

RCC No. 104

**RAILWAY CONVENTION
COMMITTEE (1999)**

(THIRTEENTH LOK SABHA)

**SIXTH REPORT
ON**

**ACTION TAKEN BY THE GOVERNMENT ON
THE RECOMMENDATIONS CONTAINED IN
THE FOURTH REPORT OF RAILWAY
CONVENTION COMMITTEE (1999)
ON 'DEVELOPMENT OF
ALTERNATIVE ROUTES
FOR DECONGESTING
EXISTING ROUTES'**

*Presented to Lok Sabha on 19.12.2002
Laid in Rajya Sabha on 19.12.2002*



**LOK SABHA SECRETARIAT
NEW DELHI**

*November, 2002/Agrahayana, 1924(Saha)
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RAILWAY CONVENTION COMMITTEE
(1999)

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@ Sarvashri B.P. Apte, Suresh Pachouri and Janardhana Poojary nominated w.e.f. 20.05.2002 vice S/Shri Lakhiram Agarwal, Suresh Pachouri and Maurice Kujur retired from Rajya Sabha w.e.f. 09.04.2002.

INTRODUCTION

I, the Chairperson of the Railway Convention Committee (1999), having been authorized by the Committee to submit the Report on their behalf, do present this Sixth Report on Action Taken by the Government on the observations/recommendations contained in their Fourth Report on 'Development of Alternative Routes for Decongesting Existing Routes'.

2. The Fourth Report was presented to Lok Sabha on 26 February, 2002 and laid on the Table of Rajya Sabha on 13 March, 2002. It contained 20 observations/recommendations. Action taken replies on all the 20 observations/recommendations were received from the Ministry of Railways (Railway Board).

3. The Committee considered the replies of the Government at their sitting held on 26 November, 2002. The Committee also considered and adopted the Draft Report at the same sitting. The Minutes of the sitting form Part-II of the Report.

4. An analysis of action taken by the Government on the observations/recommendations contained in their Fourth Report is given at Appendix.

NEW DELHI;
26 November, 2002
5 Agrahayana, 1924 (S)

BHAVNABEN CHIKHALIA,
Chairperson,
Railway Convention Committee.

PART-I
CHAPTER I
REPORT

This Report of the Committee deals with the Action Taken by the Government on the observations and recommendations contained in their Fourth Report (Thirteenth Lok Sabha) on 'Development of Alternative Routes for Decongesting Existing Routes' which was presented to Lok Sabha on 26 February, 2002 and laid on the Table of Rajya Sabha on 13 March, 2002. It contained 20 observations/recommendations.

2. The Action Taken replies on all these observations and recommendations have been received from the Ministry of Railways (Railway Board) and the same have been broadly categorized as under:

(i) Recommendations/observations which have been accepted by Government:

Para Nos. 154, 155, 158, 159, 163, 164, 166, 167, 170 & 171

(ii) Recommendations/observations which the Committee do not desire to pursue in view of the Government's replies:

Para Nos. 156, 157, 160, 165, 168, 169 & 172

(iii) Recommendations/observations in respect of which replies of the Government have not been accepted by the Committee and which require reiteration:

Para Nos. 153 & 161

(iv) Recommendations/Observations in respect of which final replies of the Government are still awaited:

Para No. 162

3. The Committee desire that final reply in respect of the recommendations/observations on which only interim replies have been furnished by the Government should be submitted to them expeditiously.

4. The Committee will now deal with the Action Taken by the Ministry of Railways (Railway Board) on some of their recommendations/observations.

5. The Committee had, in para 153 of their Report observed as under:

"The Committee note that the Ministry of Railways declare a line saturated when a line exceeds the chartered capacity to carry a certain number of trains each way during a period of 24 hours and that capacity depends on the speeds of the different trains operating on the section, the gradients, the standard of signalling and

interlocking, the distance between crossing stations and daily maintenance block. In accordance to the Railway Board's directives a total line section is deemed to be saturated at 90 per cent utilization of chartered capacity after accounting for a mandatory maintenance block of 4 hours. Likewise a single line section is considered saturated when capacity utilization exceeds 80 per cent.

The Committee find that the Golden Quadrilateral connecting the four metropolitan cities of Mumbai, Delhi, Kolkata and Chennai and the two diagonals comprising 15.8 per cent of the total network, carries in excess of 50 per cent of the total freight transport output and 47 per cent of the passenger traffic. The Ministry of Railways have informed the Committee that this high density network is today totally saturated and needs massive doses of investment in its basic infrastructure, particularly because future growth is also projected by industry, trade and business interests along these very corridors. In addition to these routes, there are other freight and passenger intensive sections where there is saturation as far as line capacity utilization is concerned. Keeping in view the above facts, the Committee are of the firm view that the Ministry of Railways will have to decongest existing routes by creation of additional capacity by gauge conversion, doubling or laying multiple lines, new alignments, electrification, upgrading standard of signalling and interlocking, splitting long block sections, automatic signalling, introducing air brakes, increasing average speed, creating speed differentials, procuring higher capacity wagons/coaches, adding more wagons/coaches per train, procuring high horsepower locomotives and developing alternative railway terminals/station facilities. They also desire the Railways to take timely steps, in case of nearly saturated routes, well in advance to create additional capacity and reduce multifarious problems being faced by the saturated routes today. The Committee recommend that a well defined plan be formulated for decongesting the existing saturated/near saturation routes".

6. In their Action Taken reply the Ministry of Railways have stated as under:

"In order to plan quantifiable inputs in the 6 routes comprising the Golden Quadrilateral and the diagonals, following specific areas of investment have been identified for investment as required:—

- Doubling of remaining single line sections
- Additional lines on selected routes
- Electrification of the unelectrified sections
- Grade separation at important road rail crossings
- Signalling Improvements & Manning of Level Crossings
- Reduction in speed differential
- Introduction of High Horse Power Locomotives
- Track upgradation.

Alternative sources of funding for the purpose are being explored”.

7. The Committee note that Ministry of Railways have identified the specific areas for investment such as doubling of lines, laying of additional lines, electrification, etc., in order to expand the existing capacity of the Golden Quadrilateral and Diagonal routes and are exploring alternative sources of funding for the purpose but they have not furnished the details of these projects. The Committee desire that the details including schedule of execution of these projects and also the progress made by the Ministry in mobilizing resources for the purpose so far be furnished to them.

8. The Committee had, in para 161 of their Report observed as under:

“The Committee note that the Railway Board had requested the Government for creation of infrastructural development funds by the Finance Ministry on the analogy on which National Highways Fund has been created. The representatives of the Ministry of Railways have submitted to the Committee during evidence that in case such a fund was created for them, they would be committed to deal with freight and passenger business entirely on their own. They also emphasized that if non-lapsable Infrastructural Development Fund was also created for them, it will not only enhance their share in the transport sector but also help in funding projects relating to doubling of lines, enhancement of loop-lines, improvement in signalling etc., which would in turn improve line capacity utilization. This would in turn help in decongestion of heavily congested routes. The Committee desire that the Ministry of Railways should carry out a detailed study in the matter in consultation with the Ministry of Finance. They also recommend that the Ministry of Railways should incorporate the proposal for creation of such a fund in their Memorandum on Rate of Dividend and other ancillary matters, so that this proposal could be examined by the Committee in-depth”.

9. In their Action Taken reply, the Ministry of Railways have stated as under:

“In order to strengthen the Golden Quadrilateral and the Diagonals connecting the four metropolitan cities, which carry the bulk of the passenger and freight traffic, a comprehensive plan has been made by the Railways. Ministry of Railways has approached the Ministry of Finance for obtaining funds for the purpose from the multilateral/ bilateral agencies”.

10. The Committee note that Ministry of Railways have made a comprehensive plan to strengthen the Golden Quadrilateral and the Diagonals connecting the four metropolitan cities which carry the bulk of the passenger and freight traffic and are also making efforts for mobilizing resources for the purpose for which they have approached the Ministry of Finance. The Committee desire that the Ministry of Railways should furnish to them the details of the comprehensive plan made and the response of the Ministry of Finance as well as other agencies in providing necessary funds to the Railways.

CHAPTER II
RECOMMENDATIONS AND OBSERVATIONS WHICH HAVE
BEEN ACCEPTED BY THE GOVERNMENT

Recommendation (Para No. 154)

The Committee find that the Railways have been facing acute financial crunch for the last so many years. While the Railways have been taking measures to improve their performance in movement of freight and passenger traffic, yet they are unable to create sufficient surpluses. After an in-depth study, the Committee find that there is a huge shelf of projects costing about Rs. 35,000 crore while the closing balances in various funds of Railways are very meagre. The Ministry of Railways have not even been in a position to pay dividend in full to the General Exchequer for the last two years and its payment, to the extent of Rs. 1500 crore in 2000-01 and Rs. 1000 crore in 2001-02 has deferred. It is more disturbing to the Committee that the Ministry of Railways have been taking up new projects without completing the earlier ones. The money spent on these projects is also thinly distributed with the result that they are not in a position to earn revenue or bring benefit to the people by completing a project. Although all the pending projects are supposed to have been prioritized by the Government, the priority of these projects have been kept changing with the change of Government at the Centre or with the change of Railway Minister. The Committee recommend that the Ministry of Railways should make concrete efforts to increase generation of their internal resources and at the same time should complete the projects which are nearing completion by investing sufficient funds so that the nation could reap the benefits of huge investments made on these projects. The Committee emphasize that the existing projects should be reviewed critically and prioritized after realistic assessment in terms of their state of completion, financial viability and achieve optimum utilization of scarce funds. The Committee are also of the firm opinion that the priorities once fixed should not be changed except in the larger national interest or on strategic considerations.

Reply of the Government

Railways have a large shelf of projects particularly under New Lines and Gauge Conversion plan-heads, which causes thin spread of resources resulting in time and cost overruns. These projects were prioritised with the approval of the Government in November, 1998. A large share of the available funds are allocated to projects which are nearing completion. Priority of the projects have remained the same since then. All projects subsequently added in the Budget have been assigned appropriate priority

after a critical review. Further, during 2002-03, funds to various projects have been allocated State-wise on the basis of formula announced by Minister of Railways in Budget Speech.

It is not possible nor desirable to put a complete moratorium on taking up new projects. Certain operationally and strategically important projects have been taken up in the current year's Budget.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4 dated 9/10/2002]

Recommendation (Para No. 155)

The Committee are perturbed to find that at the time of Introduction of Projects Unigauge, conversion of MG and NG lines was done without going into their financial viability or operational priority. In this connection, they find that the Gondia-Chandafort-Ballarshah (252 Kms.) line in Nagpur Division of South Eastern Railway was converted and connected to Ballarshah after investing a huge amount of scarce resources. This alternative route has a potential of six trains each way but is being used for only two pairs of passenger trains per day. As this line is very much under utilized, the Committee recommend that the Railways should make proper utilization of this line by introducing some more goods trains/diversion of traffic for South bound trains. The Committee would also like to know the efforts made in this regard within the next three months. Capacity utilization of similar other lines should also be enhanced under intimation to them.

Reply of the Government

The average numbers of coaching trains run on this section are 4 per day. Freight trains have been introduced from 2001. The number of freight trains run in 2001 were 14 and in 2002 to end of May were 29.

Efforts are being made to increase the utilization of Gondia-Ballarshah section. Wadsha and Naghbir stations have now started dealing with originating and terminating loads. Since April, 2002 South Eastern Railway has started running south bound trains *via* the above mentioned section thereby reducing congestion at Ajni and also reducing the distance by 90 kms.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4 dated 9/10/2002]

Recommendation (Para No. 158)

The Committee note that the Ministry of Railways assess volume of traffic through survey, which is an ongoing process. In order to derive benefits from the latest information techniques, a Long Range Decision Support System has been evolved for forecasting traffic trends on Indian Railways. Forecasting an accurate traffic trend on a particular route would help the Railways in planning for alternative measures/routes in case of

decongestion. The Committee would, however, like to know the extent to which these techniques are being used by the Indian Railways in forecasting traffic trends accurately.

Reply of the Government

Long Range Decision Support System (LRDSS) is used as a tool for forecasting traffic and identifying bottlenecks on the railway network both at present and that are likely to arise in the future. Further its capability of evaluating various investment options to relieve the bottlenecks or constraints that are likely to arise in the future is also being used. The LRDSS traffic forecasting methodology is a combination of survey-based analysis and the use of standard statistical techniques of forecasting and extrapolation. The method involves the creation of an Origin-Destination freight flow matrix for a particular year (the base year) using the data of actual freight traffic carried on the Indian Railways. This matrix is used to create a future Origin-Destination freight flow matrix by taking into account factors like growth, modal choice, changes in demand or supply centres etc. This forecast Origin-Destination flow matrix is then assigned on to a virtual network using an optimization module. This optimal assignment yields to a forecast of traffic trend on particular routes, which is then utilized to identify likely congestion and methods to decongest the specific routes.

The Phase-II of the study analyzed different scenarios for the future and in the LRDSS report bottlenecks that are likely to arise have been identified. This list forms the basis for the Planning Directorate in deciding investment priorities for capacity enhancement. The detailed plan for the Golden Quadrilateral has also been prepared based on the LRDSS findings. Further specific proposals like increasing the speed of freight trains have also been evaluated using these techniques.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002]

Recommendation (Para No. 159)

During the evidence, the Committee were apprised that based on traffic potential and capacity constraints, a large number of projects are unremunerative, particularly in backward areas. However, these projects are socially desirable. The Committee are of the opinion that such non-viable projects reduces the scope for internal generation of resources by the Railways. They are of the firm view that the prevalent practice in the Railways to liberally sanction projects (commercially viable and non-viable) without ensuring availability of the requisite funds for their completion and commissioning has to be curbed. The Committee stress that this kind of callous attitude only leads to spreading the scarce resources thinly. They are of the considered view that adding of new projects in the Railway's existing shelf without correspondingly making funds available would be disastrous to the financial health of the Railways. The Committee stress

that projects which are unviable but socially desirable may be taken up only when matching funds are assured both by the Planning Commission and the Ministry of Finance.

Reply of the Government

The recommendations of the Committee have been noted. In the current year's Budget, only the operationally and strategically important projects have been included as new works.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002]

Recommendation (Para No. 163)

The Committee recommend that fiscal and other mechanisms have to be developed to stimulate the flow of private capital into the rail sector without correspondingly generating intolerable burden of market interest rates and unmanageable debt trap.

The Committee observe that there are a number of projects at hand which are uneconomical in terms of low level traffic and do not justify their funding. With opening up of economies, such areas are opened to private operators, at times by giving concessions on long term basis. The Committee feel that Railways could make serious efforts in involving the private sectors in the creation and maintenance of Railway network and assets. Some concrete measures have to be taken in this direction as private money is likely to shy away because of the high risk factor. With private sector involvement, Railways could bring more efficiency, provide better services and market for more traffic. The Committee, therefore, suggest that on experimental basis initially some pilot projects could be started on some of these routes.

Reply of the Government

Indian Railways are operating in the core sector of the economy and to strengthen, modernise and expand the network, investment requirements are huge. Ministry of Railways wishes to attract private capital in accelerating building up of fixed rail infrastructure. For this purpose, it has invited proposals for its existing shelf of projects and also Greenfield projects.

Guidelines for private/public participation in rail projects through different models have been formulated. The specific issues will be decided on a case-to-case basis. Depending on the model of private investment, Ministry of Railways will enter into MOU or go in for competitive bidding for making further progress in specific cases.

We have involvement of private sector in two projects in creation of rail infrastructure for providing rail connectivity.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002]

Recommendation (Para No. 164)

The Committee find that electrification modernizes the Railway system by introducing high speed locomotives, modern signalling and telecommunications which in turn enhances the line capacity. Electrification of tracks can increase the capacity of the existing congested routes to the extent of 15 percent. The Committee observe that electrification work had been left half way through at many places resulting in blocking huge investments. The Committee recommend that the gaps left on various projects relating to electrification of tracks should be completed at the earliest. They are convinced that once this work is completed, the returns will start flowing to the Railways and in turn help in increasing internal generation of resources apart from increasing line capacities on the congested routes.

Reply of the Government

Electrification of the Railways is proceeding in an integrated manner and no gaps are being left.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002]

Recommendation (Para No. 166)

The Committee were informed that the Ministry of Railways had to pay much higher tariffs for electric traction which is even more than the high tension consumers. In some cases, the tariffs are as high as three to four times the cost of generation of electricity. It is so, in spite of the fact that the Railways are the major consumer and they make payments in time. Instead of getting a discount they were made to pay much higher rates

than that charged from the industrialists. The Committee recommended that for payment of electricity charges Railways should be treated on par with the bulk consumers and they should be charged at a reasonable rate, depending on the cost of production of electricity in a particular State.

Reply of the Government

Railways agree with the recommendations of the Committee. In order to bring down the traction costs, Railways have started drawing power directly from Central Generating Agencies like NTPC. Railways are also exploring the possibility of setting up captive power plants to cater to their needs. For this purpose an MOU has been signed with NTPC on 18.02.2002.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4 dated 9/10/2002]

Recommendation (Para No. 167)

The Committee are disappointed to note that a huge amount of Rs. 1,321.81 crore being about 83.51 per cent of the total outstanding dues of the Railways was outstanding against State Electricity Boards in March, 2000. A handful of errant power houses viz. Badarpur Thermal Power Station, Delhi Vidyut Board, Haryana Power Generation Corporation Limited and Punjab State Electricity Board together constitute 93 per cent of these total outstandings. Though, the Ministry of Railways, based on earlier recommendations of this Committee, have been able to reduce the outstanding dues to some extent after adoption of prepayment scheme by all SEBs, the Committee is constrained to note that BTPS (which alone forms 72 per cent of SEB outstandings) has not complied with the system and has further added to the outstandings. The Committee, therefore, recommend that the Ministry of Railways should approach the Cabinet to impose higher rate of cut from the Central Plan Assistance to the State Electricity Boards, which are heavily defaulting.

The Committee also reiterate their earlier recommendations that the amount recoverable from the State Electricity Boards, etc., should be adjusted against their future power tariff bills. The Ministry of Railways should continue and ensure strict adherence to the cash and carry scheme for all consignments to be booked in future to curb fresh accruals to freight outstandings.

Reply of the Government

Efforts taken by Ministry of Railways have resulted in clearance of current outstanding of Badarpur Thermal Power Station. At the end of March 2002, by and large BTPS has cleared the outstanding accrued from 1-4-2000 to 31-3-2001 and 1-4-2001 to 31-3-2002. However, they have paid Rs. 13.53 crores less against the total freight of Rs. 377.89 crores accrued during 1.4.99 to 31.3.2000. The reasons for increase despite enforcement of pre-payment of freight was due to the fact that coal stocks became

extremely critical at BTPS on number of occasions and requests were received from the Ministry of Power as well as Central Electricity Authority, NTPC to rush coal to BTPS whose entire power generation is supplied to the national capital region.

The matter of outstanding against SEBs has been followed up regularly with the Ministry of Power, Ministry of Finance and with the Chief Minister of various States. On the directions of Ministry of Finance already the outstanding dues from State Electricity Boards as on 31.12.1996 are being adjusted from the Central Plan Assistance of the State Governments subject to certain limits. The amount thus received is very meagre and has come to only Rs. 159.23 crores during the last five years. On the other hand the outstandings have been increasing at a much higher pace bringing the outstandings to Rs. 1616.45 crores as on March, 2002 as compared to Rs. 1061.28 crores on 31.12.1996. Therefore, on recommendation of Standing Committee on Railways, Ministry of Railways have requested Ministry of Finance (copy enclosed) for:

- (a) deductions of outstanding Railway dues from the allocation of concerned states and pass on the amount so deducted to Railways in case of SEBs.
- (b) in case of Central Power Utilities, Ministry of Power should deduct the dues of the Railways from their annual allocations and deducted moneys to be passed on to the Railways.

Ministry of Railways is implementing the earlier recommendations made by the Committee by way of adjusting the outstanding dues against traction bills raised by State Electricity Boards wherever feasible.

Recently, a scheme for 'One time settlement of SEB dues' by issuing of bonds has been approved by the Union Cabinet. It is expected that this would improve the position.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002]

APPENDIX REFERRED TO ACTION TAKEN NOTE OF
RECOMMENDATION NO. 167 OF THE FOURTH REPORT OF
RAILWAY CONVENTION COMMITTEE (1999)

भारत सरकार GOVERNMENT OF INDIA
रेल मंत्रालय MINISTRY OF RAILWAYS
(रेलवे बोर्ड RAILWAY BOARD)

रेल भवन, नई दिल्ली-110001, तिथि

Rail Bhavan, New Delhi-110001, dated

No.: TC IV/2002/4105/10/DEA

New Delhi, dt. 22/7/2002

The Secretary,
Department of Economic Affairs,
Ministry of Finance,
Government of India,
North Block,
New Delhi-110001

Sub:—Realisation of Outstanding Dues from State Electricity Boards/
Power Houses.

Sir,

The Railway Finances are severely effected on account of non-payment of dues by the State Electricity Boards/Power Houses. The outstanding dues on account of these two sectors stood at Rs. 2069 crores as on end of March, 2001. Out of these the SEBs account for Rs. 684.01 crores and the Central Utilities 976.85 crores. The Standing Committee on Railways 2002 have in the recommendation No. 158 stated as under:—

“The Committee find that the closing balance of unrealised receipts in March 2000 was Rs. 1662.17 crore and fresh net accretion of Rs. 406.83 crore in 2000-01 resulted in a closing balance of Rs. 2069.00 crore in March, 2001. The Committee find that the reason for accretion under the Head ‘traffic suspense’ has been non-payment of complete dues by the State Electricity Boards/Power Houses. The Committee express serious concern over non-clearance of the Railway dues by these agencies and desire that the Planning Commission and the Ministry of Finance should take into serious consideration these financial irregularities while finalizing budgetary support for the Railways or the Central/State Governments should give counter-guarantee to the Railways’ to this effect. Simultaneously, the Ministry of Railways should also take up this matter with the Ministry of Power and in case nothing tangible comes out, they should insist on Pre-payment of freight charges.”

2. This Ministry proposes the following mechanism for realisation of the dues and with a view to ensuring that in future no such heavy outstandings accumulate.

- (a) So far as State Electricity Boards are concerned the Planning Commission and Ministry of Finance may deduct the outstanding dues from the allocation of the concerned State and pass on the amounts so deducted to Railways.
- (b) For the Central Power Utilities the Ministry of Power should deduct the dues of the Railways from their annual allocations and the deducted moneys be passed on to the Railways.

Ministry of Finance are requested to consider the above recommendations of the Standing Committee on Railways.

Yours faithfully,

Sd/-

(Joyanta Roy)

Addl. Member (Commercial)

Recommendation (Para No. 170)

The Committee observe that there is heavy congestion at terminals and long waiting periods for passenger and freight trains. They feel that the very purpose of decongesting congested line/routes is defeated if the terminals are left congested. The Committee feel that the main thrust should be to have more platforms, more stabling lines, more maintenance pits, etc. They emphasize that these facilities should be developed consistent with introduction of new originating trains from the terminals. This is a prime requirement not only to decongest the congested terminals but also on safety considerations. The Committee, therefore, recommend that a blue print of the specific steps taken by Ministry of Railways to handle the expected increase in traffic by upgrading the existing coaching and freight terminal facilities and providing new terminals be brought out and placed before the Committee within a period of six months.

Reply of the Government

Railways have been constantly endeavouring to improve the terminal facilities both for freight as well as coaching traffic. Details of ongoing works of coaching and freight terminals is enclosed.

As regards shortage of coaching maintenance facilities, the same are regularly reviewed specially when any new train is introduced. There is a net shortage of 2 coaching maintenance pit lines on all Railway basis, taking into account works in progress as on 31.03.2002. During X-Plan

period, 52 pits will be required for additional services. Therefore, 54 pits will be required to be provided at a cost of about Rs. 103 Crores.

RSRC Part (I) recommendation No. 164—"Railway Management should immediately work towards upgrading the facilities at all major freight train examination points....." has been accepted by the Government and is under implementation. During the X-Plan period, it is proposed to upgrade infrastructural facilities at around 50 freight train examination points and around 45 sidings subject to availability of adequate funds. The fund requirement for implementation of above-mentioned RSRC recommendation has been estimated to be Rs. 235 crores approximately.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4 dated 9/10/2002]

COACHING TERMINAL WORKS UNDER TRAFFIC FACILITIES
PLAN HEAD: 2002-03

S. No.	Rly.	Particulars of Work	Latest Anticipated Cost (Rs. in Thousands)
1	2	3	4
1.	CR	Kurla Passenger Terminals: (Ph-II/Stage-II)	394357
2.	CR	Mumbai VT: Remodelling of main line complex (Ph-I)	623976
3.	CR	Pune JN.: Phase-I: Layout alterations for dealing 28 coach length trains on Platform No. 1 & 7, and extension of washing-cum-pit siding to deal with 28 coach rakes.	30000
4.	ER	Dhanbad: Extn., wiring & signalling fac. on PF No. 6 & 7	24011
5.	ER	Howrah: Aug. of coaching ter. facilities (Ph-I)	150992
6.	ER	Howrah: Extn. of PF Nos. 8, 12 & 14 to accommodate 24/26 coach trains	11784
7.	ER	Howrah: Remodelling of Suburban PF Nos. 1 to 6 for provision of Double Discharge fac. (Ph-I, for remodelling of PF Nos. 1 to 3)	50500
8.	ER	Patna Jn.: Provision of additional platform and extension of platform Nos. 4 to 7	118100
9.	ER	Patna Jn.: Aug. of Pass. Terminal fac: (1) Rajendranagar-Dev. of Pass Terminal (2) Extn. of PF Nos. 1 to 3	86192
10.	ER	Sealdah: Prov. of addl. PF	35937
11.	NER	Barauni: Provision of 2 BG passengers and 1 goods running line and a stabiling line	110879
12.	NER	Chapra: Additional island platform, full length washing pit, stabling line and simultaneous reception of trains from Varanasi & Bhatni direction	47700

1	2	3	4
13.	NER	Lucknow Jn: Remodelling of Yard for providing additional facilities, i.e conversion of all MG yard to BG with provision of coaching complex at abandoned loco shed and MG coach maintenance facilities at Lucknow City station	161468
14.	NFR	Katihar (BG): Remodelling of yard	33154
15.	NFR	New Bongaigaon (BG): Remodelling of Complex	12030
16.	NR	Aligarh Jn.: Shifting of goods shed to CD siding alongwith second block rake siding & development of passenger & parcel complex on city side	16450
17.	NR	Chandigarh: Development of Coaching terminal (PH-I)	88416
18.	NR	HNZM: Additions & alternations in coaching yard	156939
19.	NR	NDLS: Development of Stn. (Ph.-III)	160929
20.	NR	NDLS: Development of stn. (Ph-IV)	260763
21.	NR	Tundla: Addl. Up PF of 26 coaches length	15100
22.	SCR	Secunderabad: New stn. building and circulating area on Bhoiguda side	57934
23.	SER	Khurda Road: Yard remodelling	46000
24.	SER	Puri: Remodelling of station for running of 24/26 coach trains	47299
25.	SER	Santragachi & Padmapukur: Acquisition of land for new passenger terminal	72300
26.	SER	Talcher-Modification of station yard for augmentation of passenger facilities	28825
27.	SER	Visakhapatnam: Increase in the facilities for passenger train including additional PFs	144000
28.	SR	Bangalore City; Addl. tmnl. facil. & 2nd entry	35600
29.	SR	Chennai Egmore: 2nd Entry	55000
30.	SR	Coimbatore Jn.: Additional Terminal Facilities	128239
31.	SR	Kochuveli: 2nd Coaching terminal	80000
32.	SR	Mangalore: Addl. terminal facilities	62080
33.	SR	Palghat: Conversion of MG Platform to BG	18415
34.	SR	Palghat: Widening of Platform No. 3 & 4	33988
35.	SR	Trivandrum Central: Addl. tml. facilities	27977
36.	SR	Yeshwantpur: 2nd coaching terminal	164100
37.	WR	Bandra: Augmentation of terminal facilities	86390
38.	WR	Bandra Terminus: Augmentation of coaching facilities & one pit line	47966
39.	WR	Jaipur: Extension of shunting neck for 24/26 coach trains	16726
40.	WR	Jaipur: Removal of infringement of Jaipur yard & other connected works	22412
41.	WR	Okha: Terminal Facilities	45000

**FREIGHT TERMINAL WORKS UNDER TRAFFIC FACILITIES
PLAN HEAD: 2002-03**

S. No.	Rly.	Particulars of Work	Latest Anticipated Cost (Rs. in Thousands)
1	2	3	4
1.	CR	Kalamboli: 3 addl. R&D lines of 686m CSR with Electric Traction	51265
2.	CR	Madanmahal (Kachhapura): Aug. of Goods shed for dealing full rakes	17806
3.	CR	Nasik Road: Provision of full length high level goods PF & circulating area	22750
4.	CR	New Mulund Goods Shed: Provision of 2 addl. R&D lines of 686 Mts. CSR	55000
5.	ER	Bandel-Katwa: Aug. of sectional capacity (1) Conv. of Flag into a Halt Stn. at Bhagnapara & Bhandartikuri, (2) Addl X-ing stn. between Samudragarh & Nibadwipdham	85717
6.	ER	Dankuni: Dev. into nodal freight terminal facilities (Ph-I)	71110
7.	ER	Delhi-on-Sone: Provision DD line	14065
8.	ER	Fatuha: Dev. of freight terminal facilities	143794
9.	ER	Gour Malda: Rake unloading facilities	17800
10.	ER	Sainthia: Rake unloading facilities	6320
11.	NER	Nakaha: Rake handling facilities	7000
12.	NER	Barabanki-Katihar section: Provision of 6 three line crossing stations between Narayanpur-Pasraha, Pasraha-Maheshkhunt, Lakhminia-Lakho, Bhatni-Bhatpar Rani, Deoria Sadar-Noonkhar and Manakpur-Motiganj	85400
13.	NER	Basti: Provision of Mineral siding	8006
14.	NER	Hajipur: Full rake handling facilities	19832
15.	NER	Karpurigram: Provision of 2nd rake handling facility	13699
16.	NFR	Kishanganj: Remodelling of Yard	10318
17.	NFR	New Guwahati: Provision of subsidiary goods BG yard	34105
18.	NR	Aligarh Jn.: Shifting of goods shed to CD siding alongwith second block rake siding & development of passenger & parcel complex on city side	16450
19.	NR	Dhandari Kalan: Direct reception & despatch fac., extn. of line No. 8 & provision 2 extra lines	47371
20.	NR	Improvement of 8 freight terminal over NR	70000
21.	NR	Moradabad Div.: Chanethi & Bulandshahar: Impvt. & devt. in freight terminals	7033
22.	NR	Naini & Cheoki: Development of freight handling facilities	16851
23.	SR	Badadi: Creation of facilities for loading cars	6400
24.	SR	Chochin Harbour Terminus: Rake unloading facilities	14425

1	2	3	4
25.	SR	Irugur: Provision of Satellite Goods Terminal for Coimbatore area	103155
26.	SR	Korukkupet Goods Yard: Additional Terminal Facilities (Phase-II)	30000
27.	SR	Korukupet Goods Terminal: Dev. as Centralised goods ter. for Chennai area	45449
28.	SR	Ollur: Rake unloading facilities	5300

Recommendation (Para No. 171)

The Committee observe that high horse power electric locos provide higher acceleration, haul heavier loads at higher balancing speed and are more reliable in service. They find that its unique features of regenerative breaking enables the train to restart immediately after breaking. Apart from being energy saving, it reduces overall running time. The Committee were informed that the actual impact of these locos on line capacity at a section/route shall be known when large number of locos are inducted in the system. As the superior features of high horse power loco contribute in enhancing line capacity of a section, the Committee recommend that with transfer of technology (TOT) from ABB, CLW should start manufacturing high horse power electric locos indigenously for deployment in the Railways on a larger scale.

Reply of the Government

The process of technology transfer from ABB, Switzerland at CLW is in progress as per contract terms and conditions. With successful indigenisation programme, CLW have so far manufactured 34 'high horse power' three-phase electric locomotives during the period 1998-99 to 2001-02.

Further it is planned to manufacture 125 'high horse power' three-phase electric locomotives during the X-Plan.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002]

CHAPTER III

RECOMMENDATIONS AND OBSERVATIONS WHICH THE COMMITTEE DO NOT DESIRE TO PURSUE IN VIEW OF THE GOVERNMENT'S REPLIES

Recommendation (Para No. 156)

The Committee observe that the missing links on approved lines such as Jayanagar-Darbhanga-Narkatiyaganj and Darbhanga to Samastipur, Barauni and Patna, including a stretch of 3 Kms in between, needs to be completed at the earliest. Some other lines such as Gonda-Gorakhpur loop and a line between New Jalpaiguri to New Bongaigaon have also been left incomplete.

The Committee are perturbed to find that on certain other sections also gauge conversion works were carried out leaving small patches incomplete, thereby leading to non-utilization of the entire line. There have also been cases where freight has suffered because of break of continuity in Meter Gauge. The Committee are unable to comprehend as to why the Railways could not complete these lines by converting these small stretches into B.G. The Committee strongly recommended that the work should be taken up in these areas and completed at the earliest so that the entire line starts functioning. This would help in decongestion of the saturated routes apart from ensuring free movement of freight traffic. The Committee may be kept apprised about the progress of these projects from time to time.

Reply of the Government

Work of Gauge Conversion work of Samastipur-Darbhanga section has been completed and commissioned. Status of Jayanagar-Darbhanga-Narkatiyaganj, Gonda-Gorakhpur loop and New Jalpaiguri-New Bongaigaon Gauge Conversion works are as follows:—

1. Jayanagar-Darbhanga-Narkatiyaganj

On Jayanagar-Darbhanga-Sitamarhi (136 Km), earthwork in a length of 117 Km has been completed. Out of 98 Minor bridges, 11 have been completed and work on 5 bridges is in progress and 8 bridges are being retained. The work on one major bridge is also in progress. The tenders for earthwork on Sitamarhi-Raxaul-Narkatiyaganj have been processed. An outlay of Rs. 10 Crores has been provided during 2002-2003.

2. Gonda-Gorakhpur loop

Requisite clearances have been obtained. Work is being taken up.

3. New Jalpaiguri-New Bongaigaon

Earthwork, bridgework and other works are in progress. Work is planned for completion during 2003-04.

Care has been taken to convert entire routes to Broad Gauge in one go so that the continuity of traffic is not broken. However, large scale Gauge Conversion work has resulted in certain isolated MG sections, which have among other things, affected the freight throughput on the MG system. Efforts are being made to streamline the operation in such sections by deploying appropriate rolling stock and devising relevant maintenance practices. All ongoing works of Gauge Conversion are being progressed as per the availability of resources.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4 dated 9/10/2002]

Recommendation (Para No. 157)

The Committee find that on certain double line sections, which are saturated after accounting for maintenance block, line capacity utilization is as high as 142%. They are apprehensive that in such cases of high line capacity utilization, safety considerations must have been compromised. The Committee would caution the Ministry of Railways to utilize the line capacity only to the extent it does not affect the basic safety norms and affect human life and/or loss of public property. They desire that compliance to safety norms by the Railways be given priority while the lines are optimally utilized. The Committee hope that in such cases the Government must have adopted other alternative measures to augment line capacity on saturated high density corridors. They may be apprised of the specific measures taken/planned to be taken by the Government to decongest these busy routes while keeping the safety norms in mind.

Reply of the Government

Even when running trains on high density and saturated routes, safety in operations is given due consideration. Saturation of a route results in operational problems but due care is taken to ensure that safety is not compromised. Augmentation of capacity on saturated routes is an ongoing and continuous process. As a part of this process Railways are developing a comprehensive plan to strengthen the Golden Quadrilateral by means of laying additional lines, electrification, improved signalling, improved track structures, etc. Carrying capacity of the system is also sought to be increased by reducing the speed differential between coaching and freight trains. This will be achieved by running freight trains at 100 KMPH.

[Ministry of Railways (Railways Board) O.M. No. 99/RCC/206/4 dated 9/10/2002]

Recommendation (Para No. 160)

The Committee appreciate the categorical announcement of the then Minister of Railways in her speech that no new projects would be taken up in the year 2001-2002. However, from the Budget for the year 2001-02, they note that an amount of Rs. 736 crore is proposed to be spent on various projects in the name of material modification. The Committee, therefore, strongly recommend that henceforth a temporary ban should be imposed on fresh projects, including the expansion of existing projects, in the name of material modification.

Reply of the Government

A complete ban on taking up new projects may not be possible or even desirable. Certain new projects have to be taken up on operational, strategic and other considerations. However, Government have decided that no new project is to be included in the Budget without prior requisite clearances.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002]

Recommendation (Para No. 165)

The Committee were also apprised that there exists a controversy about the relative benefits of electrification *vis-a-vis* diesel traction. However, the Chairman, Railway Board, informed that at the instance of the Railway Minister, a committee was being constituted to assess the relative benefits of electrification on diesel traction. The Committee are keen to know about the status of the Committee so constituted and whether that Committee has submitted its Report to the Government. In case the Report has been submitted, its findings and recommendations may be intimated to the Committee.

Reply of the Government

Committee on Railway Electrification has submitted its report. A copy of the report is enclosed as Annexure and the same is under consideration of Railway Board.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002]

Recommendation (Para No. 168)

The Committee are of the firm opinion that the Railways must look for alternative methods to increase capacity of the existing network to take care of the increase in traffic instead of investing in new lines, which are capital intensive with larger gestation periods. More so because the Railways are facing a financial crunch. Automatic signalling leads to better train management and ensures that the idle time of rolling stock is reduced to the minimum as trains follow each other in quick succession. The Committee also find that while the cost of laying a new line can be up to Rs. 2 Crore/route Km., automatic signalling requires just Rs. 12 lakh to Rs. 14 lakh/route Km. for a double line section. With automatic route setting and signalling, rail traffic can be optimized at the central traffic control to get the best out of the network. The present manual system is cumbersome and leads to greater detentions, especially in slow moving traffic. Bringing down the difference in average speeds of goods and passenger trains and reduction in turn-round time of goods trains, also enhances the existing line capacity.

The Committee recommend that the Railways should concentrate on introducing advanced signalling network, reduce the speed differential between different trains and increase traffic on the line to increase line capacity of the existing network. They also recommend introduction of modern technology so that the exact location of every train is known and

centralized traffic control is promoted to manage trains with different speeds according to their priority. The Committee also stress for faster turn round time, so that rolling stock on trunk routes could be utilized better for more loading, leading to more revenues for Railways, apart from reducing pressure on the system.

Reply of the Government

Modernisation of Railway system including introduction of Automatic Signalling, Train Describer System, Central Traffic Control, etc. are being implemented in a need based manner subject to availability of resources. Requirements of traffic and safety in operations are kept in view while adopting appropriate modern technology.

Train Describer System, which give the exact location of the trains electronically is being implemented on suburban system of Western and Central Railways in Mumbai.

Automatic Signalling is already in operation in various sections of the Railways. It is being introduced on other sections as per line capacity requirements. Railways as a policy have decided to reduce the speed differential between passenger and freight trains. All new wagons being procured during the X-Plan are to be fit to run at 100 Kmph. A proposal for retrofitting existing wagons to make them fit to run at 100 Kmph is being developed. Increasing the speed of freight trains will not only add to line capacity but will also improve the productivity of rolling stock by ensuring faster turn around time.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002]

Recommendation (Para No. 169)

The Committee appreciate the concept of 'Shadow goods trains' and faster moving rakes developed by Railways to reduce congestion. They were apprised that on several sections goods trains follow fast moving passenger trains reducing travel time by half. They would like to know the extent to which congestion has been reduced in high density network by following this concept. The details of congested route on which such shadow goods trains have been introduced should also be intimated to the Committee. They recommended that this concept should be utilized on most of the congested routes to reduce travel time of goods/passenger trains.

Reply of the Government

Freight trains capable of running at 100 kmph have been introduced for moving international export and import container traffic. These trains are running primarily between Tughlaqabad and Jawaharlal Nehru Port. These trains are running on time-tabled paths and comprise of specially designed high speed wagons. Due to the speed and fixed path these trains are able to achieve a faster turn round and intense utilization of the sections.

The Gaya-Mughalsarai-Allahabad-Tughalaqabad trunk route has a number of BOX-N rakes carrying coal to Northern India for power houses. These rakes are run in the shadow of mail express trains with a view to make most of the available time for movement of the above coal. In various busy trunk route sections a number of paths are identified for movement of freight traffic. These are also commonly referred to as, 'freight windows'. Railways have been asked to identify specific paths for movement of freight traffic to ensure the fullest utilization of gaps between mail/express/passenger trains.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002]

Recommendation (Para No. 172)

The Committee find that even though some routes have already reached the chartered capacity, a number of new trains have been introduced and frequency of the existing trains increased on these routes. They feel that this will compound the problem of the existing high density routes by interrupting and slowing down traffic significantly apart from causing safety hazards. They, therefore, recommend that the Ministry of Railways must conduct a detailed exercise to assess the line capacity before introducing new train services of increasing frequency of existing trains on saturated routes.

Reply of the Government

The new trains are introduced on the basis of traffic requirements, operational feasibility and availability of resources. As these trains are introduced on the sections where the passenger trains are already running and the route is fit for passenger services, their introduction will not cause any safety hazard. It will in no way affect movement of other traffic.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002]

CHAPTER IV

RECOMMENDATIONS AND OBSERVATIONS IN RESPECT OF WHICH REPLIES OF THE GOVERNMENT HAVE NOT BEEN ACCEPTED BY THE COMMITTEE AND WHICH REQUIRE REITERATION

Recommendation (Para No. 153)

The Committee note that the Ministry of Railways declare a line saturated when a line exceeds the chartered capacity to carry a certain number of trains each way during a period of 24 hours and that capacity depends on the speeds of the different trains operating on the section, the gradients, the standard of signalling and interlocking, the distance between crossing stations and daily maintenance block. In accordance to the Railway Board's directives a total line section is deemed to be saturated at 90 per cent utilization of chartered capacity after accounting for a mandatory maintenance block of 4 hours. Likewise a single line section is considered saturated when capacity utilization exceeds 80 per cent.

The Committee find that the Golden Quadrilateral connecting the four metropolitan cities of Mumbai, Delhi, Kolkata and Chennai and the two diagonals comprising 15.8% of the total network, carries in excess of 50 per cent of the total freight transport output and 47 per cent of the passenger traffic. The Ministry of Railways have informed the Committee that this high density network is today totally saturated and needs massive doses of investment in its basic infrastructure, particularly because future growth is also projected by industry, trade and business interests along these very corridors. In addition to these routes, there are other freight and passenger intensive sections where there is saturation as far as line capacity utilization is concerned. Keeping in view the above facts, the Committee are of the firm view that the Ministry of Railways will have to decongest existing routes by creation of additional capacity by gauge conversion, doubling or laying multiple lines, new alignments, electrification, upgrading standard of signalling and Interlocking, splitting long block sections, automatic signalling, Introducing air brakes, increasing average speed, creating speed differentials procuring higher capacity wagons/coaches, adding more wagons/coaches per train, procuring high horsepower locomotives and developing alternative railway terminals/station facilities. They also desire the Railways to take timely steps, in case of nearly saturated routes, well in advance to create additional capacity and reduce multifarious problems being faced by the saturated routes today. The Committee recommended that a well defined plan be formulated for decongesting the existing saturated/near saturation routes.

Reply of the Government

In order to plan quantifiable inputs in the 6 routes comprising the Golden Quadrilateral and the diagonals, following specific areas of investment have been identified for investment as required:—

- Doubling of remaining single line sections.
- Additional lines on selected routes.
- Electrification of the unelectrified sections.
- Grade separation at important road rail crossings.
- Signalling Improvements & Manning of Level Crossings.
- Reduction in speed differential.
- Introduction of High Horse Power Locomotives.
- Track upgradation.

Alternative sources of funding for the purpose are being explored.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/4
dated 9/10/2002].

Recommendation (Para No. 161)

The Committee note that the Railway Board had requested the Government for creation of infrastructural development funds by the Finance Ministry on the analogy on which National Highways Fund has been created. The representatives of the Ministry of Railways have submitted to the Committee during evidence that in case such a fund was created for them, they would be committed to deal with freight and passenger business entirely on their own. They also emphasized that if non-lapsable infrastructural Development Fund was also created for them, it will not only enhance their share in the transport sector but also help in funding projects relating to doubling of lines, enhancement of loop-lines, improvement in signalling etc., which would in turn improve line capacity utilization. This would in turn help in decongestion of heavily congested routes. The Committee desire that the Ministry of Railways should carry out a detailed study in the matter in consultation with the Ministry of Finance. They also recommend that the Ministry of Railways should incorporate the proposal for creation of such a fund in their Memorandum on Rate of Dividend and other ancillary matters, so that this proposal could be examined by the Committee in-depth.

Reply of the Government

In order to strengthen the Golden Quadrilateral and the Diagonals connecting the four metropolitan cities, which carry the bulk of the passenger and freight traffic, a comprehensive plan has been made by the Railways. Ministry of Railways has approached the Ministry of Finance for obtaining funds for the purpose from the multilateral/bilateral agencies.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/206/
dated 9/10/2002]

CHAPTER V

RECOMMENDATIONS AND OBSERVATIONS IN RESPECT OF WHICH FINAL REPLIES OF THE GOVERNMENT ARE STILL AWAITED

Recommendation (Para No. 162)

The Committee find that though railway transport is 5 to 6 times more energy efficient, cost effective and eco-friendly as compared to road transport, the share of railways in movement of goods and passenger traffic has declined significantly from 1950-51 to 1996-97 (89 per cent of goods traffic to 40 per cent and 80 per cent of passenger traffic to 20 per cent). During the evidence, representative of the Ministry of Railways, had pleaded before the Committee that wherever infrastructure has developed *viz.*, power of road sector, it has become viable. Hence, it has been suggested that any project, which is non-viable but socially desirable, should be considered as a part of an integrated development plan for the transport sector by the Government. The Committee, therefore, desire that the matter may be referred to the Ministry of Finance and the Ministry of Surface Transport for their consideration. The Ministry of Railways should also persuade the above Ministries for an integrated development plan so that road and railway sectors may supplement each other in the development of an area.

Reply of the Government

Recommendations of the Committee have been forwarded to the Ministry of Finance and Road Transport & Highways for their consideration.

An Integrated Transport Policy has already been developed by the Planning Commission.

[Ministry of Railways (Railway Board) O.M. No. 99/RCC/2064 dated 9/10/2002].

NEW-DELHI;
26 November, 2002

5 Agrahayana, 1924 (Saka)

BHAVANABEN CHIKHALIA,
Chairperson,
Railway Convention Committee.

PART II
MINUTES OF THE THIRTIETH SITTING OF THE RAILWAY
CONVENTION COMMITTEE (1999) HELD ON
26th NOVEMBER, 2002

The Committee sat on Tuesday, the 26th November, 2002 in the Chairperson's Chamber (Room No. 133-A), Parliament House Annexe from 1500 hrs. to 1545 hrs.

PRESENT

Shrimati Bhavnaben Chikhalia—*Chairperson*

MEMBERS

Lok Sabha

2. Shri Raghunath Jha
3. Shri Hannan Mollah
4. Shri Ravindra Kumar Pandey
5. Shri Manabendra Shah
6. Shri Radha Mohan Singh

Rajya Sabha

7. Shri Dina Nath Mishra
8. Shri Suresh Pachouri
9. Shri A. Vijaya Raghavan

SECRETARIAT

1. Shri V.S. Negi — *Deputy Secretary*
2. Shri O.P. Shokeen — *Assistant Director*

2. The Committee considered the Draft Report on Action Taken by Government on the recommendations contained in their Fourth Report on 'Development of Alternative Routes for Decongesting Existing Routes' and adopted the same without any amendment/modification.

3. The Committee authorized the Chairperson to present the Report to both the Houses after making consequential changes arising out of factual verification by the Ministry of Railways or otherwise.

4. ** ** ** **

The Committee then adjourned.

APPENDIX

(Vide para 4 of Introduction)

ANALYSIS OF THE ACTION TAKEN BY GOVERNMENT ON THE RECOMMENDATIONS/OBSERVATIONS CONTAINED IN THE FOURTH REPORT OF RAILWAY CONVENTION COMMITTEE (1999)

I. Total number of recommendations	20
II. Recommendations/observations which have been accepted by Government:	10
Para Nos. 154, 155, 158, 159, 163, 164, 166, 167, 170 & 171	50%
III. Recommendations/observations which the Committee do not desire to pursue in view of the Government's replies:	07
Para Nos. 156, 157, 160, 165, 168, 169 & 172	35%
IV. Recommendations/observations in respect of which replies of the Government have not been accepted by the Committee and which require reiteration:	02
Para Nos. 153 & 161	10%
V. Recommendations/observations in respect of which final replies of the Government are still awaited:	01
Para No. 162	05%

ANNEXURE

REPORT
OF
THE COMMITTEE
FOR
FIXING NORMS
FOR
RAILWAY ELECTRIFICATION

JANUARY, 2002

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EXECUTIVE SUMMARY

1. The era of planned economic growth brought in its wake phenomenal increase in freight traffic on Indian Railways (IR). Amongst the various measures taken by IR to modernize the system and to build capacity to carry the traffic thrown up by the economy was the induction of diesel (mid fifties) and electric (early sixties) traction. Since the switch over was from steam traction, this change over coupled with technological upgradation and other operational strategies, yielded very handsome results in increasing speeds and loads of trains there by facilitating running of larger number of trains, lifting higher volumes of traffic, and, improving tonne kilometres carried by facilitating trains with heavier loads. And, most importantly, at reduced cost of operation. At the end of X-Plan period, nearly 40 percent of broad gauge system would be electrified, with over 60 percent of freight traffic and nearly 50 percent of passenger traffic moving by electric traction.

2. The energy scenario in India is dominated by Coal and Oil. Hydel and nuclear energy play a supplemental role. With consumption in the range of 300 million tonnes of oil equivalent, India is the sixth largest consumer of commercial energy. The per capita use at about 280 kilograms is relatively low as compared to the world average of about 1430 kilograms. India's coal reserves are estimated over 200 billion tonnes, though only about 82 billion are proven reserves. With annual production level of 300 million tonnes, the reserves will last for nearly seven centuries.

3. The nineties saw a poor growth both in addition to power generating capacity and in improvement in plant load factor. The situation was further aggravated by high transmission and distribution losses, and, a distorted traffic structure—seriously affecting the performance of State Electricity Boards. This in turn affected the Indian Railways who were charge exorbitant rates affecting the economics of electrification. However, with the reforms initiated in the Power sector recently particularly the setting up of State Regulatory Commissions, there is clear trend towards rectifying the distortions in the tariff structure. Moreover, once the Electricity Bill 2000 is enacted, the Railways can explore the possibility of obtaining power supply at economical rates directly from NTPC or Independent Power Producers (IPPs) or other private sources.

4. As compared to this, the Indian crude oil reserves at 645 million tonnes (as of April 2000) are likely to last for a couple of decades only. High speed diesel is the largest petroleum product produced in India, accounting for as much as 44 per cent of total production of petroleum products—even then it leaves a marginal deficit to be made good by

import. But given the current trends, India should become self-sufficient or even surplus in High Speed Diesel in the next few years or so. With the recent deregulation and partial dismantling of the APM, the price of High Speed Diesel is now set at Import Parity Price. It is anticipated that the price in the foreseeable future would however around Rs. 18 to Rs. 20 per litre.

5. The Committee discussed the energy scenario with the Ministries of Petroleum and Natural Gas, Power, and the Planning Commission and concluded that with the low level of consumption of energy by IR—electricity in the range of 2 per cent and diesel in the range of 5 per cent—as compared to overall consumption in the country, this study assumes availability of energy in required quantity at affordable prices in the next decade or so. While the energy scenario may not be a determining factor presently, it should be reviewed from time to time.

6. IR has in recent years (since 1996) given up the practice of using the concept of break-even level for initiating proposals for electrification or for perspective planning, and, has adopted the Internal rate of return concept (currently prescribed as 14 per cent) to consider financial viability of electrification projects. While the concept of break-even level may have a limitation or two like using the weighted average of the cost of electric supply for the entire network but the density of traffic cannot be ignored. A precept that does not take into account traffic level is neither rational nor desirable. Traffic levels and financial returns go hand in hand. Rail technologists all over the world are unanimous that in the choice between diesel or electric traction, a clear break-even point always exists. Break-even level serves the purpose of a benchmark in that when traffic density is in the range of break-even level, a preliminary investigation could be made to see whether it is financially worthwhile to examine its feasibility. However, each project has to be surveyed, evaluated and appraised individually and separately. IR should revert back to the system where each electrification project is justified on the basis of level of traffic and financial return. More so, when the assumptions made in arriving at different costs/savings and the propriety of including or excluding some of the costs/savings in the financial evaluation are not always clear.

7. The justification of electrification projects is primarily based on savings in energy cost which can vary with fluctuations in International petroleum prices and foreign exchange saving which again depends on the position of foreign exchange reserve. With the volatility noticed in petroleum prices and movements in foreign exchange reserves, this is not an adequate and satisfactory method. It has necessarily to be linked to quantum of traffic, increase in capacity, better rolling stock utilization,

better speeds, reduced capital cost, lower maintenance cost, energy saving as a result of improved technology, etc. All these should be built in the project reports and the projects should not be treated as complete till these have been achieved. Since WDG4 and WDP4 diesel locomotives, and, WAG9 and WAP5 electric locomotives will be increasingly used in future, comparative assessment of the two systems of traction should, as far as possible, be made in relation to their standards of performance.

8. The Committee feels that there are certain specific and pertinent issues pertaining to a comparative study of the costs involved in the two systems of traction that need to be resolved, for undertaking a financial evaluation of a electrification project, viz.—

- ♦ excluding the cost (railways share) of electrification of sidings from the capital cost;
- ♦ excluding the cost of loco sheds for homing electric locomotives;
- ♦ excluding the cost of replacement/renewal of overhead electric installation;
- ♦ excluding cost of rehabilitation of electric locomotives;
- ♦ excluding the cost of modification to the existing signalling gear on account of electrification;
- ♦ equating one electric locomotive to 1.6 diesel locomotives rather than work out the actual requirements for the candidate section;
- ♦ practice of calculating the cost of maintenance of overhead electric installation on the basis of 000 GTKMs rather than on the basis of per kilometer and number of locomotives plying;
- ♦ allocation of cost of shunting operations, performed by diesel locomotives in electrified territory, to electric traction;
- ♦ allowing a blanket reduction of 2 per cent towards energy consumed by colour light signals and other equipment;

- ◆ including the cost of diesel power pack as a routine irrespective of ground realities;
- ◆ practice of calculating cost of maintenance of diesel locomotives in terms of per 1000 GTKM in electrified territory where they necessarily earn considerably less mileage;
- ◆ practice of working out cost of running repairs and maintenance of locomotives on the basis of 000 GTKMs rather than on the basis of per loco particularly when the scope of operation of diesel traction has got severely curtailed;
- ◆ with IR surplus of locomotives and electrification having, for the time being reached a point of saturation, should the total cost of full complement of diesel locomotives used on a section be taken into account or only the incremental costs of additional diesels required;
- ◆ suitable formula for escalating costs both under diesel and electric traction while evaluating electrification projects; etc.

9. Unless the change of traction is creating serious operational problems, necessitating a short extension of the electrified section, electrification projects should not be justified merely on the ground of elimination of detentions, Railways should evolve a formula to evaluate the severity of problem of movement through a change of traction point.

10. The Committee found that specific energy consumption for freight, and passenger services assumed while evaluating electrification projects cannot stand strict scrutiny. Now that WAG 9s have been equipped with energy meters, the norms prescribed earlier should be revised. In fact, besides WAG9s, each railway should equip at least a few electric locomotives of each type to study the pattern of energy consumption for different types of locomotives and for various services. And based on this build a data base and fix norms for typical section of varying grades and other characteristics as guidelines for future decision-making.

11. Adopting the methodology, the Railways have been using, the break even level of traffic in 53.64 gmt. per route kilometer per year. However, as the lead time for survey and implementation of a project are fairly lengthy, the Committee feels that Railways could initiate techno-economic feasibility surveys when a section attains a traffic level of 40 to 45 gmt. or even lower depending upon the peculiar features of the section concerned. But, in each case the BEL should be specifically worked out based on actual costs and not global (zonal railway or all railway) costs.

12. Line haul cost is an important component of expenditure and thereby an important unit cost. While line haul cost is worked out through an elaborate exercise, it suffers from a number of major weaknesses listed in the report highlighting the urgent need for an overhaul of the traffic costing system to develop it as an effective tool for financial and management decisions. Similarly, the compilation of statistics needs to be improved greatly.

13. The continuous tractive effort of the diesel locomotives is higher than those of the corresponding electric locomotives at lower speeds. And, while diesel locomotives provide more or less the same starting tractive effort as by electric locomotives for starting a train, the performance of electric locomotives is superior to achieve better acceleration and higher balancing speeds for the same trailing loads on account of higher horsepower rating. But the option of electric traction for a section/route can be exercised only when it is financially viable for a break-even level of traffic.

14. It has, however, to be understood clearly, and, unambiguously that irrespective of the transport characteristics of locomotives, these locomotives cannot achieve their potential till an all embracing systemic overhaul including induction of rolling stock capable of running at higher speeds; providing and maintaining track that would permit not only heavier axle loads and higher speeds but is also free of speed restrictions; adopting operational strategies that would permit long undisturbed runs, providing full complement of sub stations better signalling and telecommunication arrangements, etc. In short, the operational and infrastructural constraints have to be removed and appropriate conditions created to realize the full potential of these locomotives to haul heavier freight trains and longer passenger trains at higher average speeds.

15. The Committee feels that after the successful completion of an accelerated programme of electrification—thanks to the effective and efficient management of CORE—there is strong case to allow the position to consolidate, for gaining more experience, and, most importantly, for studying the financial and operational ramifications further in greater detail. With 35 to 40 per cent of broad gauge network electrified and 65 per cent of freight traffic and 50 per cent of passenger traffic carried by electric traction, the traction model mix favours the use of electric traction by an ample margin broadly conforming to the pattern of energy supply in the country.

16. The pace of electrification has to now necessarily slow down. More so, when the Indian Railways anticipate poor rate of growth (2.5% in terms of NTKMs) in the X Plan, and, the Railways and the country are facing acute scarcity of funds necessitating extreme caution in expenditure—both capital and revenue. The survival of Indian Railways call for financial prudence and conservative investment decisions. The Committee has therefore, recommended review of a few projects. The system of incremental planning followed on Indian Railways is best exemplified in case of Electrification Projects where for a considerable length of time, the entire work of initiating, processing and execution of electrification projects was entrusted to Central Organisation for Railway

Electrification. The process of consultation and discussion with others involved in the activity was totally abridged. While this has now been corrected in that Zonal Railways are now required to initiate proposals but during our discussion, it appeared that this correct procedure has not taken a firm foot hold. Board may ensure this.

17. As recommended by various important Committees in the past, Indian Railways should seriously look at the question of restructuring the present day cadres and their numbers with a view to reduce them and thereby avoid duplication of administrative and infrastructural facilities, curb the spirit of departmentalism, improve the quality of service and efficiency of the system, and, make it cost effective, competitive, the profitable in the emerging liberalised environment. The present day technologies used in rolling stock and management skills offer an excellent opportunity to form a unified cadre to look after traction—be it electric locomotives or diesel locomotives or multiple units—and other rolling stock.

18. As a result of departmental orientation of Indian Railways, their traction policy has got compartmentalized between diesel and electrical whereas the need is for an integrated traction policy whereby locomotives are not changed merely because of change in traction but an overall view is taken and the most beneficial arrangement adopted.

19. It is recommended that RDSO may gather information about electro-diesel locomotives and examine their suitability in Indian conditions. In fact, for financial considerations, Indian Railways may also be compelled to run diesels under wire in unviably low traffic density sections. This may be examined by the Board for sections like Ambala-Kalka.

20. Now that the areas of diesel and electric traction have been largely delineated, it is time that Indian Railways drew a motive power plan detailing the designs and numbers of different types of locomotives, and, considered combined diesel and electric loco sheds homing upto 300 locomotives. The Committee envisages that the Railways will have necessarily to go in for heavier freight trains and longer passenger trains and that they will need to develop the types of locomotives which can singly or in consist form (multiple operation), in conjunction with loco-trol technology to meet the transport requirements of traffic.

21. The possibility of introducing electric and diesel train sets on short inter-city routes like Delhi-Chandigarh (ETS) and Delhi-Amritsar (DTS) should also be seriously explored.

22. Other areas where a systemic view of things is required will include extensive use of hydraulic rerailling equipment in electrified territory, double stacking of containers, adopting the concept of overpowering of trains under diesel and electric tractions.

CHAPTER I
ELECTRIFICATION—PRESENT STATUS

1.1 The era of planned economic growth brought in its wake phenomenal increase in freight traffic on Indian Railways (IR). In the first decade (1950-51 to 1960-61) of planned economy, the tonnage lifted by IR increased by 68 per cent from 93 million tonnes to 156 million tonnes. But the transport effort nearly doubled from 44 billion net tonne kilometres to 88 billion net tonne km. Amongst the various measures taken by IR to modernize the system and to build capacity to carry the traffic generated by the economy was the induction of diesel (mid fifties) and electric (early sixties) traction. Since the switch over was from steam traction, this change over coupled with technological upgradation and other operational measures, yielded very handsome results in increasing speeds and loads of trains thereby facilitating running of larger number of trains, lifting higher volumes of traffic, and, improving tonne kilometres carried by facilitating trains with heavier loads. And, most importantly, at a reduced cost of operation. While the technical and operational superiority of diesel and electric traction and their financial advantage was never in doubt, it was considered that electric traction had an edge over the diesel traction on high density traffic routes. And, starting with Eastern and South Eastern Railways in early sixties, the electrification on the IR system progressed in stages at varying tempo as tabulated below:—

Year	Kilometre Electrified (Commu- lative)	Percentage of Broad Gauge System Electrified	Percentage of Traffic Carried by Electric Traction	
			Freight	Passenger
1	2	3	4	5
1950-51	388	0.7%		
1960-61	748	1%		
1970-71	3706	6%		
1980-81	5345	9%	28	25
1985-86	6517	11%	37	28
1990-91	9968	16%	46	40
1991-92	10653	17%	48	42

1	2	3	4	5
1992-93	11064	18%	52	45
1993-94	11260	18%	55	47
1994-95	11772	19%	57	47
1995-96	12306	20%	59	46
1996-97	13018	21%	60	46
1997-98	13490	22%	60	47
1998-99	13765	22%	60	47
1999-00	14261	23%	61	47
2000-01	14675	23%		

Note: At the time India gained independence, 388 Kilometres in Mumbai and Chennai areas were already electrified.

CHAPTER II

ENERGY SCENARIO

2.1 The energy scenario in India is dominated by Coal and Oil. Hydel and nuclear energy play a supplemental role. And, in keeping with the national scene, IR draws its energy mostly from Coal and Oil.

2.2 With consumption in the range of 300 million tonnes of oil equivalent, India is the sixth largest consumer of commercial energy. It is, however, 12.5 per cent of USA—the world's highest consumer—and 37 per cent. of China—the world's most populous country. The per capita use at about 280 kilograms is relatively low as compared to the world average of about 1430 kilograms.

2.3 India's coal reserves are estimated over 200 billion tonnes, though only about 82 billion are proven reserves. With annual production level of 300 million tonnes, the reserves will last for nearly seven centuries.

2.4 This explains the prominence of the thermal based production of electricity. It accounts for 75 per cent. of total production. The nineties saw a poor growth both in addition to power generating capacity and in improvement in plant load factor. The situation was further aggravated by high transmission and distribution losses, and, a distorted tariff structure—seriously affecting the performance of State Electricity Boards. This in turn affected the Indian Railways who are charged exorbitant rates varying from Rs. 1.90 P to Rs. 4.95 P with an all India average of Rs. 4.30 P and, one of the Important factors affecting the economics of electrification is the arbitrary tariffs that State Electricity Boards charge the Indian Railways. However, with the reforms initiated in the Power sector recently particularly the setting up of State Regulatory Commissions, there is a clear trend towards rectifying the distortions in the tariff structure. And, may be over a period of next ten years or so, Railways will be charged a correct price based on a rational tariff.

2.5 Moreover, once the Electricity Bill 2000 is enacted, the Railways can explore the possibility of obtaining power supply at economical rates directly from NTPC or Independent Power Producers (IPPs) or other private sources. Railways have with advantage made a beginning in this direction and should persist with it. And, again with the enactment of Electricity Bill 2000, Railways can plan captive power plants under joint venture arrangement without getting involved in managerial and other functions. Their only contribution should be capital. In both cases, the economics must favour Railways so that they do not end up throwing good money after bad money.

2.6 As compared to this, the Indian crude oil reserves at 645 million tonnes (as of April 2000) are likely to last for a couple of decades only. With the production of crude in the range of 30 odd million tonnes, the imports have sharply increased to 60 million tonnes or so. High speed diesel is the largest petroleum product produced in India, accounting for as much as 44 per cent of total production of petroleum products—even then it leaves a marginal deficit to be made good by imports. But given the current trends, India should become self-sufficient or even surplus in High speed Diesel in the next few years or so. The price of crude oil, and, consequently of petroleum products is, unfortunately, not determined by demand and supply position but mostly by events in the Middle Eastern countries. The Administered Price Mechanism (APM) followed in India had further distorted the price structure of petroleum products. However, with the recent deregulation and partial dismantling of the APM, the price of High Speed Diesel is now set at Import Parity Price. It is anticipated that the price in the foreseeable future would hover around Rs. 18 to Rs. 20 per litre provided political developments do not lead to extreme price volatility and exchange rate risk remains within tolerable limits. The APM is slated to be largely dismantled by March, 2002.

2.7 The Committee had discussed the energy scenario with the Ministries of Petroleum and Natural Gas, Power, and the Planning Commission and concluded that with the low level of consumption of energy by IR—electricity in the range of 2 per cent. and diesel in the range of 5 per cent—as compared to overall consumption in the country, energy as required would remain available to the Railways at affordable prices in the next decade or so. While the energy scenario may not be a determining factor presently, it should be reviewed from time to time.

CHAPTER III

BREAK EVEN LEVEL *versus* RATE OF RETURN

3.1 While dieselisation was a step towards modernization of traction system, electric traction was, in the initial stages, selectively introduced. As electrification progressed, the need for assessing the relative merits of diesel and electric traction was increasingly felt particularly in view of the capital cost involved in electrifying tracks. Since the gain in direct operating expenses under electric traction varies with the density of traffic, return on heavy capital investment required for providing infrastructure for electrification improves with the density of traffic. And, therefore, IR has, by and large, followed the practice of determining, from time to time, the break even point of traffic density beyond which electric traction may be preferable. It was necessary to adopt this practice for one the price relatives of critical inputs do not remain constant, and, secondly in the energy scenario obtaining in India. It was obvious that a situation of tight supply and high price would persist.

3.2 IR has in recent years (since 1996) given up the practice of using the concept of break-even level for initiating proposals for electrification or for perspective planning, and has adopted the internal rate of return concept (currently prescribed as 14 per cent) to consider financial viability of electrification projects. In fact, not only the norm of break even has been given up, but norms of operational requirements and financial justification have been severely diluted, as in several other investment decisions and projects. While the concept of break-even level may have a limitation or two like using the weighted average of the cost of electric supply for the entire network but the density of traffic cannot be ignored. A precept that does not take into account traffic level is neither rational nor desirable. Traffic levels and financial returns go hand in hand Break-even level provides a uniform methodology for evaluating projects. Rail technologists all over the world are unanimous that in the choice between diesel or electric traction, a clear break-even point always exists. Break-even level serves the purpose of a benchmark in that when traffic density is in the range of break-even level, a preliminary investigation could be made to see whether it is financially worthwhile to examine the feasibility of electrification after taking into account any operational, financial topographical, or technical features peculiar to the section under consideration. However, each project has to be surveyed, costed based on actual costs obtaining on the section, evaluated, and priced individually and separately. Needless to add that no electrification project irrespective of the traffic density, can be considered unless the financial return more than covers the cost of capital. IR should revert back to the system where

each electrification project is justified on the basis of level of traffic and financial return.

3.3 The arguments advanced against the concept of break even level (BEL) and response to them are given in juxtaposition below:—

S.No.	Argument	Response
1	2	3
1.	BEL to be an effective aid in prejudging justification of a project must approximate parameters of individual project which it does not.	BEL is merely an indicative tool as to when IR may undertake preliminary investigation to consider electrification of a section. It is not an absolute edict to prejudge the issue of electrification. It is a tool to assist management. BEL can always be worked for a few typical cases to serve as guidelines for different situations.
2.	BEL makes assumption about and uses all India values only.	Once BEL is available for typical cases which will also include sections with different power rates, the value of BEL is not diminished.
3.	BEL misses some project specific features e.g. savings due to avoidance of detention.	It is a facile argument. No electrification project takes into account detentions that it will introduce at change of traction points. If it were to, it will make a serious dent into financial return. And, figures of detentions can be easily manipulated.
4.	BEL misses some project specific features like operational and/or strategic consideration.	This is a management decision where neither BEL nor IRR plays any role.
5.	Very high BEL is unworkable	Here again management can apply correctives and take a decision.

1	2	3
6.	BEL cannot be applied for long periods as technological changes affects some of the basic parameters.	True. And, it is for this reason that BEL is worked out at regular intervals.
7.	BEL type approach is not followed in other spheres e.g. gauge conversion, doubling new lines, etc.	It is not so. Sound principles like physical limit to capacity to tranship to start planning for gauge conversion, stage at which a single line is considered as saturated for initiating doubling of a section, and traffic availability and other conditions for considering new lines have been laid down. Apparently this argument has been advanced for a large number of unremunerative works in these categories which have been thrust upon IR for political considerations. This is an aberration that does not change IR's inherently sound investment policy.
8.	It has not been put to use in the past.	There was no confirmation of this.

3.4 A host of factors influence the choice between diesel and electric traction — the principal being price relatives of critical inputs, standards of performance in terms of loads and speeds for the types of services obtaining on any particular section/routes, density of traffic, ruling gradient of the section/route, technical advantages or constraints, if any, reliability of equipment, availability of fuel/energy including position of foreign exchange, and most importantly, costs involved.

3.5 Any comparative assessment of the systems of traction can be made only in relation to costs and standards of performance in terms of loads and speeds for a given section with single or suitable combinations of diesel and electric locomotives that will optimize the performance.

3.6 Since extensive areas have already been electrified, it was not possible to select typical sections for such studies. In any case, such studies of typical sections can, at best, serve as benchmarks or

guidelines because actual conditions obtaining on any particular section cannot be replicated in such studies. As such, even though discrepancies do tend to get evened out, while considering proposals for electrification of any section/route, specific project studies would have to be undertaken keeping both guidelines — technical, operational and financial — and actual ground conditions in view.

3.7 While adequate level of traffic and positive financial return are the main planks on which electrification projects are based, there is a need to reorient the approach towards formulation of these projects. The justification of electrification projects is primarily based on saving in energy cost which can vary with fluctuations in international petroleum prices and foreign exchange saving which again depends on the position of foreign exchange reserves. With the volatility noticed in petroleum prices and movements in foreign exchange reserves, this is not an adequate and satisfactory method. It has necessarily to be linked to quantum of traffic, increase in capacity, better rolling stock utilization, better speeds, reduced capital cost, lower maintenance cost, energy saving as a result of improved technology, etc. All these should be built in the project reports and the projects should not be treated as complete till these have been achieved. The implementation and operation of projects should be monitored till all these benefits are achieved.

3.8 In addition, there are certain specific and pertinent issues pertaining to a comparative study of the costs involved in the two systems of traction that need to be resolved for undertaking financial evaluation of a electrification project. Some of these are:—

- ◆ excluding the cost (Railways' share) of electrification of sidings from the capital cost;
- ◆ excluding the cost of loco sheds for homing electric locomotives;
- ◆ excluding the cost of replacement/renewal of overhead electric installation;
- ◆ excluding the cost of rehabilitation of electric locomotives;
- ◆ excluding the cost of modification to the existing signalling gear on account of electrification;
- ◆ equating one electric locomotive to 1.6 diesel locomotives rather than work out the actual requirements for the candidate section;
- ◆ practice of calculating the cost of maintenance of overhead electric installation on the basis of 000 GTKMs rather than on the basis of per kilometer and locomotives plying;
- ◆ allocation of the cost of shunting operations, performed by diesel locomotives in electrified sections, to electric traction;
- ◆ allowing a blanket reduction of 2 per cent towards energy consumed by colour light signals and other equipment;
- ◆ including the cost of diesel power pack as a routine irrespective of ground realities;

- ◆ practice of calculating cost of maintenance of diesel locomotives in terms of per 1000 GTKM in electrified territory where they necessarily earn considerably less mileage;
- ◆ practice of working out cost of running repairs and maintenance of locomotives on the basis of 000 GTKMs rather than on the basis of per loco particularly when the scope of operation of diesel traction has got severely curtailed;
- ◆ with IR surplus of locomotives and electrification having, for the time being, reached a point of saturation, should the total cost of full complement of diesel locomotives used on a section be taken into account or only the incremental cost of additional diesels required;
- ◆ a suitable formula for escalating costs under both diesel and electric traction while evaluating electrification projects; etc.

3.9 Since WDG4 and WDP4 diesel locomotives, and WAG9 and WAP5 electric locomotives will be increasingly used in future, comparative assessment of the two systems of traction, should as far as possible be made in relation to their standards of performances.

3.10 Unless the change of traction is creating serious operational problems, necessitating a short extension of the electrified section, electrification projects should not be justified merely on the ground of elimination of detentions. Railways should evolve a formula to evaluate the severity of problem of movement through a change of traction point. It may critically examine the formulae suggested in earlier reports.

3.11 Similarly, arguments like electrification will meet strategic considerations — now extremely doubtful after the experience in Kosovo war — and the economic fall out of food security arrangements, enhance capacity for carrying pilgrim and tourist traffic, give a fillip to industrial development, and ensure traction synergy with adjoining sections, etc, as advanced in the case of Ludhiana-Amritsar electrification project can, at best, supplement and operationally and financially viable project but cannot form the basis for electrifying a section.

3.12 The specific energy consumption for freight, mail/express, and passenger services assumed while financially evaluating electrification projects cannot stand strict scrutiny. Now that WAG 9s have been equipped with energy meters, the norms prescribed earlier should be revised. In fact, besides WAG 9s, each railway should equip at least a few electric locomotives of each type to study the pattern of energy consumed by different types of locomotives for various services. And, based on this, build a data and fix norms for typical sections of varying grades and other characteristics as guidelines for future decision-making.

3.13 As the assumptions made in arriving at different costs/savings and the propriety of including or excluding some of the costs/savings in financial evaluation are not transparent, the adoption of only the internal

rate of return method cannot be recommended. There can be no better example of this that the financial appraisals of the Jolarpettai-Arakkonam electrification project given to the Committee. As against 16.26 per cent return worked out at project estimate stage, the electrical group has now worked out the interm rate of return as 30.24 per cent, the mechanical group has assessed it between 7.2 & 9.8 per cent under one set of assumptions and between negative to less than 2 per cent under another set of assumptions, and the financial group has estimated it to be 9.05 per cent without taking savings into account beyond 2001 and 15.97 per cent with savings (at the same level as in 2001) taken into account upto the end of the project life. However, with the conversion of Ranigunta-Tirupati Pakala-Katpadi metre gauge section to broad gauge, some traffic presently moving on Arakkonam-Jolarpettia section will get diverted on to the new broad gauge route affecting the volume of traffic moving on Arakkonam-Katpadi section and the financial return of the project.

3.14 And, the same revaluation exercise has clearly brought out the importance of taking into consideration the level of traffic. While assumptions made in respect of costs and savings have gone away but with freight traffic surpassing the anticipated level and coaching traffic—which is costlier to move by electric traction—not increasing as per the forecast, the financial return has remained positive. Some Important figures are given below:—

Item	Estimated Value	Actuals in 1999-2000	Percentage variation
Project Cost	Rs. 30.0 cr	Rs. 30.0 cr. (as per the completion report)	10
Traffic in billion GTKM			
Freight	3.7	4.6	24
Coaching	2.7	2.5	-7
Operating Cost (in Rupees Crores)			
Electrical	4	50	1150
Diesel	8	52	550
Savings (in Rupees Crores)	4.2	2.2	-48

Note: While it was assumed that the operating costs under diesel traction would be double that of electrical, it actually turned out to be only 4 per cent higher. Similarly, the savings are 50 per cent of the anticipated savings. However, these would undergo a change in later years due to steep increase in the price of diesel and 7.5 per cent increase in the electric tariff.

CHAPTER IV

BREAK EVEN LEVEL OF TRAFFIC

4.1 Break-even level in case of two alternatives (diesel and electric traction) is the level of traffic (measured after comparing costs for different levels of traffic) at which their total line haul costs become the same. The alternative with higher investments—in this case electric traction—would become more viable above this level of output.

4.2 The cost components of any system of traction includes capital costs, maintenance costs, fuel costs, and operational costs. Electric traction involves higher capital cost but beyond a certain level of traffic the running costs are lower than diesel traction resulting in operational savings. In other words, as the traffic volumes increase, electric traction should become more economical till it results in lower costs after allowing for capital and allied costs. This then becomes the break even level of traffic. This is the minimum initial level of traffic where allowing for the assumed growth of traffic the (net present value) NPV of total savings will equal to the NPV of additional costs due to electrification at a given rate of discount.

4.3 The Committee has worked out a simple formula to explain the concept of Break Even Level of traffic. It is explained below:—

Line Haul cost is composed of two components:—

- (i) Fixed cost which is dependent on interest and depreciation of the cost of infrastructure.
- (ii) Variable cost which is dependent upon the cost of operation and maintenance of the system at a particular traffic density level.

Now, if Y_1 & Y_2 are the haul costs of Electric & Diesel traction, A_1 & A_2 are the fixed costs and, B_1 & B_2 are operation and maintenance costs for electric & diesel traction respectively for a traffic density level of X which will obtain at the time of commissioning of an electrical project, then

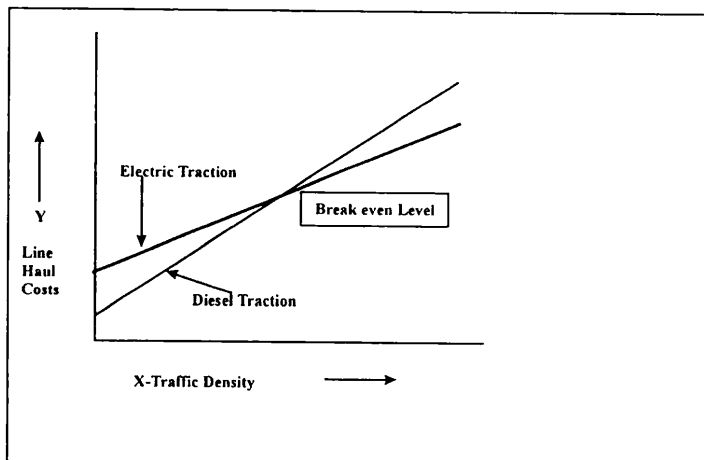
$$Y_1 = A_1 + B_1X$$

$$Y_2 = A_2 + B_2X$$

To determine BEL for electric traction

$$Y_1 = Y_2 \text{ or } A_1 + B_1X = A_2 + B_2X \text{ or } X = \frac{A_1 - A_2}{B_2 - B_1}$$

This is graphically represented below:—



4.4 Since this value of X is the estimated level of traffic at the time of commissioning of electrification project, the value of X will have to be calculated at different points of time along with relevant values of A1, A2, B1 & B2 based on the anticipated growth of freight and passenger traffic and costs during the life span of the project of 30 years. This equation has the advantage of automatically taking into account the sensitivity of the Break Even Level to A1, A2, B1 and B2. As B2 approaches B1 in value due to efficiency of diesel operation or technological upgradation, the BEL will increase. The Committee has not tested this equation under real conditions.

4.5 Due to limitation of time, lack of resources and facilities for field work, doubtful quality of line haul costs, absence of typical sections for selection, and difficulty in locating suitable independent experts, the Committee undertook a comparative study based on all-India average parameters as given in Annual Statistical Statements, Budget and Plan documents. The methodology used is about the name that the Railways have been using.

The parameters adopted in this exercise are tabulated below:—

	Diesel	Electric
Repair & Maintenance Cost per 1000 GTKM	Rs.16.91	Rs. 9.52
Specific Fuel/Energy consumption per 1000 GTKM		
Freight SFC/SEC	2.96 lit.	8.28 Kwh
Passenger SFC/SEC	4.82 lit.	20.6 Kwh
Price (Diesel per litre)/(Electric per Kwh)	Rs. 16.20	Rs. 4.38
Price of Lube Oil per litre	Rs. 54.27	Rs. 54.27

In addition, the following assumptions, based on X-Plan document, have been made:—

Cost of Electrification	Rs. 65 Lakh per kilometre
Growth Rates	
Freight	2.5% per annum
Passenger (Non-suburban)	5.8% per annum
Percentage of BG GTKMs	
Freight	60
Passenger	40

4.6 With these parameters and assumptions the break-even level works out to 53.64 gmt per route km per year.

The calculations made on the basis of total switch over to Diesel or Electric traction are tabulated below:—

Savings per 1000 GTKM			
	Diesel	Electric	Savings
1	2	3	4
	16.91	9.52	7.39
A. Repair and Mtc. Cost per 1000 GTKM			
B. Operating cost per 1000 GTKM			
B.1 Fuel/energy cost per 1000 GTKM			
Goods			
SFC	2.96	8.28	
Price	16.20	4.38	
Cost per 1000 GTKM	47.95	36.27	11.69
Passenger			
SFC	4.82	20.6	
Price	16.20	4.38	
Cost per 1000 GTKM	78.08	90.23	-12.14
B.2 Lube Oil cost per 1000 GTKM			
Goods			
Consumption per 1000	0.0719	0.004754	
GTKM	54.27	54.27	
Price	3.90	0.26	3.65
Cost per 1000 GTKM			
Passenger	0.0727	0.010399	
Consumption per 1000	54.27	54.27	
GTKM	3.95	0.56	3.38
Price			
Cost per 1000 GTKM			

1	2	3	4
C. Net Savings per 1000 GTKM			
	Goods		22.72
	Passenger		-1.37
NPV of total savings per 1000 GTKM			
Goods			
	Saving per 1000 GTKM		22.72
	Ratio of goods traffic		60%
	Factor B	8.147150	
	NPV of savings per 1000 GTKM		111.54
Passenger			
	Saving per 1000 GTKM		-1.37
	Ratio of Passenger traffic		40%
	Factor A	10.1098	
	NPV of savings per 1000 GTKM		5.52
	Total NPV of savings per 1000 GTKM		106.02
D.	No. of Additional Electric Locos Required		2436
	No. of Additional Diesel Locos Required		3563
	Cost of Additional Electric Locos (Rs. in Crores)		9744
	Cost of Additional Diesel Locos (Rs. in Crores)		14253
	Savings (Rs. in Crores)		4609
E. Shed Cost for Horning Additional Locomotives			
E.1.	Additional Cost of Electric Shed (Rs. in Crores)		
	No. of Additional Locos		2436
	No. of Locos to be condemned		94
	No. of Locos net Addition to Holding		2342
	Infrastructural Cost for Additionl Holding (Rs. in Crores)		570
E.2	Additional Cost of Diesel Shed (Rs. in Crores)		
	No. of Additional Locos		3563
	No. of Locos to be Condemned		263
	No. of Locos net Addition to Holding		3300
	Infrastructural Cost for Additionl Holding (Rs. in Crores)		1270

	Savings (in Crores of Rs.)	700
	Savings per Route Km. towards Loco Costs on Rs. 1013358 Accounts of Electrification	
	Savings per Route Km. towards shed cost on account of addition to holdings	Rs. 157234
F.	Cost of Electrification per Km.	Rs. 6500000
	Residual Value	Rs. 650000
	NPV of Residual Value	Rs. 81423
G.	Cost of Maintenance of OHE per Km/Year	Rs. 116767
	Cost of Maintenance of OHE for 30 years	Rs. 3503023
	NPV of Cost of Maintenance of OHE per Km. for 30 Years	Rs. 438808
	Break Even Level (GMT/Route Km./Year)	53.64

Note:—

- (i) Factor A is the sum total of the discounting factors for cost savings in individual years, over 30 years of the project life, in relation to the savings of costs on passenger operations on electrification.
 - (ii) Factor B is the sum total of the discounting factors for cost savings in individual years, over 30 years of the project life, in relation to the savings of costs on freight operations on electrification.
- Both factors will increase if a lower rate of return is adopted. Both factors will increase if higher rate of growth of passenger and freight traffic are adopted.
- (iii) The Project life has been taken as 30 years.
 - (iv) The discounted rate has been taken as 14%.

4.7 With these parameters and assumptions the Break even level works out to 53.64 GMT per route km per year. However, since there are many variables like price, share of traffic, rate of growth, the break even level can shift upward or downward depending upon which factor or combination of factors change. For example, other factors remaining constant:—

- if there is 10 percent reduction in the price of Lube Oil, the break even level will be 55.28 gmt. However, if the price rises by 10 percent, the break even level will be 52.00 gmt;
- if the price of diesel rises to Rs. 20 per litre the break even level will be 24.22 gmt. and, if this is accompanied by electric charges moving upto Rs. 5 per kwh. the break even will be 35.92 gmt;
- if the passenger traffic increases at the rate of 6.5 percent with freight growth remaining 2.5 percent, the break even level will be 53.77 gmt;

- if the freight traffic increases at the rate of 4 per cent per annum with passenger growth remaining 5.8 percent, the break-even level will be 48.5 gmt;
- if the freight traffic grows at 4 per cent and passenger traffic at 6.5 percent, the break even level will be 48.61 gmt.;
- if the costs of loco maintenance (both diesel and electric) as well as of the maintenance increase by 5 percent, the break even level will be 52.22 gmt;
- if the costs of locos, additional shed capacities, and of electrification increases by 5 percent, the break even level will be 56.11 gmt;
- if the costs of locos, additional shed capacities, electrification, loco and the maintenance increases by 5 percent the break even level will be 54.62 gmt;
- if the electric traction carries 65 percent of freight and 50 percent of passenger traffic, the break even level.
 - With 5 percent increase in the costs of loco maintenance and the maintenance will be 62.08 gmt;
 - With 5 percent increase in the costs of locos, additional shed capacity and of electrification, the break even level will be 66.79 gmt;
 - With 5 percent increase in the costs of loco and the maintenance as well as in the costs of locos, additional shed capacity, and electrification, the break even level will be 64.97 gmt;
- if electric traction carries 65 percent of freight and 50 percent of passenger traffic with X-Plan growth rates and loco utilization indices but SFC at 2.94 litres and SEC at 10.36 kwh per 1000 GTKM freight, the break even level will be 63.8 gmt.

4.8 The break even level established under any set of parameters and assumptions cannot be taken as the point at which a section should be electrified. Different sections have their own peculiarities pertaining to topography, volume and nature of traffic, train mix cost of electric energy, etc. which affect the cost of operation. A break even level should be taken as a broad guideline to select sections/routes which could be studied and investigated to see whether electrification is a financially viable proposition. Unless the remunerativeness of electrifying a section is established beyond doubt after taking into account all the factors, a section should not be taken up for electrification.

4.9 As the lead time for survey and implementation of a project are fairly lengthy, the Committee feels that Railways could initiate techno-economic feasibility surveys when a section attains a traffic level of 40 to 45 gmt or even lower depending upon the peculiar features of the section concerned. But, in each case the BEL should be specifically worked out based on actual costs obtaining on the candidate section, and not global (zonal railway or all railway) costs.

CHAPTER V LINE HAUL COSTS

5.1 As the inadequacies of the unit costs worked out on the Indian Railway System started showing up in the post-independent era, a traffic costing system was designed/evolved for working out unit cost of freight and coaching services and allied areas. While the system as it obtains provides some data for cost analysis, it needs to be reviewed in depth to make it conform to commercial accounting principles, to adopt concepts useful for internal cost control, to facilitate detailed analysis of specific traffic costing situations, etc. In short, to develop it as an effective tool for financial and management decisions.

5.2 Line haul cost is an important component of expenditure and thereby an important unit cost. While line haul cost is worked out through an elaborate exercise, it suffers from certain infirmities which cast doubts on its reliability and consequent use for taking major decisions. Some of the important and major weaknesses are mentioned in the following paragraphs:—

- (i) The quality of basic data whether actual expenditure data or statistical data used as input for the traffic costing system is not entirely reliable. For instance, wrong allocations are not unusual for lack of adequate checks and balances to ensure absolute accuracy in the booking of expenditure and distribution of joint costs. And, since expenditure booked to selected and specific heads of accounts is used to work out line haul costs, wrong booking skews the results and make them more of estimates than anything else.
- (ii) The situation is compounded by the poor quality of statistical data used for the calculation of line haul costs. Statistical parameters and units required for the calculation of line haul costs mainly consist of operating statistics obtained by processing of Combined Train Reports (CTRs). Firstly all CTRs are not received implying that cent per cent data is not processed. Secondly, the number of CTRs generated is so large that it makes the work voluminous and tedious. In this situation, with the work culture obtaining Indian Railways, no one can vouchsafe for the accuracy of even computed generated statistics based on CTRs. The Board can look at the computer based operating statistics system developed by South Eastern Railway. It appears to eliminate the present day inaccuracies. It should be integrated with FOIS for on line accurate data. Some statistics are obtained from respective departments

where it is not uncommon for data to be doctored and for biases to creep in.

- (iii) There are reasons to believe that there are kinks in the system giving rise to inconsistencies in the calculation of line haul cost. If these are remedied, it could give a far better quality line haul cost figure.
- (iv) The norms and proportions adopted for the distribution of costs between running and other than running heads, appear illogical and need a re-look. For example, the apportionment between running and shunting heads for appropriations to DRF and the dividend payable is done on the same proportion as the number of locos on train running and shunting duties whereas train locos also carry out a lot of shunting. With the introduction of engine-on-load system of working, this distinction is further blurred.
- (v) There is a time lag in the transfer of capital expenditure incurred on electrification to the Zonal Railways. A large amount (over Rs. 4,000 crores) has been retained in the books of RE organisation. While IR is paying dividend on this borrowed capital, this dividend liability is not being reflected in the line haul cost calculations of the Zonal railways. The non-transfer of this capital to the Zonal railways also skewed the provision of DRF, based as it is, on capital on books as well as the burden of DRF on electric traction line haul costs.
- (vi) The cost of depreciation of assets acquired under DRF is not taken into account in line haul costs and to that extent distort the line haul costs. This is very pronounced in case of diesel locomotives for a large number of them have been financed through DRF. Similarly, the mid-term rehabilitation of diesels is also charged to DRF.
- (vii) The ratios adopted for the allocation of cost of repairs and maintenance between Goods and Coaching services are as under:

Engine Hours	— 25%
Engine Kms	— 25%
Engine on line	— 50%

The genesis of adopting these ratios is not known. Since the most predominant element is locomotive unit kilometers, it would appear Engine kilometers should be taken as the basis of distribution of repairs and maintenance expenses between passenger and goods services.

- (viii) The consumption of electricity by different classes of traffic — freight, passenger, suburban — is an important consideration governing economics of electrification. The consumption is presently calculated on the basis of a formula mooted by RDSO in 1976 whereby consumption by freight services is derived by deducting the estimated consumption by passenger including suburban services. This formula appears to be seriously flawed. For example, in one instance in October 1995 it was revealed that by adopting the prescribed standards for distributing electricity consumed by different services, no energy was left for allocation to goods services in the D.C. territory of Central Railway. Subsequently, even after the revision, it was found that actual specific energy consumed in the case of D.C. EMU services varied considerably from the revised standard thereby distorting the energy consumed by goods services. A formula that gives such unrealistic picture of electric consumption by different services needs to be given up in favour of reliable energy meters. It is a pity that efforts initiated over thirty years ago in 1970 to provide energy meters have been allowed to languish. The need for providing energy meters can not be over emphasized. The Railways must pursue the matter purposefully and vigorously and provide energy meters in a time bound frame.
- (ix) The ad hoc manner in which appropriations to DRF are decided not only delays/postpones replacement of over-aged or worn-out assets, but also results in the values of line haul costs being kept low artificially. Similarly, deferment of dividend payments does not get reflected in the costs. Only the amount of dividends actually paid is taken in the calculation of line haul costs. Again this gives a lower, and therefore incorrect, line haul cost figure.
- (x) The cost of mid-life rehabilitation of diesel locos, carried out at DCW, Patiala, is being booked to Demand 16 and not to revenue heads. Similarly, while the rehabilitation of OHE is also being booked to Demand 16, the cost of rehabilitation of electric locomotive is being neglected in both cases, the expenditure is not getting reflected in the line haul costs.
- (xi) The survey ratios, which are the basis of apportioning shunting costs among marshalling, terminal, etc. activities have not been revised since 1984 whereas they are to be re-worked every ten years. The system should be capable of automatically triggering such reviews.
- (xii) As DMUs & MEMUs consume higher energy compared to conventional passenger trains, the cost of fuel and energy for these services should be separately calculated.
- (xiii) The computation of GTKMs that have an important bearing on

line haul cost need to be corrected in case of freight trains hauled by consists (multiple operation). Similarly for computing GTKMs earned by locomotives hauling passenger trains on the basis of standard formation of passenger trains ignoring the actual lengths of trains of higher weight of AC coaches needs to be corrected.

- (xiv) The practice of reducing 2 per cent of electric energy consumed by electric traction towards consumption by colour light signals and other associated equipment needs to be looked into for arrangements to normally draw power for signals, etc. from local source of power supply obtain at stations and power from overhead equipment is required to be tapped only in case of failure of local supply — mostly, State Electricity Boards. It is learnt that RDSO has also undertaken a project for “Development of Integrated Power Supply” for way side stations to provide reliable power supply.
- (xv) An element of cost of upgrading track to make it fit for faster passenger trains and heavier loads should be included in line haul costs.
- (xvi) With the computerization of the system, it should be possible to work out line haul costs class-wise in case of passenger traffic and commodity-wise in case of freight traffic.
- (xvii) While the costs of colour light signalling is excluded from the cost of electrification, it is felt that the cost of modification to the existing signalling gear on account of electrification should be charged to electrification projects.
- (xviii) The apportionment of IRFC lease hire charges between diesel and electric locomotives on the basis of their relative holdings is not rational. It would be more appropriate to distribute it on the basis of actual investments in diesel and electric locomotives as, it is learnt, is being done in the case of coaches and wagons.
- (xix) Further, while dividend (interest) on capital at charge — to the extent information is available — is taken into account for calculating line haul costs, no element of IRFC charges is debited to line haul costs (traction). This lacuna needs to be rectified for it results in unnecessary underestimation of line haul costs.

5.3 Line haul costs as worked out presently does not necessarily reflect the true picture for it is averaged out for the entire zonal railway. The system should make it possible to calculate line haul costs for different systems of tractions based on actual costs obtaining on different sections; for different loads and speeds separately for freight and passenger trains; separately for different classes of passengers and different commodities, for each section.

5.4 While the weaknesses mentioned suggest the obvious remedies, the need to thoroughly review and overhaul the traffic costing system and

compilation of statistics cannot be over-emphasised. It is necessary to adopt the latest techniques in activity-based costing and allocation of joint costs to achieve better accuracy and reliability in the calculation of line haul costs. This is all the more essential as IR will have to increasingly depend on such cost figures for taking investments, rating and related decisions in the competitive environment being ushered in by liberalization of economy.

CHAPTER VI

TRANSPORT CHARACTERISTICS OF DIESEL AND ELECTRIC LOCOMOTIVES

6.1 Indian Railways have been manufacturing Diesel and Electric locomotives since 1964 & 1967 respectively at Diesel Loco Works (DLW) and Chitranjan Loco Works (CLW). They have developed capacity to produce 150 each diesel and electric locomotives. And, have, over the years, improved the designs — both in terms of performance and reliability — of locomotives, and, are manufacturing diesel locomotives of 3100 HP and electrics of 5000 HP. However, with the import of state-of-the-art high powered diesel (GM/USA) and electric locomotives (ABB/Switzerland) with transfer of technology, DLW is moving on to manufacture 4000 HP diesel locomotives — WDP4 for passenger and WDG4 for freight services, and CLW has commenced manufacturing 6000 HP electric locomotives-WAP5 for passenger and WAG9 for freight services.

6.2 The salient features of different types of diesel and electric locomotives in use, are tabulated on the next page.

6.3 It may be seen from the table that the continuous tractive effort of the diesel locomotives is higher than those of the corresponding electric locomotives at lower speeds. And, that while diesel locomotives provide more or less the same starting tractive effort as by electric locomotives for starting a train, performance of electric locomotives is superior to achieve better acceleration and higher balancing speeds for the same trailing loads on account of higher horse power rating. The other areas — technical, operational, and, financial — where the comparative merits and demerits of diesel and electric traction are so well known and undisputed that they need not be reiterated here. However, as discussed above, the option of electric traction for a section/route can be exercised only when it is financially viable for a break-even level of traffic.

6.4 It has, however, to be understood clearly, and unambiguously that irrespective of the transport characteristics of locomotives, these locomotives cannot achieve their potential till an all embracing systemic overhaul including induction of rolling stock capable of running at higher speeds; providing and maintaining track that would permit not only heavier axle loads and higher speeds but is also free of speed restrictions; adopting

operational strategies that would permit long undisturbed runs; providing full complement of sub-stations; facilitation drawal of full voltage by electric locos; better signalling and telecommunication arrangements, etc. is undertaken. In short, the operational and infrastructural constraints have to be removed and appropriate conditions created to realize the full potential of these locomotives to haul heavier freight trains and longer passenger trains at higher average speeds.

COMPARATIVE PERFORMANCE OF DIESEL AND ELECTRIC LOCOMOTIVES

Parameters Weight(t)	Imported				Imported				Authority			
	WDM2	WAG5	WDG4	WAG9	WDP2	WAP4	WDP4	WAP5		WDG2	WAG7	WAM4
HP	11208 2600	118.8 3850	120 4000	123 6120	117 3100	1128 5000	117 4000	75 5440	123 3100	123 5000	112.0 3640	
Traffic Effort (t)												
Starting	30.45	33.6	53	46.8	29.25	30.8	27.54	26.3	40.6	44	32.20	
Continuous	27.3 at 19.8 Km/h	20.6 at 50.5 Km/h	40.5 at 22.5 Km/h	33.1 at 50 Km/h	19.95 at 32 Km/h	18.8 at 72 Km/h	20.4 at 22.5 Km/h	22.4 at 50 Km/h	31.92 at 20 km/h	30.8 at 43 km/h	17.8 at 58 Km/h	
Time Taken to attain 100 KMPH (Min.)												
18Coach	14.4	NA	NA	NA	8.20	4.20	4.65	3.58	NA	NA	5.51	
151CF+3AC2												
21 Coach	Unable	NA	NA	NA	11.60	5.80	6.85	4.98	NA	NA	8.40	
171CF+4AC2												
24 Coach	Unable	NA	NA	NA	16.73	5.80	6.85	4.96	NA	NA	8.40	
201CF+4AC2												
Time Taken to attain 110 KMPH (Min.)												
18 Coach	Unable	NA	NA	NA	12.47	5.00	5.96	4.20	NA	NA	7.50	
151CF+3AC2												
21 Coach	Unable	NA	NA	NA	30.60	6.10	7.60	5.16	NA	NA	10.00	RDSO TC. 70
171CF+4AC2												2000 DT
												12.10.00 Letter
												No EC / 31 39 / 1

24 Coach	Unable	NA	NA	NA	Unable
20ICF+4AC2					
Time taken to attain 30 Km / h on level (min) with 4700t load	4.15	4.36	2.04	2.58	NA
Time taken to attain 50 Km / h on level (min.) with 4700t load	11.50	7.96	5.20	4.46	NA
Time taken to attain 75 Km / h on level (min.) with 4700t load	Unable	19.23	18.30	18.15	NA
Balancing speeds achievable to haul 4700t					
Level	61	80	85	100	NA
1:500	31	59	53	83	NA
1:200	*	*	29	5	NA
1:500	*		23	Cannot Start	NA
					NA-Not Applicable

7.10	9.45	6.00	NA	NA	13.60
NA	NA	NA	2.81	2.89	5.45
NA	NA	NA	7.95	5.08	9.53
NA	NA	NA	Unable	11.23	Unable
					RDSO TC. 70 Dt 14.11.00 Latter ECG3.1.391
NA	NA	NA	69	92	NA
NA	NA	NA	39	70	NA
NA	NA	NA	.	40	NA
NA	NA	.	.	NA	

*Unable of Start

CHAPTER VII

PRODUCTIVITY REVIEWS

7.1 The Committee had planned Productivity Reviews of three electrification projects namely, Vijayawada-Balharshah, Arakkonam-Jolarpettai and Itarsi-Nagpur, to assess whether the benefits that had been initially anticipated in the Project Reports have actually materialised or not. However, it ended up with only two reviews for information about Itarsi-Nagpur project did not become available to it.

7.2 The Zonal Railways concerned had been requested to conduct the Productivity Reviews in advance of the Committee's visits to these railways. The Committee discussed the reviews with the General Managers and Heads of Departments concerned during their visits. And, based on these discussions, the Zonal Railways revised the earlier reviews. It is these final results that have been incorporated in this Report in view of the extremely divergent views expressed and varying conclusions arrived at General Managers of the Zonal Railways were intimately associated with the reviews.

7.3 **Vijayawada-Balharshah Electrification Project:** The project was approved in 1981-82 at a cost of Rs. 7675 crores. It was completed in 1988-89. The electrification of branch lines was undertaken in 1995-96. However, the actual net cost incurred was Rs. 150.96 crores including Rs. 13.46 crores towards the cost of colour light signalling and Rs. 9.93 crores the cost of electric loco shed. The cost excluding these two items is Rs. 137.57 crores. In addition, another Rs. 7.79 crores was spent towards the electrification of branch lines making a total of Rs. 145.36 crores and including the cost of electric loco shed the cost will aggregate to Rs. 155.29 crores. Subsequently, 16 sidings were electrified between 1995 and 1999. The cost or rather the Railway's share of the cost of electrifying these sidings is not readily available. Based on the information available with the Zonal Railway, the Productivity Review has assumed the cost as Rs. 130.39 crores.

7.4 In order to clarify doubts and remove the apprehensions expressed by the officers of the electrical and mechanical departments, South Central Railway authorities conducted actual field trials with diesel (WDG2 Locomotives) and electrical (WAG7 Locomotives fitted with load meters) hauling loaded and empty BOXN & BCN rakes on BZA-BPQ Section.

7.5 The Productivity Review has been conducted partly based on the published statistics and partly by adapting the results obtained during the trials for the last few years. While the cash flows remained consistently negative, it yielded the following broad conclusions:—

- (i) the cost of maintenance of AC locomotives based on the cost per loco is 4.0 per cent less than that of diesel locomotives;
- (ii) AC Locomotives can attain higher speeds (approximately 13 per cent) over diesel locomotives. The comparative average speeds achieved during the trials were 46 kmph in case of diesels and 53 kmph in case of electrics. Higher electric speeds could yield a 5 to 7 per cent increase in line capacity. This was, however, not pertinent in this case for the section is running below capacity as the line capacity had been increased by doubling, provision of intermediate block sections, Kazipet chord line, Dornakal bye-pass, etc.;

NOTE: While the results are both encouraging and informative, the published statistics do not bear this out. The speeds for a few selective years on BZA-BPQ section are given below:—

Type of Locomotive	1988-89	1989-90	1994-95	1997-98	1999-00
Diesel	21.1	17.2	21.3	24.2	24.3
Electric	21.0	18.2	20.7	25.1	24.1

- (iii) Better-speed would also reduce the number of electric locomotives required for a given level of freight traffic;

NOTE: The loco requirement worked out to 74 electric versus 83 diesels giving a ratio of 1:1.12 against 1:1.2 worked out by an earlier Committee and 1:6 being projected now.

- (iv) Higher speeds will also result in lesser holding of wagons for a given number of trains run on a section. In this case, it gives a financial advantage of Rs. 50 lakhs per annum; and, most importantly.

- (v) The specific energy consumption on freight trains (AC traction) is much more than given in the Annual Statistical Statement (ASS) whereas the specific fuel consumption for diesel trains was found to be much less than given in the ASS.

These are tabulated below:—

Type of locomotive	As per ASS for 1999-00	As per trials	Percentage variation
Diesel			
Diesel	3.20	2.94	-8.8
Electric	7.75	10.36	+33.7

- (vi) The return works out to be (-) 2 percent.

NOTE: The return will change but marginally if it is worked out on the basis of present day costs of diesel (Rs. 17 per litre) and electric (Rs. 4.60 per kwh) realistic cost of Project taking into account some of the exclusions; and, realistic operational and maintenance costs. Even under the most optimistic estimate, it will not be a remunerative project. It is interesting that CORE has worked out the return as 15.87 percent and the Electrical Directorate as 10.84 percent.

7.6 The Railway has attributed the loss — rather negative results — to high tariff for electricity. It was assumed to be fifty (50) paise per KWH in the Project Report as against Rs. 4.60 being paid. However, another disconcerting feature is that the traffic mix as it has emerged affects the Project adversely. While there has been a sharp increase in passenger services which are not only costlier to haul by electric traction but also loss making, the freight traffic which involves considerable empty running has increased rather modestly. A disproportionately large percentage—40 to 55—of line capacity is being eaten away by passenger services. This is given in the table below. There is need both to check the indiscriminate increase of passenger services and to rationalise the pattern of services.

Section	BPQ-BPA		BPA-KZJ		KZJ-DKJ		DKJ-BZA	
	Pass.	Goods	Pass.	Goods	Pass.	Goods	Pass.	Goods
1980-81	9	7	9	16	16	14	15	13
1984-85	10	8	10	16	17	14	19	15
2000-01	18	11	18	18	24	16	24	16
Capacity	40					44	47	

7.7 Arakkonam-Jolarpettai Electrification Project: The salient features of the Productivity Review have been given in an earlier chapter. While the project may fall marginally short of the remunerative return of 14 per cent, it will always yield a positive return. This project has brought out the importance of the traffic mix in that in spite of estimates of costs and savings having gone away, it has yielded positive return due to growth of revenue generating freight traffic.

7.8 The Productivity Reviews has once again singled out some of the important weaknesses that have, of late, crept into the system like:—

- Poor investment policy
- Distorted tariff structure
- Deficient and unreliable project appraisal procedures
- Tendency towards overestimation of traffic
- Inaccurate statistical information
- Outdated traffic costing system
- Imperfect line haul cost methodology
- Technological backwardness
- Departmental bias in investments
- Departmentalism

CHAPTER VIII

FUTURE PLAN FOR ELECTRIFICATION

8.1 The Committee held discussions with the Zonal Railways (Central, Eastern, Southern, South-Central and South-Eastern), concerned Directorates (Electrical, Mechanical, Operating and Planning) of the Board; and Central Organisation for Railway Electrification to assess the future needs of electrification on the Indian Railways. The Committee was impressed by the objective and precise presentations made before it. Indian Railways have—with the exception of Pune-Wadi-Guntakal-Renigunta suo section of Mumbai-Chennai route—achieved the objective—it set for itself at the beginning of the VII Plan—of electrifying the Golden Quadrilateral and Diagnosals connecting the four Metropolitan towns (Delhi, Kolkata, Mumbai and Chennai) which carry the bulk of traffic. The Committee feels that after the successful completion of this accelerated programme of electrification—thanks to the effective and efficient management of CORE—there is a strong case to allow the position to consolidate, for gaining more experience, and most importantly, for studying the financial and operational ramifications further in greater detail. With 35 to 40 per cent of broad gauge network electrified and 65 per cent of freight traffic and 50 per cent of passenger traffic carried by electric traction, the traction model mix favours the use of electric traction by an ample margin broadly conforming to the pattern of energy supply in the country. In fact, this perception—barring one of two exceptions—was generally shared by others too. In the circumstances there is no urgent need to initiate any new proposals or take up new projects on account of traffic density. The fact that in quite a few cases assumptions, made in respect of costs and benefits anticipated in area of speeds, loads, etc. in electrification projects have not materialized fully, strengthens the case for a detailed and realistic review of the electric traction policy.

8.2 The Committee felt strongly convinced of this for while examining the proposal for electrification of Sitarampur-Mughalsarai route, it found that the internal rate of return of 22% was based on traffic density of freight trains varying from 16.3 to 27.9 trains per day in 2004-05 when the current level of traffic (excluding departmental pilots, etc.) ranges from 2 to 8 freight trains—mostly in the range of 2 to 4. The report has also assumed an unrealistic norm of 6 lakh for electric engine usage. While the need for electrifying Sitarampur-Jhajha section was felt on account of severe grades and the bottleneck created by change of traction at Sitarampur, the reasons for extending it beyond Jhajha upto Mughalsarai are not obvious. The abysmally low level of traffic coupled with cost over run over from Rs. 240 crores to Rs. 370 crores—over 50 per cent—is likely

to lower the anticipated rate of return of 22 per cent drastically. It is a fit case for "case study" to draw lessons for the procedures adopted for initiating, processing, and appraising proposals for electrification in the future. In fact, there is a strong case for appointing a Consultant or a Group of Consultants representing the relevant disciplines to develop a variety of financial models for appraising various types of railway projects. The Committee came across the case of Hospet-Guntakal doubling where the return of 24 percent worked out by the Zonal Railway was whittled down to 14 per cent by an independent Consultant.

8.3 The need to take a breather and take stock of the position in further strengthened by the observations made in respect of electrification of Katni-Bina section in the Report of the Comptroller and Auditor General of India for the year ended March 1999 (Union Government-Railway No. 9 of 2000) where they have commented on inflated traffic projections, depressed cost of repairs and maintenance, etc. and concluded that the cost of moving traffic carried on the section in 1998-99 would have been cheaper by 38 per cent under diesel traction. Since there are reservations about the conclusion arrived at by the CAG, it is recommended that the Railways should conduct two sets of trials on this section one each with WDG4 and WAG9 locomotives and each extending over 10 to 14 days to study and compile the comparative technical, operational and, financial results.

8.4 In the light of discussions the Committee has had, and, keeping in view the physical progress made and expenditure incurred on ongoing electrification projects, the Committee suggests that the following proposals may be reviewed in the light of norms for Break Even Level of traffic and financial viability enunciated in this report and in view of the fact that alternative means are available to meet the traffic requirements:—

- (i) Krishnanagar-Lalgola
- (ii) Patna-Gaya
- (iii) Ludhiana-Amritsar
- (iv) Mughalsarai-Zafrabad
- (v) Delhi Sarai Rohilla-Gurgaon
- (vi) Circular Railway for Lucknow
- (vii) Khurja-Hapur-Meerut City-Saharanpur
- (viii) Ernakulam-Trivandrum
- (ix) Hospet-Guntakal-Renigunta including Toranagullu-Ranjitpura
- (x) Talcher-Cuttack-Paradeep

8.5 There are 23 Railway Electrification Projects listed in the latest Pink Book for the year 2001-2002 with a throw forward of Rs. 1500 crores or so. And, according to the X Plan document, 7 of these works—not necessarily enjoying any priority on grounds of traffic requirement—are likely to be completed shortly. And, another 7 works are either operationally required or are in too advanced a stage of progress for any

review. The remaining 9 works are neither financially viable nor operationally required nor otherwise important. **These comments in the X Plan document, by and large, support the observations made by the Committee.**

8.6 The pace of electrification has to now necessarily slow down. More so, when the Indian Railways anticipate poor rate of growth (2.5% in terms of NTKMs) in the X Plan, and, the Railways and the country are facing acute scarcity of funds necessitating extreme caution in expenditure—both capital and revenue. It is, perhaps time to observe a holiday from further electrification for a few years. The Railways will have to suitably plan to phase out the various activities set up under the electrification programme. The survival of Indian Railways call for financial prudence and conservative investment decisions.

8.7 The system of incremental planning followed on Indian Railways is best exemplified in case of Electrification Projects where for a considerable length of time, the entire work of initiating processing and execution of electrification projects was entrusted to Central Organisation for Railway Electrification. The process of consultation and discussion with others involved in the activity was totally abridged. While this has now been corrected in that Zonal Railways are now required to initiate proposals but during our discussion, it appeared that his correct procedure has not taken a firm foot hold. The Railway Board may ensure this and see that all the Departments concerned—Electrical, Finance, Mechanical, and Operating—participate in the formulation of these proposals. In fact, the Board may extend this practice of participative management in case of all new projects.

CHAPTER IX

INTEGRATED TRACTION AND ALLIED MATTERS

9.1 Strictly speaking the issues dealt with in this Chapter are not within the purview of the terms of reference of the Committee but since they have come to its notice they have been spell-out here.

9.2 Railways have over a period of time become a cadre based and departmental-oriented organisation. The spirit of departmentalism has become so deep rooted that it vitiates the working of the organisation. In fact, it is the bane and curse of the system that is eating into its vitals. Harmonious inter-departmental relationships and team spirit, so essential for safe and smooth working of this multi-disciplinary system, are conspicuous by their absence on the Indian Railways. **And, the undercurrent of hostility amongst the departments, pursuit of narrow departmental interests, and entrenched departmental loyalties, came out loud and clear during the discussions the Committee had at different levels.** The Electrical and mechanical departments made separate presentations—taking uncompromising stands. In order to encourage managers to take a holistic view of the organisation, the need to reduce the number of cadres has been felt intensely and emphasized again and again. **The present day technologies used in rolling stock and management skills offer an excellent opportunity to form a unified cadre to look after traction—be it electric locomotives or diesel locomotives or multiple units—and other rolling stock. As recommended by various important Committees in the past, Indian Railways should seriously look into the question of restructuring the present day cadres and their numbers with a view to reduce them and thereby avoid duplication of administrative and infrastructural facilities, curb the spirit of departmentalism, improve the quality of service and efficiency of the system, and, make it cost effective, competitive, and profitable in the emerging liberalised environment.**

9.3 As a result of departmental orientation of Indian Railways, their traction policy has got compartmentalized between diesel and electrical whereas the need is for an integrated traction policy whereby locomotives are not changed merely because of change in traction but an overall view is taken and the most beneficial arrangement adopted. For example, 17 locomotives (2DC, 10AS and 5 Diesel) have been saved by the revision of passenger loco links introduced under Coaching Directorate's letter No. 2000/Chg. 11/22/15/loco dated 31.08.2000. The Committee has reasons to believe that there is considerable scope for adopting such integrated operation thereby saving and optimizing the use of locomotives. **We suggest that the economics of running Iron Ore trains originating on**

Guntakal division of South Central Railway through to Madras port with diesel locos preferably the new WDG-4 locos—which are perhaps being underutilized at present—without changing locomotives from diesel to electric and *vice versa* at Renigunta may be seriously studied and, introduced, if found useful. Similarly, there appears to be scope for introducing through running of diesel locomotives working passenger-carrying trains on Pune-Renigunta-Chennai route. This may also be examined. The Board can, perhaps, plan an All-India exercise.

9.4 In fact, a policy of integrated traction has led some rail technologists to think in terms of electro-diesel locomotives to combine the advantages of low price of electric energy and flexibility of diesel traction to optimize passenger and freight operation with routes selectively but partially electrified and dieselised. With emphasis shifting to economic concerns like productivity, efficiency, and competitiveness to provide the least resource cost transport service, this option will become more and more attractive. It is for such reasons that a dieselised railway system like America is electrifying the North-East corridor; Chile and Brazil have pulled down overhead lines, and, some rail technologists are talking of selective electrification or de-electrification to exploit the trade-off between diesel and electric traction. **It is recommended that RDSO may gather Information about electro-diesel locomotives and examines their suitability in Indian conditions. In fact, for financial considerations, Indian Railways may also be compelled to run diesels under wire in unviably low traffic density sections. This may be examined by the Board for sections like Ambala-Kalka.**

9.5 Now that the areas of diesel and electric traction have been largely delineated, it is time that Indian Railways drew a motive power plan detailing the designs and numbers of different types of locomotives. The Committee envisages that the Railway will have necessarily to go in for heavier freight trains and longer passenger trains and that they will need to develop the following types of locomotives which can singly or in consist form (multiple operation), in conjunction with locotrol-technology, to meet the transport requirements of traffic.

S. No.	Traction	Type	Transport Characteristics
1.	Electric & Diesel	Broad gauge main line (Freight)	(i) Operating speed at level 100 kmph. (ii) Ability to start a 10000 tonne train on 1 in 100 grade. (iii) To haul a 10000 tonne at a speed of 75 kmph on 1 in 200 grade.
2.	Electric & Diesel	Broad gauge main line (Passenger)	(i) Ability to attain an average speed of 100 to 120 kmph hauling a 20 to 24 coach passenger trains. (ii) Supply a hotel load of 800 to 850 kwh.
3.	Electric & Diesel	Train sets	Ability to run at an average speed of 100 kmph on high density commuter traffic sector.
4.	Electric & Diesel	Broad gauge branch lines (and Metre gauge sections)	
5.	Electric & Diesel	Light & heavy duty shunting locomotives	

9.6 In order to contain costs, Railways should explore the possibility of **increasing the number of locomotives homed in a loco shed from 100/150 to 300**. And, with restructuring of cadres they can take a further functionally and financially advantageous step of setting up of **combined loco sheds for diesel and electric locomotives**.

9.7 The concept of fast inter-city trains (Rajdhani and Shatabdis) has taken roots in the country. They are prestigious and popular train with high standards of performance and service. With the induction of new, sophisticated, state-of-the-art locomotives—both electric and diesel—**on the system, it is time that Indian Railways plan a coordinated and consolidated systemic upgradation of track and signalling system to improve speeds**. These services are used primarily by passengers travelling by comparatively expensive upper class accommodation. An improvement in speeds will strengthen the competitive edge of the railways *vis-a-vis* the airlines—so essential not only to retain but increase their share of passenger traffic in this segment.

9.8 A quick simulation indicated that with systemic improvement, the running time of Rajdhani Express running between New Delhi and Mumbai can be easily reduced by two to three hours. And, to ensure

reliability the train can be double-led and load increased to twenty coaches. Similarly, the time taken by Shatabadi train between New Delhi and Amritsar can be curtailed by 30 minutes.

9.9 Alternatively, the possibility of introducing electric and diesel train sets on short inter-city routes like Delhi-Chandigarh (ETS) and Delhi Amritsar (DTS) should be seriously explored. With all coaches equipped with traction motors and driving cabs at either end, these train sets have superior acceleration and deceleration properties and are ideally suited for such inter-city runs. With three phase drive technology now indigenously available, there should be no technological impediment to design a suitable train set—preferably a double decker—to ply on such routes. Such train sets can reduce the journey time considerably—30" to 40" in case of journey to Chandigarh and an hour or so in case of journey to Amritsar, In order to gain experience and assess results, the Committee recommends that two pilot projects—one each on electric and diesel route—may be undertaken. In fact, to minimize financial risks, Indian, Railways can float it as a Joint Venture (JV) or Build Own Operate Transfer (BOOT) project where its capital contribution need not be more than 15% with others bearing the balance cost including cost of passenger facilities and services.

9.10 Another example where a systemic view has not been taken is that while progressing electrification at an accelerated rate, replacement of overhead cranes for rerailling operations has not been given adequate thought. In order to avoid slewing of wires and damage to overhead equipment. It is essential that Railways plan for systematized and extensive use of hydraulic rerailling equipment.

9.11 Similarly, Railways will have to explore ways and means of double stacking of containers on electrified routes—so essential for making the container revolution successful.

9.12 Indian Railways are not only acquiring state-of-the-art locomotives but their requirement of locomotives has also come down so much so that the Production Units have had to curtail their production it is ideal time for it to experiment and adopt the concept of over powering their freight trains by using diesel and electric locomotive consists for this would help in improving speeds, increasing loads, and optimizing the use of available capacity. In fact, selective double heading of freight trains on sections which are not ripe for electrification and where low horse power of diesel locomotives is a constraint, may prove beneficial. The Committee cannot quote of a better example of the need for a coordinated approach towards technological upgradation than their experience on the trial run of newly acquired freight diesel (WDG4) locomotives on the Secunderabad-Vikarabad section. A locomotive cleared for running at 105 kmph, hauled wagons cleared for speeds of only 75 kmph, and ran on a 80 km, long stretch of track riddled with 16 or more speed restrictions—the result the train averaged a speed of 24 kmph, no better than present day average speeds, defeating the overall objective of modernizing the locomotive fleet on the Indian Railway system.

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