Garvita
NEWS BULLETIN
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Message from Chairman, Rly. Board

Indian Railways (IR), one of the largest Railway systems in the world is undergoing transformation to emerge as the most modern and efficient Railway. Electrical Engineers are playing a key role in this transformation by undertaking initiatives like 100 per cent electrification of railway tracks, induction of High Horse Power electric locomotives & high acceleration EMU/MEMU trains, green energy etc.

100 per cent Railway Electrification by 2023-24 will help IR in realizing the vision of net zero carbon emission by 2030. The effort of Electrical Engineers in reducing the cost of energy through Open-Access is commendable and will contribute immensely towards improving operational efficiency of IR. I am happy to note that a large number of Green Energy initiatives like solar and wind power generation have also been planned. Provision of lifts and escalators at over 250 railway stations is also a major step towards providing convenience to Divyangjan, Senior Citizens, women and children. Initiatives like indigenous manufacturing of High Horse Power Locomotives through joint venture partner are contributing towards "Make in India".

I congratulate all the Electrical Engineers for the excellent work done by them and encourage them to further take up new initiatives to build a modern Railway which would work as an Engine of Growth and Development for the country.

I also congratulate team IREE for bringing out the 8th edition of the News letter "Garvita" on the 9th IREE day highlighting the achievements of Electrical department of IR for up-dating knowledge and for motivating the team of young Electrical Engineers of IR.

(Vinod Kumar Yadav)
Chairman & ex-officio Principal Secretary to Govt. of India, Rly. Board

Foreword

I am glad to learn that on the occasion of 9th Railway Electrical Engineers day, IREE is coming out with 8th volume of News Letter 'Garvita' bringing out various activities and initiatives undertaken by them. IREE's contribution in the growing role of Electrical Engineers in Indian Railways is highly appreciable & this News Letter will be another milestone in the process.

Presently, 59% of total Route kms of Indian Railways have already been electrified with further commitment for 100% electrification by 2021-22. The role of Electrical Engineers in overall working of Railways has grown tremendously. With addition of operation and maintenance of Diesel Locomotives under its fold, Electrical Engineers on Indian Railways now manage logistics and operation of more than 10,000 electric/diesel locomotives on pan India basis. Recent historic decision for 100% electrification, leading to carbon emission reduction, foreign exchange saving and overall growth and prosperity of the Nation, brings Railway Electrical Engineers in the forefront on Indian Railways.

With growing Role comes responsibility to preserve the values and inculcate new ideas, which I am sure that IREE through its various initiatives is taking forward. I once again convey my best wishes to IREE for bringing out this edition of News Letter. I am quite sure that this will rightly spread the message of progress and growth of Electrical department on Indian Railways.

(Manju Gupta)
President, IREE and Addl. Member Electrical, Railway Board

From the Desk of Patron

I am happy to note that Institution of Railway Electrical Engineers (IREE) is publishing a news letter 'Garvita' regularly since February, 2013 on IREE Day bringing out various developments in the field of Electrical Engineering on Indian Railways. The role of Electrical Engineers on Indian Railways has grown many folds since the induction of first electric train, 90 years back in 1925.

Electrical Engineering department is playing a pivotal role in Railways and is perceived as a Technical Engine of growth and transformation of Indian Railways towards a modern, reliable, economical & environmental friendly mode of transport system providing high speed, comfort and safety.

I applaud the efforts of the organizing team to bring out this news letter highlighting the achievements of Electrical Department of Indian Railways which act as a platform for serving and retired Electrical Engineers of Indian Railways to share their ideas and thoughts for future growth of Railways.

(Rajesh Tiwari)
Patron, IREE and
Member Traction & ex-officio Secretary to Govt. of India,
Railway Board

From the Desk of General Secretary

The institution of Railway Electrical Engineers (IREE) is a professional body of Railway Electrical Engineers. It is a technical body under the auspices of Ministry of Railways, sharing knowledge and experience of various Railway Engineers and others connected with Electrical Engineering.

We are pleased to bring out the 8th edition of 'Garvita'. The large pool of intelligent and hard working Electrical Engineers on IR calls for a platform for sharing and propagating innovative ideas, involving modern technology at various levels. IREE is now coming up with this Bulletin covering important areas:

- To promote/disseminate and share emerging technologies in the field of Transportation.
- To exchange experience/knowledge in improving existing systems/practices/work culture.

In addition, this Bulletin also highlights the activities of Electrical Engineering Department through IREE joining hands with other professional bodies. I wish to call upon all Electrical Engineers of Indian Railways to contribute articles so as to add to the knowledge base of their colleagues.

(Nikhil Pandey)
General Secretary, IREE &
Pr. Chief Electrical Engineer, Northern Railway

Achievements of Electrical Department

Railway Electrification over Indian Railways

Indian Railways as transporter of the Nation plays a vital and pivotal role in development and growth of the country, with network providing economic means of passenger as well as goods transportation between major cities and hinterlands of the country. Electrification of the railway network provides further impetus to transport economics by energy efficient, faster and eco-friendly transportation services apart from increased handling capacity due to higher haulage and higher speed. Electrification of Railway network also reduces dependence on largely imported costly diesel oil, thereby enhancing energy security of the Nation.

At the time of independence, India had just 388 km of electrified rail network and it is only in the post independence period that further electrification was taken up. Since then, there has been no looking back and the Indian Railways have slowly but steadily electrified its routes. Out of total BG network of 64298 RKM as on 01.04.19, Electrified network of 35488 RKM catered to passenger and goods transport share of 56.50% and 64.50% respectively out of total transport of Railways. The energy bill at the same time for electric traction stood at Rs 10138 Cr out of total energy bill of Rs 30751 Cr for the year 2019-20.

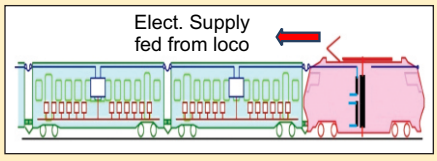
With the progressive electrification, metro cities of Delhi, Mumbai, Kolkata and Chennai have already been interconnected with electric traction. Mumbai-Chennai route is also electrified except Guntakal-Pune, on which electrification work is in progress which when completed will bridge the remaining gap.

With the clear advantage in terms of fuel cost and haulage capacity, Indian Railways has planned to electrify its BG route by Dec-23.

New Era of Green Technology - Head on Generation (HOG) power supply

All Passenger (WAP7) locos being turned out by CLW are fitted with Hotel Load Converters. The main benefits of this system are supply of pollution free and cheaper power from OHE as compared to End on Generation (EOG) system besides other advantages like reduction of carbon emission, noise level and consumption of fossil fuels helping in protecting the environment. There is a saving of around Rs. 1.5 lacs per day per pair of rake by using HOG supply.

665 locomotives have been provided with Hotel Load Converter and 328 pair of trains are being hauled by HOG locos up to Dec 2019.

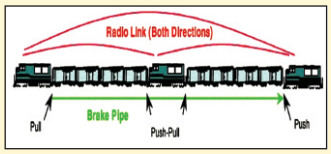


Upgradation of speed of WAP-7 locomotives up to 160 kmph

Upgradation of speed of WAP7 locomotives from 140 kmph to 160 kmph has been achieved indigenously. The first upgraded locomotive has been rolled out by CLW and is under process for sanction of competent authority.

WAP-5/WAP-7 locomotive in push-pull mode

- Operation of Twin WAP5/ WAP7 loco in push-pullmode has been planned which gives faster acceleration and substantially lowers coupler forces.
- COCR trial of WAP-5/ WAP-7 locomotive in push-pull mode has been done successfully by RDSO.
- During the first ever commercial operation of special Rajdhani train no. 22221/2 (from Mumbai-Delhi) in Push-Pull mode on IR, journey time has been reduced significantly by over 90 minutes.
- More trains like Mumbai/August Kranti/HWH/SDAH Rajdhani are under trial and planned to be taken over on push-pull mode shortly.



Composite Converter

Indigenous development of composite converter (Traction converter with hotel load) has been taken up for WAP-5 locomotives. 9 locomotives have been provided with composite converter. All WAP5 locomotives are planned to be fitted with HOG/Composite converters.

Manufacturing of High Horse Power (9000 hp) Freight locomotives

IR has taken initiative for development of High Horse Power Freight locomotives (9000 HP) in-house. The upgradation is entirely a result of indigenous efforts. This is a vital initiative in the direction of right powering of freight trains over IR. Locomotive will undergo oscillation trials to be carried out by RDSO shortly.

Up-gradation of WAP-5 locomotive from 5400 HP to 6000 HP

The entire fleet of WAP-5 locomotives has been upgraded from 5400 HP to 6000 HP by suitably modifying the software. This has not only increased the power on-wheel but also the acceleration reserve. Above up-gradation has been carried out indigenously. All WAP5 locomotives being turned out from CLW are of 6000 HP.

Development of High speed Passenger locomotives with speed potential of 200 kmph

CLW has turned out WAP-5 locomotives with speed potential of 200 kmph and aerodynamic cab.

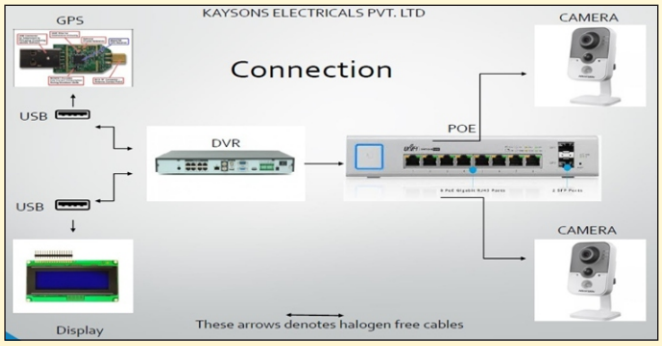
Highest-ever Production of Electric Locomotives

- During 2018-19, IR production units viz. CLW, DLW and DMW together produced a total of 605 Electric locomotives (CLW-402, DLW-145 and DMW-58) which was 60% higher than previous year production of 377 locomotives.
- CLW manufactured 402 locomotives which was unprecedented in the history of CLW and perhaps the highest production by any single production unit worldwide.
- In the current year, upto 31.12.2019 a total of 567 electric locomotives have already been manufactured by Production

Units of IR which include 273 locomotives manufactured by CLW alone.

Technological Interventions for Safety - Crew Voice and Video recording system

Five locomotives have been provided with Crew Voice and Video Recording system. Performance is under examination. Purchase Order for 500 loco sets has been placed by Diesel Modernization Works (DMW). Additionally IR has planned for fitment of 5000nos of CVVRS in locomotives for enhancement of safety.



Real Time Train Information system (RTIS)

- For availability of actual train information in public domain, a GPS based 'Real Time Train Information System' (RTIS) has been developed and is being installed on electric locomotives.
- Total 2700 no. electric locomotives have been equipped with RTIS as on date 31.12.2019.

Availing Power through Open Access for Electrical General Services

In a first ever for Indian Railway, Northern Railway has started availing 2.95 MW power under Open Access Arrangement at 11kV level for Electrical General Services since 00:00 hrs 15.01.2020. These locations are under Delhi Division at New Delhi Railway Station, Sadar Bazaar, Ajmeri Gate Connections. It is expected to reduce Energy Bill by at least 42% with an amount of nearly 6.75 crores in a most conservative scenario.

New Delhi Railway station under Open Access Arrangement

Improving Operating Ratio-Reducing Electric Traction Bill: through Open Access

IR has been granted the status of Deemed Licensee under third proviso to section 14 of Electricity Act 2003 & started to procure power through Open Access directly from Generating Companies through tariff based bidding/bilateral arrangements. Accordingly, Mission 41K was envisaged for Traction Energy Cost Optimization Conceptualizing Savings of Rs 41,000 Cr. from 2015 to 2025.

On 26th Nov, 2015, IR dream was realized when it started drawing approx. 200 MW power on CR from RGPPL in Maharashtra. Against total requirement of about 2000 MW, currently approx 1100 MW power is flowing under open access in the states of M.P., Maharashtra, Gujarat, Jharkhand & Rajasthan, Haryana, Karnataka, Delhi, Bihar, UP & DVC area Total Savings till Oct' 19 is approx Rs 12916 Cr. in BAU mode.

Sub-Urban Trains - Traction System

- ***Air conditioned EMU rake***

  First air conditioned EMU rake manufactured by ICF with indigenous propulsion system started its commercial services successfully from 25th Dec'17 in WR. Further, 3 more air conditioned EMU rakes have been inducted in the service over Mumbai sub-urban.

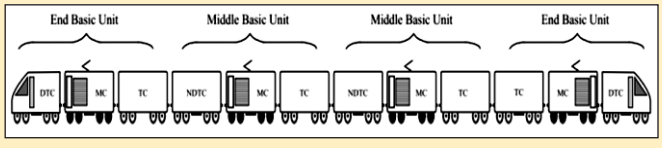
- ***3 phase On Board MEMU rakes***

  37 MEMU of 8 car equipped with 3 phase On Board electrics turned out from ICF and sent to the Zonal Railways for putting into service.

- ***3 phase underslung MEMU rakes***

  One MEMU rake of 8 car with underslung 3 phase electrics has been turned from ICF and under trial with RDSO.

- ***Other Features***
  - ➢ Inclusion of ADD (Automatic drop device) and ORD (Overreach detection) in pantograph to prevent damage to OHE and pantograph in case of unusual.
  - ➢ Provision of LED based Cab Spot Light and Emergency Light.



Rake composition

Passenger Amenities at Railway stations

Indian Railway as a part of Sugamya Bharat Abhiyan is alive to the needs of Divyangjan, elderly, pregnant women and hence is committed to provide lifts and escalators at a fast pace.

- 723 Escalators have been commissioned at 257 stations till date.
- 541 Lifts have been commissioned at 231 stations till date.
- Illumination levels have been improved at 682 stations out of selected 690 stations till date.

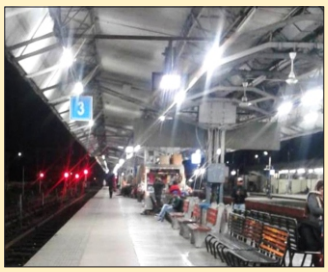
Electrical Energy Management & Green Initiatives on IR - Policy directives

- "Vision 2020" document of Indian Railways envisages sourcing at least 10% of energy used from renewable sources such as solar power and wind power and saving up to 15% of energy through improved energy efficient appliances.
- To improve efficiency and to explore alternate sources of energy, Indian Railways have already taken a large number of steps & measures for energy conservation and renewable energy including framing of policy directives specially for level crossing gates, remote railway stations, provision of solar street lights, provision of solar water heaters etc.

Initiatives of harnessing renewable energy on IR

- ***E vehicle charging***
  - ➢ Rajasthan Electronics & Instruments Limited (REIL), proposed 20 DC fast charging station for E-vehicles.
  - ➢ A smart public electric vehicle charging station, set up by Northern Railway (1st time in Indian Railways) initially at 7 locations in Delhi area.
  - ➢ This will translates into charge of Rs. 4.50 to 5.50 per unit which is extremely competitive compared to petrol, diesel and CNG vehicles.
  - ➢ 40 Nos. E-vehicles can be charged at a time from this facility.
  - ➢ Environment-friendly step in the highly polluted area of Delhi-NCR.
  - ➢ Reduction in carbon footprint from the operating vehicles.


- ***Provision of LED Lighting***
  - ➢ Indian Railway achieved target of 100% LED lighting in all Railway stations (more than 8000) and all Railway installation & buildings (more than 20000).
  - ➢ One time LED provision is being done in all residential quarters (more than 4.6 lakhs quarters). About 94% work has been completed.

- ***National Energy Conservation Awards (NCEA)***

  The continuous efforts of Ministry of Railways and Zonal Railways to embrace various energy efficient technologies and energy conservation measures had resulted in bagging 14 National Energy Conservation Awards (NECA) in 2019 in 4 categories.

- ***CH-IGBC Green Building Ratings***
  - ➢ 13 Railway stations & 18 other Railway Buildings have been certified as Green Buildings by CH-IGBC.
  - ➢ 52 other Railway Installations have been certified with Green Co ratings.
- ***Star Rated buildings Certified by Bureau of Energy Efficiency (BEE)***

  50 buildings (including 4 Divisional Hospitals) have been given Star rating by BEE.
- ***Solar Power plant- Roof Top & Land based***

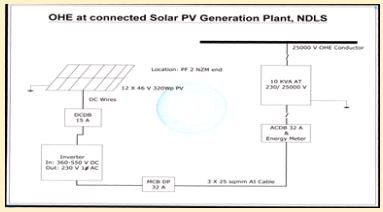
  100.99 MW (97.99 MW Roof Top + 3 MW Land based) Solar Power Plants commissioned till date.

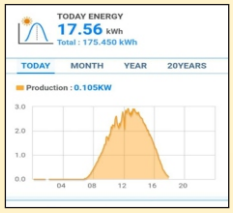

New Delhi


Anand Vihar Terminal

- ***Wind Power***

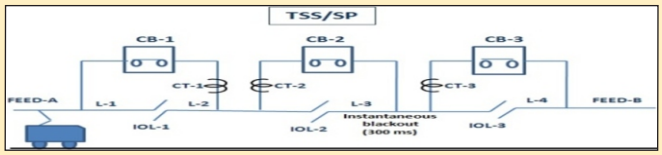
  103.4 MW Wind Power Plants have been commissioned till date.
- ***Solar panel to feed in 25 kV OHE***
  - ➢ First time in history of Indian Railways 5 KW solar Plant installed successfully to feed 25 KV OHE.
  - ➢ Installed at Platforms No. 2/3 of New Delhi Railway station.
  - ➢ Average Generation is 15kWh per day





Automatic Switch Neutral Section -ASNS

Indian Railway has decided to run trains at 160/200 KMPH under 'Mission Raftar'. For introducing high speed trains, the spacing between TSS shall be reduced and observing of DJ on/off signal boards by Loco Pilots will become major constraint. To overcome this problem RDSO have developed the Automatic Phase Switch Controller to be installed at the TSS/SP locations by which there will not be any requirement for switching on/off DJ at Neutral Section. Northern railway has successfully completed the trial of Directional Current Control (DCC) based ASNS at Asaudah TSS in Delhi division recently.



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