Strategy for Energy and the Environment in JR East

Satomi Suzuki
East Japan Railway Company
Assistant Manager
Tokyo, JAPAN
(1) Summary, process of the company
(2) JR East Group Management Vision V
(3) Station activities in the past
(4) Energy-saving stations “ecoste”
(5) Saving energy and recycling wastes
(1) Summary, process of the company
Summary, process of the company

<History>

• In April 1987, East Japan Railway Company (JR East) was established through division and privatization of the public Japanese National Railways.

• Initial aim of privatization was to maintain stable railway management.
Background of JNR Reform

• JAPANESE NATIONAL RAILWAYS

◆ Factors of JNR bankruptcy

(1) Limitations inherent in public corporations

(2) Inflexibility of nationwide uniform organization

Unable to respond to changes in the operating environment

Bankruptcy

JNR, a public corporate entity operated under a nationwide uniform management system, was divided into seven private entities: six regional passenger rail companies and one rail freight company.

In April 1987

JNR East
Major figures of our company

Passenger line network: 7,474.2km
Total number of passengers per day: 17.10 million
Number of stations: 1,700
Average number of trains per day: 13,000
Number of employees: 60,000
Outline of JR-EAST

SERVICE AREA (COMPETITIVE SITUATION)

10 large railway companies
(2,500 km railway network within 50 km radius)

Tokyo - Aomori 714 km (2h59m)
Tokyo - Niigata 334 km (1h37m)

79%
100%
Characteristics of JR-East

VERTICAL MANAGEMENT STRUCTURE

We own our all rail infrastructure, operating and maintaining it as a fully integrated railway model.

Operation and Maintenance

Infrastructure
Financial comparison

【Operating Revenues】

JR East: 26,242
IAG: 25,697
Lufthansa: 21,963
FedEx: 44,287
UPS: 55,438

(US $ million)

【Net Income】

JR East: 1,941
IAG: 557
Lufthansa: 431
Union Pacific: 1,561
FedEx: 4,388
UPS: 4,372

(US $ million)
JR East Group Management Vision V

1987  
Reform and Privatization of JNR *
“First Starting Point”
* JNR: Japanese National Railways

2012  
Great East Japan Earthquake
“Second Starting Point”

2020  
JR East Group Management Vision V
- Ever Onward -

JR East 2020 Vision - idomu -
New Frontier 2008
New Frontier 21
FUTURE21 (Past Management Visions)
Energy and environmental strategies

<Promoting energy creation>

<Promoting energy conservation>

<Introducing smart grid technology to railway power systems>
**Energy and environmental strategies**

- **Introducing smart grid technology**
  - “Using surplus electricity at a distant location”
  - “Storing and using surplus electricity”

- **Promoting energy creation**
  - JR East’s power plant
  - Substation for electric trains
  - Regenerative power storage, etc.
  - Regenerative power Interchanger (RPC), etc.
  - Station buildings

- **Promoting energy conservation**
  - Electric company
  - R&D activities focused on new renewable energy sources
  - Introduction of solar power generation
  - Adopting LED lights, and achieving high efficiency for equipment

- **Promoting energy conservation**
  - Using surplus electricity at a distant location
  - Storing and using surplus electricity

- **Introducing smart grid technology**
## Environmental Targets

<table>
<thead>
<tr>
<th>Item</th>
<th>Targets to be met by FY2021</th>
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<tbody>
<tr>
<td>Energy consumption from railway business activities</td>
<td><strong>8% reduction</strong> (MJ: relative to FY2011 level) (52.7 billion MJ ⇒ 48.5 billion MJ)</td>
</tr>
<tr>
<td>CO₂ emissions per unit of electricity generated by JR East’s own power plants</td>
<td><strong>30% improvement</strong> (kg-CO₂/kWh: relative to FY1991 level) (0.457 kg-CO₂/kWh ⇒ 0.320 kg-CO₂/kWh)</td>
</tr>
</tbody>
</table>
Composition of energy consumption by JR East

The chart illustrates the energy consumption by JR East across various fiscal years from '11 to '16, categorized by Head Office, Branch Office, Buildings, etc., Stations, Rolling Stock Centers, Shinkansen line operation, and Conventional line operation. The data shows a reduction rate compared to the baseline year '14, with notable decreases in energy consumption across all categories over the years.
(3) Station activities in the past
Past activities at stations
(Promoting energy conservation)

Introducing LED lighting for platform

Introducing flat screen LED information displays

Traditional product

The fluorescent lighting

Flat screen LED information displays

LED lighting

Actions for energy saving
### Past activities at stations (Promoting energy conservation)

Platform (Left : Nikko Station / Right : Osaki Station)

<table>
<thead>
<tr>
<th>Items</th>
<th>FY2020 target</th>
<th>FY2015 result</th>
<th>FY2016-FY2020</th>
</tr>
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<tbody>
<tr>
<td>Introduction of LED lighting (FY2014 to FY2020)</td>
<td>36,000 LED lightings (out of 244,000) 83 mil MJ reduction</td>
<td>Total 9,000 LED lightings 18.5 mil MJ reduction</td>
<td>Abt. 5,400 LED lightings (per year) (planned)</td>
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36,000 LED lightings (out of 244,000)
83 mil MJ reduction

[LED lightings]
[Total 9,000 LED lightings 18.5 mil MJ reduction]

[Abt. 5,400 LED lightings (per year) (planned)]
Past activities at stations (Promoting energy creation)

Solar power system over the Tokaido line at Tokyo station

- **Year and month installed**: February 2011
- **Panel area**: Approx. 3,846 m²
- **Power output**: 453kW

Other solar power systems installed at stations:
- Tokyo station Shinkansen line platform (March 1993)
- Takasaki station Shinkansen line platform (March 2001, February 2004)
(4) Energy-saving stations “ecoste”
What does “ecoste” stand for?

Environment Earth Conscious Station of East Japan Railway Company
energy-saving stations “ecoste”

・“Ecoste” model stations introduce various technologies for environmental preservation, including energy conservation and use of renewable energies, aiming to appeal to passengers.

・We will create “ecoste” in different areas making use of regional characteristics.
# “ecoste” ~Four pillars~

<table>
<thead>
<tr>
<th></th>
<th>Four pillars</th>
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<tbody>
<tr>
<td>1</td>
<td><strong>Energy conservation</strong></td>
</tr>
<tr>
<td></td>
<td>:Promoting more advanced energy conservation</td>
</tr>
<tr>
<td>2</td>
<td><strong>Energy creation</strong></td>
</tr>
<tr>
<td></td>
<td>:Actively implementing renewable energy</td>
</tr>
<tr>
<td>3</td>
<td><strong>ECO-Awareness</strong></td>
</tr>
<tr>
<td></td>
<td>:Preparing facilities that make users eco-aware</td>
</tr>
<tr>
<td>4</td>
<td><strong>Environmental Harmonization</strong></td>
</tr>
<tr>
<td></td>
<td>:Creating vitality through an environment that is in harmony with people</td>
</tr>
</tbody>
</table>
In-service “ecoste” stations

1st “ecoste”
Yotsuya station in Tokyo

2nd “ecoste”
Hiraizumi station in Iwate prefecture

3rd “ecoste”
Kaihin-Makuhari station in Chiba prefecture

4th “ecostee”
Yumoto station in Fukushima prefecture

5th “ecoste”
Fukushima station in Fukushima prefecture
1\textsuperscript{st} ecoste model station - Yotsuya Station on JR Chuo Line

- Natural ventilation system
- LED light
- Green roof
- Green wall
- Basic greenery
- Information display
- Greenery
- Solar panel
- Solar power
- Water-saving toilet system
- Water-retentive paving
- Fuel battery for household use
- Increased efficiency in air conditioning
- High efficiency transformer
- Roof garden
- Transparent solar panels
- Roof garden
- Solar power
- Water-saving toilet system
- Water-retentive paving
- Fuel battery for household use
- Increased efficiency in air conditioning
- High efficiency transformer
2nd ecoste model station (Hiraizumi)

- Storage battery
- Solar panel
- Insulation painting
- LED light
- Information display

Concept of zero-emissions station:
- Surplus electricity in the daytime is used to charge storage batteries
- Stored electricity is used at night

Graph showing output of solar panels and consumption by station over time.
3rd ecoste model station (Kaihinmakuhrari)

- Solar power
- Green wall
- Wind-generated electricity
- Sunlight lighting system
- Cooling tube
- Optical duct system
- LED light
- Information display
- Greenery
4th ecoste model station (Yumoto)

Concept: The utilization of community resources
(hot-spring heat, local wood, solar power)
4th ecoste model station (Yumoto)

Radiation type heater using hot spring heat
Location: The waiting room

Foot bath using hot spring
Location: Platform

Solar panels
Location: Beside the rail track.
5th ecoste model station (Fukushima)

Concept: Collaboration with Fukushima prefecture

- Solar panels
- Organic thin-film solar batteries
- Storage batteries
- Charging facility for electric vehicles
- Heat pump using underground heat
- LED lighting
- Storage batteries
- Eco information display
5th ecoste model station (Fukushima)

Heat pump using underground heat

Solar panels
Location: platform roofs

Organic thin-film solar batteries

Heat pump (under construction)
New “ecoste” stations

Niitsu station in Niigata prefecture

Urawa station in Saitama prefecture

Musashi-Mizonokuchi station in Kanagawa prefecture
New eco model station (Urawa)

CO2 emissions reduction target: ▲40% (relative to 2015 level)

- Sprinkler system on the platform
- "Eco bench"
- Solar panels
- LED lighting
- Eco information display

Energy Management System

CO2 emissions reduction target:
▲40% (relative to 2015 level)
Concept of Urawa “ecoste”
: Energy Management System

Energy management system configuration

- Train schedule
- Weather
- Solar panels
- Opening and closing of shutters

Information input

Energy Management System (EMS)

Control

- Air conditioner
- Lighting
- Eco information display
Control of lighting on the platform in conjunction with trains

- Train schedule
- EMS
- Control lighting

Lowering brightness in areas where the train does not stop

Lighting in areas where train stops:
- 15-car stopping position
- 10-car stopping position

LED lighting shows length of arriving train
【Current】
Regenerative system power for train running in vicinity

※Lost as heat when there is not a train running in the vicinity

【Future system】
Regenerative power for station equipment even without running train in vicinity

Power running train
Braking train

Niitsu station
Air conditioners
Elevators
Escalators

Regenerative brake
Braking train

Inverter
AC power
DC power

Regenerative brake
Braking train
New "ecoste" model station (Niitsu)

CO2 emissions reduction target:
▲41% (relative to FY2014 level)
New “ecoste” model station (Musashi-Mizonokuchi)

Concept: **CO2-free hydrogen**

Autonomous Hydrogen Energy Supply System
In the future

We will create more new “ecoste” in different areas, making use of regional characteristics.

We will make use of knowledge provided by our existing “ecoste”.
(5) Saving energy and recycling wastes
Reducing energy consumed for train operations
Creation of Renewable Energy Hub in Northern Tohoku

**Solar light**

- **Akita Izumi solar power plant**
  - Power generation output: Approx. 1.3 MW
  - Began use in March 2016

- **Hanamaki Atago solar power plant**
  - Power generation output: Approx. 0.3 MW
  - Began use in February 2015

**Wind**

- Abundant wind resources along shorelines, etc.

**Biomass**

- **Hachinohe biomass power plant**
  - Power generation output: Approx. 12 MW
  - Use scheduled to begin in December 2017

**Geothermal**

- Abundant geothermal resources in the Tohoku region’s volcanic areas

*Between Michikawa and Shimohama on Uetsu Main Line*
JR Akita Shimahama Wind Power Station
Recycling waste collected from stations and trains

More than 90% recycled
Recycling waste collected from stations and trains
Recycling waste PET bottles into various things
Reducing and recycling tickets

The used tickets are recycled to which of the following?

① Note Book
② Toilet Paper
③ Office papers
The Answer is

② Toilet Paper

100% recycled
Thank you for your attention

Satomi SUZUKI / East Japan Railway company
eco@jreast.co.jp
http://www.jreast.co.jp/