



सत्यमेव जयते



Indian Railways

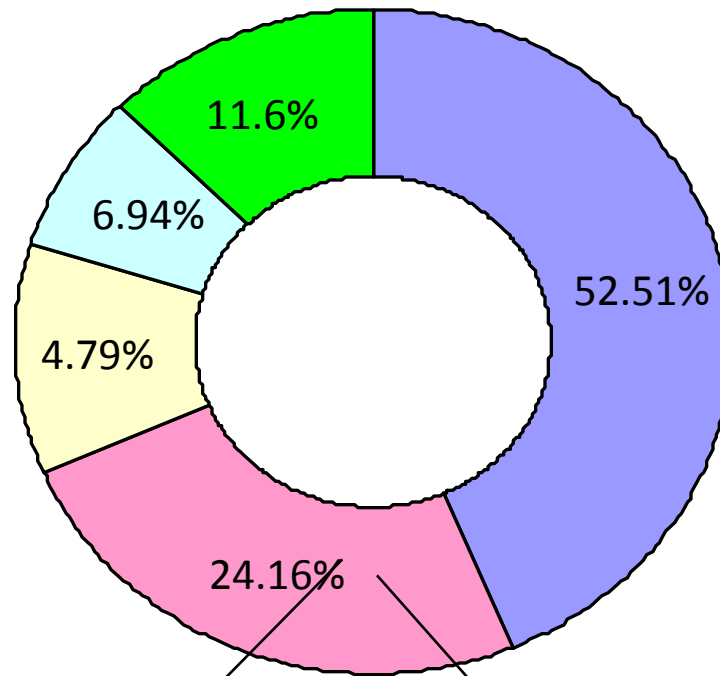
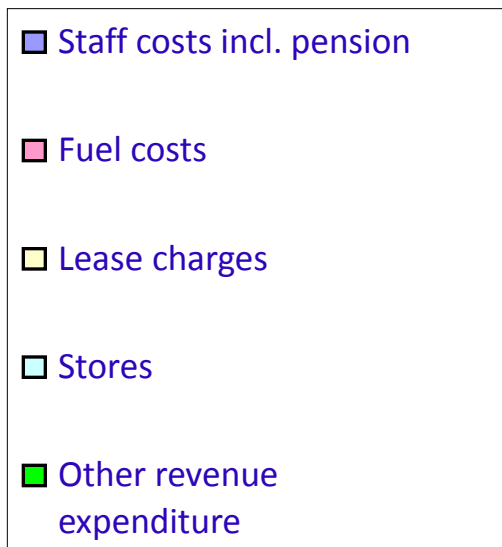
Lifeline to the nation...

Indian Railways' Energy Policy and Management

03rd November, 2016

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Ministry of Railways

Energy costs constitute 24.16% of ordinary working expenses of Railways



Possibility of savings in electricity costs can push up operating margins for railways

Electricity – 9.44%

Diesel – 14.72%

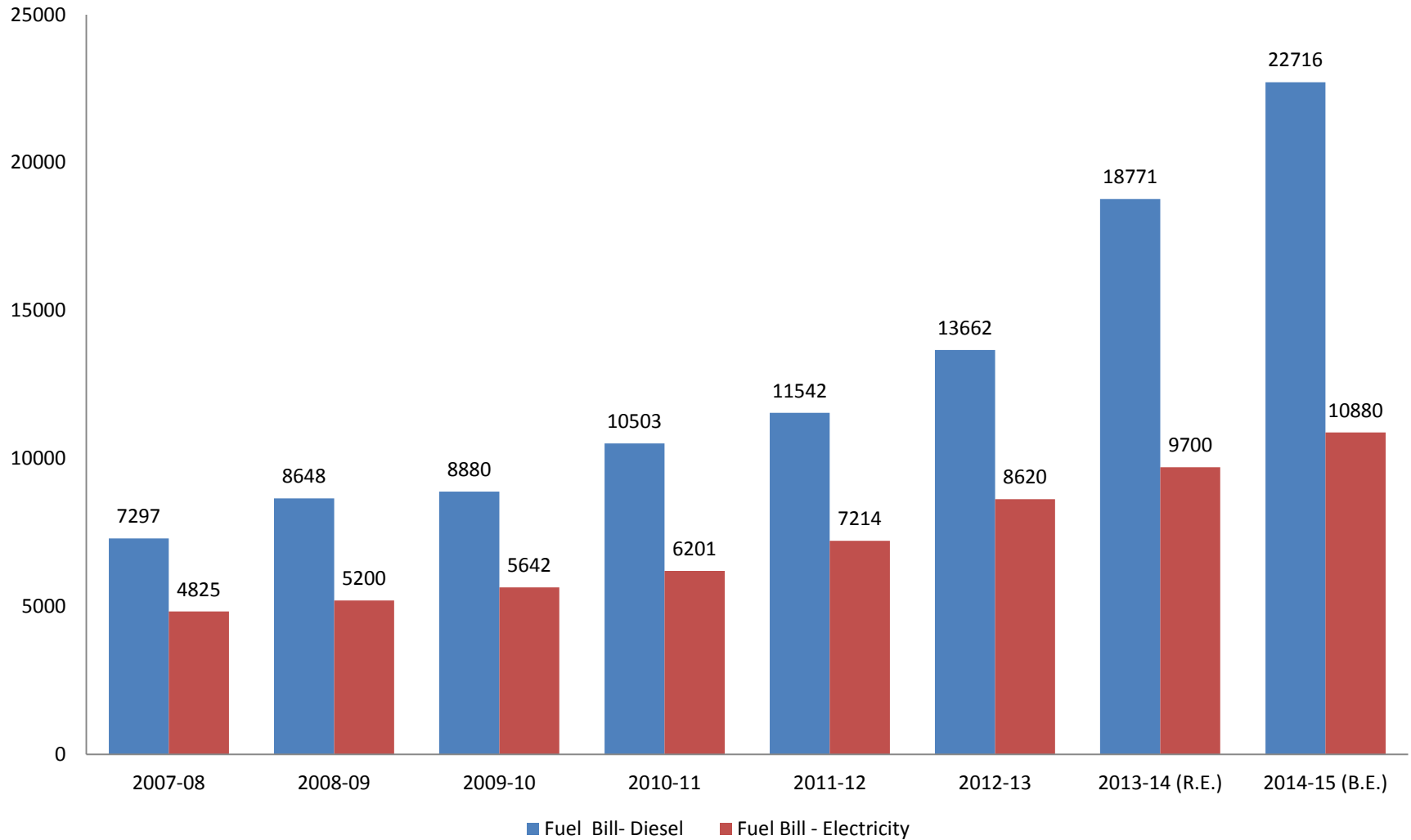
IR– Focus Areas

- Expansion of network: New Freight Corridors on the Golden Quadrilateral (over 9,500 kms)
- Increase in Avg. speeds- Right powering
- Higher Speed – 160/200/300 kmph
 - Delhi- Mumbai,
 - Delhi- Howrah,
 - Delhi-Chandigarh,
 - Chennai-Bangalore
 - Mumbai-Ahamedabad -

IR– Focus Areas

- Improve passenger amenities - escalators, lifts
- Improve Asset utilization by Backward/forward integration of activities
- Go to next level of technology,
- Modernisation
- Expenditure reduction

Increase in Fuel Bill



ELECTRIC TRACTION- Key Statistics of 2015-16

- About 28,000 RKM (40%) electrified.
- Hauling about 67% Freight and 50% Passenger traffic.
- Fuel expenses 37%
- Consumes 17.5 Billion units
- Electricity bill (Budgeted for 16-17): Rs. 8500 crore.

Key components of Railway Energy policy

1. Reduction in cost of total energy Bill

- Procuring from open market as deemed licensee
- Development of Railways transmission network
- Have Captive Power Plant
- Quick electrification and
- Reducing running of diesel under wire
- Procure diesel differently

Key components of Railway Energy policy (Cont.)

2. Go for reducing the Carbon foot print progressively
 - Use of Wind Power
 - Use of Solar Power
 - Use of Waste to energy
3. Reduce cost of Non Traction Power
 - Feed from solar power on roof top and Rly land
 - Use Wind Power for Non Traction supply
4. Use of Energy Efficient Technologies in Traction & Non-traction Application

Possible methods to Reduce the Cost of Power Procurement

1. Indian Railways to migrate from DISCOMs
2. Have Captive Power plants
3. Have Transmission network
4. Improve efficiency of power utilization
5. Go for Renewable Energy

INITIATIVES TO REDUCE ELECTRIC TRACTION BILL- Migrate from DISCOMs

IR has now started buying power as deemed Distribution

1. 50 MW power taken in U.P. on IR's CTU connected network
 - Saving achieved : Rs. 100 Cr. per yr.
2. 500 MW power tied from PGPPL in the states, Maharashtra, MP, Gujarat, Jharkhand
 - Saving achieved : Rs. 1000 Cr. per yr.
3. 90 MW power tied up from Tata power in Mumbai area, Saving about 150 Cr. per yr.

INITIATIVES TO REDUCE ELECTRIC TRACTION BILL

4. 585 MW tied up for Northern, Eastern & Central part- expected saving about Rs.1,000 Cr. per yr.
 - NOC obtained in M.P. & Rajasthan
5. 400 MW contracted for Southern states- expected saving about Rs. 400 Cr. per yr.
6. Power from DVC in West Bengal-Saving about Rs.10 Cr. Per yr.

INITIATIVES TO REDUCE ELECTRIC TRACTION BILL-

Have Captive Power plants

- IR's first captive plant at Nabinagar, Bihar is now taking shape:
 - It is a 1000 MW plant in Joint venture with NTPC
 - Have 4-units of 250 MW
 - The first unit was commissioned on 30th March 2016
 - The COD of the first unit is expected in October 2016
 - The cost of power is expected to be around Rs.4 per unit.
 - The other units will be ready in phased manner by March 2018.

INITIATIVES TO REDUCE ELECTRIC TRACTION BILL-

Take up Construction of Transmission lines-

1. IR has its own network from
 - Dadri to Kanpur -400 kms
 - Kanpur-Allahabad- 200 kms
2. Further IR has taken up construction on following routes
 - Allahabad-Mughalsarai-160 kms
 - Mughalsarai-HWH- 700 kms
 - MGS-Son Nagar- 130 kms
 - Delhi-Bharuch -1100 kms
 - Delhi-Chennai – 2200 kms
 - HWH-Mumbai- 2000 kms
 - In SECR- 500 kms

Renewable Energy- PV based electricity generation in IR

- Plans - 1000 MW Solar power by 2020 :
 - 500 MW on Roof Tops
 - 15MWp solar plants already installed
 - 218 Railway Stations were roofed with solar PV Rooftop plants
 - Use free railway rooftop and land spaces through Public- Private- Partnerships
 - Tenders for 50 MW under finalization by Zonal Railways
 - Tender for 100 MW issued on 28.09.2016
 - For about 350 MW M/s. CEL will carry out assessment
 - 500 MW on Land based:
 - 50 MW through RUMS
 - 190 MW through SECI

Renewable Energy- PV based electricity generation in IR

The photographs of solar power plants set up by zonal railways are under:

500 kWp Solar rooftop power plant at Varanasi Railway Station

Solar rooftop power plant at Jaipur Railway station



Renewable Energy- Wind power generation

- About 40 MW already in operation
- Tenders for 60 MW will be issued soon
- Additional 100 MW in the pipeline

Possible methods to Reduce the Cost of Power Procurement

- Go for Energy Conservation

Energy Conservation

- Reduced consumption by $> 3.3\%$ on yr to yr in Electric Traction
- On Diesel traction reduction by 2% on yr to yr basis
- On traction -By about 2% despite a growth in load by 5%

Improve Power utilization

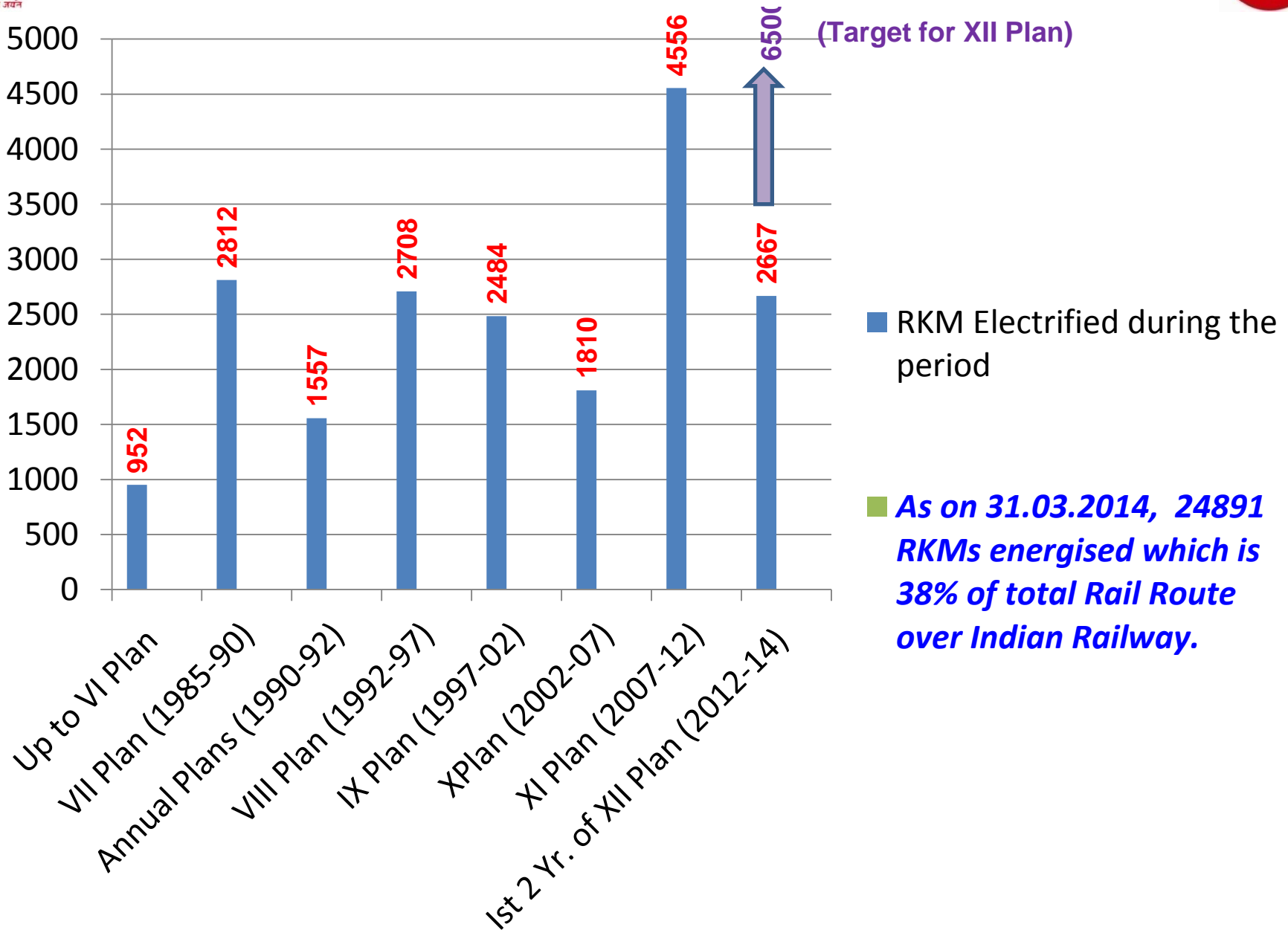
- Production of three phase locomotives and EMUs only
- Go for Train Sets
- High Horse power locos- 9000/ 12000HP
- Use of LED lighting only
- Switch to 5 star equipment
- Use Building management system extensively
- Go for ECBC Compliant Buildings-400 new stations

Improve Power utilization - Future Plans

- Automate Train Operation- Optimize train operations - Pass trains can save up to 10% whereas the Freight trains up to 30 %
- Install Smart sense & smart Grid system- Complete IT based monitoring
- Opt for SCADA system for major installations



Electrification on faster pace



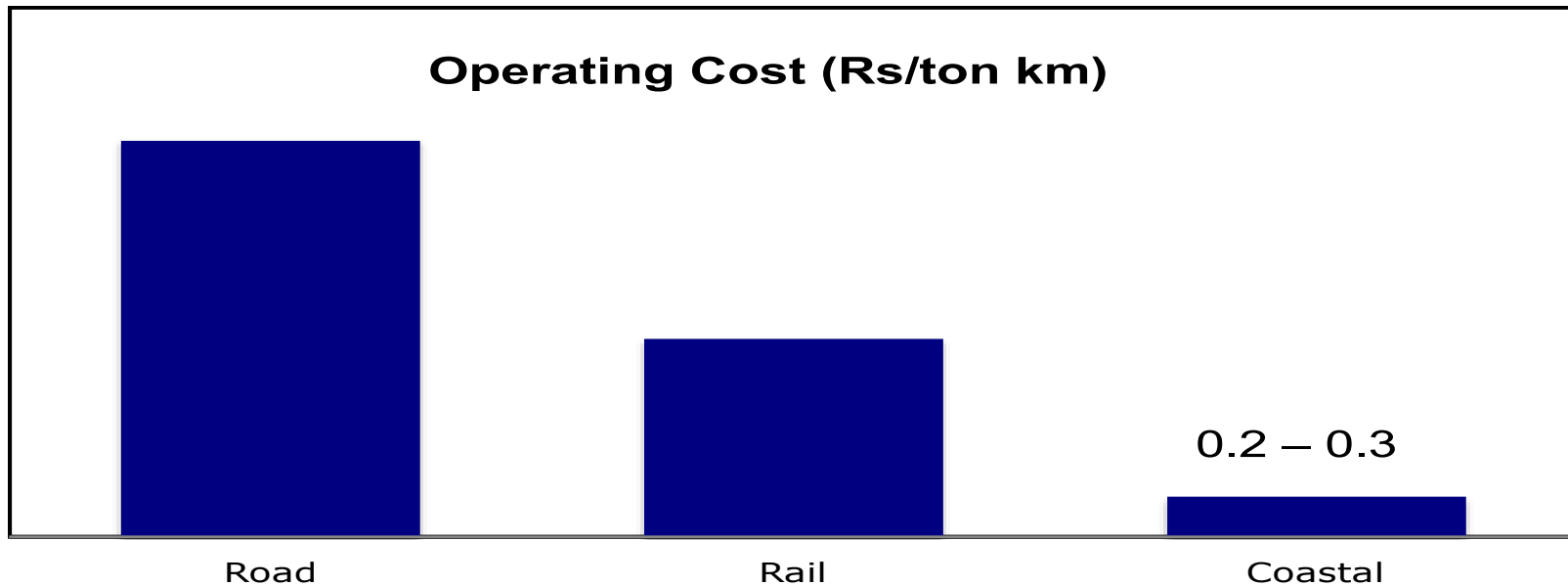
Cost reduction & environmental impact with Railway Electrification projects in 2015-16 & 2016-17

	RKM	<i>Anticipated cost (Rs. Cr.)</i>	Anticipated annual saving in first year of operation of electric traction (Rs. Cr)
Electrification of Routes included in Budget 2015-16	6608	6746.45	2014.37
Electrification of Routes to be proposed for inclusion in Budget 2016-17	5217	5404.60	1234.71
TOTAL	11825	12151.05	3249.08

IR is working to electrify 90 % of all its routes in next 5 years to carry 90 % load on electric traction

Future Scenario- 2030

The operating cost of freight carried by Railways is 50% lower than that of road as indicated below:



Increase in share of Railways from present 36% to 40% would significantly enhance energy saving. Dedicated freight corridor for Delhi-Chennai, Chennai-Kolkata and Mumbai-Kolkata sector should be taken up.

Future Scenario- 2030

By 2030 - With almost 90% electrification &

- DFCCIL network of 7000 RKM,
- Some new high speed (350 Kmph) corridors,
- Few tracks upgraded to 160 to 200 Kmph and
- With total loading of about 5-6 billion metric tonnes (as per projection of National Transport Development Policy Committee for 2032),
- With sustainable economic growth as motto
- Rly to build transmission network of about 20000 Kms
- Railways to have captive power plant for about 5000 MW- with renewable of 3000- 5000 MW peak

Developing partnerships

- IR wants innovative solutions for
 - Cost reduction- long term complete solution from start to finish
 - Provide innovative solutions for Railway environment
 - Increase in turn over/ throughput
 - Tackle issues of Obsolescence
 - Speedily implementation
 - Increase in manpower output

Emerging opportunities in Indian Railways

- Building Railways new transmission network
- Developing IR's Renewable Energy plants
- Energy efficient solutions for 400 mega Railways station
- Developing 9000 HP & 200 Kmph loco motives

Switching to Energy efficient technologies on IR -

- 100% manufacture of 3 phase locos & EMUs
- 100% LED lit Stations & buildings
- Install Smart sense & smart Grid system
- SCADA system for major installations
- Building management system

Thank You

