Mitsubishi Electric
Energy Management System for Factory (FEMS) & Building (BEMS)

21 Nov. 2018
K. Miyashita, President
Mitsubishi Electric do Brasil
1. Mitsubishi Electric Corporation - Overview & Policy

2. Our Energy Management System (EnMS)
   
   2-1 FEMS (Factory Energy Management System)
   
   2-2 BEMS (Building Management System)
   
   2-3 Other EnMS
1. Mitsubishi Electric Corporation

Mitsubishi Electric Corporation

Head Office: Marunouchi, Tokyo, Japan
President & CEO: Takeshi Sugiyama
Established: Jan. 15, 1921 (100th year in 2021)

Operating Income: 319 Bil JPY (US$ 2.9 Bil. Profit, FY2017)

Employees: 142,000 (in 40 countries)

Fortune Global 500 No. 279 (25th in Japan)
Rating

Moody’s A1 Standard & Poor’s A+

Mitsubishi Electric do Brasil / MELCO Automotivos do Brasil
150 employees
1. Management Philosophy

**Corporation Mission**

The Mitsubishi Electric Group will continually improve its technologies and services by applying creativity to all aspects of its business. By doing so, we enhance the quality of life in our society.

**“Global Leading Green Company”**

**Embody of the corporate mission**

- **Initiators to create value**
  - Provide products, systems, and services globally
  - Make strong businesses stronger
  - Technology synergy/business synergies

**Growth targets to be achieved by FY2020**
- Net sales 5 trillion JPY or more
- OPM 8% or more

**Contemporary challenges in society**
- Environmental issues
- Resource/energy issues
1. Management Philosophy for 17 SDGs

Mitsubishi Electric group will contribute to meeting the SDGs' globally shared 17 goals by continuing to pursue sustainable growth through all corporate activities, including value creation to solve challenges in society.
1. Total Solution in Brazil/LATAM

- **Building Solution**
  - Building Automation
  - Refrigeration Systems
  - Uninterruptible Power Supplies

- **Automation & Energy Saving Solution**
  - Industrial Automation
  - Process Automation
  - EDM/Laser and CNC

- **Social Infrastructure & Transportation Solution**
  - Transportation Systems
  - Visual Information Systems
  - Automotive Components
## Electrical Energy Cost /Industry
### (US$/100KWH in 2017)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>US$/100KWH in 2017</th>
</tr>
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<tbody>
<tr>
<td>ITALY</td>
<td>18.02</td>
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<tr>
<td>JAPAN</td>
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<tr>
<td>GERMANY</td>
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<tr>
<td>SLOVAK</td>
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<td>BELGIUM</td>
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<tr>
<td>NEW ZEALAND</td>
<td>8.31</td>
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</table>

(Source: DECC, OECD countries)

- **BRA 14.7**
- **AVER. 9.8**
2. Energy Management System (EnMS)

2-1  FEMS (Factory Energy Management System)

2-2  BEMS (Building Energy Management System)

2-3  Other EnMS
2-1  FEMS (Factory Energy Management System)
2-2  BEMS (Building Energy Management System)
2-3  Other EnMS
e-F@ctory objective:
To make information from factory(shop floor) available to improve productivity, quality, energy saving, efficiency, etc.
2-1. FEMS - Mitsubishi Electric e-Factory Concept
2-1. FEMS – Products & Solution

**Energy Measurement**

**Understand energy consumption**, acquiring data for trend analysis and actions.

**Efficient Motor Control**

**Drive Motors with the most efficient solution reducing energy consumption and increasing motor lifespan.**

**Optimize process control for variable demand and personalized items.**

**Process Control**

**Control and Visualize your entire Factory, taking energy saving actions based on real-time information.**

**SCADA (MC Works 64)**

**Energy Measurement**

Understand energy consumption, acquiring data for trend analysis and actions.

**Not only protect your system, but keep maintenance easier by using measurement circuit breakers.**

**Protection and Measurement**

**Store and Control energy information in a web based solution, with quick and easy access.**

**Energy Management (EcoWebServer)**
MITSUBISHI ELECTRIC – FUKUYAMA WORKS

Since: February 1st, 1943
Facilities: 95,000m²
Employee: 2,000
Visitors: 10,000 + /year

Manufacturing process of products:
- Circuit Breakers (ACB, MCCB)
- Measurement & Control equipment (Power Meter, EcoWebServer etc.)

More than 1,000 measured points.

REDUCTION:
- ELECTRICITY DEMAND - 1.7 MW/YEAR
- ANNUAL CONS. ENERGY - 70 MWH/YEAR
- ELECTRIC BILL - 25%

System Configuration
- SCADA: MC Works
- PLC: Q-Series
- EMS: EcoWeb Server
- Meters: ME110, EcoMonitorLight/Plus, ACB, MDU MCCB etc...
- Remote I/O: CC-LINK IE Field
- Inverter: FR-A800 series
2-1. FEMS

Mitsubishi Electric - Fukuyama Factory Case
Energy Demand Reduction 1.7MW/year

Notes:
(1) Energy demand reduction was achieved because of both equipments and operation.
(2) ISO 14001 certified in December 1997

Reduction:
- Electricity Demand - 1.7 MW/year
- Annual Cons. Energy - 70 MWh/year
- Electric Bill - 25%
2-1 FEMS (Factory Energy Management System)

2-2 BEMS (Building Energy Management System)

2-3 Other EnMS
2-2. Our BEMS

- Air Conditioning
- Water Management
- Fire Alarm
- Garage Pumping Water
- Irrigation Control
- Air Pressure Control Of Emergency Stairs
- Lighting Control
- Access Control
- Energy Monitoring
Reduce MTTR (mean time to repair) with status of all installed systems (less cost of downtime)

The system can release e-mail or sms in case of alarm or warning

Real time monitoring!

Monitor and control all assets in real time!

Control Room Location

BEMS REDUCE THE SYSTEM DOWNTIME WITH ENERGY SAVING!
2-2. Our BEMS

Japan House Sao Paulo

- Japan government project for better understanding & presence of Japanese Technology & Culture in Brazil
- 3 floors with 2,000m² at Avenida Paulista.
- With Mitsubishi Electric products:
  - Elevator
  - Air conditioning systems (High efficiency VRF system)
  - JET TOWEL (Hand drier)
  - BEMS (Building Energy Management System)
2-2. Our BEMS

Japan House Sao Paulo

BEMS System Configuration

- **SCADA:** MC Works 64
- **PLC:** iQ-R Series
- **HMI:** GOT2000 (GT27)
- **Remote I/O:** CC-LINK IE Field
- **Inverter:** FR-F800 series
- **Services:** Installation, Tests, Configuring

BEMS MONITOR/CONTROL ENERGY FOR ENERGY SAVING & COST REDUCTION!
2-2. Our BEMS

ZEB (net Zero Energy Building) in Japan

Shirasagi Denki Kogyo’s building in Kumamoto, Japan (after large earthquakes in 2017)

With Mitsubishi Electric’s
- ZEB consulting
- Air conditioning systems
- Ventilation
- Hot water supply
- Elevators
- Solar panels
- DC distribution
- BEMS

And other suppliers technology
- Geo Power System
- Hot water supply using solar
- Heat Insulation materials etc.

This building was accredited as “ZEB Ready Building” with 50% or more energy saving

ZEB/BEMS ARE OUR EXPERTISE!
2-1 FEMS (Factory Energy Management System)

2-2 BEMS (Building Energy Management System)

2-3 Other EnMS
2-3. EnMS for Water Treatment (WT) facility

BENEFITS FOR WT FACILITY
- Electricity costs represent second highest OPEX in water operation.
- 70% of the energy demand is for pumping.
- VFD inverters, controllers, SCADA can contribute a lot for cost reduction.
Energy/Water consumption metering/billing system

- For 3 Terminal Buildings
  - 2 Domestic Terminals
  - 1 International Terminal
- 4,000 measured points for Electricity and Water usage
- Products: Remote I/Os, Power Meters, Metring servers, PLC, BACNET communication

**BENEFITS FOR AIRPORT**

- Automated Electricity/Water metering and billing system.
- Time saving/cost saving without manual metering & billing.
- Mistake free billing to tenants etc.
2-3. EnMS for airports

Tokyo International Airport (Haneda Airport)

Metering servers

Remote I/Os

Meters

DATABASE

COMPUTER

SERVER

Supervisory

BACnet

Ethernet

Switch / Hub

Metering Switchboard

PLC

Metering Server

RS-485

Communication B/NET

S33A
Energy Saving Solution is Mitsubishi Electric!