Integrator between rolling stock systems & ground-based systems

- Global business development for ground-based systems
- Solution business, e.g. EMS
- M&A, strategic alliances

EMS: Energy Management System
4. Growth Strategy A) No.1 equipment manufacturer

Expand market share by launching innovative products

Inverter with all-SiC*1 power module
- 30% reduced energy consumption*2
  Enabling efficient use of regenerative energy
- Less maintenance
  Less usage of mechanical brakes
- 65% reduced size & weight*3

*1: SiC: Silicon Carbide
*2: As a main circuit system, compared to our conventional system
*3: compared to our conventional system

APS with all-SiC power module
- High efficiency
- Reduced size & weight

Highly efficient traction motor
- Reduced energy consumption
- Less maintenance
- Less noise
- High reliability
4. Growth Strategy A) No.1 equipment manufacturer

Expand market share by launching innovative products

- **High reliability**
  - Apply in-house key components

- **Reduced energy consumption**
  - 10% reduction for cooling, and 60% for warming by using heat-pumps
Integrate rolling stock systems with packaged solutions

Create rolling stock system packages by use of TCMS –TRAIN BRAIN, backed by our extensive knowledge of electrical equipment for rolling stock.

- Current
  - Products
    - Main circuit systems, e.g. inverter
    - APS
    - HVAC
    - Train vision
    - TCMS
    - On-board safety equipment
    - Brakes

- Target
  - Packaged rolling stock systems
    - TCMS –TRAIN BRAIN
      - Main circuit systems e.g. inverter
      - APS
      - HVAC
      - Brakes
      - On-board safety equipment
      - Train vision
      - Items beyond our scope, e.g. door systems etc.

- Optimization for individual products
- Total optimization as system
4. Growth Strategy B) Rolling stock system integrator

Integrate rolling stock systems with packaged solutions

By total optimization through TCMS;
- More efficient use of energy
- Simpler outfitting
- Total cost reduction
Total integration among trains, ground-based facilities, and operation system by use of ICT

Proposed solution business: **Energy Management System**

- REMS (Railway-EMS)
- SEMS (Station-EMS)
- TEMS (Train-EMS)
- FEMS (Factory-EMS)

**4. Growth Strategy C) Integrator between Systems**
Introduction to EMS solutions:
Increase regenerative energy by applying products with all-SiC power module

-> energy savings in trains and stations

Stations

- Lighting
- Air conditioner
- Elevators, escalators, etc

Trains

Deceleration

Generator

Motor

Acceleration

Inverter with SiC power module

S-EIV

SiC power module

S-EIV: Station Energy Saving Inverter
5. Production & Service Network

Improve competitiveness through local production & services

Europe
- Italy: Set up in Apr 2014
- China: Expanded in May 2014

China
- Mother factories: Itami, Nagasaki, Kobe

Australia

India
- Open in Dec 2015

USA
- Set up in May 2014
- Expanded in May 2014

Mexico
5. Production & Service Network

1) Europe
a. **MEKT** *(Mitsubishi Electric Klimat Transportation Systems S.p.A)*
   - Established in Apr 2014
   - Engineering, assembly, and service of HVAC

2) North America
a. **MEPPI** *(Mitsubishi Electric Power Products, Inc)*
   - Expanded in May 2014
   - Local production of propulsion control systems and HVAC
b. **MRS** *(MEPPI Rail Service Center)*
   - Established in May 2014
   - Target to expand service business
3) India

a. **New factory**
   - Start operation in Dec 2015
   - Local production of electrical equipment for metro projects, etc
   - Target to expand service business in India

### New factory outline

<table>
<thead>
<tr>
<th>Location</th>
<th>Bengaluru, State of Karnataka</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension</td>
<td>4,605m²</td>
</tr>
<tr>
<td>Business</td>
<td>Assembly, testing, &amp; maintenance of propulsion control systems, APS, and traction motors</td>
</tr>
<tr>
<td>Schedule</td>
<td>Finish construction: Sep 2015</td>
</tr>
<tr>
<td></td>
<td>Start operation: Dec 2015</td>
</tr>
</tbody>
</table>
Europe
USA
Japan HQ

6. Sales & Marketing Network

Develop global business with more personnel outside Japan

Europe
USA
Java

Middle East, Africa
India
SEA
Australia

Expatriate dispatch plan

Sales personnel
Sales engineers

Increased sales personnel in FY2014
Maintaining the status quo
Considering expansion

FY2011
FY2014

Sales persons
15
7
11
23
x 1.5

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Modernization of Deutsche Bahn ICE-2 Train Equipment
- Our first delivery of train equipment to Deutsche Bahn

<table>
<thead>
<tr>
<th>Customer</th>
<th>Deutsche Bahn AG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order</td>
<td>Modernize propulsion control systems in 46 Intercity Express 2 (ICE-2) High-Speed trains</td>
</tr>
<tr>
<td>Sales</td>
<td>Approximately JPY 3.0billion (expected)</td>
</tr>
<tr>
<td>Delivery</td>
<td>FY2016 – FY2018</td>
</tr>
</tbody>
</table>

- Set up transportation business division in EU sales office (April, 2014)
- Collaborate with railcar manufacturers
- Work closely with rail operators and railcar manufacturers
North America

- Strong delivery record of electrical equipment for 6,500 railcars, mainly in NYC area
- Expand service business and strengthen relationship with rail operators by setting up MRS
- Penetrate into ground-based systems business

**Supply electrical equipment for NYC suburban M-9 train**

<table>
<thead>
<tr>
<th>Customer</th>
<th>Kawasaki Rail Car, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order</td>
<td>Supply propulsion control systems and TCMS for 92 trains for Long Island Rail Road M-9</td>
</tr>
<tr>
<td>Sales</td>
<td>Approximately JPY 3.2billion (expected)</td>
</tr>
<tr>
<td>Delivery</td>
<td>FY2015 -</td>
</tr>
</tbody>
</table>

(Picture: NYC Long Island Rail Road M-7)
India

- 70% market share in electrical equipment for rolling stock in Indian metro market
- Strengthen relationship with local railcar manufacturer
- Targets include projects financed with yen loans

**Supply electrical equipment for Delhi Metro RS-10**

<table>
<thead>
<tr>
<th>Customer</th>
<th>Rotem / Delhi Metro Rail.co</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order</td>
<td>Supply propulsion control systems, APS, and TCMS for 486 metro trains</td>
</tr>
<tr>
<td>Sales</td>
<td>Approximately JPY 11.1 billion (expected)</td>
</tr>
<tr>
<td>Delivery</td>
<td>FY2014 – FY2016</td>
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</tbody>
</table>
7. Conclusion

- Thoroughly execute the growth strategy
- Develop global production & service
- Reinforcing global salesforce

Target:
No.1 transportation systems integrator
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The expectation of operating results herein and any associated statement to be made orally with respect to the Company’s current plans, estimates, strategies and beliefs, and any other statements that are not historical facts are forward-looking statements. Words such as “expects,” “anticipates,” “plans,” “believes,” “scheduled,” “estimated,” “targeted,” along with any variations of these words and similar expressions are intended to identify forward-looking statements that include but are not limited to projections of revenues, earnings, performance and production. While the statements herein are based on certain assumptions and premises that the Company trusts and considers to be reasonable under the circumstances to the date of announcement, you are requested to kindly take note that actual operating results are subject to change due to any of the factors as contemplated hereunder and/or any additional factor unforeseeable as of the date of this announcement. Such factors materially affecting the expectations expressed herein shall include but are not limited to the following. As such, additional factors may arise at any given time.

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3. Changes in stock markets, especially in Japan
4. Changes in balance of supply and demand of products that may affect prices and volume, as well as material procurement conditions
5. Changes in the ability to fund raising, especially in Japan
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7. New environmental regulations or the arising of environmental issues
8. Defects in products or services
9. Litigation and legal proceedings brought or contemplated against the Company or its subsidiaries and affiliates that may adversely affect operations or finances
10. Technological changes, the development of products using new technology, manufacturing and time-to-market
11. Business restructuring
12. Incidents related to information security
13. Occurrence of large-scale disasters including earthquakes, typhoons, tsunami, fires and others
14. Social or political upheaval caused by terrorism, war, pandemics by new strains of influenza and other diseases, or other factors