

# MINISTRY OF RAILWAYS

## **Some Initiatives of Indian Railways on Sustainable Environment Management**

# Transport Sector

- Key driver of economic growth and social development of the country
- Major Energy Consumer in the country
  - > 50 % of total petroleum consumption
  - > 25 % of overall energy needs
- 13 % GHG emissions are from Transport Sector using Fossil fuels –approx 140 million tons of CO<sub>2</sub> equivalent in 2007

# GHG Emissions from Transport Sector (Mt. of CO<sub>2</sub>)

Sector	Passenger Traffic (Share in %)				Freight Traffic (Share in %)			
	2005	2010	2015	E. I.	2005	2010	2015	E.I.
Road	83.67%	84.69%	84.81%		57.16%	58.29%	60.51%	
Rail	15.84%	14.60%	14.34%		42.82%	41.69%	39.47%	
Aviation	0.50%	0.71%	0.85%		0.02%	0.02%	0.02%	

Note: E.I. = Emission Intensity in tCO<sub>2</sub> / BPKM (Pass.) and tCO<sub>2</sub> / BTKM (Freight)

# GHG Mitigation strategies for I R

- Debottlenecking the existing network
- Strengthening the existing network
- Augmentation of network
- Energy efficient operation
- Renewable and Alternate sources of Energy

# Mitigation Strategies - Passenger Traffic

- Increasing frequency, speeds & throughput of passenger traffic by Rail mode through capacity augmentation
- Use of MEMU/DEMU as better option for medium distance transport
- Introduction of High Speed Rail service(HSR)

# Mitigation Strategies - Freight traffic

- Stepping up rail share is the need of hour
  - Share of rail in freight decreased from 80% in 1950-51 to 36% in 2013-14
  - But absolute freight traffic increased from 44 BTKM in 1950-51 to 601 BTKM in 2009-10
- Dedicated Freight Corridor
  - 3376 km of Eastern and Western corridors by 2020
- Electrification – 10000 KM by 2020, further 15000 KM by 2030

## Other important augments----

- Doubling - 10000 km by 2020
  - Further 16000 km by 2030
- Gauge Conversion – 3500 km by 2020
- New lines - @ 400 km p.a. up to 2020
  - @ 500 km p.a. up to 2030

# Rolling Stock augmentation

- 4000 locomotives to be manufactured/ procured by 2020, further 7500 by 2030
- 9000/12000 hp energy efficient electric locos and 6000 hp state of the art diesel locos to be inducted.
- To procure 83000 wagons by 2020, further 195000 by 2030
- To manufacture/procure 34000 coaches by 2020, further 83000 by 2030
- To introduce distributed powered electrical multiple unit train sets



# Projected Traffic Growth in Rail Mode

- Passenger traffic set to grow at CAGR 6% from 1158 BPKM in 2013-14 to 2904 BPKM by 2029-30.
- For freight transport the traffic will grow at CAGR of 8 % between 2013-14 and 2029-30 from 666 BTKM to 2158 BTKM
- This is in line with Low Carbon Strategies for Inclusive Growth report of the Planning Commission (2014)

# Mitigation measures

## **Energy Efficiency – Diesel Traction**

- Improvement in Fuel Efficiency–
  - Passenger Traffic- 5.37% by 2020 compared to 2013-14 and further 4.23% by 2030
  - Freight traffic- 3.71% by 2020 compared to 2013-14 and further 3.86% by 2030
- Provision to handle Hotel load by Diesel Locomotives
- Guidance for optimised Loco Driving (GOLD)
- Alternative Fuels in Traction
- Other Diesel engine specific Improvements

# Mitigation measures ...Contd.

## Energy Efficiency – Electric Traction

- Improvement in Fuel Efficiency–
  - Passenger Traffic-2.12% by 2020 compared to 2013-14 and further 2.7% by 2030
  - Freight Traffic-7.22% by 2020 compared to 2013-14 and further 6% by 2030
- Switch over to 3 phase energy efficient Locomotive / EMU technology
- Introduction of latest Energy Efficient Locomotive technology
- Regenerative Braking features
- Hotel load provision in locos
- Energy cum speed Monitoring System ( EMSON) for energy efficient driving

# Efforts on improving Energy efficiency Trailing Rolling Stock

- Pay load to tare ratio to be increased- 3.44 to 4.0/4.21
- Commodity specific wagons for better through put & logistic advantages for customers
- S.S. Coaches with higher C.C. To improve PKM to GTKM ratio

# Energy Efficiency on Non-Traction side

- Many of GOI initiatives on energy efficiency to be adopted /intensified
- Green building concepts to be inducted in an appreciable manner

# Use of Renewable Energy Sources

- Commitment to source at least 10% of electric energy through Renewable
- Includes 1000 MW of solar energy & 170 MW of wind energy

# Improvement in energy intensity in Railway systems

- Railways is the most energy efficient mass transport system
- Energy intensity comparison- 2004-05

<b>Pass.</b>	<b>Railways</b>	<b>Taxis</b>	<b>Bus</b>
Ton Joule/ BPKM	71	1338	196
<b>Freight</b>	<b>Railways</b>	<b>HCVs</b>	
Ton Joule/ BTKM	91	1125	

# Improvement in Emission Intensity & GHG mitigation programmes over IR

	tCo2/million GTKM	% reduction	Annual savings in million tCo2
2005	12.40	Base year	Base year
2014	10.82	12.7	3
2020	9.44	23	9
2030	8.35	31	23



# Bio - Toilets

- Developed indigenously with DRDO
- 17388 bio toilets installed in about 7000 coaches upto 2014-15
- 17,000 bio toilets to be fitted in 2015-16
- 4711 bio toilets fitted in 1347 coaches up to Aug. 2015
- All coaches to be fitted with bio toilets by 2021-22
- Kanalas- Dwarka- Okha – is the first section with zero train toilet discharge

# Water Management

- Water Recycling Plants provided at 29 locations resulting in savings of 12 million litres of water per day.
- Further plans to set up WRPs at 32 major stations and 10 coaching depots.
- Rain Water Harvesting systems provided at 1864 locations across the IR earlier and more than 350 provided in 2015-16.
- Water Audit done at 85 major stations in 2015-16 to achieve reduction of losses/leakages and to identify conservation measures.

## Automatic Coach Washing Plants

- Railway Budget Speech 2016-17, para 134
  - ACWP with water recycling to be provided at major coaching depots holding > 500 coaches
- Including water recycling
- Works for 10 depots, holding > 500 coaches are being processed for inclusion in Supplementary Budget

# Other Green Initiatives

- Waste to Energy conversion plants planned at major coaching terminals for disposal of solid waste in environment friendly manner. One pilot plant to be set up within a year
- Green Buildings
  - Rail Nirman Nilayam at Secundrabad, the first Green Building of IR, is accredited as 3 star rated building under GRIHA.
  - IRICEN New Administrative Building constructed as a Green Building is accredited as a Platinum rated building by LEED-INDIA and 5 star rated building by GRIHA.
- 40600 hectare of railway land is under afforestation. About 61 lakhs saplings planted in 2014-15

## Municipal Solid Waste (MSW) Management : Segregation and Recycling Centres at A1 Cat. Stations

- Budget Speech 2015-16, para 16 - Setting up of pilot plant near major coaching terminals
- Railway Budget Speech 2016-17, para 68 iii. - to identify 5 more major stations for the year 2016- 17
- NWR has setup a 0.5 TPD Biodegradable waste processing plant at JP coaching Depot
- IROAF is setting up a 1 TPD Biodegradable waste processing plant at Kishanganj Railway Colony, New Delhi
- Tender opened through RITES on 14.03.2016 for 2 plants at NDLS, JP

## Green Industrial Units (GIU)

- Railway Budget Speech 2016-17, para 135
  - All PUs & one Repair Workshop in each ZR to become GIU
- Directive for IMS accreditation including Environment Management issued to all ZRs and PUs on 11.06.2015
  - 2 PUs - RCF / RBL and RWP / Bela yet to get accreditation
  - 27 out of 44 workshops are accredited
  - 16 Diesel sheds are certified, 30 under process
  - 4 Major coaching depots are certified (Tikiapara/ ER, Sorting Yard/ ER, Jaipur/ NWR, Mumbai Central/ WR) out of 32 identified
  - 2 major wagon depots certified (Khanalampura/ NR, Vatva/ WR) out of 12 identified

## 5% Blending of Bio diesel in Traction Fuel

- Railway Budget Speech July, 2014 - 5% blending of bio diesel as Traction Fuel all over IR
- Figuring in India's Intended Nationally Determined Contributions (INDC) {para III - 1.5 (12)} as a mitigation measure
- Annual consumption of HSD oil 2800 million ltrs.
  - Annual Requirement of Bio diesel 140 million ltrs. (ML)
  - Qty. indented in Ph I - 12.9 ML , Qty. received 4.1 ML in 14 ZRs; Qty. indented in Ph II - 36.9 ML
- Max. bio diesel consumed in SWR, NR, SCR, WCR

## Other initiatives from EnHM Dte. / RB

- Policy directive issued on 3.2.2016 for undertaking Works against CSR in Railways
  - ZRs to upload the possible works on their website by creating a CSR page. MM's letter to GMs to upload by 20-3-16. So far only ER has done which also needs to be refined
  - Works on CSR should be stepped up substantially during 2016-17
- Policy on 1% provision in Estimate cost for Environment Works will be issued soon by which Works on environment can be executed



## Other initiatives from EnHM Dte. / RB... contd.

- Track side boundary plantation - Model Agreement in consultation with MoEF issued in March 2016. Agreements to be signed between NR and PCCF/Haryana and Punjab next week formally. Other rlys to take action.
- Cleanliness Survey through third party done for all A1 and A cat stations in Feb/March 2016. Rankings of the stations have been released based on passenger feedback. Final report expected shortly.
- Minimum Essential Requirement (MER) - MER for Cleanliness of A1 & A Category stations is under consideration of Board.
- Policy for Clearance of MSW from Trackside - under consideration of RB.

- CoP21
- INDC

# Implementation of India's Intended Nationally Determined Contributions (INDCs)

- IR submitted its INDC to MoEFCC on 12.08.2015
- GoI submitted INDC to UNFCCC in Oct. 2015
- Details of INDCs of IR conveyed to GMs of ZRs / PUs on 05.11.2015

## Key actionable points for Indian Railways are

- To enable increase in Rail Mode share from 36 % to 45 % by 2030
- Construction of Eastern and Western Dedicated Freight Corridors
- Enhancement of throughput, Capacity Augmentation and Network expansion

## India's INDCs : Key actionable points for IR ...contd.

- Use of 10% Solar Energy & Wind Energy by 2030
- Use of 5 % blending of bio fuels
- To reduce emission intensity (i.e. tCO<sub>2</sub> per million GTKM) by 32.6% in 2030 as compared to 2005 level
- Improvement in Energy / Fuel efficiency in traction from 2013-14 level
  - ✓ In SEC, 4.8 % in Pass. and 13.2 % in Goods
  - ✓ In SFC, 9.6 % in Pass. and 7.6 % in Goods
- PAT (Perform Achieve and Trade) scheme to include Railways (2016-19)
  - ✓ ZRs with TOE above 70000, Workshops with TOE above 30000 and 6 PUs are notified as designated consumers (DCs) on 29.12.15

## Key actionable points from the INDCs of GoI having implications on Railways

- National Water Mission – to improve water use efficiency by 20%
- Rain water harvesting for every large House or Hotel (200 yards or more)
- Swachh Bharat Mission – Bio toilets to eliminate open defecation
- Waste to wealth conversion
- Green India Mission – to increase forest cover by 5 million hectare
- Green Building Ratings – Energy Conservation Building Code (ECBC) to be mandatory for new Govt. Buildings

- Investing in Railways is necessary for India's ecological sustenance.
- Hon'ble Minister for Railways Sri Suresh Prabhu said during his Rail Budget Speech (Feb. 2015)

*“Investment in Indian railways is an investment in our future. It is an investment in our sustainability. It is an investment for posterity.”*

**Thank  
You**

## **SOME RECENT ENVIRONMENT MANAGEMENT INITIATIVES ON IR**

- 1) Environment Management Directorate formed in Jan 2015 with the posting of Adv./Env. to function under CRB. Environment Management Dte. re-designated as Environment & Housekeeping Management Dte. as a part of Budget pronouncement and brought under MM on 08.04.15. (Office Order No. 30/2015).
- 2) Following policy directions were announced in the Budget Feb, 2015, contributed by Evt. Dte.
  - i) Mission for Water Conservation- stepping up actions on Water Recycling Plants, RWH, and Water Audit
  - ii) All workshops, major loco sheds and depots to get accreditation on Environment management.
  - iii) Setting up waste to energy conversion plants near major coaching terminals to dispose waste in an environment friendly manner. One pilot plant to be set up to begin with followed by more plants in a phased manner.
- 3) Guidelines for handling Municipal Solid Waste (MSW) arising in the railway area of stations and tracks prepared by a committee headed by Advisor (Env) on 17.04.2015 and circulated to all zonal railways for necessary action through ED/ PM on 30.04.2015 for complying NGT's instructions.
- 4) World Environment Day was organized all over Indian Railways on 5<sup>th</sup> June, 2015 in a befitting manner. As a part of World Environment Day, a Programme was organized on 5<sup>th</sup> June, 2015 in New Delhi wherein a seminar on 'Environmental Challenges before Indian Railways' was organized, participated by Members of Railway Board & Hon'ble MR. One e-Book titled 'IR-marching towards better environment' was released highlighting achievements on environmental issues and hosted in the IR website.
- 5) Policy directive issued to all ZRs and PUs for obtaining IMS accreditation including Environment Management for all loco sheds and major coaching & wagon maintenance depots including EMU/DEMU car sheds. This took place after a period of nearly 15 years when the first Environment Management Accreditation was got done in Railways. (Letter No. 2015/Environ/0/02 dated 11.06.2015).



- 6) Policy on Scope and Formation of Environment & Housekeeping Management (EnHM) Wing in ZRs issued on 28.08.2015.
- 7) M/s. RITES has been engaged for setting up of two pilot plants at NDLS and JP for disposal for Municipal Solid Waste (MSW) in an environment friendly manner including conversion of Waste to Energy (bio-methanation). The scope of work and modalities were finalised and tender opened on 14.03.2016 through M/s. RITES.
- 8) A major push was given to get additional sanction of more than 30 Water Recycling Plants during 2015-16. As against this, less than 30 WRPs have been functioning all these years.
- 9) **Climate Change**
  - i) INDCs of Indian Railways were formulated duly coordinating with all the concerned departments and obtaining approval of Railway Board and submitted to MoEFCC in August, 2015 to enable preparation of INDCs of India. The 'cabinet note' received from MoEFCC was examined and commented after getting CRB & MR's approval.
  - ii) The Media Campaign on INDCs of Indian Railways was launched effectively including making of 5 short films.
  - iii) The Campaign on Transport sector of Govt. of India was coordinated and organized by MoR at COP-21/Paris, involving all transport sector ministries viz. MoRTH, MoCA, MoSHP, MoUD etc.
  - iv) Ministry of Railways were designated as Nodal Ministry by MoEF&CC for holding event on 'Transport Sector GHG Emissions' at 'Indian Pavilion' as part of CoP-21 at Paris, France. The event was participated by officials of all transport sector Ministries of Govt. of India, Expert Bodies as well as International Agencies.
- 10) **Capacity Building**
  - i) A course on Water Management with focus on water audit at IRICEN, Pune organized during Oct, 2015 for Jr./Sr. scale officers of Indian Railways.
  - ii) A curriculum was introduced on Water Management including Water Audit for supervisor's training at IRICEN in Feb, 2016.
  - iii) A Workshop on Climate Change and measurement of Green House Gases was organised in March, 2016 at IRICEN.

- 11) An NGT case of Solid Waste Management in Railway was taken over and handled effectively from September, 2015 onwards. Two important Inter-Governmental meetings were done to enable steering the case. As a part of this, a policy on the management of track side Solid Waste Pollution has been formulated and submitted to Board for discussion.
- 12) A policy on execution of works of environment sustainability, sanitation and certain passenger amenities through Corporate Social Responsibility (CSR) of Corporates and PSUs was formulated and issued in Feb, 2016.
- 13) A frame work for track side plantation of trees has been made in coordination with L&A Dte. and MoEFCC and model agreement for plantation issued to ZRs by L&A Dte.
- 14) Following policy directions were announced in Rail Budget Feb, 2016, as initiated by EnHM Dte.:
  - i) Proliferation of Waste segregation and recycling centres at A1 category stations in a phased manner including setting up of 5 centres in the next Financial Year.
  - ii) Setting up of a pilot unit on Solar micro grid in remote stations for supply of power to stations as well as nearby households.
  - iii) Setting up of Automatic Coach Washing Plants in major coach maintenance depots.
  - iv) All PUs and one Workshop in each ZR to become Green Industrial Units (GIU).
- 15) An important policy for allocating 1% cost in all sanctioned Works for executing of environmental works is in the last stages of issue.
- 16) An MR's shield has been instituted to be given for best performing ZR/PU on Environment management. First shield awarded in April, 2016.
- 17) Efficiency in Rail Traction
- 18) Other Energy Conservation measures (other than traction)
- 19) Renewable Energy – Solar, Wind
- 20) Alternate fuel – 5 % blending of bio diesel in diesel locos
- 21) Proliferation of bio toilets in coaches

*April 2016*