Garvita

NEWS BULLETIN

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Message

It gives me great pleasure to know that the Institution of Railway Electrical Engineers (IREE) is coming out with a news letter on various developments in Electrical Engineering related to Rail Sector on the auspicious day of 3rd February, when the Electric Traction was first introduces on Indian Railways in 1925.

IREE had been organizing national and International Seminars on strategically important topics relevant to Indian Railway's growth panorama and recently conducted an International seminar on High Speed Trains in India, on 1st and 2nd February, 2013.

The role of Electrical Engineers on Indian Railways has grown many fold since 1925 and today about 65% Goods and more than 50% passenger traffic is hauled by electric traction. While, it is a matter of great pride to know the critical roles being played by Electrical Engineers in providing reliable, economical and efficient services, however, I see much more challenging tasks lying ahead. To list a few:

1.0 With deficit in electric power in India we need to take up electric power generation. We need to adopt innovative methods to finance such projects and also use a good mix of renewable and traditional electric energy generating sources. Public private partnership for providing solar power, using roof top space on our platforms offers a good option.

2.0 Provide a real alternate to air travel by going for high speed trains. This country is in dire need for such a cost effective alternate for its faster economic growth.

3.0 Use of open access policy to reduce cost of power purchase.

All above things are possible only when we strengthen our design and manufacturing capabilities and also develop high quality maintenance practices for electric locomotives and other electrical assets which can make India a hub for manufacturing high HP, High speed locomotives and train sets. These areas offer great opportunities and challenges for young electrical Engineers of Indian Railways. However, it goes without saying that excellence in whatever we do has to continuously remain our motto.

In the end I once again congratulate the organization of IREE for bringing out this News Letter which I believe will become a connecting thread for all electrical Engineers of Indian Railways, those serving and also my retired seniors who had given their best for nurturing this wing of Indian Railways and bringing it to this level where it can boast itself as a key player in the success story of Indian Railways.

(Kul Bhushan)
Patron, IREE &
Member Electrical, Railway Board

Foreword

I am pleased to know that on the occasion of 2nd Electrical Engineers day, IREE is coming out with a News Letter which will bring out its various activities and mission area for which it had been working. IREE's contribution in the growing role of Electrical Engineers in Indian Railways is highly appreciable & I am sure this News Letter will be another milestone in this process.

Electrical Engineers today are playing key role in the fields of running trains on electrified routes which on date are 34% of total route kms of Indian Railways, provide critical EMU/MEMU services and maintain around 8500 air conditioned coaches. We need to appreciate that Electrification on Indian Railways has not only reduced our precious foreign exchange outgo but has also created large number of jobs for fellow Indians in the fields of electric and related industry.

Towards the end, once again all the best to this young start and I am of the firm belief that with passage of time this News Letter will rightly spread the message of progress and growth of Electrical department on Indian Railway

(Raj Kumar)
President, IREE &
Addl. Member Electrical, Railway Board

Preamble

Off late, it is being realized that there is a dire need to keep our officers and supervisors abreast with latest developments and advancements in Indian Railways and in Electrical Department in particular. The activities of the Institution of Railway Electrical Engineers also need to be percolated down below so that it could be made more vibrant. With this view and vision, we at IREE have decided to come up with the periodical News letter to start with on the 2nd Electrical Engineers Day being celebrated on 3rd February every year. This News letter brings out history and various activities of IREE. This year has been a glorious year for the Electrical Department where lot of achievements have been made. This edition also covers the major achievements of this year which has given a special place and recognition to the Department.

In today's scenario there are lot of expectations by our customers and as Electrical Department we play a vital role. May I therefore, call upon our great fraternity to join hands and rise to the occasion so as to live up to the expectations of this great Nation. It is rightly said to be successful keep thinking differently and strategically.

I look forward towards each and every member of Electrical Deptt. for active support in patronizing this News letter to keep each of us updated.

(Mehtab Singh)
General Secretary, IREE &
Chief Electrical Engineer, Northern Railway

History & Panorama of IREE activities

The Institution of Railway Electrical Engineers is a professional body of Railway Electrical Engineers and is a technical body under the auspices of Ministry of Railways sharing knowledge and experience of various Railway Electrical Engineers. The Institution was registered at Nasik on 29th July 1995 and was inaugurated by the then Member Electrical, Railway Board Shri. V. Santhanam on 26th August, 1995 at Nasik. Further, the institution was recognized by Railway Board in 1998.

The Institution is administered by a Governing Council which works under the overall guidance of the President of the Institution. Member Electrical, Railway Board is the patron of the Institution and Addl. Member Electrical, Railway Board is the President. Chief Electrical Engineer, Northern Railway, is the Hony. General Secretary of the Institution. The administrative work of the Institution is controlled by Hony. General Secretary.

The aim of the Institution is to disseminate and share technical knowledge among Railwaymen and industry regarding available and new technology related to design, construction and maintenance of electrical assets. It is the platform for adopting new emerging technology to serve the needs of Railway Electrical Engineering.

Some of the important National & International activities carried out by the Institution during the recent past are:

At National Level

- The Institution in October 1998 organized a workshop on the most important subject in today's era i.e. "Emerging Trends in Mass Rapid Transit System".
- A Book titled "History of Electric Traction" authored by Late Sh. R.K. Vir was released on April 8th, 2011 by the then Chairman Railway Board Sh. Vivek Sahai
- Technical Lectures on "AT & CL Reduction a challenge-With Power Utilities", "Green Building Initiatives", "Hardware in Building Industries-Latest Trends, were held during Aug/Sept. 2011.
- All India Seminar on "High Speed Trains" during November 4-5, 2011. There were three Technical Sessions viz. (i) "Emerging trends in High Speed Trains", (ii) "Indian Issues and Option-Finance", (iii) "World Wide Scenario and Socio Aspects".
- A National Seminar on "Emerging Technologies and strategies for Green Energy in Railways" was held at India International Centre, New Delhi.
- It was decided to celebrate the 3rd February of every year as "Railway Electrical Engineers Day" to mark the running of Ist Electric Train on 3rd February, 1925 between than Bombay VT and Kurla on harbour Line.
- The Ist Railway Electrical Engineers Day was celebrated on 3rd February, 2012 at New Delhi. On the occasion a documentary film titled "Prodigy of Indian Railway" was released by Shri Kul Bhushan, Member Electrical, Railway Board and Shri A.K. Vohra, Member Staff, Railway Board.
- IREE and IET (UK) jointly arranged a Seminar on "Mass Transport Systems in Urban Development-Trends and Challenges in India at India International Centre, New Delhi on 29th December, 2012.

At International Level

- An International Seminar on "Emerging Technologies & Strategies for Energy Management in Railways & Exhibition" at Pragati Maidan, New Delhi was organized on 21st & 22nd October, 2008.
- The IREE associated with IET to arrange 'the Lord Austin Lecture' delivered by Lord Berkley a Board Member of European Rail Freight Association on 29th October, 2012 at National Rail Museum.
- A Technical talk of "Safety in Railways" delivered by Peter Shepherd form M/s Bombardier UK and chair IET Transport panel on 1st November, 2012 at Rail Bhawan.

IREE's Path Ahead

- To make Institution more vibrant and to diversify its activities, it has been decided to appoint an Executive Director of the institution.
- The Institution plans to introduce Diploma Courses on Electric Traction to spread general awareness and technical insight about Electric Traction and other Railway related Electrical Engineering subjects. The syllabus for the Course is under finalization and to start with, these will be initiated at four centres i.e. Delhi, Kolkata, Mumbai and Chennai. IRIEEN/ Nasik will provide all necessary assistance in organizing contact classes and the examinations to be held after each semester.
- Monthly technical lectures on relevant topics in the field of Electrical Engineering applicable to Indian Railways from people recognised at National and International level will be organized.
- Bring out achievements of Electrical Deptt. In the quarterly News Letter.

Achievements of Electrical Directorates of Indian Railways

A. 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 efficiency.
- 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.

I. Initiatives of harnessing renewable energy on IR :

(i) ***Wind Energy :***

Indian Railways first ever Wind Mill Project of capacity 10.5 MW was commissioned at the cost of Rs. 66.05 crore on 30.03.2009 at Kasthurirengapuram Village & Urumangulam Village, Radhapuram Taluk, Tirunelveli Dist. Tamilnadu, for meeting energy demand of Integral Coach Factory(ICF) Chennai. Excess energy generated from Wind mills will be sold to TNEB. So far this wind mill plant has generated 23.708 lakh units (up to May-2012) and has realized credit of Rs. 23.92 crore from TNEB from the date of its commissioning.

Wind Energy Farm

Future planning for wind energy on IR:

Wind energy plant of about 93 MW capacity have also been planned to be harnessed on IR in the wind rich states of Andhra Pradesh, Karnataka, Kerala, Rajasthan, Tamilnadu & West Bengal in JV mode. Out of this, 25 MW capacity wind mill plants is planned in Rajasthan in JV with M/s RITES.

(ii) ***Solar energy :***

Policy initiatives & intervention taken to harness green energy resources and implementing energy conservation measures have yielded fruitful results. So far IR has harnessed about 4.5 MW of solar energy at LC gates, way side Railway stations, street lights, solar water heaters at training institutes/running rooms/hospitals/rest houses/canteens/base kitchens etc. During 2011-12, capacity addition of about 326 Kwp in solar energy was made.

Use of Solar Water Heaters in Running Rooms, Hospitals etc.

Solar Light System at Lc Gate

Future planning :

Solar projects for addition of another 4.69 MWp by providing solar PV modules at 200 stations, 21 administrative buildings and 1000 level crossing gates have been planned as green energy initiative with assistance from Ministry of New and Renewable Energy (MNRE) as a initiative of "Year of Green Energy".

II. Improvement in Energy efficiency :

- During the year 2011-12 the consumption of electrical energy on Indian Railways was 16.62 billion units. With the present conservative growth of 5.6% per annum in electricity requirement the expected requirement of power for Indian Railways will be 21.5 billion units MW by the end of XII Five Year Plan.
- Policy directives : Following policy directives for energy conservation already exists for implementation on Zonal Railways :

(i) Segregating of 70/30 lighting circuits at platforms.

(ii) Use of CFL fittings at corridors, staircase, toilets & bathrooms in place of 60/40 watt incandescent lamps.

(iii) Use of T-5 fluorescent tube lights in place of T-12 FTL fittings.

(iv) Use of automatic power factor correction panels in HT/LT substations.

(v) Replacement of old 90 watt ceiling fans be 60 watt ceiling fans.

(vi) Use of electronic fan regulator in place of conventional fan regulators.

(vii) Provision of LED based station name board in place of neon sign board.

(viii) Timer switch on high mast towers-yard lighting/street lighting.

(ix) Use of electronic ballast in place of conventional ballast in FTL circuits and metal halide circuits.

(x) Automation of pumps

(xi) Use of energy efficient pumps in place of old inefficient pumps.

(xii) Efficiency measurement of pumping installation and implementation of action plan.

(xiii) Use of electronic kwh meters in place of conventional kwh meters for residential quarters.

(xiv) Use of energy saver for: (a) Pumps (b) Lighting circuits (c) Air conditioning circuits (d) machines in workshops.

(xv) Use of quick coupling socket for air distribution in workshops and sheds

(xvi) Use of occupancy sensors for light control in (a) officer's chambers (b) conference rooms (c) waiting halls

(xvii) Use of copper wiring for quarters.

(xviii) Setting for optimum voltage for transformers in substations for lighting circuit.

(xix) Replacement of HPMV lamps with metal halide lamps.

(xx) Use of VVF control for cranes, lifts and escalators.

(xxi) Use of 3 star and above labeled electrical products and equipments.

(xxii) Energy audit conducted in past two years and short term & long term recommendations implemented or not.

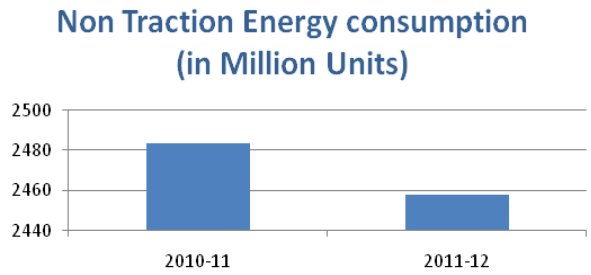
(xxiii) De-stocking of incandescent lamp.

Extensive use T-5 28 watt energy efficient luminaries at stations

- IR is very conscious about saving energy, as energy saved is energy generated. IR has started use of energy efficient new generation electric locomotives and Electrical Multiple Units (EMUs) with 3 phase regenerative braking features, head on generation systems for eliminating use of DG sets in trains. Energy conservation initiatives including replacement of T-8 FTL by energy efficient T-5 & CFL fittings, provision of LED lights, energy efficient ceiling fans, occupancy sensors, use of star rated equipments etc. have reduced the energy consumption.

Savings achieved :

Intensified energy conservation measures have resulted into a saving of 1.03% of electricity for non traction application (2458.34 Million unit during 2011-12 as compared to 2483.96 Million units during 2010-11) despite increase in connected load.



Electrical Energy Consumption (Non Traction) in Million units

III. Other Initiatives :

- New trains introduced in Mumbai sub-urban section equipped with regenerative braking features to reduce specific energy consumption and have resulted in energy regeneration while braking, to the tune of 35-40% of energy used for hauling these trains.
- For sensitization of railway employees towards their responsibility towards environment, Indian Railways have completed a project for replacement of energy inefficient incandescent lamps with energy efficient Compact Fluorescent Lamps (CFLs) in railway quarters. The project has been awarded Special Jury award at UIC conference in Venice.

IV. Awards at National level in recognition of energy conservation measures:

Continued and dedicated efforts for energy conservation initiatives by Zonal Railways have resulted into bagging **11 National Energy Conservation Awards** by IR out of total awards of 87 from 773 applications during 2012, the highest ever by any organization so far. These awards was distributed by Hon'ble President of India in Vigyan Bhawan, New Delhi during National Energy Conservation day on 14th Dec 2012. The National Energy Conservation Award for the year 2012 received by Zonal Railways are as under :

a) ***Zonal Railway category:***

1.	Northern Railway	-	First
2.	South East Central Railway	-	Second
3.	Central Railway	-	Certificate of Merit
4.	Western Railway	-	-do-

b) ***Office Building Category :*** (Open category at National level from all Government offices, industries including private sector)

(I) **Category-I** (consumption less than 10 lakh unit/ year) - **All awards in this category bagged by IR.**

(i) DRM Office Ambala/NR - First

(ii) DRM Office Varanasi/NER - Second

(iii) DRM Office Jodhpur/NWR - Certificate of Merit

(II) **Category-I** (consumption more than 10 lakh unit/ year) - **First out of 3 awards bagged by IR**

DRM Office Ahmedabad/WR - First

Hon'ble President of India & Minister of State of Power during the National Energy Conservation Day in Vigyan Bhavan, New Delhi

c) ***Hospital category:*** (Open category at National level from all Government and Private hospitals) : **3 out of 4 awards in this category bagged by IR.**

(i) Divl. Hospital, Izzatnagar, NER - First

(ii) Divl. Hospital Guntakal, SCR - Second

(iii) Divl. Hospital, Bhopal, WCR - Certificate of Merit

B. Setting up of captive power plants for reduction in expenditure in electricity bill:

To economize the electricity bill by bridging the gap between the cost of generation and current electricity tariff, setting up of captive power plants for Railways' application has been identified as one of the key focussed area and Railway has planned to set up following captive power plants:

1. 1000 MW capacity at **Nabinagar**, Bihar in JV with NTPC
2. 1320 MW capacity at **Adra** in West Bengal in JV with NTPC
3. 700 MW gas based at **Thakurli** in Maharashtra.

The first unit of Nabinagar Power Plant is slated to for commissioning by May, 2014. In respect of proposed power plant at Adra and Thakurli various clearances/ linkages are in the process of being obtained

C. Railway Electrification

By the end of March' 2012, 22224 Route Kilometers have been electrified. This constitutes 34.48% of IR network, hauling about 64% of freight and 51% of passenger traffic, on which 38% of total fuel cost of Indian Railways for traction purpose is spent. Besides, Electric traction being an energy efficient and eco-friendly mode of transport, it is leading to considerable savings in imported fuel bill.

During XI Plan period, 4556 route kilometers were electrified against the revised target of 4500 route kilometers in mid-term review from 3500 route kilometers. Target for XII Plan has been fixed as 6500 route kilometers.

1174 Route Kilometers have been energized from January'2012 to December'2012. In the corresponding period of year' 2011 achievement was 1199 Route kms.

- To introduce electric traction, on newly electrified sections, Sanction of Commissioner of Railway Safety has been obtained for following sections :

Section	Railway	Rkms
Bina -kota	WCR	308
Bangarpet- Marikuppam	SWR	16
Part of Bangalore Area	SWR	10
Alamnagar- Utratia	NR	23
Tomka- Keonjhar	ECOR	104
Chhapra Kachehary-Barauni Via Shahpur Patoree	ECR	145
Indore-Ujjain	WR	80
Trivendrum-Kanyakumari	SR	87
Tamluk- Digha	SER	89
Hardoi - Rosa	NR	53
Shakurbasti - Rohtak	NR	60
Jhansi- Moth	NCR	55
Kaddapa-Muddanur	SCR	63
Chhapra Kachehari- Chhapra	NER	03
Nagercoil-Tirunelveli	SR	72
Total		**1168**

- Following New Railway Electrification Projects Have Been Sanctioned.

SN	Name of Projects	Railway	Rkms
1	Andal-sitarampur Via Jamuria-ikra and Sripur	ER	57
2	Coimbatore North - Mettupalayam	SR	33
3	Jharsuguda-Sambalpur-Titlagarh Section Including Jharsuguda-Ib (bye-pass) Line	ECOR & SECR	238
4	Itarsi-Katni-Manikpur-Chheoki Including Satna-Rewa	WCR & NCR	653
5	Nallapadu-Guntakal Including Gooty-Pendekallu	SCR	426
6	Garwa Road-Chopan-Singrauli Including Karaila Road-Shaktinagar	ECR	257
7	Kumedpur-Malda-Singhabad and Pakur-malda	ER & NFR	153
8	Amla-Chhindwara-Kalumna	CR & SECR	257
9	Guntakal-Bellary-Hospet Section Including Tornagallu-ranjitpura Branch Line	SCR & SWR	138
10	Manheru- Hisar	NWR	74
11	Sambalpur-angul	ECOR	156
	Total		**2442**

D. Recent achievements concerning electric locos

- CLW will be producing 260 electric locos against the target of 230 during the year 2012-13 with the infra-structure available only to manufacture 200 locos.
- A work for setting up of Electric Loco Assembly & Ancillary Unit of CLW at Dankuni for assembly of 100 nos. three phase electric locomotives has been sanctioned. The work has already started and the facility is expected to be ready for production within 18 months.
- BHEL has supplied 136 WAG-7 conventional tap changer during the years 2009-2012. 60 WAG-7 locomotives are planned to be supplied by BHEL during the year 2012-13.
- Higher capacity oil free (non-lubricating) compressors are now being provided in different class of passenger locomotives. These compressors require less maintenance and are useful in hauling trains like Duronto having air springs & Control Discharge Toilet System (CDTS) requiring more compressed air.
- At present, switching device used in traction and auxiliary converters is Gate Turn Off (GTO). Considering the obsolescence of the GTOs and inherent advantages of Insulated Gate. Bipolar Transistor (IGBTL Indian Railways is migrating from GTO technology to IGBT technology retaining same transformer and traction motors. IGBT propulsion works at superior switching speed which enables better control over the voltage and current waveform with higher operation temperatures and has got modular design having better maintainability & adhesion performance with single axle control. More than 25 locos are now fitted with IGBT propulsion equipment.
- Vigilance Control Device (VCD) is a device which takes intermittent inputs through positive actions from the driver like sounding of horn, operation of master controller, application, of brakes and pressing of button to judge his alertness every 60 seconds and applies brakes, if found lacking to stop train thereby ensuring safety. 93 electric locos are now fitted with VCD.
- IR has started using multiple Wireless Remote Control System (WMUCS) for both conventional and three-phase locos and presently 2 pairs of WAG-7 and 1 pair of WAG-9 locos are undergoing extensive field trials in SCR and SER respectively.

E. Recent achievements concerning EMU & coaches :

1. To give relief to daily commuters, following steps have been taken to improve the suburban services of Mumbai area:

   128 AC/DC EMU rakes with new state-of-the-art technology, improved ventilation, better seating arrangement and aesthetic have already been inducted into service since 2007-08. With the induction of these rakes:

- 546 numbers of Additional services (339 in Central Rly & 207 in Western Railway) have been introduced.
- 1155 number of services (728 in Central & 427 in Western Railway) have been augmented from 9 to 12 car.

2. To meet with the requirement of EMU rakes during DC to AC conversion in Mumbai area, directives have been issued to retrofit existing DC EMU rakes to AC & AC/DC EMU rakes. Western Railway has so far retrofitted 5 rakes of 12 car whereas Central Railway has retrofitted 16 rakes of 9 car.
3. An order for 288 sets of IGBT based 3-phase propulsion equipment has already been placed on M/s Bombardier Transportation for manufacture of 72 rakes of 12 car at ICF against MUTP-II against World Bank funding. The supply of electrics for proto-type rakes is likely to commence from April 2013.
4. Indian Railway has planned to introduce one air conditioned EMU rake in Mumbai area for convenience & comfort of daily commuters in 2013-14 on trial basis. After gaining the field experience and response of daily commuters, more air conditioned EMU rakes will be introduced.
5. ICF has so far manufactured 11 air-conditioned Kolkata Metro with indigenous BHEL make electrics and these have already been inducted into passenger services. 9 more rakes will be manufactured during the year 2012-13 & 2013-14 at ICF.

6. **Scale of mobile charging in GS & sleeper coaches:**

   In order to provide better comforts to the passengers in sleeper class, 18 mobile charging points are being provided in new sleeper coaches being manufactured by ICF/RCF. Further, in GS coaches also it is planned to provide mobile charging points. In existing coaches the provision of charging points will be made progressively.

7. **Permanent Magnet Alternator:**

   A path breaking development has taken place in Train lighting & Air-conditioned coaches with the development of Permanent Magnet Alternator for SG AC coaches. With this development, it is possible to manufacture SG AC LHB coaches. These alternators are more energy efficient, lighter in weight and having higher capacity.

8. **Reliability/Punctuality performance**

   There has been remarkable improvement in the reliability of AC/TL equipment as there is improvement in punctuality performance by 20% per year on cumulative basis during the last two year despite 8% increase in AC/TL coaches.

Highlights of International Conference on High Speed Trains in India held during 1st & 2nd February, 2013

An International Seminar on High Speed Trains in India-Issues & Options was organized by the Institution of Railway Electrical Engineers, on February 1 & 2, 2013 at Manekshaw Centre, New Delhi. This seminar was inaugurated by Hon'ble Minister for Railways Sh. Pawan Kumar Bansal.

In the seminar, technical sessions on Issues and Options for Indian Railways; Development of High Speed Passenger Rail Projects ; Emerging Trends in High Speed Rail Systems World Wide; Technology Options for Dedicated High Speed Passenger Rail Systems and Financing Models & Commercial Sustainability, Economic, Social, Environmental aspects of High Speed Passenger Rail Projects were held. Presentations were given by the experts, in house from RVNL, DFCCIL, RDSO, DMRC, RITES, Railway Board, NMCC & TERI and overseas from Korea Rail Network Authority, Systra/France, Toshiba, Alstom, Arthur Flurry AG/Switzerland, Bombardier Transportation, Siemens AG, CAF/Spain, Atkins Limited-London and Talgo- Spain

Need of High Speed Rail in India:

With the rapid economic growth of Indian economy and increase in aspirations of young population of the country, requirement of fast and safe travel has increased manifold. High Speed rail System will facilitate significant enhancement in economic development as well as more job opportunities. There is a need to induct high speed train services by upgrading existing lines and also by constructing new dedicated lines to run such trains, as is the trend world over.

Six corridors have already been identified for technical studies for setting up high speed train operations. TERI, India has undertaken as ex-ante study of environmental & energy impacts due to introduction of high speed passenger rail on Pune-Mumbai-Allahabad corridor. High speed rail corridor between Thiruvanantha-puram and Kasargod in Kerala has also been identified whose feasibility report has been prepared by DMRC. Indian Railways also aims at raising the speed of passenger trains to 160-200 kmph, which will bring about a major paradigm shift in travelling by train.

During the seminar, latest developments taking place world wide in the field of high speed trains were covered. Bombardier Transportation has developed high speed EMUs which offer short travel time, high capacity, high comfort, smart interior design and ecological sensitivity. Arthur Flurry Switzerland has developed spring droppers popularly known as Pendiflex for high speed lines which has elastic effect and makes hard points become softer. Siemens has developed push-pull concepts using locomotives of the Vectron-platform and passenger coaches of the Viaggio-platform for offering efficient and reliable solutions for requirements of high speed rail transport. CAF/Spain has developed wide range of state of the art high speed trains, fitted with avant-garde technological advancements regarding design, safety & comfort.

However, introduction of high speed trains is going to pose technological, financial and managerial challenges. Core functions would include planning of infrastructure including land acquisition, invitation and award of contracts/concessions and identifying source of financing etc. Rightly conceived projects and its success can attract public private partnership for high speed projects.

The seminar was concluded with the panel discussion on "Way Forward for High Speed Trains in India" with Member Electrical/Railway Board as the Moderator in the panel.

Chairmen of Local Centres

Sh. P.K. Srivastava
Chief Electrical Engineer, CR

Sh. H.P. Singh
Chief Electrical Engineer, ER

Sh. R.P. Nibariya
Chief Electrical Engineer, NER

Sh. B.P. Verma
Chief Electrical Engineer, NFR

Sh. M.C. Murli
Chief Electrical Engineer, SR

Sh. G.R. Aggarwal
Chief Electrical Engineer, SCR

Sh. Vinod Kumar Agarwal
Chief Electrical Engineer, SER

Sh. Sunil Goel
Chief Electrical Engineer, WR

Sh. Pravin Pradhan
Sr. ED TI/RDSO

Sh. M.K. Jain
Director/IRIEEN

Sh. Shailendra Tripathi
Chief Electrical Engineer, CLW

Sh. Man Singh
Chief Electrical Engineer, CORE/ALD

Sh. R.K. Singh
Chief Electrical Engineer, ECR

Sh. S.K. Patel
Chief Electrical Engineer, ECoR

Sh. A.K. Rawal
Chief Electrical Engineer, NCR

Sh. Anand Dev
Chief Electrical Engineer, NWR

Sh. Madhukar Meshram
Chief Electrical Engineer, SECR

Sh. S.K. Arya
Chief Electrical Engineer, SWR

Sh. A.K. Kapoor
Chief Electrical Engineer, WCR

Sh. Narottam Dass
Chief Electrical Engineer, RCF

Sh. J.S.P. Singh
Chief Electrical Engineer, ICF/SR

IREE Governing Body

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Member Electrical, Railway Board

PRESIDENT
Shri Raj Kumar
Addl. Member Electrical, Railway Board

GENERAL SECRETARY
Shri Mehtab Singh
Chief Electrical Engineer, Northern Railway

TREASURER
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