Energy Efficiency Initiatives in Railways

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ELECTRIC TRACTION- Key Statistics of 2015-16

- About 26000 RKM (39.92%) electrified.
- Fuel expenses 37% (Rs. 10963 Cr) out of Rs. 29234 Cr
- Consumes approx. 17 Billion units (1.9% of total consumption)
- Electricity bill (2015-16) provisional: Rs. 10300 Cr
- Requirement of power likely to double in next 5 yrs.
Railways Energy Consumption in last Six years
Energy consumption in 2015-2016 (Traction)

Total Energy Consumption is 14674 million Units

- SER, 151895808 Units
- SCR, 1576791466 Units
- CR, 1694193154 Units
- NCR, 1455350814 Units
- WR, 1393439911 Units

Legend:
- CR
- ECoR
- ECR
- ER
- MR
- NCR
- NER
- NR
- SCR
- SECR
- SER
- SR
- SWR
- WCR
- WR
Traction Energy consumption as per SEB (2015-2016)
Traction Energy consumption as per States
(2015-2016)
Energy consumption in 2015-16 (General Services/Non traction)

Total Energy Consumption is 1945 million Units
Non-traction Energy consumption as per SEB's (2015-2016)
Non-traction Energy consumption as per States (2015-2016)
Highlights of Rail Budget 2016-17

- Through Power Procurement Contracts (using its status as Deemed Distribution Licensee) already signed and implemented will mean an annualized saving of Rs. 3000 crore by coming year.

- In addition, the saving of Rs. 300 crore is being targeted through demand side management and energy efficiency measures.

- All new light provisions will be LED luminaire and all Railway stations will be covered with LED luminaire in next 2 to 3 years.

- Green Industrial Units: To convert all production units as well as at least one workshop in each Zonal Railway as green industrial unit by obtaining relevant certification, **good energy management and sourcing energy from renewables**
Energy Conservation Achievements

• Total of Rs. 2656 crores (approx) saved in the last 5 years due to energy conservation measures

• 87 No. of National Energy Conservation Awards bagged by Railways till 2015-16.

• Developed a web based portal ‘Rail Saver’ & IRGREENRI.

• Issued 98 Policy Guidelines/ Circulars on General Power Supply Systems like use of LED lights etc

• Indian railways has carried out 643 energy audit of facilities till March, 2016.

• On 12 August 2015, IR has signed MOUs with Ministry of Power and BEE for cooperation to improve Energy Conservation on IR in the presence of Hon'ble Minister of Railways and Minister of State (Independent Charge) for Power, Coal and New & Renewable Energy.
Energy Conservation Initiatives

Measures initiated:

- Energy auditing of major load centers
- Segregating of 70:30 lighting circuits at platforms
- Use of energy efficient LED luminaries & fans
- Policy to Procure star rated equipment
- Automation of pumps
- Power factor Improvement measures
- Timers for high mast lighting and occupancy sensors in offices
- More than 8 lakhs LED purchased by Railway staff
- These measures have maintained Energy consumption over last 3 yrs despite increase in load @ 5% per yr.
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Year</th>
<th>Specific Energy Consumption</th>
<th>Passenger % Reduction</th>
<th>Goods % Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2009-10</td>
<td>19.6</td>
<td></td>
<td>7.29</td>
</tr>
<tr>
<td>2</td>
<td>2010-11</td>
<td>19.4</td>
<td>1.02</td>
<td>6.79</td>
</tr>
<tr>
<td>3</td>
<td>2011-12</td>
<td>19.0</td>
<td>2.06</td>
<td>6.43</td>
</tr>
<tr>
<td>4</td>
<td>2012-13</td>
<td>18.9</td>
<td>0.52</td>
<td>6.13</td>
</tr>
<tr>
<td>5</td>
<td>2013-14</td>
<td>18.8</td>
<td>0</td>
<td>6.08</td>
</tr>
<tr>
<td>6</td>
<td>2014-15</td>
<td>18.9</td>
<td>0</td>
<td>6.86</td>
</tr>
<tr>
<td></td>
<td>Imp For 6 years</td>
<td>3.57%</td>
<td></td>
<td>17.6%</td>
</tr>
</tbody>
</table>
Energy Conservation Initiatives

Major initiatives:

• Facade LED lighting at Mumbai CST station
Energy Conservation Initiatives

Major initiatives:

- LED Lights in 5 Rakes of 12 Coaches EMU (Churchgate to Virar)
Energy Conservation Initiatives

Major initiatives:

- LED lights installed at Railway stations
Energy Conservation Initiatives

Major initiatives:

- 200 nos. 35 Watt Energy Efficient Ceiling Fans installed at Platform No 1 of NDLS & HNZM Railway Stations
Energy Conservation Initiatives

- Implementation of SCADA system at New Delhi Railway Station:

SCADA ARCHITECTURE

- M2M Gateway
- MODEM
- SCADA LAN
- GPRS
- SCADA SERVER -CUM- OPERATOR WORKSTATION
- SCADA SERVER -CUM- OPERATOR WORKSTATION
- 230VAC Input From Customer End
- 230VAC Output For SCADA
- 3kVA UPS 3kVA UPS
- SMF Battery
- 3kVA UPS
- 3kVA UPS
- SMF Battery
- 230VAC Input From Customer End
- 230VAC Output For SCADA
Energy Conservation Initiatives

- Implementation of SCADA system at New Delhi Railway Station:
Energy Conservation Initiatives

- Implementation of SCADA system at New Delhi Railway Station:

- Benefits:

  - **Increased Efficiency of operations:**
    - Increased efficiency of Power Operations
    - Lesser deployment of power due to centralized monitoring & Control
    - Better response time to any outage.

  - **Better energy Management:**
    - Identification of major sources of power consumption and targeting these for load reduction
    - Identify losses and take action
    - Reports for Analysis
    - Maximum Demand Monitoring & Regulation
**Energy Conservation Initiatives**

- Under **Indian Railway-GEF-UNDP project**, the following demonstration pilot projects on Energy Efficiency were implemented.
- Ministry of Railways is exploring to replicate the following energy efficient technologies across Indian Railways.

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<td>1</td>
<td>Optimal light control system over DLI Division</td>
</tr>
<tr>
<td>2</td>
<td>Smart sense &amp; smart Grid system at NR, Baroda House, New Delhi</td>
</tr>
<tr>
<td>3</td>
<td>Provision of automized light &amp; fan control for New Delhi Railway Station</td>
</tr>
<tr>
<td>4</td>
<td>Implementation of SCADA on New Delhi Railway Station</td>
</tr>
<tr>
<td>5</td>
<td>Automation of pumping arrangement at Ghaziabad NR</td>
</tr>
<tr>
<td>6</td>
<td>Bay lighting in workshops &amp; Loco sheds</td>
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<tr>
<td>7</td>
<td>Provision of 200 Super energy efficient fans at NDLS station</td>
</tr>
<tr>
<td>8</td>
<td>Installation of VVVF (Variable voltage variable frequency) drives for lifts</td>
</tr>
<tr>
<td>9</td>
<td>Provision of Solar pumps over DLI division</td>
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<td>10</td>
<td>Supply, fixing, testing &amp; commissioning of retro-fitment of LED lights in 150 non AC GSCN coaches of TL Depot in DLI Division</td>
</tr>
<tr>
<td>11</td>
<td>Energy efficient automation system for pumping installations for stations; workshops; hospitals; railway offices &amp; colonies at Jaipur NWR.</td>
</tr>
<tr>
<td>12</td>
<td>Provision of building management system for stations &amp; railway offices for implementing energy efficiency measures at Dadar Station, Central Railway</td>
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<tr>
<td>13</td>
<td>Transformation of Rail Bhawan building into Energy Efficient by Building Management Intelligent systems (BMIS) project.</td>
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<tr>
<td>14</td>
<td>Substations Metering Data Analysis Systems (MDAS) project at Northern Railways</td>
</tr>
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Energy Conservation Initiatives

Major initiatives:

As part of capacity building of railways staff on energy efficiency, “International Summit on Energy Efficient Technologies in Railways” was held on 6th November 2015 at Taj Palace, New Delhi to share several energy efficient technologies adopted by railways across other countries.
Thank you

A route to a climate-neutral train journey

- 2016: 30 grams
- 2020: 0 grams

CO₂ emissions per travel kilometer