Action by JR-West to Reduce CO₂ Emissions

West Japan Railway
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Overview of JR-West

Sanyo-Shinkansen
- Operating km: 644 km
- No. of train: 290 train/day
- No. of Car: 874 cars

Urban Network (Kansai Urban Area)
- Operating km: 635.5 km
- No. of train: 4800 trains/day

Conventional Line (Other Than Kansai Urban Area)
- Operating km: 3744.5 km

(Data 2008.4.1)
Actual Condition of JR-West Energy Consumption Volume

FY 2008 Energy Consumption Volume

**Group Total** 33.39 billion MJ

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<tr>
<th>Energy for train operation saving measures</th>
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<tr>
<td>1. Introduction of energy-saving rolling stock</td>
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<td>2. Replaced by high-efficiency transformer</td>
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<td>3. Tie feeding between up and down line</td>
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<td>4. Optimized regenerative brake</td>
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<td>5. Hybrid power feeding</td>
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<td>6. Hybrid diesel railcar</td>
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<td>7. Energy-saving operation</td>
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<td>8. Diesel railcar idling stop</td>
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<th>Energy for business purpose saving measures</th>
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<td>1. High-efficiency lighting in station and office building</td>
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<tr>
<td>2. Use of energy-saving elevator and escalator</td>
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For train operation (83.5%)

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<tr>
<th>Shinkansen (Electric Railcar)</th>
<th>Conventional Line (Electric Railcar)</th>
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<td>12.10 billion MJ (36.2%)</td>
<td>14.78 billion MJ (44.3%)</td>
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Conventional Line (except Electric Railcar) 1.01 billion MJ (3.0%)

Fuels for Industrial Use
(Automobile for business use, kerosene, etc.)
660 million MJ (2.0%)

Electricity for business purpose
(Lighting at station and company premise, air-conditioning, etc.)
4.84 billion MJ (14.5%)
Transition of Introduction Ratio for Energy Saving Railcars

End of FY 2009  Energy-Saving Railcars: 4,251  Non Energy-Saving Railcars: 1,986
End of FY 2012  Energy-Saving Railcars: 4,731  Non Energy-Saving Railcars: 1,570

Goal of Mid-Term Business Plan  Over 75%  (End of FY 2012)
Transition of Energy Saving Railcar Ratio

Transition of Energy Saving Railcar Ratio (Shinkansen TEC)

No. of Railcars

Energy Saving Railcars Ratio

Non Energy Saving Railcar
Energy Saving Railcar
Energy Saving Railcar Ratio

0  5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80  85  90  95  100 (FY)

(FY)
Transition of Energy Saving Railcar Ratio (Conventional Line EC, EL)

Transition of Energy Saving Railcar Ratio

No. of Railcars

Energy Saving Railcar Ratio

Non Energy Saving Railcar

Energy Saving Railcar

Energy Saving Railcar Ratio

(Conventional Line EC, EL)

(FY)
Facility of Tie Feeding System between Up and Down Line

Tie feeding system between up and down line: System connecting the feeder of up and down line in-between substations.

Cross bond: System connecting the rail of up and down line through impedance.
Comparison of the flow of regenerative electricity

Current System

Substation

Regenerative Brake Train

Power Running Vehicle

Tie feeding system between up and down line (Connects feeder in up and down line)

Cross bond (Connects the rail in up and down line)

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Substation

Regenerative Brake Train

Feeder

Rail

Feeder

Rail

Power Running Vehicle

Cross bond

The flow of electricity from Regenerative Train
Actual Condition of Electricity Consumption in Station buildings

Present Situation

- Power used at stations overall & usage by category (breakdown) unknown
  - No measurements at other companies
- What effect energy-saving equipment and measures would have on stations overall is unknown

Clarify power used at stations (overall & breakdown)

Purpose

Determine priority of energy-saving measures
(Station energy-saving measures for lighting, air-conditioning or other areas?)
Summary of Measurement

Selection of Station…

- Stations where we cannot figure out power usage
- Elevated stations with 1 or 2 platforms
  (Platforms for local trains with 7 railcars)

Nada Station

Station Building
Total Floor Space: 500 m²

Volumes of entrainment and detrainment: 45,000/day

Number of Trains: 305/day
Station Building Layout

1. Automatic ticket gate
2. Fare adjustment
3. Elevator (1)
4. Elevator (2)
5. Escalator
6. Escalator
7. Stairs
8. Ticket Vending Machine
9. Stairs
Survey of power use at Nada station

Estimated annual energy use at mid-size stations: **Approx. 1053 kWh/day**

385,000 kWh/year

Platform lighting: 189 kWh (18%)
Concourse lighting: 253 kWh (24%)
Automatic Ticket Gate: 85 kWh (8%)
Escalator: 160 kWh (15%)
Air-conditioning: 115 kWh (11%)
Ticket Vending Machine: 25 kWh (2%)
Others: 223 kWh (21%)

Utilize for energy-saving measures at station
Transition of basic unit for energy (compared with 1995)

Basic Unit = \frac{\text{Energy Consumption (Electricity, Kerosene)}}{\text{Car Kilometer}}

Goal of Mid-Term Business Plan 12.0% reduce (End of FY 2012)
Eco renewal of Osaka station

- Hydropower Generation
- Solar power system
- Cold and Hot water supply to neighboring building
- Double glazing windows
- Energy saving lights
- Roof tree planting
- Rain water system
- Dry mist
- Solar power system
- Roof tree planting

JR-WEST
Thank you for your attention!

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