Environmental Sustainability –
Role of Indian Railways

Annual Report 2015-16
INDIAN RAILWAYS ...

Green footprints on the sands of time
“Earth has enough resources to meet people's needs, but will never have enough to satisfy people's greed”

– Mahatma Gandhi
Indian Railways Environment Management

VISION

- To promote Green environment and clean energy while making the Indian Railways a global leader in sustainable mass transport solutions.

MISSION

- To promote energy conservation measures.
- To maximize the use of alternate forms of clean energy, thereby minimizing the carbon footprint of Railways.
- To provide clean and hygienic environment to customers.
- To promote conservation of water and other natural resources.
- To march towards Zero waste discharge from the major Railway units.
- To promote Green built-up spaces and expand tree-cover.
- Building in-house capacity to set up an effective Environment Management System.
- Noise reduction in Railway operations.
Railways are an environmentally sustainable mode of transport and have been playing a key role in saving energy and protecting environment. With the setting up of Environment and Housekeeping Management Dte., in Railway Board last year, we have committed ourselves to focus on environment sustainability initiatives which includes Rain Water Harvesting, water audit, setting up of Water Recycle Plants at major consumption centers, energy audit, setting up solar plants, waste management including setting up waste to energy plants, use of alternate fuels, improving the energy efficiencies on traction & non traction side etc.

Indian Railways have also recently signed Agreements with the State Forest Department, Government of Haryana and Punjab, to undertake boundary plantation alongside the railway track and block plantation on vacant railway lands. Zonal Railways have been directed to execute similar agreements with the PCCFs of the other State Forest Departments. More than three crore trees are planned to be planted through this initiative.

Railways have taken number of policy initiatives towards protection of environment, the notable among them is earmarking 1% lump sum provision in the works estimates of all the projects and issue of guidelines for undertaking various environment sustainability works through CSR of Corporates and PSUs.

I am happy to note that all Zonal Railways and other organizations of Railways are taking steps towards continuous improvement in environment and are organizing events on the occasion of World Environment Day.

I am delighted to present the Annual Report on ‘Environmental Sustainability-Role of Indian Railways’ which is being released for the first time and reflects Indian Railways’ commitment in embedding sustainability in its business and operational strategies.
भारतीय रेल
पर्यावरण प्रबंधन

विज्ञान

- भारतीय रेलवे को व्यवहारिक दृष्टि परिवहन समाधान के क्षेत्र में ग्लोबल लीडर बनाने सामय हस्तिय पर्यावरण तथा स्वच्छ ऊर्जा को बढ़ावा देना।

मिशन

- ऊर्जा संस्कृति संस्थापकों को बढ़ावा देना।
- स्वच्छ ऊर्जा के वैकल्पिक स्वरूपों का अधिकतम उपयोग करना, जिसके परिणामस्वरूप रेलवे में कार्बन फुटप्र्रेंट को न्यूनतम करना।
- ग्राहकों को स्वच्छ एवं स्वस्थ्यपरक पर्यावरण उपलब्ध कराना।
- जल और अन्य प्राकृतिक संसाधनों के संसर्ग को बढ़ावा देना।
- प्रमुख रेलवे इकाइयों से कचरे का उल्लंघन न होने देने का प्रयास।
- हस्तिय निर्माण तथा छायादार वृक्ष-क्षेत्र को बढ़ावा देना।
- प्रभावी पर्यावरण प्रबंधन प्रणाली स्थापित करने के लिए संगठन के भीतर क्षमता विकसित करना।
- रेलवे परिचालन में ध्यान प्रदूषण को कम करना।
With the renewed focus since last two years, Indian Railways have taken a number of initiatives in water and energy management. IR possess vast infrastructure - built asset, land, railway track, workshops, production units, rolling stock etc. and it is a major consumer of water required for their upkeep and maintenance.

About 1000 million litres of water is consumed per day at more than 8000 railway stations of IR. Out of this, about 200 MLD is used for non-potable purposes like platform & apron washing, coach washing etc. IR plans to undertake water audits and set up water recycling plants at major water consumption centres to reduce the demand for fresh water and proliferate rain water harvesting systems to recharge the aquifer and promote conservation.

Huge quantity of waste including bio-degradable waste is generated at railway stations and IR are trying to adopt innovative methods and technologies for disposal of the solid waste in an environment friendly manner. Given our dedication towards Swachh Bharat Mission and the limited availability of water resources and faster depletion of groundwater table across the nation, holding of a seminar on Waste Management in Indian Railways to brain-storm on the issues by experts and other stake holders, on the occasion of World Environment Day is quite befitting.

Many initiatives have been taken by IR in the past one year which have been compiled in the Annual Report on ‘Environmental Sustainability — Role of Indian Railways’. It is a useful document encompassing achievements in the area, the way forward and policy perspective at a glance in the field of environment in IR. I commend the efforts of Environment and Housekeeping Directorate of Ministry of Railways in this regard.

Manoj Sinha
Railways is one of the most eco-friendly modes of transport. It is about three times more energy efficient in passenger transport and twelve times more efficient in freight transport vis-a-vis the road sector and therefore its contribution to green house gas emission is substantially less. As the rail infrastructure and rail transport has been expanded manifold to keep pace with the economic development, the environmental impact on account of the same has been receiving increasing attention. Railways are quite sensitive to these concerns and have been adopting various strategies to mitigate such impacts which include adoption of modern technologies in infrastructure construction, operation & maintenance and embracing green energy initiatives like solar energy, wind energy and CNG/bio-fuels.

Railways have also taken a number of initiatives in water conservation and management. Rain Water Harvesting has been made mandatory in all the projects. Water audit is being undertaken at major water consumption centres in programmed manner. Waste water recycling plants have been planned at major consumption centres to reduce the demand of fresh water. Important policy initiatives towards environment have also been taken in the recent past such as to earmark 1% lump sum provision in all works/project estimates towards environment related works and issue of guidelines to undertake environmental sustainability works by Zonal Railways through CSR of Corporate/PSUs. IR is also setting up two waste to energy plants at New Delhi and Jaipur stations on pilot basis. This could all be possible with the setting up of new Environment and Housekeeping Management Dte., in Railway Board last year.

I am glad to learn that Environment and Housekeeping Management Dte., is bringing out an Annual Report on ‘Environmental Sustainability-Role of Indian Railways’ on the occasion of World Environment Day which underlines this Ministry's commitment to environment and disseminate the efforts made and the results achieved in this regard.

I have no doubt that the information would be very useful to railway men and our fellow citizens alike.

A.K. MITAL
Chairman, Railway Board
Indian Railways is the third largest rail network with 66000 route kms. It runs 21000 passenger and freight trains daily and transports 90% of total coal in the country. Rail transport is one of the most economical and environment friendly mode of conveyance of goods and passengers keeping in view the specific energy/fuel consumption and use of modern technologies.

Since the formation of separate Environment and Housekeeping Management Dte in Railway Board last year, there has been a fillip in measures towards environment protection and sustainable development in different fields such as the water, energy and solid waste management. The Annual Report on ‘Environmental Sustainability-Role of Indian Railways’ show cases the achievements, initiatives and the policy perspectives of IR on environment management. In the recent Rail Budget, a number of policy initiatives relating to environment have been announced like providing waste to energy plants at select railway stations, bio-toilets at railway stations, more bio-toilets in trains, proliferation of solar power plants, Rain Water Harvesting, Water Recycling Plants etc.

Indian Railways (IR) played a lead role in the Conference of Parties (CoP-21) held at Paris on climate change in December 2015, hosting a transport sector event. As a part of Railways’ Intended Nationally Determined Contribution (INDC), IR has committed to reduce its emission intensity to the extent of 32% by 2030 by taking series of energy efficiency initiatives.

Railway Board has advised Zonal Railways and Production Units to organize "World Environment Day" in a befitting manner and to hold workshops/discussion on the relevant topics among all stakeholders. On this occasion, Indian Railways is recognizing the efforts of railway men who have made significant contribution towards environment protection and water conservation by distributing awards to outstanding contributors on environment management.

I am sure that the Annual Report on ‘Environmental Sustainability-Role of Indian Railways’ will be quite useful to all the stakeholders. The contribution of Environment and Housekeeping Management Directorate in bringing out this Annual Report is appreciated.

I wish all my colleagues a very green cheer on this World Environment Day-2016.

Hemant Kumar
Member Mechanical, Rly. Board
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Acknowledgements
Indian Railways a Snapshot

1.0 Background

1.1 The journey of Indian Railways, which began 163 years ago, has covered a long distance, starting with a short trip from Mumbai to Thane in 1853, Indian Railways has grown to be one of the World’s largest rail networks today with a route KM of 66,000.

1.2 Indian Railways (IR) has also become the lifeline of the country carrying 23 million passengers every day making it the largest passenger carrying system in the world. It is also the 4th largest Freight transporter in the world transporting nearly 1,100 million tonnes of freight, across the length and breadth of the country.
1.3 Railways is the most environment friendly mass transport system due to its inherent energy efficiency and minimal utilisation of resources. Growth of Indian Railways to regain its premium role in the transport scenario will be a crucial requirement for the sustainable development of Indian Economy. Presently, Railways is about 12 times more efficient in freight traffic and 3 times more efficient in passenger traffic as compared to the road transport which is presently the major player. It has been estimated that for the sustainable development of Indian Economy, the inter-model share of freight traffic by rail should go up from the present 36% to 45% in the next 15 years. Accordingly, Indian Railways is gearing up for a massive growth to achieve such increase in inter-model share by augmentation of its network and rolling stock fleet along with increase of productivity.

1.4 Targets envisaged to be achieved by year 2030 in this regard are as under:-

- Operationalising 3376 KM on Eastern & Western Dedicated Freight Corridors by the year 2020, to achieve reduction of 457 million tonnes of CO2 in 30 years mainly by modal shift.
• Capacity Augmentation and Network expansion to be achieved by year 2030 - 26000 kms of Doubling, 3500 km of Gauge Conversion, 25000 km Railway Electrification & 450 km p.a. of New lines.

• Augmentation of rolling stock by the year 2030 with 11500 High Horse power Electric & Diesel locomotives, 117000 coaches & 278000 wagons, all of energy efficient designs.

• Upgrading the existing network and freight stock for higher pay load to tare ratio of freight traffic.

1.5 Notwithstanding the inherent energy efficiency, Indian Railways is planning to infuse the latest technologies in Rail transport to achieve better energy efficiency while accommodating the improvements warranted in the quality of service which are energy intensive.

1.6 Efforts are on the anvil to achieve the low carbon growth by reducing emission intensity by 33% in the year 2030 over the base year 2005 by improving Rail Traction energy & fuel efficiency by 8% to 13% over 2013.
1.7 Setting up an exclusive Directorate for Environment Management in the Ministry of Railways has increased the focus on the environmental sustainability issues while IR is gearing up for such substantial growth and improvement in the productivity. The Environment Directorate which became fully operational during April, 2015, is the maiden effort at the Ministerial level in India. The awareness that this Directorate could bring among the various segments of operation and maintenance of Indian Railways as well as crucial policy initiatives, have resulted in several positive changes taking place on environmental sustainability.

1.8 Presently the focus of IR regarding environmental sustainability is on Energy, Water and Solid Waste Management where Railways is a significant player in the sector of transport as well as industries in India. An effort has been made to catalogue such changes along with the roadmap for the selected priority sectors of Railways in this Annual Report.
2.0 **Achievements**

2.1 Various energy efficiency measures adopted through technology inputs have resulted into sustained reduction in electric energy consumption. During the last year a reduction of about 2% in traction energy and 3% on non-traction energy has been achieved. In the case of Diesel traction, similar efforts have resulted in the reduction in Specific Fuel Consumption (SFC) by 2% during 2015-16.

2.2 Agreements have been signed with Private Companies to set up manufacturing units at Madhepura and Marhowra for the production of energy efficient State-of-Art Electric and Diesel Locomotives for Indian Railways.

2.3 Nearly 200 energy audits were carried out in major non-traction energy consumption centres across various zones last year.

2.4 Guidelines have been issued in 2015 for promoting use of LEDs and other energy efficient appliances and equipment across the Railways. This includes mandatory use of LEDs in all new passenger coaches and railway stations and buildings.

2.5 Web portal railsaver.gov.in on Energy Efficiency Management System has been developed for providing data on efficiency parameters across various railway units.

2.6 About 10 lakh LED bulbs have been distributed to railway staff till January, 2016. In addition, 1.15 lakh LED bulbs were used by Zonal Railways till March, 2016.
Indian Railways –
Thrust Areas on Environment Sustainability

1.0 Indian Railways being one of the largest consumers of electricity, fuel as well as water in the country, it is imperative to adopt a sustainable business and operation plan. Accordingly Railways have chalked out a multi-fold strategy to achieve its environment and sustainable objectives.

2.0 Priority Initiatives:

2.1 Railways being the energy efficient transporter, the expansion of railway network itself to carry the growth in traffic is a major contribution towards sustainable development in the country.

2.2 Railways being the major consumer of energy, systematic programmes have been launched towards improving energy efficiency and energy conservation. These include a number of technological advancements and field interventions to make Railways an energy efficient system.

2.3 Use of Renewable Sources of Energy and Alternative Fuel has been given very high priority. A big target has been set to achieve 1000 MW of solar power and 170 MW of wind power installed capacities.

2.4 The policy initiative to directly procure bio-diesel for 5% blending with High Speed Diesel (HSD) Oil, will facilitate reduced dependence on Fossil fuel. Also, the conversion of pure diesel based motive power systems into partially CNG powered vehicles is an important strategy towards clean fuel usage.

2.5 Railways are the owners of a huge land area. To step up afforestation efforts already under way a Joint afforestation programme by associating Forest Department, has been launched which would lead to sizeable increase in green cover on vacant railway land.
2.7 IRs efforts have been recognized at National level and several prestigious awards were given to IR units. In the year 2015, Indian Railways have bagged 23 National Energy Conservation Awards by Bureau of Energy Efficiency on the occasion of Energy Day event on 14.12.2015 at Vigyan Bhawan, New Delhi – which is the highest number of National Energy Conservation Awards received by Indian Railways during the last decade.
2.6 Indian Railways have demonstrated their concern over the Water Management issues and accordingly developed a detailed Water Management Plan. Major initiatives include (a) Setting up Water Recycling Plants, (b) Rain Water Harvesting Systems and (c) conducting Water Audits at major consumption centres.

2.7 Solid Waste Management on Indian Railways has now been given a greater significance in order to ensure environment friendly disposal of all kinds of waste being generated in the railway premises. Setting up of Waste to Energy Plants, on pilot basis will lead to new ventures coming up in Railways.

3. In addition to above key programmes, various other local green initiatives are being taken consistently over different field units, with the aim to make Indian Railways’ image as the true ‘Environment Friendly Transporter’.
I. Energy Management

1.0 Background

1.1 Given the massive scale of its operation, it is not surprising that the consumption of energy by Indian Railways has been growing steadily. In 2014-15 alone, Indian Railways consumed about 18.25 billion kwh of electricity, comprising around 1.8% of the country’s total power consumption. Similarly, the diesel consumption stood at 2.78 billion litres, which is about 3.5% of India’s total diesel requirement. With rail traffic projected to register a substantial growth in the coming years, it is estimated that the demand for electricity & fuel by the Indian Railways will go up considerably over the next decade.

1.2 Considering the potential for energy efficiency in Rail Transport amidst the rising energy cost in the O&M expenses, the Indian Railways have identified several strategies for improving energy efficiency by emphasizing the focus on proper energy management.
3.0 Roadmap

3.1 Improvement in Specific Energy Consumption (SEC)

- Adoption of 3 phase IGBT Technology for EMUs in Mumbai Suburban area is expected to reduce emission of 600 tonnes of CO2 per annum per train due to regenerative braking features.

- Introduction of latest energy efficient Locomotive technology, is expected to reduce 500 tonnes of CO2 annually due to regenerative braking features of new 6000 HP locomotives.

- Other Technological improvements in electric locos.
  i. Fitment of 1000 KVA hotel Load converter to supply to the utilities in trains.
  ii. Provision of Energy-cum-speed monitoring system (ESMON) on all electric locomotives to monitor the driver performance leading to energy conservation.

3.2 Improvement in Fuel efficiency in Diesel Traction: Following measures planned to improve Specific Fuel Consumption (SFC) through technological intervention:
• Provision of Auxiliary Power Units (APU) on all diesel locos.
• Common Rail Electronic Direct Injection (CREDI) / Electronic Fuel Injection (EFI) system.
• Guidance for Optimized Locomotive Driving (GOLD).
• Multi Genset locomotives.
• Miller Cycle Turbocharger.
• Smart Multiple Units.

3.3 **Improving Energy efficiency on account of trailing Rolling Stock**

• Pay load to tare ratio will be increased to 4.0 for ARI Gondola wagons and 4.21 for BOXN25 Design.
• Commodity specific wagons are also being developed.
• These measures will enable higher throughput and result in reduced GHG emissions for the same freight traffic.
• Improved design Stainless Steel Coaches also provide higher carrying capacity. With increasing share of such coaches, PKM to GTKM ratio will improve resulting in reduced GHG emissions for carrying the same passenger traffic.

3.4 Improving Energy Efficiency in Non-Traction side

• Adoption of energy efficient fittings, use of LEDs in passenger coaches & Railway stations, adoption of automation of pumps are key initiatives.

• Mandatory procurement of 3 star or higher rated appliances.


3.5 Indian Railways have joined the PAT (Perform, Achieve and Trade) cycle-II scheme for energy conservation for the various Designated Consumers of Indian Railways.
4.0 Way Forward

- Target of 8% to 13% reduction in consumption of traction energy and fuel by the year 2030 has been set to be achieved through a number of technological interventions.

- Specific Fuel Consumption (SFC) for diesel traction is targeted to be improved by 5.37% upto 2020 as compared to 2013-14 and by 4.23% in the decade between 2020 and 2030.
Alternative Sources of Energy

1.0 Background

With the Indian Railways being a significant consumer of energy, identifying cost-effective options to achieve and realizing an energy system with least environmental impacts is essential. Vision 2020 document of the Indian Railways states that the key target is to utilize at least 10% of its energy requirement from renewable sources.

1.1 Indian Railways has been using Solar energy for signalling equipment, level crossing gates, street lights, etc. for past many years.

1.2 First major effort was made when a 10.5 MW capacity Wind Power plant was set up in 2009 by the Integral Coach Factory (ICF), Chennai – a premier Production Unit of IR, making ICF the ‘First Green Production Unit’ of Indian Railways.

1.3 The next significant effort was the 2 MW Solar Power Plant commissioned in 2014 at Modern Coach Factory, Rae Bareily, which is catering to about 25% of the factory’s energy consumption.

2 MW Solar Power Plant at Modern Coach Factory, Rae Bareily
2.0 Achievements

2.1 One MW Roof Top Solar Power Plant was commissioned in 2015 at Shri Mata Vaishno Devi Katra Railway Station of Northern Railway.

2.2 Provision of solar PV modules on the roof top of coaches is under trial.

2.3 Population of CNG based Diesel Electric Multiple Units (DEMUs) was increased from 5 to 11.

2.4 On the world Environment Day last year on June 5, 2015, Indian Railways commenced blending of 5% bio-diesel in HSD oil in few Zonal Railways for traction purposes. Approximately 4100 KL of bio fuel was consumed by Indian Railways in the last year.
2.5 **Notable Initiatives**

- Indian Railways has recently installed a 26 MW wind power plant at Jaisalmer, Rajasthan through Railway Energy Management Company Ltd (REMCL).
- Solar water heaters installed by several railway units for running rooms and kitchens.

3.0 **Road Map**

3.1 **Solar Power:**

- As part of Indian Railway’s Solar Mission to reduce dependence on fossil fuels, Budget announcement was made by Hon’ble MR to set up 1000 MW solar power plant by Indian Railways. On the rooftops of Railway stations, buildings and on Railway land.
- Above includes plan to set up 500 MW capacity solar plants on roof top of Railway buildings through developers which will be used for meeting non-traction power supply loads.
2.0 Achievements
2.1 40,600 hectares of Railway land is already under afforestation.
2.2 Every year around 7 million saplings being planted.

3.0 Way Forward
3.1 Agreements between Northern Railway and State Forest Departments of Haryana and Punjab has been signed in May 2016 and plantation alongside tracks will be undertaken soon.
3.2 Zonal railways to laise on priority with State Forest Departments in their jurisdiction and enter into similar agreements with them for boundary plantation of trees alongside track.
3.3 Plantation of more than 3 crore trees on railway land with the assistance of State Forest Department is planned.
Another 500 MW capacity solar plants will be put up on land based systems with Power Purchase Agreements (PPAs) to be signed by railways with developers for meeting traction & non-traction supply loads.

Railways till date have set up a total of 11 MW solar power plants at administrative buildings, stations & hospitals. Works are in final stages for 6.5 MW capacity plants which includes 500 KW at Varanasi, Secundrabad and Jaipur etc.

Zonal Railways have been asked to set up solar power plant of 50 MWp on the rooftop of Railway buildings.

200 railway stations identified for installation of rooftop solar.

On a pilot basis – microgrid standalone power plants are planned in a few stations in rural locations.
3.2 Wind Power:

- Indian Railways have planned to set up a total capacity of 168 MW of wind mill power plants. Out of this 10.5 MW capacity wind mill plant in Triunelveli District, Tamilnadu and 26 MW windmill power plant at Jaisalmer Rajasthan have already been commissioned.

- For setting up additional capacities, Railway Energy Management Company Ltd. (REMCL) is working out the modalities.

3.3 Alternative Fuels in Traction:

- Blending of 5% bio-diesel in HSD all over Indian Railways by 2020 and increasing the blending to more than 5 % of bio-diesel upto 20 % by year 2030.

- Plan to convert 25 rakes of DEMUs to run with 20% CNG by 2020 and 100 rakes with 40% CNG by 2030.

- IR is working on development of LNG locomotives (80% substitution of HSD). One prototype LNG loco to be developed by 2020.
Water Management

1.0 Background

Many parts of the country are battling water scarcity which has reached crisis proportions as a result of successive droughts and rapid depletion of the ground water reserves. Indian Railways recognises this dire situation and is aware of its responsibility, being a major consumer of water. Indian Railways is developing an effective water management system keeping long-term sustainability in view.

2.0 Achievements

2.1 Indian Railways (IR) launched a mission for water conservation in March 2015.

2.2 Water Recycling Plants (WRPs) have already been provided across 30 locations, saving 12 million litres of water per day.

2.3 Last year, it was planned to provide WRPs at another 42 locations on IR. Out of this, 6 WRPs have since been commissioned.

2.4 Rain Water Harvesting Systems (RWH) provided at around 1,900 locations, have been extended to another 371 locations during the past one year. Special emphasis is being laid on the use of water efficient fixtures.
Afforestation

1.0 Background

Increasing the forest cover ‘through Green India Mission’ has been projected as focus area in Government of India’s Intended Nationally Determined Contribution (INDC) to United Nations Framework Convention on Climate Change (UNFCCC). In line with this, Indian Railways have decided to scale up its afforestation in the coming years. In this context, it has been decided to undertake boundary plantation alongside of railway tracks and block plantation on vacant land not required for developmental work/operational needs in foreseeable future. With the assistance of State Forest Department, a model agreement with Ministry of Environment & Forest (MoEF) has been put in place in this regard.
2.5  Appreciable savings (in comparison to previous year) made in fresh water consumption by Southern Railway, South Central Railway and North Western Railway consequent to water audit at select locations.

2.6  Water audits have been carried out at 85 locations in the last year.

2.7  Rain Water Harvesting has been made mandatory for all works/projects involving built up space.

3.0  Way Forward

3.1  More water audits are planned at major stations to achieve reduction of losses/leakages and identification of works for conservation of water and new water recycling plants.

3.2  Rain water harvesting systems planned at all existing establishments on IR where roof area is more than 200 sqm. Focus on RWH will continue.

3.3  Steps to be taken to protect and improve the water bodies in railway land which would help in recharging the aquifer.
Solid Waste Management

1.0 Background :-

1.1 Network of Indian Railways has over 8000 stations out of which nearly 1000 stations are in the category of major and suburban stations. A typical major station generates 5 to 15 tonnes of Municipal Solid Waste (MSW) every day. Presently, the entire MSW is being handled from station premises and are being handed over to the Municipal authorities for final disposal. Segregation of waste and timely disposal are the major challenges presently being faced.

1.2 IR is operating nearly 13,000 coaching trains every day with 55,000 coaches, out of which nearly 3,000 are Mail & Express trains operating for more than 500 kms of distance. Direct discharge from the toilets of these trains has been an issue contravening the prevailing norms on sanitation issue.

2.0 Achievements

2.1 Guidelines for Solid Waste Management in accordance with latest rules and regulations were issued to all railway zones.

2.2 Indian Railways is executing the massive task of fitting bio-toilets to avoid open discharge of faecal matter in its entire 55,000 fleet of passenger coaches. So far 35,000 bio-toilets have already been installed in 11,000 coaches and the task is being scaled up.
2.2 Key take aways for IR from the INDCs of India

2.2.1 IR should aim to enhance the share of the Railways in the overall land based freight transport from the present 36% to 45% by year 2030.

2.2.2 IR should target setting up of Dedicated Freight Corridors (DFCs) across the country. The first two corridors are already under construction and likely to be completed by 2019.

2.2.3 This first phase of the project alone is estimated to reduce emissions by about 457 million ton CO2 over a 30 year period.
2.3 Environment friendly disposal of solid waste in a decentralised manner at the arising point itself is planned at major coaching terminals. Pilot plants are being set up at Jaipur and New Delhi.

3.0 Notable Initiatives

3.1 Rameswaram – Manamadurai Section of Southern Railway has become the first open discharge free Railway Section.

3.2 IR has 204 locations where organised segregation of Municipal Solid Waste (MSW) is in practice including 12 Waste-to-Energy plants.

3.3 Organised segregation of MSW has been started at 47 locations in East Coast Railway.

4.0 Way Forward

4.1 Environment friendly disposal of solid waste including waste to energy plants proposed at another 8 major coaching terminals of Indian Railways, during the next two years.

4.2 Fitment of Bio toilets will be scaled up to achieve 30,000 Bio toilet fitments in 2016-17 and complete the entire process for all the main line coaches by 2021-22 to achieve open discharge free Railway sections.
Reducing Global Carbon Footprint

1.0 Background

1.1 Transport is a key driver of economic growth and social development of our country. The sector is however a major energy consumer. It accounts for more than half of India’s total petroleum consumption and more than 25% of the overall energy needs (second only to industry). It is also a significant contributor to the emissions generated by the country, accounting for about 13% of the emissions from the sector. Given the relative advantage of the efficiency of Rail based Transport, increasing the share of Rail mode for both passenger movement (regional, sub-urban and urban) and freight movement is vital not only for increasing overall efficiencies of transport sector, but also to reduce GHG emissions for the country.

2.0 Achievements

2.1 Conference of Parties (COP 21)

2.1.1 At the Conference of Parties (COP 21) organised in December 2015 at Paris, Indian Railways played an important role in highlighting the efforts and initiatives taken up by the transport sector so as to put India on the path of low-carbon sustainable development. Ministry of Environment, Forest and Climate Change (MoEFCC), the nodal ministry for this event, had nominated Ministry of Railways, for organising various activities in India Pavilion at Paris for the transport sector event in COP 21.

2.1.2 With the aim to identify possible opportunities and potential for moving India towards a low carbon transport pathway, the Government of India, led by the Ministry of Railways organized an event titled “GHG Mitigation in Transport Sector – Roadmap for India” at the India Pavilion at Le Bourget, Paris on the 4th of December, 2015.
2.2.4 The Railways which have already achieved a 19.7% improvement in Specific Fuel Consumption for Freight Service Locomotives and 21.2% improvement for Passenger Service Locomotives during the last 10 years should further improve its energy efficiency for both diesel and electric locomotives thereby facilitating the reduction of GHG emissions for the country.

2.2.5 Use of 5% blending of biofuels in traction diesel fuel.

2.2.6 Adopting the good practices on Water Management, afforestation and Green Buildings for the management of resources and infrastructure to achieve Environmental Sustainability in growth of IR.

2.3 A capacity Building Workshop on Climate Change and measurement of Green House Gases was organised for senior officers of Indian Railways to at IRICEN, Pune to familiarise them about the subject.
2.1.3 Shri Hemant Kumar, Member Mechanical and ex-officio Secretary to Govt of India, led the delegation on behalf of various transport sector ministries viz. MoRTH, MoCA, MoSHP, MoUD, etc. He was accompanied by Shri Abhay Bakre, Executive Dir. (EnHM) for the above event as the Nodal officer for transport sector.

2.1.4 The purpose of the Seminar was aimed at an informative session for officials/representative from various countries, Government and public entities, who are eager to know about GHG mitigation approach for the transport sector in India.

Shri Hemant Kumar, Member Mechanical, & ex-officio Secy. to Govt. of India and Shri Abhay Bakre, ED (EnHM) at COP 21 event in Le Bourget, Paris
2.1.5 Spread over three sessions the event was well-attended and saw participation from key representatives from the Government as well as public entities in Indian transport sector, international experts, researchers and senior representatives from agencies financing low carbon initiatives in India.

2.1.6 The chair of the event, Mr Hemant Kumar, Member Mechanical, Ministry of Railways, in his keynote address, made a detailed presentation giving the overview of the Railways in India and explained to the delegates about the multipronged strategy being adopted by the Indian Railways to reduce its GHG emission intensities. Through capacity augmentation, and introducing efficient locomotives, wagons and coaches, he highlighted how the Indian Railways was marching towards state of art technology and best practices in energy efficiency.
CHAPTER 3.7

Other Green Initiatives

1.0 Background

With a pan-India network and linkages to various sectors of the economy, the Indian Railways has always considered environmental management as part of the core operating strategy. Various initiatives have been announced last two years in the Rail Budget of Feb 2015 and Feb 2016 indicating a strong commitment towards improving environmental sustainability within the Railways with specific action plans being mentioned for air and water pollution, waste management, energy efficiency and renewable energy and green technology.

2.0 Achievements

2.1 Building of Indian Railway Institute of Civil Engineering at Pune is accredited with Platinum Rating by LEED India and has got a 5 Star rating by GRIHA in the year 2013-became the first Government building to secure highest rating.
2.2 Rail Nirman Nilayam at Secunderabad under the South Central Railway has been accredited with 3 star rating by GRIHA in the year 2012.

2.3 Integral Coach Factory Chennai, has been certified with ISO:50001, Energy Management System in August 2015, the first major establishment over IR to achieve such recognition.
3.0 Policy and budget initiatives in the past one year

3.1 With continued thrust on Environment initiatives, Ministry of Railways have made efforts to frame policy guidelines which can be conveniently implemented at field locations.

3.1.1 Issued policy circular for Environment Management System accreditation (EMS) to be obtained in all Production Units, Workshops, Locosheds and major Coaching and wagon depots.

3.1.2 6 Production Units and 26 Major Workshops are accredited for Environment Management System; remaining Workshops and Production Units of Indian Railways to achieve the same by 2016-17

3.1.3 Policy frame work to undertake environmental sustainability works by Zonal Railways through CSR has been put in place.

3.1.4 Policy frame work to earmark 1% lump sum provision in all works/project estimates towards environment related works has been issued.
3.2 Budget Announcements

- Water Recycling plant to be provided at major water consumption centres.

- Rain water harvesting system to be provided subject to techno-economic feasibility.

- Water audit to be done at major water consumption centres.

- Inclusion of Automatic Coach Washing Plant with Water Recycling Plant in all major coaching depots.

- Rate of track electrification increased to 2000 RKM/annum from 1300 RKM/annum, with a target of 10,000 RKM by 2020.

- Use of 5% bio-diesel in traction fuel.
• Retrofitting with energy efficient lighting and star-rated appliances.

• EMS/IMS accreditation for all Production Units, Workshops, loco sheds and major coaching & wagons depots.

• Production of only energy efficient 3 phase electric locos from 2016-17 onwards.

• Planting of trees on vacant railway land to be increased.

• IR shall convert all existing coaches fitted with conventional toilets to those fitted with environment-friendly toilets by 2021-22.

• Provision of dustbins in all the coaches and more dustbins at stations.

• A few production units/workshops being identified to become Green Industrial units in coming years.

• Railways is making efforts to bring noise levels of locos at par with international norms.

• Railways will demonstrate its sensitivity to the wildlife by factoring in concerns related to their environment.
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