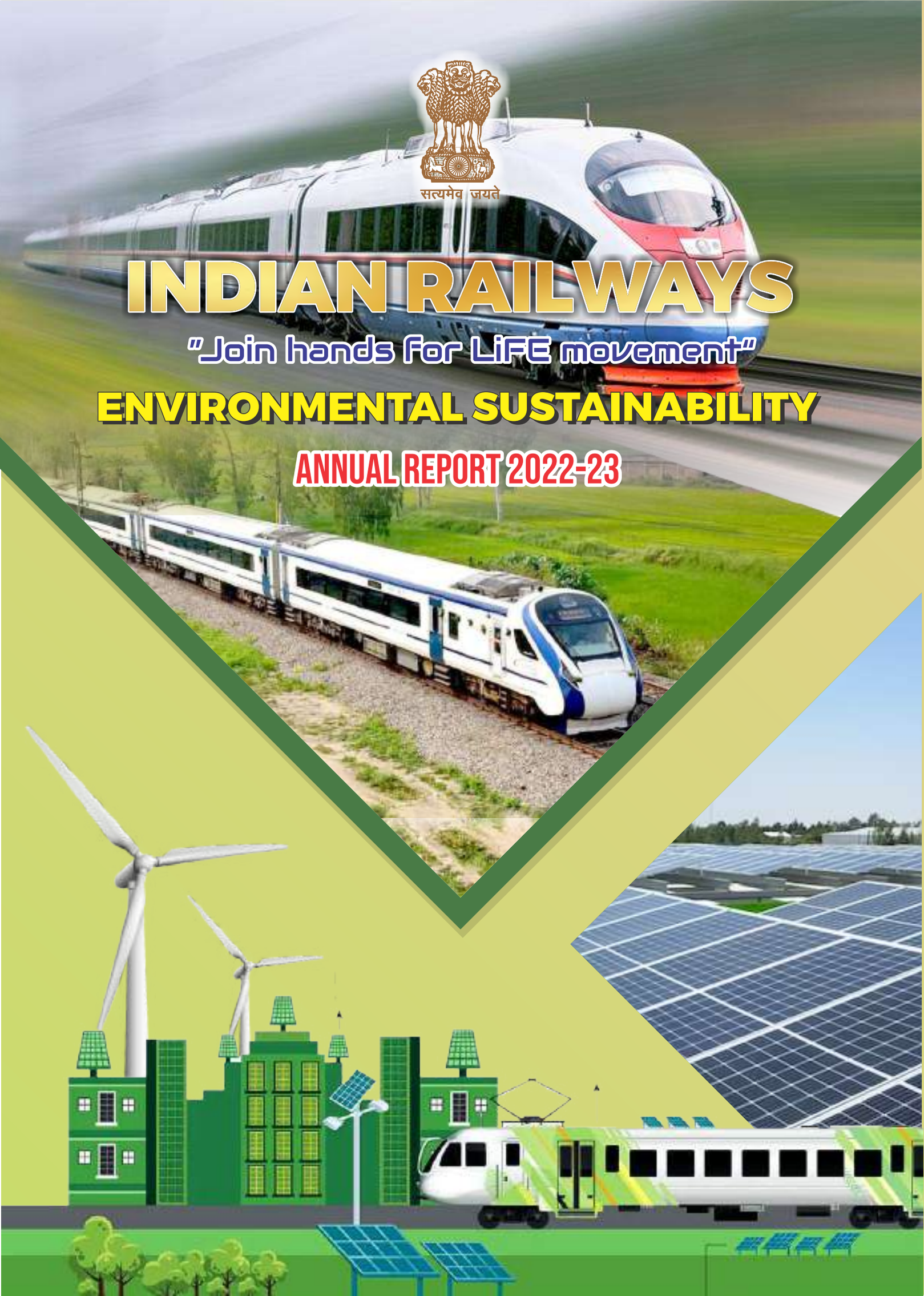
सत्यमेव जयते

INDIAN RAILWAYS

"Join hands for LiFE movement"

ENVIRONMENTAL SUSTAINABILITY

ANNUAL REPORT 2022-23




INDIAN RAILWAYS
GREEN FOOT PRINT
ON SAND OF TIME

सत्यमेव जयते

स्वच्छ भारत
एक कदम स्वच्छता की ओर

INDIAN RAILWAYS

"Join hands for LiFE movement"

Environmental Sustainability

Annual Report 2022-23

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.
- To obtain consent to operate from concerned Pollution Control Board under Environment Protection Act for major railway stations & goods sidings.
- Building in house capacity to set up an effective Environment Management System.
- To take care of environment through Environment Management Plan (EMP) in station redevelopment
- Noise reduction in Railway operations.

भारतीय रेल पर्यावरण प्रबंधन

विजन

भारतीय रेलवे को व्यावहारिक द्रुत परिवहन समाधान के क्षेत्र में ग्लोबल लीडर बनाते समय हरित पर्यावरण तथा स्वच्छ ऊर्जा को बढ़ावा देना

मिशन

- ऊर्जा संरक्षण उपायों को बढ़ावा देना
- स्वच्छ ऊर्जा के वैकल्पिक स्वरुपों का अधिकतम उपयोग करना,जिसके परिणामस्वरुप रेलवे में कार्बन फुटप्रिंट को न्यूनतम करना
- ग्राहकों को स्वच्छ एवं स्वास्थ्यपरक पर्यावरण उपलब्ध कराना
- जल और अन्य प्राकृतिक संसाधनों के संरक्षण को बढ़ावा देना
- प्रमुख रेलवे इकाइयों से कचरे का उत्सर्जन न होने देने का प्रयास
- हरित निर्माण तथा छायादार वृक्ष–क्षेत्र को बढ़ावा देना
- प्रमुख रेलवे स्टेशनों और माल साइडिंग के लिए पर्यावरण संरक्षण अधिनियम के तहत संबंधित प्रदूषण नियंत्रण बोर्ड से संचालन के लिए सहमति प्राप्त करना
- प्रभावी पर्यावरण प्रबंधन प्रणाली स्थापित करने के लिए संगठन के भीतर क्षमता विकसित करना
- स्टेशन पुनर्विकास में पर्यावरण प्रबंधन योजना के माध्यम से पर्यावरण देखभाल
- रेलवे परिचालन में ध्वनि प्रदूषण को कम करना

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1.0 GLOBAL PARTICIPATION OF INDIAN RAILWAYS ON CLIMATE CHANGE

India is a Party to the UNFCCC, its Kyoto Protocol, and the Paris Agreement. Under the Paris Agreement, long-term temperature goal of holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels has been agreed upon by the countries ratifying Paris Agreement.

Climate change has widespread impact on human and natural systems. Accordingly, Climate Change Conferences are held annually in the framework of the United Nations Framework Convention on Climate Change (UNFCCC). India, through Ministry of Environment, Forests and Climate Change (MoEFCC) has been participating in these conferences. A decisive step to address the issue was taken with the adoption of the Paris Agreement in Conference of Parties (COP-21) in December 2015. Participating countries submitted near-term targets to address GHG emissions, called 'Nationally Determined Contributions' or NDCs to be reviewed and extending the targets every five years. Ministry of Railways was designated as Nodal Ministry by MoEFCC for holding event on 'Transport Sector GHG Emissions' at 'Indian Pavilion' as part of COP-21 at Paris, France in the year 2015.

Ministry of Railways participated in COP-22 held at Marrakecha, Morocco in November 2016, COP-23 at Bonn, Germany in November 2017 and COP-24 at Katowice, Poland in December 2018. Sessions on sustainable transport network were organised at India Pavilion. 25th UNFCCC conference of parties was held at Madrid, Spain from 10thto 13thDecember, 2019.

1.1 In COP-26 held at Glasgov, United Kingdom in year 2021, India presented the following five nectar elements (Panchamrit) of India's climate action:

- Reach 500GW Non-fossil energy capacity by 2030.
- 50 % of its energy requirements from renewable energy by 2030.
- Reduction of total projected carbon emissions by 01 billion tonnes from now to 2030.
- Reduction of the carbon intensity of the economy by 45% by 2030, over 2005 levels.
- Achieving the target of net zero emissions by 2070.

1.2 Hon'ble Prime Minister during his speech at COP 26 held in Glasgow in November' 2021, shared the mantra of LiFE- Lifestyle for Environment to combat climate change and emphasized to take forward this campaign to make it a mass movement of environment conscious lifestyles. The message conveyed by India was that the world needs mindful and deliberate utilization, instead of mindless and destructive consumption. Hon'ble Prime Minister has also stated that passengers numbering more than the entire population of the world, travel by Indian Railways every year and railways have set itself a target of making itself 'Net Zero' by 2030.

This initiative alone will lead to a reduction of 60 million tonnes of emissions annually. Ministry of Railways also participated in the session hosted by CII at India Pavilion on "Practices in Indian Railway Transport and Automobile Sector towards climate mitigation".

1.3 An inter-Ministerial delegation from India attended the 27th session of Conference of Parties (COP 27) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Egypt in Nov, 2022. India emphasized the necessity to adhere to the principles of UNFCCC and Paris Agreement, which include *inter-alia* equity, principle of common but differentiated responsibilities (CBDR-RC) and respective capabilities and that developed countries must take lead in climate action as well as the provision of climate finance and technology transfer.

India's efforts also led to inclusion of reference to the need for transition to sustainable lifestyles together with sustainable patterns of production and consumption in the cover decision titled 'Sharm El-Sheikh Implementation Plan'.

The 'Sharm El-Sheikh Implementation Plan' *inter-alia* urges the developed countries to provide enhanced support through financial resources, technology transfer and capacity-building, to assist developing country, Parties with respect to both mitigation and adaptation, in continuation of their existing obligations under the Convention.

2. REDUCING GLOBAL CARBON FOOTPRINT

India has a population of around 1.40 billion people spread over a vast geography. Mobility will play key role with urbanisation and the growth of cities. The transport sector is and will continue to remain a critical enabler of development and would also have to grow in a sustained manner for the country to meet its developmental objectives.

Transport accounts for more than half of India's total petroleum consumption and around 20% of the overall energy needs. It accounts for about 10% of the total Green House Gases (GHG) emissions. Road transportation accounts for around 85% of the total GHG emission of transportation section. Given the relative advantage of the efficiency of rail-based transport, increasing the share of rail for both passenger movement (regional, sub-urban and urban) and freight movement is vital for increasing the energy efficiency of the transport sector thereby, reducing the GHG emissions of the country.

2.1 Nationally Determined Contributions (NDCs)

The India's Nationally Determined Contributions (INDC) document submitted by India in October 2015, was widely discussed at the 21st Conference of Parties (COP21) organized by the UNFCCC in Paris, in November 2015. Ministry of Railways was the nodal ministry for India's transport sector dialogue and to set up the Government of India's official transport sector event at COP21.

Conference of Parties to the UNFCCC in its sixteenth session (COP-16) had also decided that developing countries should submit Biennial Update Report (BUR) as an update to the most recently submitted national communication. India furnished its first Biennial Update Report (BUR-1) in January 2016, second BUR-2 in December 2018 and third BUR-3 on 20th February, 2021.

The Government of India, as part of its updated Nationally Determined Contributions (NDCs) submitted to UNFCCC in August 2022, includes India's commitment to reduce Emissions Intensity of its GDP by 45 percent by 2030, from 2005 level, with the transport sector being one of the key sectors with substantial mitigation potential.

2.2 Indian Railways' role in India's NDC towards combating Climate Change

- To enhance the share of the Railways in the overall land based freight transport.
- Setting up Dedicated Freight Corridors (DFCs) across the country.
- Increase the share of renewable energy in its energy mix.
- Railways to further improve its energy efficiency for both diesel and electric traction thereby facilitating the reduction of GHG emissions for the country.
- Perform Achieve and Trade(PAT) Scheme to be implemented in railway sector.
- Use of 5% blending of biofuels in traction diesel fuel.

- Improve water use efficiency by 20% upto 2030.
- Tree Plantation to increase Carbon Sink.
- Waste Management and Pollution Control
- Adopting the good practices on Green Buildings, Industrial Unit and other establishments for the management of resources and infrastructure to achieve Environmental Sustainability in growth of Indian Railways.
- Contribution in 'Swachh Bharat Mission'
- Indian Railways(IR) has set a target of becoming a "Net Zero" entity by 2030.

3.0 INDIAN RAILWAYS UNITE WITH MISSION LIFE : 'LiFESTYLE FOR ENVIRONMENT'

Indian Railways (IR) is one of the world's largest rail networks, spread more than 68000 route Km. IR is the lifeline of the country carrying nearly 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 moving 1512 MT of freight in 2022-23 (an increase of ≈ 7% over 2021-22), as it traverses the length and breadth of the country.

Rail-based transport is the most environment friendly mass transport system due to the inherent gains it provides in terms of energy efficiency and resource optimisation. To illustrate, one goods train carries about 4000 tons of iron ore whereas about 267 trucks are required to carry the same load, at a rate of 15 tons per truck. Railways are about 12 times more efficient in freight traffic and 3 times more efficient in passenger traffic as compared to road transport.

Indian Railways boasts of rich history. Railway stations that were built more than a century ago are still in operation. UNESCO World Heritage sites of railways in Darjeeling, Shimla Nilgiris and other built heritage sites across its network balance tourism with heritage and sustainable development.

India stands committed through its updated Nationally Determined Contributions (NDCs) submitted to UNFCCC in August 2022. This includes emissions intensity reduction of GDP by 45 percent by 2030 from 2005 level; achieve about 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030. This may be achieved with the help of transfer of technology and low-cost international finance including from Green Climate Fund and by propagating a healthy & sustainable way of living based on traditions and values of conservation and moderation, through a mass movement for 'LiFE'– 'Lifestyle for Environment' as a key to combating climate change. As the Indian economy transitions, with economic growth and sustainable development as twin goals, mobility will play a key role.

IR consumed about 29 billion units of electricity and 1.98 billion litres of diesel resulting in estimated carbon emission of around 29 million tons in the year 2022-23. IR has taken several steps to streamline its initiatives with regards to environmental management, some notable initiatives are energy efficiency management, paced electrification of railway tracks, sourcing of energy requirements through renewable energy sources, water conservation initiatives, better waste management, green certifications of railway establishments, consent to operate (CTO) from concerned State Pollution Control Boards for major railway stations & sidings, use of 3 phase technology for regenerative braking (locomotives/EMUs/MEMUs), Head on Generation technology (HOG) (eliminating the need for separate diesel fueled power cars), provisioning of LED lights in trains & in all railway establishments, use of energy efficient rated appliances and creation of additional carbon Sink by afforestation, Environment Management Plan sanction in station redevelopment projects etc.

4.0 ENERGY EFFICIENCY IN MASS TRANSPORTATION SYSTEM

Decreasing carbon emissions is a crucial component of the solution to the serious problem of climate change that the world is currently confronting. Enhancing energy efficiency is one of the best methods to accomplish this because by reducing energy consumption, we can reduce the amount of carbon emissions that are released into the atmosphere.

4.1 Advances in Energy Efficiency in Electric Traction

Indian Railways' Production Units have completely switched over to production of energy efficient three-phase electric locos. These locomotives are equipped with regenerative braking feature capable to regenerate electricity during braking action which is fed back to grid.

4.1.1 12000 HP Electric Freight Locomotive

This is locally manufactured world's most powerful electric locomotive (12000 HP WAG12 electric locomotive), In its first operation from the Pt. Deen Dayal Upadhyaya Jn Station in May 2020, the train departed with a long-haul formation with the Dhanbad Division of the East Central Railway with 118 wagons. This is a state of the art IGBT based 3 phase drive and 12000 horse power electric locomotive equipped with regenerative braking system which provides substantial energy savings during operations. These high horse power locomotives will help to decongest the saturated tracks by improving average speed and loading capacity of freight trains. 100 units manufactured in year 2022-23 making total commissioning to 360 till October, 2023.

4.1.2 Adoption of Head on Generation (HOG)

It is more important to make Railway energy efficient, environment friendly and economically viable by reducing the losses and wastage of diesel fuel which is used to run the hotel load (AC plant and light of coaches) which is only possible by using a system which can take electrical energy from over head wire and use it for hotel load. End on Generation (EoG) configuration require power cars equipped with Diesel Alternator (DA) sets for feeding air conditioning, train lighting and other

electrical loads in the coaches. Each such train has two power cars, each power car having 2 DA sets. This system has inherent disadvantage of air and noise pollution. Pursuant to adoption of HOG system in trains, trains run with single power car resulting into augmentation of one more passenger coaches, reduced consumption of fuel, and significantly reducing carbon emission.

In HOG system power is drawn through converters provided in locomotives. The electrical power drawn by the pantograph of the locomotive is suitably converted and supplied for air conditioning, train lighting and other electrical loads in the train. 1376 LHB rakes have been converted into HOG as of July, 2023. Due to HOG conversion, diesel savings to the tune of around 599 million tones has been achieved till March'2023 (since 2018-19) resulting in reduced diesel consumption as well as reduction in air and noise pollution.

4.1.3 3-Phase EMU/MEMU/Vande Bharat & Kolkata Metro

Over Indian Railways, 331 EMU rakes (12 car), 185 MEMU rakes (8 car), 20 Vande Bharat Rakes and 32 Kolkata metro rakes with energy efficient regenerative braking feature and powered by 3 phase IGBT based system have been introduced till march 2023. On average following % of energy is being regenerated stock wise:-

Types of stock	% energy regenerated
EMU	35.28
MEMU	28.18
Kolkata Metro	27.59

4.1.4 Additional Achievements in Electric Traction

- All electric locomotives are provided with Energy cum Speed Monitoring (ESMON) systems for monitoring the performance of Loco Pilots with respect to energy conservation.
- Loco Pilots are being encouraged for maximum use of regenerative brakes on three phase electric locomotives for reducing traction energy bill.
- Energy consumption and energy regeneration in each trip by individual crew is being monitored through Crew Management System.

4.2 Advances in Fuel efficiency in Diesel Traction

4.2.1 Computerize Fuel Management System (FMS) has been developed and RCDs have started daily entry of all High Speed Diesel (HSD) issuance and receipt data in the FMS system. This strengthens the data analysis to help in regulating diesel consumption for traction purpose.

4.2.2 Diesel Consumption reduction- Indian Railways has witnessed a reduction of 38.12% in 2022-23 as compared to year 2019-20.

4.2.3 Diesel locomotives standardizing for Reduced Carbon Emission: IR has taken up the task of further reducing the emission from diesel locomotives and to standardize them in line with the international emission practices.

4.2.4 Energy consumption are regularly monitored through Microprocessor based Energy Meters provided in all the electric locomotives and benchmarking is done based on average energy consumption.

4.2.5 Blending of Bio- diesel with HSD

The Bio-based fuels produced from renewable biomass and other natural products present complete carbon neutrality as CO_2 generated by burning these fuels is captured again by trees and plants thus eliminating the adverse environmental impact. The pollutants created by burning of the conventional fossil fuels arising from Sulphur and other harmful elements contained in fossils fuels are absent in Bio-fuel which results in much lower emission. The substitution of H.S.D with bio-diesel results in reduction of 44 % hydrocarbon (HCs), 89.3 % reduction of carbon mono oxide (CO) and no sulphur content in exhaust. Indian Railways started 5% Bio-Diesel blending with HSD on 5th June 2015. Blending of Bio-Diesel to the extent of 5% has commenced at 76 Railway Consumers Depots of Indian Railways in different Zones.

4.3 Vande Bharat Trains

India's first semi high speed train set was manufactured under 'make in India' programme by ICF during 2018-19. 28 rakes have been manufactured and are operational in 25 service routes by July 2023. It is an energy efficient train. Version-2 of these trains sets are equipped with following improved features which helps in better energy saving.

(i) It has been provided with 3-phase IGBT based under slung propulsion equipments. Has advanced regenerative braking system and need for power car is eliminated. It helps in saving energy up to the tune of 35%.

(ii) Aerodynamic profile of the train also helps to reduce air drag and thus reduce energy consumption.

(iii) Energy efficient VVVF drive compressor in HVAC helps in 15% of energy saving.

(iv) Reduction in gross weight of rake (16 cars) by 41.41 tonnes than version-1 also helps in lesser energy consumption.

4.4 Development of Hydrogen Fuel Cell based distributed Power Rolling Stock (DPRS) 1200KW DEMU

Hydrogen is envisaged to be the future fuel to replace fossil fuels. Using power from renewable energy, such as green hydrogen, is one of the major requirements towards environmentally sustainable energy security of the nation. The new technology envisages zero emissions with water as net exhaust. IR, as a pilot project, has awarded a contract for conversion of diesel power mode to hydrogen fuel as retro fitment of one DEMU rake on Sonipat-Jind section. RDSO has finalized specifications for hydrogen fuel cell trains. Field trial for this hydrogen fuel based train is expected to commence in 2024-25.

IR envisages manufacturing train set with fuel cell based propulsion system to provide traction energy from Hydrogen fuel cell. Fuel cell is a device in which hydrogen is used to generate electricity through a chemical reaction in the presence of oxygen with water as a by product.

HFC: Hydrogen Fuel Cell
APU: Auxilary Power Unit
VVVF:Variable Voltage Variable Frequency drive Inverter

5.0 CAPACITY AUGMENTATION & NETWORK EXPANSION WITH ENVIRONMENT SUSTAINABILITY:

Indian Railways have developed a National Rail Plan (NRP) 2030 with the aim of making Indian Railways future ready by 2030 to create capacities for handling projected traffic requirements of upto 2050. NRP targets reducing transit time of freight substantially to divert road traffic (major polluter) towards Railways.

5.1 Mumbai-Ahmedabad High Speed Rail (MAHSR)

National High Speed Rail Corporation Limited (NHRCL) was incorporated in February, 2016 for construction of 508 Km long Mumbai-Ahmedabad High Speed Rail (MAHSR) project with maximum design speed of 350 Kmph and operating speed of 320 Kmph. As on july 2023, all civil contracts for the MAHSR project have been awarded and the project has been divided into 28 contract packages, with 23 packages already awarded. Substantial progress has been made in foundation and pier construction, as well as girder casting and launching. This energy efficient and environment friendly rail transport system as per global standards will result in reduced Co2 emission.

5.2 Dedicated Freight Corridor

Dedicated Freight Corridor Corporation of India Limited (DFCCIL) supports ecological sustainability by encouraging users to adopt railways as the most environment-friendly mode for their transport requirements. DFC ensures faster transits, reduced logistics costs, higher energy efficiency, and environment-friendly operations. The average speed of freight trains has nearly doubled from 24 kmph to 46 Kmph resulting in half the time taken to ferry products. The Dedicated Freight Corridors (DFCs) encompass two Corridors namely Eastern Dedicated Freight Corridor (EDFC) [Ludhiana in Punjab to Dankuni in West Bengal] and Western Dedicated Freight Corridor (WDFC) [Dadri, Uttar Pradesh to Jawaharlal

Nehru Port Trust, Navi Mumbai, Maharashtra]. A total route length of 2196 Km of Dedicated Freight Corridor (1150 of EDFC & 1046 of WDFC) have been completed by July 2023.

DFCCIL follows Corporate Environment Policy which envisages initiatives to foster growth and sustenance of healthy environment in each aspect of its working. It further lays emphasis upon compliance of all regulations and guidelines relating to environment protection and endeavors to adopt:-

- Integrated Environment Management and Practices.
- To exhibit sensitivity towards environmental responsibilities.
- Efficient utilization of energy resources.
- Associate in direct activities towards environmental improvement through development of green belt and conservation of water resources.
- Make efforts for preservation of ecological balance & heritage.
- Mitigation measures for noise, vibration and waste pollution.
- Sensitize human resource of the corporation towards environmental needs.
- Sustain improvement of environmental performance of the organization.

5.2.1 Measures taken by DFCC to curb the Noise Pollution

Noise barriers are being installed at the sensitive receptors (Schools, Hospitals, etc) close to the project i.e. within 100 m distance.

5.2.2 Water Management & Conservation initiatives taken by DFCC

- Several ponds have been developed along the DFC corridors which will enhance the groundwater level.
- Provision of rainwater harvesting system has been made in all the structures constructed under DFC corridors.
- Recycling of Waste Water generated out from Batching Plants using Primary Sedimentation Treatment Methodology which was used for Suppression of Dust in Haul Road and Stockpiles.

Development of Pond

Regular Water Sprinkling in working zones and roads throughout the alignment to reduce dust pollution

Fly ash utilization in formation of embankment at waterlogged area

Natural earth's topsoil transported and utilized for the agriculture/forestry/any useful purpose fly ash used in construction.

6.0 ENERGY CONSERVATION INITIATIVES:

Given the massive scale of its operation, it is not surprising that the Indian Railways have a growing appetite for the consumption of electricity. Indian Railways consume around 29 billion kWh of electricity annually, comprising around 2% of the country's total power consumption. With rail traffic projected to register an increasing growth in the coming years, it is estimated that the demand for electricity by the Indian Railways will go up over the next decade. IR plans to progressively shift its power requirement from diesel to electric traction with mission of 100% electrification. A total of 90.33% (58848 RKM out of total 65,141 RKM as of April, 2023) railway track has been electrified resulting in reduced diesel consumption.

IR has taken a series of measures to cut down its energy consumption and rationalise its energy procurement process by implementing several energy conservation measures, procurement of power under Open Access and harnessing Renewable Energy. Railways also carry out regular energy audits at consumption points.

6.1 LED lighting

All railway stations, service buildings & residential quarters have been provided with 100% LED lights. This will reduce about 10% of total energy being utilized on its Non-traction thus leading to savings of about 240 million units of electricity i.e. savings of Rs 180 Cr. per annum.

All coaches have been provided with energy efficient LED lights, which not only help in reducing energy bill but also enable Indian Railways to reduce emissions. It may result into likely average saving of Rs. 41.23 crores per annum and corresponding reduction in CO_2 emission per annum.

6.2 Perform Achieve Trade (PAT)

Perform Achieve Trade (PAT) is a flagship scheme under the National Mission for Enhanced Energy Efficiency (NMEEE) and Ministry of Power (MOP) for improvements in energy efficiency of energy intensive industries (Called as Designated Consumers (DCs) who are required to appoint energy manager, file energy consumption returns every year and conduct mandatory energy audits regularly. If the DC achieves Specific Energy/Fuel Consumption (SEC/SFC) below the Target given by BEE, then Energy Saving Certificates (ESCerts) are issued to DC's which are tradable in the market and amount can be claimed for the same.

Indian Railways is a part of PAT Cycle-VII of Bureau of Energy Efficiency (BEE) and as per the provisions of section-14 of the Energy Conservation Act, 2001, 16 Zonal Railway, 08 Production units and 02 workshops of Indian Railways are given the status of Designated Consumers (DCs) into the PAT Scheme (Cycle VII). The period for PAT Cycle-VII commenced from 1st April 2022 and will continue till 31st March 2025. For PAT cycle-VII, it is targeted to reduce energy by 1.90% in passenger and 5.37% in Goods for Electric traction as well as 3.38% in passenger and 1.36% in Goods for Diesel traction over IR. It is estimated that total energy saving of 95549 MillionTonne of Oil Equivalent (mTOE) and carbon emission reduction of approx

0.53 million tonnes would be achieved in PAT Cycle-VII for IR. Indian Railways have exceeded the targets set under Perform Achieve and Trade-II(PAT-II) and have achieved additional energy savings of 0.11 mTOE. The emission reduction through the implementation of PAT Cycle-II is about 1.0 million tonnes of CO2. Total Energy Saving Certificates earned by Indian Railways are 1,18,790 ESCerts.

6.3 Energy Efficiency Study Initiatives of Indian Railways

Confederation of Indian Industry (CII) completed on Green Rating and Energy Efficiency studies of Indian Railway's Production Units and major Workshops, IR units covered in the study:-

Phase-I	Phase -II
DLW, Varanasi	MCF, Raibareli
CLW, Chittaranjan	Rail Wheel Plant, Bela
ICF, Chennai	Carriage Repair Workshop, Matunga
RCF, Kapurthala	Coach Rehabilitation workshop, Bhopal
DLMW, Patiala	Coach & Wagon workshop, Liluah
RWF, Bengaluru	Coach Repair workshop, Hubali
Locomotive Workshop, Jamalpur	Carriage Repair Workshop, Alambagh
Wagon Repair Workshop, Jhansi	Carriage and Diesel Loco Repair Workshop, Ajmer
Golden Rock Railway Workshop, Trichy	Rail Spring Kharkhana, Sitholi
Carriage & Wagon Workshop, Jagadhari	Carriage, Wagon and Diesel Loco workshop, Kharagpur

6.4 Star rated buildings Certified by Bureau of Energy Efficiency (BEE):

Around 50 buildings (including 4 Divisional Hospitals) have been given Star rating by BEE. Use of 5 Star rated electrical equipment is also emphasised.

6.5 BLDC Fans

Old ceiling fans are getting replaced with energy efficient BLDC fans.

7.0 HARNESSING RENEWABLE ENERGY

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. IR has been taking several steps to install clean and efficient energy. Indian Railways has planned to set up:-

1000 MW solar power plants, and

about 200 MW of wind power plants across Zonal Railways and Production Units.

7.1 Harnessing Solar Energy on Indian Railways:

Indian Railways have planned to set up 500 Mega Watt (MW) solar plants on roof top of Railway buildings through developers with 25 years power purchase agreement by Railways, which will be used for meeting non-traction power supply loads at Railway Stations etc.

- 200 Mega watt (MW) solar power capacity has been commissioned by April 2023. 103.4 MW wind capacity installed as on April 2023.
- In order to further proliferate solar power on its unused vacant land, IR have undertaken 3 pilot projects:-

Solar Plant Feeding into Traction Sub-Station Installed at Diwana

1.7 MW at Bina feeding into 25kV traction sys

Howrah Station

- 1.7 Mega Watt (MW) at Bina (WCR) - solar project commissioned in July' 2020, feeding solar power directly to 25 kilo Volt (kV) Traction System.
- 2 MW at Diwana (NR)- Commissioned in Sept.' 2020, feeding power directly to State Transmission Utility (STU) network at 132 kV.
- 50 MW at Bhilai (SECR) for feeding solar power directly to Central Transmission Utility (CTU) at 220 kV commissioned in April'2023.

7.2

Zone wise solar and wind power capacity installed		
Up to 31.03.2023		
RLY	Total Solar (in MW)	Total Wind (in MW)
CR	7.30	56.4
ER	8.67	
ECR	6.47	
ECoR	4.75	
NR	23.98	
NCR	11.07	
NER	4.59	
NFR	5.51	
NWR	7.08	26.0
SR	5.11	10.5
SCR	9.35	
SER	2.29	
SECR	55.28	
SWR	4.99	
WR	11.48	
WCR	8.55	
Metro	2.19	
ICF	3.46	10.5
RCF	0.99	
RWF	2.02	
BLW	3.86	
PLW	2.15	
CLW	6.01	
MCF	3.00	
TOTAL	200.16	103.4

7.3 Solar Plants along the Railway Track for Traction purpose

IR has planned to utilize its unused vacant Land parcels for setting up of Land Based Solar Plants for its traction power requirement as 'Green mode of transportation' and become a 'Net Zero Carbon Emission Railway' by 2030. The plants will be set up on unused vacant land. There is about 51,000 hectare of Railway land which

has a potential of installing 20 GW land based solar plants. The Solar power so generated will be fed to CTU/STU Grid or directly to 25 kV AC traction system.

7.4 Innovative Energy Conservation:

Automatic switching ON/OFF of 660 Pit lights & 620 Catwalk lights in 5 pit lines at Coaching yard /TPTY of GTL Divn. with Diffuse photo electric sensor was done as per the occupation of rakes in pit lines. By implementing this, 3,072 units/month & Rs. 26,573/month is being saved.

7.5 Harnessing Wind Energy over Indian Railways:

Out of 200 MW target of IR, 103.4 MW wind-based power plants have already been installed.

Wind based power plants of 10.5 MW (for non-Traction) and 10.5 MW (for Traction) capacity in Tamil Nadu, 26 MW (for traction) capacity in Rajasthan, 6 MW (for non-traction) and 50.4 MW (for traction) capacity in Maharashtra have been installed.

7.6 E-Mobility Policy of Indian Railways: Government of India (GoI) has identified promotion of Electric Vehicles (EVs) as a major step towards decarbonization of the transportation sector and reduces demand for petroleum products, and has taken a slew of initiatives to encourage large scale EV adoption.

Indian Railways (IR), with its vast network of operations is ideally suited to play an important role in taking forward GoI's mission of EV promotion, specifically creating an infrastructure of EV charging across the country. IR's vast number of stations, office buildings, and other assets act as important interfaces with other

modes of travel including road transport. Ministry of Railways has issued a policy for promotion of E-Mobility in Indian Railways.The policy envisages adoption of Electric Vehicles (EVs) affordable and accessible EV charging infrastructure. This can not only can be a good source of Non-Fare Revenue (NFR) for the Railways put also can help in reducing the Green house gas emissions from the petrol/diesel driven vehicles.

EV Charging station installed in Railway Board, New Delhi

8.0 ACCOLADES EARNED BY INDIAN RAILWAYS:

The continuous efforts of IR to embrace various energy efficient technologies and energy conservation measures had resulted in bagging various awards at various levels over the years.

IR bagged 14 National Energy Conservation Awards (NECA) in 2020, 11 in year 2021, 03 awards from Telangana State Energy Conservation Awards 2021 and 02 from Andhra Pradesh State Energy Conservation Awards 2021.

8.1 National Energy Conservation Awards (NECA) 2022-23:

The Hon'ble President of India, Smt. Droupadi Murmu presented the National Energy Conservation Awards on December 14, 2022 on the occasion of National Energy Conservation Day. On this Occasion, Indian Railways were presented with Nine National Energy Conservation Awards for the year 2022. These awards are declared for the best energy management practices during the year 2022. **The details of awards won by IR are: -**

- Transport Category / Railway Stations Sector:
  - Kacheguda Railway Station won the First Prize
  - Guntakal Railway station won the Second Prize
  - Kanpur Central Railway Station won the certificate of Merit
  - Tenali Railway Station won the certificate of Merit
  - Rajahmudry Railway Station won the certificate of Merit
- Buildings Category / Government Buildings Sector:
  - Ajmer Workshop of North Western Railway won the First Prize.
  - Railway Hospital / Guntakal won the certificate of Merit
  - Electric Traction Training Centre, Vijayawada won the certificate of merit.
  - Divisional Railway Hospital, Pratapnagar won the certificate of Merit

Sri Sharat Chandrayan, DRM/HYB receiving National Energy Conservation Award for Kacheguda Railway Station (1st Prize) from Hon'ble President of India

8.2 on 1st June 2022, Indian Railways have been awarded by the UIC International Sustainable Railway Awards (ISRA) held in Berlin in the category of "Best use of Zero-Carbon Technology" for feeding Solar Energy directly to 25 KV AC Traction System.

8.3 South Central Railway bagged 4 Telangana State Energy Conservation Awards (TSECA – 2022):-

- Gold Award for Kacheguda Railway Station in the Railway Station Buildings category.
- Rail Sanchalan Bhawan in Government Buildings category
- Silver award to Secunderabad Railway Station in the Railway Station Buildings category
- Silver award Lekha Bhavan in Government Buildings category

8.4 South Central Railway bagged 2 Andhra Pradesh State Energy Conservation Awards (APSECA – 2022).

Gold Award for Divisional Railway Hospital/BZA in Buildings category.

Silver Award for Electric Traction Training Centre/BZA in Buildings category

8.5 South Central Railway bagged 3 Awards from CII during National Energy Awards for Excellence in Energy Management, 2022.

Kacheguda Railway Station - As KCG Station had bagged Excellent Energy Efficient Unit Award by CII for 3 consecutive years, it was also awarded with "National Energy Leader" Award.

8.6 Energy Efficient Unit – (2 Awards) Hyderabad Bhavan &Lingampalli station

8.7 ECONAUR sustainability Awards 2022: Tirupati station and Divisional Railway hospital Guntakal have achieved Certificate of winner under transport sector for environment protection, saving our resources with best practicesin energy management.

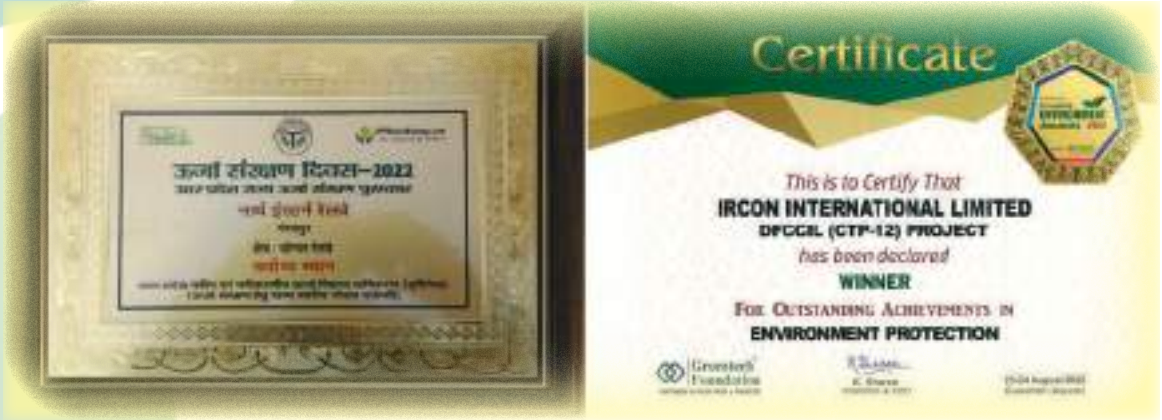
8.8 Nagour and Dausa Railway stations were awarded 1st and 2nd rank in Rajasthan Energy Conservation Award-2022 by Rajasthan Government in the category of building Railway station respectively. Ajmer group of workshops awarded 1st prize in category of Industry (General Large) in Rajasthan Energy Conservation award-2022. Bhilwara Railway Station of Ajmer division secured 1st Position in clean government office survey competition 2023 which organized by Municipality Bhilwara.

Tirupati Railway station

Railway Hospital Guntakal

8.9 Gorakhpur got top rank in UP Energy Conservation Award 2022 on Energy Conservation Day 2022

8.10 Indian Railway Construction International Limited (IRCON) bagged Greentech Environment Award – 2022 for "Outstanding Achievement in environment protection.



9.0 ENVIRONMENTMANAGEMENTPLAN:REDEVELOPMENT OF RAILWAY STATIONS

Maximum number of stations were developed before freedom of India. Major stations have now obtained consent to operate under Environment Protection (EP Acts) from concerned state pollution control boards showing IR's commitment to protect our environment.

Today the eyes of the whole world are on India and modernization of stations will create a new atmosphere for development of the country. **Government of India has taken up 508 stations for redevelopment for providing world class amenities along with elegant features and modern look. In redevelopment process, due care of environment is being taken.** A specific Committee of officers has been constituted to grant the clearance for the Environment Management Plan (EMP) of station redevelopment projects.

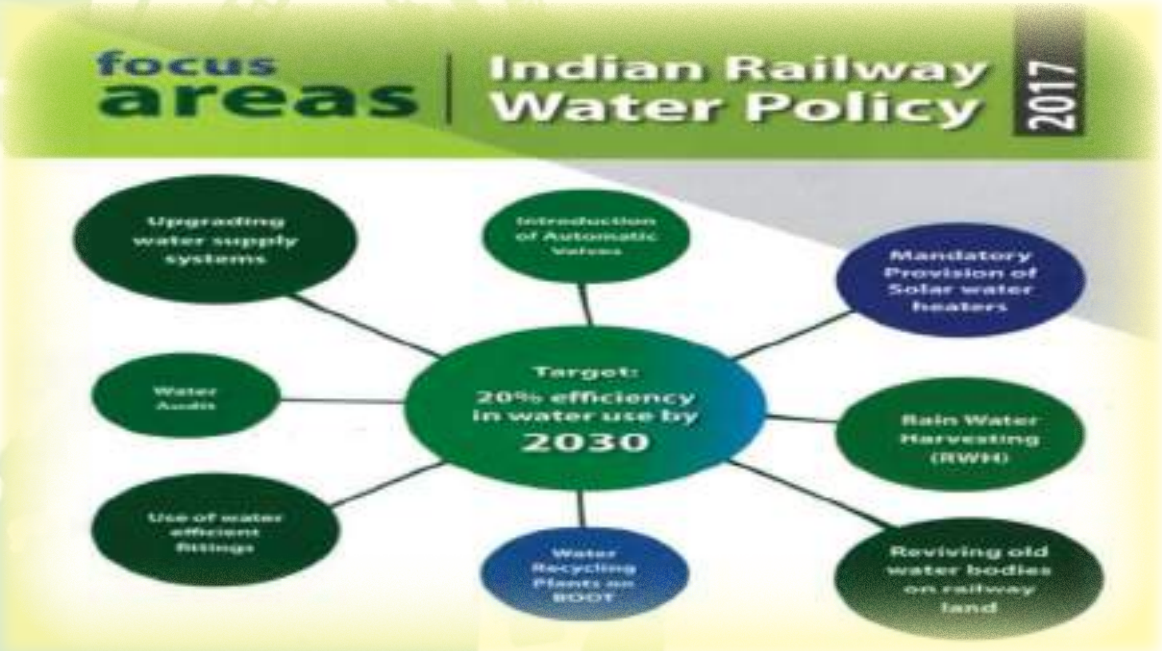
The project executing company is required to have a well laid down environmental policy duly approved by Environment and Housekeeping Directorate of the Railway Board. The environmental policy should prescribe for standard operating procedures and to have proper checks and balances to bring into focus any infringements/deviation/ violation of the environmental forest or wildlife norms. A separate Environmental Cell both at the project and company head quarter level, with qualified personnel shall be set up under the control of senior Executive, who will directly report to the head of the organization for implementation of the respective EMPs.

All aspects of Environment Protection (EP Acts) are being taken care during the process of sanction of EMP, which are broadly as below:-

- Statutory compliance;
- Air quality monitoring and preservation;
- Water quality monitoring and preservation;
- Noise monitoring and prevention;
- Energy Conservation measures;
- Waste Management:
- Green Cover.
- The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board and the State Government.

10.0 WATER CONSERVATION

Shortage of water in India is becoming a very serious issue. The tube wells drilled are lowering water tables in most parts of the country. This problem gets further compounded in areas where rain fall is poor. To overcome this problem, Railways have taken initiative in Rain Water Harvesting (RWH), Water Recycling Plant (WRP), Water Audits and Water bodies. IR issued 'Water Policy' in March, 2017 covering all aspects of water use efficiency, water recycling, conservation, recharge of ground water and restoration of water bodies.



10.1 Water Recycling Plants

Water Recycling Plants (WRP) are being provided at major consumption centre locations (stations /sheds etc) where there is heavy demand for water and provision of same is economically justified. 13 WRPs were installed in 2022-23, culminating into 125 WRPs by March'2023 over IR. More than 125 Effluent treatment Plants and Sewage treatment plants (around 70) have been installed over IR by March,2023. A target of installing 48 WRPs have been set across Indian Railway in year 2023-24.

WRP installed at Muzzafarpur in 22-23

WRP installed at Patna in 2022-23

WRP of 500 KLD commissioned on 02.10.2022 at Adra North Settlement in Adra Division

WRP of 500 KLD commissioned at Bankura on 06.01.2023 in ADA Division

10.2 Automatic Coach Washing Plants (ACWPs):

Automatic Coach Washing Plants have been installed at 68 locations (including 16 commissioned in year 2022-23) over zonal Railways to clean exterior of coaches more effectively and efficiently. In addition to excellent cleaning the direct water consumption also gets reduced avoiding wastage and recycling the water through water recycling plant integrated with this plant. In automatic coaching washing plant, the rake is made to move into the coach washing plant at a slow speed and the body is sprayed with water as pre-wetting process. The rake then moves ahead where detergent is sprayed through a nozzle. At the water brush station, the coach is cleaned by rotating nylon combination brushes on both sides. This is followed by final rinsing of the coach body. Towards the exit, blowers on both sides dry off the coach.

10.3 Water Bodies

Ministry of Railways has decided to assess and review the Water Bodies existing in the Railway Land including the ones which are presently non-functional and take action to ensure that all the existing Water Bodies are protected and nurtured and Water Bodies which are non-functional are restored early. As on March 2023, around 1700 water bodies are functional on Indian Railways.

200 year old heritage well has been rejuvenated at Zonal Railway Training Institute (ZRTI), Moula-Ali/SCR.

10.4 Water Audit

To minimize water wastage, Zonal Railways have been asked to conduct water audit at major water consumption centres through third party for quality as well as quantity and to take up Works of water recycling plants based on the report of water audit. During the year from 2015-16 to 2022-23 (i.e. up to March'2023) a total of 1164 Water Audits were conducted by various zonal railways out of which 184 were completed in the year 2022-23. A target of 468 water audits of main water consumption centers have been set for the year 2023-24.

10.5 Rain Water Harvesting (RWH)

To promote water conservation, Indian Railways have been providing Rain Water Harvesting (RWH) systems at various locations as per extant policy. In 2001, Railways were asked to adopt roof top rain water harvesting to recharge ground water especially in areas experiencing seasonal shortage of water and to take

necessary assistance from Regional offices of Ministry of Water Resources. In 2013, it was decided that RWH scheme shall be an essential sub-set of all the project estimates related to constructions of built assets like service buildings, hospitals, stations buildings (including remodelling etc), Railway quarters, workshops/sheds, yard modelling as also in doubling, new line and gauge conversion and sidings. Installation of Roof Top Rain Water Harvesting is being monitored across all Railway Zones. With consistent effort of zonal Railways, 7259 nos of RWH systems in total have been installed in Railways up to March 2023 out of which 561 nos of RWH have been installed in the year 2022-23 itself having roof top area more than 200 Sqm. 559 nos of RWH system were installed in Railways in year 2021-22 and for the year 2023-24, a target of 1450 RWH systems has been set by IR.

11.0 AFFORESTATION

Afforestation on vacant Railway land in between sections is carried out by Railway departmentally and also with a view to safeguard Railway land against unauthorized occupation.

In pursuance of Railways' commitment towards environmental improvement and sustainable development, Forest Departments of the States are being involved in plantation as well as maintenance and disposal of trees, thus bringing in their expertise in afforestation. For this purpose, Ministry of Railways have finalised a model agreement in consultation with Ministry of Environment, Forest and Climate Change (MoEFCC) in January 2016 to be entered between Zonal Railways and respective State Forest Department for plantation of trees on Railway land along the Railway track and station yards without transferring the ownership of the land in favour of State Forest Department.

As per this Agreement, plantation along the Railway track on railway land boundary can be done by Forest Department without declaring such land as protected forest and can be re-used by Railways at any time without any hindrance to Railway works/development projects. Cost of the plantation including its protection and maintenance can be borne by State Forest Department or Railway Administration or can be shared by both.

The agreement has already been finalised with State Forest Departments of Maharashtra, Haryana, Punjab, Assam, Andhra Pradesh, Chhattisgarh, Odisha and Karnataka.

11.1 Details of Railway plantation achievements are as under:-

(In Thousands)

Year	Achievement	Year	Achievement
2014-15	6081	2019-20	13141
2015-16	5512	2020-21	9270
2016-17	12508	2021-22	7210
2017-18	8896	2022-23	8143
2018-19	11009	Total (2014 to 2023)	81770

11.2 Miyawaki Plantation

Miyawaki is a technique pioneered by Japanese botanist Akira Miyawaki that helps build dense, native forests in a short time. Usage of Miyawaki technique helps in creating denser forests at 10 times more pace, and Miyawaki trees absorb 30 times more carbon than monoculture plantations. The Miyawaki method mimics the way a forest would recolonise itself if humans stepped away. Only native species that would occur naturally in that area without humans, given the specific climate condition, are planted. Indigenous plant species have spent thousands of years adapting to their local environment to create a supporting ecosystem, so planting them doesn't just reinstate this biodiversity also it builds a site that's more responsive to climate change. IR is developing forest on railway land using Miyawaki method.

Miyawaki Forest under development at RCF Kapurthala

12.0 GREEN INDUSTRIAL UNITS

Green Co rating developed by Confederation of Indian Industry (CII) offers significant value addition and direction to organizations in terms of resource conservation, waste reduction, climate change mitigation, greener supply chain and superior environmental performance. It has been acknowledged in India's Intended Nationally Determined Contribution (INDC) document, which was submitted to UNFCCC, as a proactive voluntary action undertaken by Indian private sector aimed towards combating climate change.

12.1 Status of Green Co Rating in Railway units (Production Units/Workshops):-

SNO	Location Name	Place	Rating
1	Modern Coach factory	Rae Bareilly	Platinum
2	Wagon Workshop	Guntupalli	Platinum
3	Carriage Repair shop, SCR, Tirupati	Tirupati	Gold
4	Diesel Loco Modernisation Works	Patiala	Gold
5	Mysuru Workshop	Mysuru	Gold
6	Jagadhri Workshop	Jagadhri	Gold
7	Diesel Loco shed, Moula ali	Hyderabad	Gold
8	Liluah, Workshop	Liluah	Gold
9	Pratap Nagar workshop	Pratapnagar	Gold
10	Railways - ICF / Chennai	Chennai	Gold
11	Golden Rock Workshop	Trichy	Gold
12	Ratlam Diesel Shed	Ratlam	Gold
13	Diesel loco Shed Kazipet	Kazipet	Gold
14	Diesel Loco Shed	Vatva	Gold
15	Wagon Repair Shop, Kota, WCR	Kota	Gold
16	Northern Railway Alambag Workshop	Alambagh	Gold
17	Charbagh Workshop	Lucknow	Gold
18	Diesel Locomotive Works / Varanasi	Varanasi	Silver
19	Carriage Workshop, Lallaguda	Secunderabad	Silver
20	Carriage Repair Workshop, Ajmer	Ajmer	Silver

21	Wagon repair Workshop, Nagra, Jhansi	Jhansi	Silver
22	Rail Spring Karkhana	Gwalior	Silver
23	Kharagpur Workshop	Kharagpur	Silver
24	Mettuguda Stores	Hyderabad	Silver
25	Diesel Loco Shed	Vizag	Silver
26	Kalka Workshop	Kalka	Silver
27	Bhavnagar Workshop	Bhavnagar	Silver
28	Rail Wheel factory, Yelahanka	Bangalore	Silver
29	New Bongaigaon Workshop	New Bongaigaon	Silver
30	Amritsar Workshop	Amritsar	Silver
31	Diesel Loco Shed, Gooty	Gooty	Silver
32	Diesel Loco Shed	Guntakal	Silver
33	Coach Rehabilitation Workshop	Bhopal	Silver
34	Eastern railway Workshop	Kanchrapara	Silver
35	Electric Loco Shed ,Kazipet	Kazipet	Silver
36	Railways - Carriage Workshop / Perambur	Chennai	Bronze
37	Mechanical Workshop, Izzatnagar	Barielly	Bronze
38	Carriage Repair Workshop,Hubli	Hubli	Bronze
39	Mancheswar Workshop	Bhubaneswar	Bronze
40	Wagon Repair Shop	Raipur	Bronze
41	Carriage Workshop, Matunga	Mumbai	Bronze
42	Lower Parel workshop	Mumbai	Bronze
43	Dibrugarh Workshop	Dribrugarh	Bronze
44	Carriage Repair Workshop, Harnaut	Harnaut	Bronze
45	Ajmer Loco Workshop	Ajmer	Bronze
46	Bikaner Workshop	Bikaner	Bronze
47	Jodhpur Carriage Workshop	Jodhpur	Bronze
48	Rail Coach Factory	Kapurthala	Bronze
49	Gorakhpur Workshop	Gorakhpur	Certified
50	Loco, C & W Workshop, Dahod	Dahod	Certified
51	Parel Loco Workshop	mumbai	Certified
52	EMU Mahalaxmi	Mumbai	Certified
53	Locomotive workshop, Jamalpur	Jamalpur	Certified
54	Bela Wheel factory	Bela	Certified
55	Budge Budge Bogie manufacturing facility	Kolkata	Certified

13.0 OTHER GREEN BUILT UP SPACES

IR has taken the initiative of undertaking Green Rating Certification for different types of Railway establishments, including the industrial units. Such certification mainly covers assessment of parameters having direct bearing on environment, such as, energy conservation measures, use of renewable energy, impact on GHG emission, water conservation, solid and liquid waste management, green cover etc.

13.1 Green Buildings

Green Buildings is an effort to reduce the negative impact of buildings on the environment during its construction and use. The aim of green building is to minimize demand on non renewable resources, maximize the utilization efficiency of resources, and maximize the reuse, recycling and utilization of renewable resources.

The rating systems in India like LEED, GRIHA, IGBC offer green rating for existing buildings as well as new buildings.

Bapudham Motihari station of Samastipur Div.

Dhanbad station of Dhanbad div.

Railway Higher Secondray School Bilaspur

Divisional Raiway Hospital Ajmer

13.2 Status of Green Buildings & other establishments:-

	Railway Buildings	Rating typology	Rating Level
1	IRICEN, Pune	New Building	Platinum
2	ICF Administration Building, Chennai	Existing Building	Platinum
3	Rail Nilayam, Hyderabad (Re-Cer 2023)	Existing Building	Gold
4	Hyderabad Bhavan, Hyderabad	Existing Building	Gold
5	Supervisor Training Center, Hyderabad	Campus	Platinum
6	SEC railway Higher Secondary School, Bilaspur	School	Gold
7	Rail Vikas Bhavan, Guntur	Campus	Platinum
8	Divisional Railway Hospital, Ajmer	Healthcare	Silver
9	Rail Wheel Factory - Admin Building, Bengaluru	Existing Building	Platinum
10	Rail Saudha, Hubli	Existing Building	Gold
11	Supervisors Training Centre, Lucknow (Re-Cer 2020)	Existing Building	Silver (2018), Platinum(2020)
12	ICF Silver Jubilee Matriculation Higher Secondary School, Chennai	School	Platinum
13	ICF Nursery & Primary School, Chennai	School	Platinum
14	Administrative Building at DMW Railway Colony	Existing Building	Platinum
15	Office Building of DRM Guntakal	Existing Building	Platinum
16	DRM Building Danapur	Existing Building	Silver
17	National Academy of Indian Railway, Vadodara	Campus	Certified
18	Railway Officers Enclave, New Delhi	Green Residential Society	Platinum
19	NWR Headquarters, Jaipur	Existing Building	Platinum
20	Northern Railway Central Hospital, Delhi	Healthcare	Platinum
21	Railway School Kalyan, Mumbai	School	Platinum
22	Rail Bhawan, New Delhi	Existing Building	Gold
23	DRM Office Building, Ratlam	Existing Building	Gold
24	Supervisor's Training Centre, Kharagpur	Existing Building	Gold
25	Central Railway Hospital, Jaipur	Healthcare	Platinum
26	Administrative Building of Jagadhri Workshop, Haryana	Existing Building	Gold
27	Divisional Railway Hospital Agra	Healthcare	Gold
28	DRM Office Building, Ahmedabad	Existing Building	Gold
29	DRM Office Building, Jaipur	Existing Building	Platinum
30	DRM Office Building, Jodhpur	Existing Building	Silver
31	Zonal Railway Training Institute, Udaipur	Existing Building	Silver
32	Jagjivanram Hospital, Mumbai	Healthcare	Platinum
33	Ujjain Railway Station Building, Ujjain	New Building	Certified
34	Admin Building of Marathwada Rail Coach Factory, Latur, Maharashtra	New Building	Gold
35	High Speed Rail Training Institute, Gujarat	New Building	Silver
36	Admin Building Northern Railway Mechanical Workshop, Amritsar	Existing Building	Platinum
37	Divisional Railway Manager Building, Ajmer	Existing Building	Silver
38	Administrative Block, Patiala Locomotive Works	Existing Building	Platinum
39	Chittaranjan Locomotive Works (CLW), Admin Block, Chittaranjan, Asansol	Existing Building	Gold

13.3 Green Railway Stations

IR has embarked on a mission of "Net Zero" Carbon emission by 2030 and as per estimation by CII green certification of each major Railway Station is expected to result in 500 Tonne of CO_2 reduction per year. Green Certifications covers assessment of parameters having direct bearing on the environment, such as, energy conservation measures, use of renewable energy, Green House Gas emission reduction, water conservation, waste management, material conservation, recycling etc. 14 stations achieved 'Green' Certification in 2022 from CII. Further, around 200 such green stations have been planned for taken up for Green Certification in upcoming years.

Status of Green Railway Stations by July'2023:-

Sl. No.	Station	Zone	Final Rating Level
Railway Stations			
1	Secunderabad (Re-Cer 2023)	SCR	Platinum
2	New Delhi (Re-Cer 2021)	NR	Platinum
3	Jaipur (Re-Cer 2018)	NWR	Platinum
4	Chennai (Re-Cer 2023)	SR	Platinum
5	Varanasi	NR	Certified
6	Katra	NR	Certified
7	Howrah Station	ER	Silver
8	Kacheguda	SCR	Gold
9	Vijayawada	SCR	Gold
10	Tirupati	SCR	Gold
11	Anand Vihar	NR	Silver
12	Hazrat Nizamuddin	NR	Certified
13	Guntakal	SCR	Gold
14	Tiruchirappalli	SR	Gold
15	Rajendra Nagar Patna	ECR	Silver
16	Visakhapatnam	ECoR	Platinum
17	Chhatrapati Shivaji Maharaj Terminus	CR	Gold
18	Ratlam Junction	WR	Silver
19	Delhi Cantonment	NR	Silver
20	Delhi Sarai Rohilla	NR	Silver
21	Yeshwanthpur	SWR	Silver
22	Asansol	ER	Platinum
23	Coimbatore	SR	Platinum
24	Jodhpur	NWR	Platinum
25	Chittaurgarh	WR	Gold
26	Hyderabad Deccan	SCR	Platinum
27	Solapur	CR	Gold
28	Agra Cantonment	NCR	Silver
29	Malda Town	ER	Silver
30	BapudhamMotihari	ECR	Gold
31	Dhanbad	ECR	Gold
32	Sir M. Visvesvaraya Bangalore	SWR	Silver

33	Ahmedabad	WR	Platinum
34	Bhagalpur	ER	Silver
35	Ajmer	NWR	Gold
36	Virangana Lakshmibai Jhansi	NCR	Silver
37	Prayagraj	NCR	Silver
38	Mumbai Central	WR	Gold
39	Howrah Railway station	ER	Gold
40	Banaras Railway Station	NER	Silver

14.0 ENVIRONMENT FRIENDLY BIO-TOILETS & BIO-VACCUME TOILETS FOR PASSENGER COACHES

Indian Railways, in their commitment to provide hygienic environment to passengers and to keep station premises/tracks clean, have developed environment-friendly Bio-toilets for its passenger coaches. The technology has been developed jointly by Indian Railways (IR) and Defence Research & Development Organization (DRDO).

Bio-toilet tank

This environment friendly, low cost and robust technology, is the first of its kind in Railway Systems in the world. The anaerobic bacteria used in the bio-digester are hardy enough to survive extreme cold and heat and also survive when subjected to commonly available disinfectants.

14.1 In these bio-toilets, the waste retention tanks are fitted below the coach floor underneath the lavatories and the human waste, discharged/collected into them, is acted upon by a colony of anaerobic bacteria that convert human waste mainly into water and bio-gases (mainly Methane CH_4 & Carbon Dioxide CO_2). The gases escape into the atmosphere and waste water is discharged after disinfection onto the track. Raw human waste thus does not fall on the railway tracks and this keeps station premises/tracks clean.

14.2 The first train, Gwalior-Varanasi Bundelkhand Express, fitted with IR-DRDO bio-toilets was introduced in service in January 2011. After receiving encouraging feedback from the users and railways' maintenance staff and based on the recommendation of Joint Working Group (JWG), the pace of fitment of these bio-toilets in IR's passenger coaches was ramped up, very steeply especially in last few years. Indian Railway has completed the work of fitment/installation of bio-toilets in all its coaches on line. With this effort, dumping of nearly 274000 litres per day of waste water and 3980 tons per day of excreta on tracks is avoided. All newly manufacture coaches, turning out of Production Units, are being provided with

bio-toilets. With this effort, all coaches running on line are having provision of bio-toilets. This large scale deployment of bio-toilets in coaches has resulted in a paradigm shift in the level of cleanliness on railway tracks and especially at railway stations, where the foul smell/sight associated with human waste is not to be felt or seen any more.

14.3 Upgradation of toilets with automatic hygiene, odour control system

Aiming to replace the existing toilets in trains with newly designed and upgraded ones with better amenities, the Indian Railways has introduced an AC coach with four newly designed bio-toilets in Ranchi Rajdhani as a pilot. After getting feedback, the national transporter plans to roll them out across trains. These toilets are equipped with automatic hygiene and odour control systems.

15.0 SOLID WASTE MANAGEMENT

Solid Waste Management Rules, 2016 identify railways as a bulk waste generator. Different types of wastes are generated at various railway premises like Municipal Solid waste, Plastic waste, hazardous waste, biomedical waste, etc. During the course of transportation, waste is generated by the passengers especially in long distance trains and pantry car. The waste is generated in bulk and On Board Housekeeping Services is provided in around 1150 long distance/identified trains. The OBHS staff not only conducts cleanliness activities of the trains en-route but also collects the waste generated during the journey which is disposed at designated stations.

15.1 Waste hierarchy is the priority order in which the solid waste is to be managed by giving emphasis to prevention, reduction, reuse, recycling, recovery and disposal, with prevention being the most preferred option and the disposal at the landfill being the least. IR emphasise on segregation/collection of wate in three separate streams namely bio-degradable, non biodegradable and domestic hazardous wastes.

15.2 Zonal Railways and Production Units have taken initiatives to set up solid waste management facilities including segregation and waste processing methods

Sewage Treatment Plant (100KLD) at New Delhi station commissioned in 2022-23

Effluent Treatment Plant (50KLD) is commissioned in Jan'2023 at Tirupati workshop

One ETP of 5 KLD capacity was installed at Mariani Health Unit in December 2022

Installation of one STP of 100 KLD capacity at Lumding in January 2023

Installation of one STP of 100 KLD capacity at Dimapur in March 2023

Composting Plant installed in Samastipur

Composting Plant installed in Danapur

such as composting, vermi-composting, bio-methanation for bio-degradable waste and recycling of recyclable waste. IR has installed Solid waste Management Facilities on 206 stations (including Waste to Energy: 16, Waste to Compost: 164 & Solid waste management plant: 35 stations). For other stations, waste disposal is being done with coordination of Urban Local Bodies (ULBs).

STP installed at Chittranjan Locomotive works, Chittranjan, West Bengal

15.3 IR is also taking various awareness drives for railway officials as well as for passengers for proper waste management, including eradication of single-use plastic in Railway premises through awareness rallies social and press media, audio announcements, Passenger interaction, posters and placards. Display banners to say no to plastic, Nukkad natak for Anti Littering, Audio-visual awareness campaign and display fine Board at station.

15.4 Bio-Medical waste generated at Railway Hospitals and Health units is disposed as per Bio-Medical Waste Management and Handling Rule, 2016. Bio Medical Waste generated in hospitals are collected by State Pollution Control Board approved agencies for the purpose and disposed off the waste as per State Control Board approved guidelines. Proper segregation (in colour coded bags) have been provided to collect BMW. Hospital kitchen waste is also being segregated into wet waste and dry waste in two separate dustbins at the point of generation.

15.5 Detailed instructions regarding waste management have been issued for prompt disposal of waste arising out of catering services at stations and in trains. Provision of dustbins is being done in sleeper coaches also in addition to AC coaches provided earlier. Dust bins are also being provided in bio-toilets in all coaches.

15.6 Zero-waste Railway station & colony initiative with GIZ at Varanasi

A project has been undertaken by Northern Railway to make Varanasi Cantt a model zero-waste railway station and AEN Colony at Varanasi a model zero-waste railway colony. This initiative has been undertaken in partnership with the Government of Uttar Pradesh (GoUP) and German Development Cooperation (GIZ-India), as part of the Indo-German bilateral cooperation agreement in the State of Uttar Pradesh. In this project, all the waste generated at Varanasi railway station will be segregated into wet and dry waste. The dry waste will be recycled and wet waste will be composted. For segregation of dry waste, a Material Recovery Facility is under construction at Varanasi.

15.7 Delhi division/NR has awarded an innovative contract to the firm M/s Rekart Innovations Private Limited, gurugram for waste management and resource recovery at New Delhi, Hazrat Nizamuddin, Delhi, Delhi Sarai Rohilla and 26 other railway stations of Delhi area in April 2021. This contract marks a paradigm shift as on expenditure contract has been converted into revenue contract fetching non fare revenue of Rs 50 lakhs for 05 years. The firms segregates station waste into wet and dry waste. It also ensures treatment of wet waste. Firm has installed mechanised material recovery facility at New Delhi Railway area to recover the recycled dry waste. The firm is also creating awareness about segregation of waste for behavioral change among passenger, vendors etc.

15.8 A unique garbage trolley for use on washing pits which has an openable tray has been fabricated in Gorakhpur coaching depot. The garbage collected from each coach can be now directly evacuated into the trolley because the openable tray of the trolley acts as a bridge between the coach floor & the trolley and the garbage

gets easily pushed into the trolley. There is a push lever mechanism at one end which can be pressed by hand to open the tray.

15.9 The Policy of Zero Scrap on Indian Railways is in vogue. Railway Board has issued instructions to Zonal Railways and Production Units to maintain Zero Scrap Balance (defined as no scrap arising older than 2 months). Zonal Railways and Production Units strive to maintain the Zero Scrap Balance. This has resulted in cleanliness of environment & availability of space and generation of revenue by sale of scrap.

15.10 The various Rules regarding disposal of Hazardous Wastes and E- Wastes issued from time to time by Ministry of Environment, Forest and Climate Change are being followed by Zonal Railways and Production Units. The scrap batteries etc. are sold to State Pollution Control Board (SPCB) approved recyclers only. The reports regarding consolidated data comprising of quantity of Hazardous / e-waste etc. generated, recycled and sold during the year are sent in stapulated forms regularly by Zonal Railways and Production Units to SPCB accordingly.

16.0 CELEBRATION OF WORLD ENVIRONMENT DAY & SWACHHATA PAKHWADA:

Cleanliness is important for building up a healthy environment that facilitates physical and mental well-being and growth. Cleaning the environment is the key to the existence and survival of life on planet earth. Maintaining a clean environment reduces pollution, preserves our biosphere, protects endangered species, and helps preserve the earth's natural resources. Indian Railways observe World Environment Day and Swachhata Pakhwada every year.

16.1 5th June is globally observed as a World Environment Day every year with the aim to raise awareness on environmental issues. Indian Railways have been continuously taking major initiatives that have positive impact on the environment and contributing to sustainability. Like every year, Indian Railways observed World Environment Day on 5th June 2022 over its zonal Headquarters, divisions Production units, workshops in an appropriate and befitting manner keeping in line with the theme of this year's World Environment Day. IR organized seminar on theme 'Only One Earth' of world environment day, Documentary Video/Banners were showcased/displayed to create awareness on environment conservation, Pheris/ Rallies were taken out & led by GM/DRM/ADRM & CWMs, Saplings were planted by officers, Drawing/Painting Competition, Slogan Writing Contest Environment Quiz competition

16.2 The Swachhta Pakhwada launched by Government of India, is a fortnight long program observed to ensure mass participation of citizens in Swachhta activities and to truly transform Swachh Bharat into a citizen's movement.

Swachhata Pakhwara is an important initiative under the Swachh Bharat Mission to engage all Ministries and Departments in Swachhata related activities, thereby making Swachhata "everyone's business". swachhata Pakhwada was observed from 16th September 2022 to 30thSeptember 2022, Ministry of Railways culminated it on the 02nd of October, with the celebration of Mahatama Gandhi's Jayanti. Hon'ble MR flagged off Swachhata Pakhwara drive from Railway Bhavan on 16.09.2022, through VC wherein GMs/DRMs/ other higher officials were also connected through virtual mode and pledge was taken for Swachhta Pakhwara.

Hon'ble Minister of Railways administering Swachhata Pledge in Rail Bhawan

17.0 OTHER GREEN INITIATIVES

17.1 Shield on Environment Management

An MR's shield has been instituted and given every year to best performing ZR/PU on Environment management initiatives taken by them during the year .

17.2 EMS / IMS Certification

All 8 Production Units and 43 major Workshops are certified to ISO 14001: Environment Management System (EMS) / Integrated Management System (IMS). 38 Diesel Sheds, 61 Coaching Depots, 21 Freight Depots and 8 Electric Loco Sheds have been certified. 3 MEMU/ DEMU Car Sheds, 2 Engineering Workshops and 1 Stores Depot are also certified.

Around 05 Railway Stations have been certified for implementation of Environment Management System to ISO: 14001 in the year 2022-23, which at present has increased to 700 stations. This is also in compliance of Hon'ble NGT requirements.

17.3 ISO 50001

Integral Coach Factory, Chennai was the first major establishment over IR to be certified with ISO: 50001 - Energy Management System, in August 2015. All 8 Production Units and 44 major Workshops have achieved ISO: 50001 certification showing commitment to energy conservation and energy efficiency.

ISO 50001:2018 Energy Management System Certification obtained in year 2022 for Lekha Bhavan, Rail Nilayam, Central Hospital Lallaguda and Kacheguda station for implementing best energy conservation measures.

17.4 Energy Management System Certification: ISO 50001:2018 Energy Management System Certification obtained for Lekha Bhavan, Rail Nilayam, Central Hospital Lallaguda and Kacheguda station for implementing best energy conservation measures of HYB Divn.

Lekha Bhavan *Rail Nilayam* *Central Hospital Lallaguda*

17.5 Plastic Bottle Crusher Machines (PBCM) are being installed at Railway Stations, as on july 2023 more than 720 PBCM have been installed at 483 stations. Cost effective and to collect plastic bottles, mesh bins have also been installed at few locations.

17.6 Sanitary Napkin Vending Machines and Incinerators are being installed at a number of stations. On the occasion of International Women's Day, 8th March 2023, 20 sanitary napkin vending machines have been installed at 20 major railway stations in the Hubballi, Mysuru, and Bengaluru divisions. The machines were supplied by SYSOPS Company under Corporate Social Responsibility activities to the Principal Chief Commercial Manager, South Western Railway, and the sanitary napkins are being provided by the Women's Welfare Organization of the zone. The machines have been installed in the ladies waiting hall, and a five rupee coin must be inserted into the machine to obtain one pad. This is a small initiative to empower women and make female passengers' journey more comfortable.

17.7 Rail Green Point (Carbon saving while transportation by Rail):

A new initiative namely **Rail Green Points** have been launched in April 2022 in coordination with CRIS/FIOS. It assigns carbon saving points termed as rail green points, to freight customers. It will be applicable only to the freight customer who are registered on e-RD portal of FIOS. Every customer who places demand online (on e-demand module) for freight service may be prompted by a 'Pop up' thanking him for choosing to transport by Indian Railway giving details of the expected saving of carbon emission called rail green points. Once RR is generated, the saving of carbon emission will be credited to customers' account in the form of real green point and the cumulative points will also be shown in account on freight business development portal. Downloadable certificate displaying real green point may be provided in the system. The rail green points can't be claimed for any benefit from Railways. It will be reckoned on financial year basis. The 'feel good factor' that customer would get from this information will motivate them to transport more by train tomorrow, moreover, the corporate customers may likely to mention it on their website in their annual reports

17.8 Registration of demand for wagons electronically(e-RD) through FOIS web portal:

Registration of demand for wagons electronically (e-RD) provides a facility to rail users to register demand for wagons electronically through FOIS web portal. This has made the process of registering demand for wagons simpler, convenient speedier and transparent customer has been allowed to show e-Forwarding Note un mobile/tablet/laptop in place of physical submission of Forwarding Note Wef 01.11.2022, e-RD has been made mandatory which makes it paperless system and this has ecological and environmental benefits including reduction in carbon emissions.

17.9 Electronic transmission of Railway Receipt (eT-RR)

Electronic transmission of Railway Receipt (eT-RR) envisages a user friendly and paperless transaction system wherein RR is transmitted electronically to rail customers. Delivery of consignment is given on e-surrender of eT-RR. Now, customer has been allowed to show Transaction slip/eTRR on mobile/tablet/ laptop. In place of submitting physical transaction slip/eTRR at the time of taking delivery, which is beneficial to environment.

17.10 Implementation of e-Office

E-office is Cloud Enabled Software Application developed by NIC. This software helps to improve efficiency, productivity and accountability & Transparency in the workplace by creating a reliable, efficient and effective way to handle office files & documents. A digital workplace also ensures less consumption of paper thus thereby reducing cutting of trees and thus impacting the environment in a positive way. E-Office has been rolled out at 236 Railway locations covering Railway Board, all Zones, Divisions, Production Units, RDSO, CTIs, Workshops and other Railway units. Railway zones/divisions/PUs/CTIs have also been interconnected through E-Office for digital movement of files from one railway unit to another railway unit thereby ensuring complete paperless working.

17.11 Provision of TPaaS (Telepresence)/VC facility

The use of telepresence/VC facility for various meetings/ conducting online classes is helping in reducing the carbon footprint.

17.12 112 Webex User Host Admins (Internet based VC facility) and 134 VDCOT Admins with audio and video facility have been issued to Zonal Railways/ Centralized Training Institutes (CTIs) for conducting VCs/Online, thus going by digital way of meeting/training, and saving papers.

17.13 "Switch Rail Grinding Machines (SRGM) and Rail Milling Machine (RMM) have been inducted first time for maintenance of rail of IR track, having Electronically Controlled Emmissionized (ECM) engines compliant to Tier-2 emission norms. Further, procurement of track machines has been planned with the engines compliant to Tier-2 emission norms to contribute the environmental sustainability

17.14 Sky light / Natural lighting utilization Polycarbonate Sky light panels are used for natural light utilization.

Diesel Locomotive factory, Marhowra & Green Field Electric Locomotive Factory, Madhepura

17.15 Electrical/Electronic Interlocking and Centralized Traffic Control:

84 mechanical lever frame signalling have been replaced this year with Electrical/ Electronic Interlocking signalling system including major yards at Danapur, Patratu and Bhilai Exchange yard. This will result in savings in coal and diesel used in maintenance of mechanical level frames.

24 hours shifts of Centralized Traffic Control (CTC) Tundla started from March 2019 covering 26 stations and 250 Route Km on Aligarh-Kanpur section. Power consumption at wayside stations reduces with CTC operations.

17.16 MCDO portal has been developed with CRIS for online submission of monthly MCDO to Railway Board. Portal has the facility to generate instant reports for performance comparison. The practice of sending hard copies has been discontinued. This initiative has resulted in saving of about 6000 sheets of paper in a year.

Only limited copies of Budget books/ booklets like Pink Book are printed now and all required books are available online. With merger of Rail Budget with General Budget, the requirement has further come down.

17.17 IR's initiatives : Saving paper saving Trees

Railway Recruitment Boards have introduced online examination through Computer Based Test (CBT) for all Group 'C' posts since 2015 and also for Group 'D' posts in 2018. RRBs have dispensed with paper pen examination (OMR sheets).The elimination of paper from the examination is a step towards a better environment. During year 2022-2023, around 1.2 Crore candidates took part in CBT for group C post examinations.

Indian Railways has introduced centralized computer based examinations (CBT) for conducting 70% selections and 30% LDCEs for promotion to Group 'B' posts in organized services, earlier being carried out by respective zones/units through the conventional pen/paper mode. Though the number of candidates appearing in the 70% Selections are limited, the number of candidates appearing in the LDCEs earlier having two examinations – Pre-qualifying and thereafter Mains, used to be quite high on each Railway/Production Unit. Introduction of Computer based exam (CBT) has resulted in saving of tons of paper required for the answer-sheets. National Academy of Indian Railways (NAIR) acted as nodal agency for conducting Computer Based test for selection of Group B Officers for Indian Railway in FY 22-23. 24,149 candidates appeared in the examinations. NAIR as an initiative has issued Course Certificates in NFT and Digital form. Relieving letters and other course materials are also distributed in digital form which results in saving of papers and hence saving of trees.

To achieve greater transparency in vigilance, maximum number of complaints received in Vigilance Directorate are processed via online mode i.e. through E-mail, E-office, Satark Portal, CVC Portal, IRVIN software etc. This Exercise leads

to reduction in the cost of paper, printing and transportaion. This elimination of paper is a step towards better environment. This helps Vigilance Directorate to contribute to the environment by saving a substantial number of trees.

17.18 Wildlife protection:

In the Railway sections like Alnavar-Londa-Khanapur, Alnavar- Londa-Tinaighat-Carnazol sections passing through are prone to train-wildlife conflict. IR is working consistently taking all precautionary and preventive measures for a sustainable and balanced approach towards the movements of the trains in the forest section catering in the larger public interest by a host of measures to prevent the death of wildlife. Joint meetings and inspections are conducted along with the forest officials in order to mitigate the loss of wildlife due to the train accidents.

The authorities of the Forest Department and the Railway Officials work in co-operation to ensure that no wild life death in the section goes without reporting. The locomotives are equipped with the event recorder to record the speed, braking and honking of the Locomotive. Locomotives of the section are provided with powerful horns and Loco Pilots are given instructions to free honk in the forest area to drive away the animals in or nearby tracks.

IR has taken various measures to prevent death of wildlife on railway tracks including construction of underpasses and ramps railway track diversion enforcement of speed limits etc:-

- Permanent Speed Restrictions (PSRS) have been imposed.
- Signage boards have been fixed to caution the Loco Pilots of possible wild animal crossings.
- Vegetation by the side of Track at identified locations is being cleared by Railway.
- Whistle-free caution orders have been imposed in a few identified sections.

17.19 Capacity Building

Capacity building programmes on Environment Management and Sustainability are regularly organised at different Training Institutes/Zonal Railway Headquarters/ Railway Board's level. A number of courses were conducted at NAIR, IRITM and IRIMEE during the year.

17.20 Noise reduction in power car

Indian Railways' Production Units are manufacturing all power cars with low noise feature. Introduction of Head on Generation technology (HOG) resulted significantly reduction in noise and air pollution as it has eliminated the need for separate diesel fueled power cars which produce an unbearable noise of around 100dB and on an average 3000 liters of diesel per trip per train.

17.21 Turbo ventilators are air driven, non-stop ventilators that do not require any electrical energy but effectively take out fumes, hot gases and air pollutants from workplace. Turbo ventilators have been fitted in workshop and rolling stock maintenance depots of IR.

18.0 POLICY INITIATIVES OF INDIAN RAILWAYS TOWARDS ENVIRONMENTAL SUSTAINABILITY

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. A renewed focus and thrust has been given in its activities to achieve a better environment with the launching of the new Environment and Housekeeping Management Directorate in the Railway Board. Some important policy initiatives taken in recent years are noted below :

18.1 Policy on Water Management

- Water Recycling plant to be provided at major water consumption centres subject to techno-economic viability
- Rain water harvesting system to be provided
- Water audit to be done at major water consumption colonies / installations / stations
- Revival of water bodies
- Inclusion of Automatic Coach Washing Plant with Water Recycling in all major coaching depots

Automatic Coach Washing Plant

18.2 Policy on Energy Management

- 5% energy consumption to come from alternative sources
- Retrofitting with efficient lighting and other star-rated appliances
- Production of only energy efficient 3 phase electric locos from 2016-17 onwards
- Provision of LED lights in coaches during POH
- Use of 5% bio-diesel in traction fuel
- 20% CNG substitution in DEMUs
- 100% Green Powered Stations started
- Certification to EMS 50001 Energy Management System
- IR has joined the Perform, Achieve and Trade (PAT)Progamme of Bureau of Energy Efficiency (BEE) showing its commitment for improving energy efficiency

18.3 Waste Management

- All existing coaches fitted with conventional toilets have been fitted with environment-friendly bio-toilets.
- Provision of dustbins in sleeper coaches also in addition to AC coaches
- Provision of dustbins in bio-toilets in all coaches
- Provision of separate dustbins for bio-degradable and non-bio-degradable waste and more dustbins at stations
- Pilot Plants for Solid Waste Management at major railway stations

18.4 Funding of Environmental Sustainability Works

- Policy frame work to earmark 0.5% lump sum provision in certain project estimates towards environment related works
- Policy frame work to undertake environmental sustainability works by Zonal Railways through CSR has been put in place

18.5 Other Green policy initiatives

- MoUs with States for planting of trees on vacant railway land
- Use of plastics of less than 20 micron thickness in packaging is banned
- EMS/IMS certification for all PUs, Workshops, Loco Sheds and major Coaching
- Green Certification of Railway establishments
- 'Consent to Establish' and 'Consent to Operate' / 'Consent for Operation' for stations, siding and goods sheds to be taken from State Pollution Control Board in accordance with the provisions of SPCB, keeping in view the notified areas / air pollution control areas and categorisation of Industrial Sectors. Around 100 stations obtained 'Consent to Establish' and 'Consent to Operate'/ 'Consent for

Operation' from concerned SPCB in year 2022-23, covering 720 major stations.

- RWF succeeded authorization from SPCB KSPCB in March 2023 for generation, storage and disposal of 07 types of hazardous wastes and 18 types of non-hazardous wastes with validity of five years.
- Administrative Building West Block, CLW has successfully achieved "Gold" rating in the ÏGBC Green Existing Buildings Railway System" in year 2022-23.

18.6 Monitoring/Sampling and testing of Ambient Air Quality (AAQ)

The Air (Prevention & Control of pollution) Act was amended in 1987 to provide for the Prevention, Control and Abatement of air Pollution in India, Various initiatives have been taken by IR to mitigate air pollution and improve air quality like Tree Plantation, Development of Garden, Nursery, Green Belt, forest etc in Stations, Colonies and units. A total of 720 stations have been bought under respective state Pollution control Boards and consent to operate has been obtained. To abide the guidelines of Hon'ble NGT, Monitoring/Sampling and testing of Ambient Air Quality (AAQ) and Ambient Noise Level (ANL) test conducted for identified stations of and found under limit as per Air pollution & Noise Pollution (Regulation &Contol) Rules.

Automatic Coach Washing Plant

Environment Protection Act & Rules

- The Environment (Protection) Act, 1986, amended 1991
- The Environment (Protection) Rules 1986

Water Pollution

- The Water (Prevention and Control of Pollution) Act, 1974, amended 1988
- The Water (Prevention and Control of Pollution) Cess Act, 1977
- The Water (Prevention and Control of Pollution) Amendment Rules 2011
- The Water (Prevention and Control of Pollution) Cess Rules 1978
- The Water (Prevention and Control of Pollution) Rules, 1975

Air Pollution

- The Air (Prevention and Control of Pollution) Act 1981, amended 1987
- The Air (Prevention and Control of Pollution) Rules 1982

Noise Pollution

- The Noise Pollution (Regulation and Control) Rules 2000

Waste Management

- Solid Waste Management Rules 2016
- Hazardous Waste (Management, Handling & Transboundary Movement) Rules 2016
- Bio-medical Waste Management Rules 2016
- Plastic Waste Management (Second Amendment) Rules 2022
- E-Waste (Management) Rules 2022

Construction and Demolition Waste Management Rules, 2016

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