

**ESTIMATES COMMITTEE
(1968-69)**

(FOURTH LOK SABHA)

SEVENTIETH REPORT

**MINISTRY OF RAILWAYS
RAILWAY ELECTRIFICATION PROJECTS**



**LOK SABHA SECRETARIAT
NEW DELHI**

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C O R R I G E N D A

TO

Seventieth Report of Estimates
Committee (Fourth Lok Sabha) on
Ministry of Railways - Railway
Electrification Projects.

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- Page 1, para 1.3, line 6 after 'with' insert '1500'
- Page 2, para 1.2, line 4 for 'Moghalsari' read
'Moghalsarai'.
- Page 4, para 1.14, in statement, for 'Gyaa' read
'Gaya'.
- Page 6, para 1.22, line 3 for 'Parambur' read
'Perambur'.
- Page 5, para 1.16, line 1, after '3000' insert
'V'.
- Page 7, para 2.1, line 5, after 'only' insert
'on'. and para 2.2, line 3 for 'tones'
read 'tonnes'.
- Page 9, para 2.7, line 8, for 'inot' read 'into'
and line 8 from below, for 'Sahas' read
'Sahai'.
- Page 10, para 2.10, line 9, for 'this' read 'his'
and line line. 14, for 'contract' read
'contact'.
- Page 11, line 1, for 'Mechy' read 'Anncy,'
and line 7, after 'over' insert 'the'
- Page 12, line 9, after '15000' insert 'V'
- Page 13, line 23, for 'us' read 'use'
- Page 20, para 2.29, for 'D' odar' read
'Damodar', and for 'KusudagTetambari'
read 'Kusuda-Tetumari'.

P.T.O.

- Page 21, para 2.29 in statement, for 'Bannel'
read 'Bandel' and delete last line of para.
- Page 34, Para 2.71, line 6, before 'section'
insert 'Madras-Vijayawada'.
- Page 36, para 2.76, line 1 for 'Question'
read 'Questioned'.
- Page 37, para 2.77, line 7, for 'Sheeraphuli'
read 'Sheoraphuli'.
- Page 39, para 3.6, line 7, for 'Groups 1-1 '
read 'groups 1-11.' and line 2 from below
for 'Francaised' read "Francaise d' ".
- Page 85, line 11, after 'electrification of
the' insert 'Madras-Vijayawada'.
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(1968-69)

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INTRODUCTION

I, the Chairman, Estimates Committee having been authorised by the Committee to submit the Report on their behalf, present this Seventieth Report on the Ministry of Railways—Railway Electrification Projects.

2. The Committee took evidence of the representatives of the Ministry of Railways on the 18th September, 1968. The Committee wish to express their thanks to the Member Engineering, Railway Board and other officers of the Ministry of Railways for placing before them the material and information they wanted in connection with the examination of the estimates.

3. The Report was considered and adopted by the Committee on the 22nd January, 1969.

4. A summary of conclusions/recommendations contained in the Report is appended (Appendix III).

5. A statement showing the analysis of recommendations contained in the Report is also appended to the Report. (Appendix IV).

NEW DELHI;
February 12, 1969.

Magha 23, 7890 (Saka)

P. VENKATASUBBAIAH,
Chairman,
Estimates Committee.

INTRODUCTORY

(i) Historical Background

The earliest important application of electric traction to railways was on the Tube Railways in London in 1890. The first railway actually to change over from steam to electric traction was a section of the New York-New Haven Railway, electrified in 1895. Conversion to electric work in the U.K. and the Continent commenced in 1900.

1.2. The earliest reference to electrification in India on the Central Railway dates back to 1913 when a report was submitted by Messrs Merz & McLellan, but due to the outbreak of the First World War, the scheme had to be put aside.

1.3. Subsequently, the first electric train in this country ran on the 3rd February, 1925 between Bombay VT and Kurla. Electrification of the suburban section on the BB&CI Railway was inaugurated in January, 1928 and of the suburban section of the Southern India Railway in May, 1931. Up to 1936, a total of 380 route KM were energised with V DC system of traction on the sections Bombay-Poona and Kalyan-Igatpuri of the Central Railway, Bombay Churchgate-Virar of the ex-BB&CI Railway (now Western Railway) and Madras Beach—Tambaram section of ex-South Indian Railway (now Southern Railway).

(ii) Earlier Schemes

1.4. Calcutta, the largest city in India, did not receive the benefits of electrification all these years. A number of reports for electrification of Calcutta and suburban areas were, however, produced from 1914 onwards. The firm of Messrs Merz & McLellan was the central figure in almost every one of these activities. Their first report submitted in March, 1914 recommended electrification of the section Sealdah to Kanchrapara together with the yards at Naihati and Chitpore. No action could be taken due to the outbreak of World War I.

1.5. In December, 1923 Messrs Merz & McLellan were deputed to carry out a fresh survey jointly for the EI and EB Railways, including main line electrification up to Asansol. Their report dated August, 1924 showed that with prevailing low cost of coal and change in the pattern of post-war prices of imported goods, the local condi-

tions in Calcutta were not particularly favourable for electrification. The suburban traffic was relatively small in comparison with that of other big cities of similar character and was carried on several main and branch lines and some light railways too. The density of traffic on any one line was therefore low.

1.6. Comparing conditions in Calcutta and Bombay, they pointed out that, according to the 1921 census, the population of greater Calcutta was 1.238 millions compared to Bombay's 1.176 millions. Calcutta suburbs were served by no less than 10 main and branch lines radiating from two terminal stations, whereas Bombay had two lines only. On these lines the number of suburban passengers during 1923-24 was approximately 37.5 millions whereas in the Calcutta area the corresponding figure (1822-23) was about 24 millions. The cause of this marked difference was attributed to the difficulty of access from the centre of Calcutta to the terminal stations at Howrah and Sealdah. Messrs Merz & McLellan concluded that as soon as adequate facilities were provided to overcome these difficulties, conditions in Calcutta would approximate to those in Bombay.

1.7. Attention was, therefore, focussed on the means of extension of the railways into the heart of Calcutta through one or other of the following alternative schemes:—

- (i) through the Bally Bridge,
- (ii) through a separate bridge at Howrah,
- (iii) through a tube under the Hooghly.

When the final report of the Consulting Engineers was received in 1930, the economic depression had set in and no further action was taken till 1936, when an investigation of the possibility of electrifying the section Asansol to Gaya was undertaken in consultation with the local representatives of Messrs Associated Electrical Industries (India) Ltd. The commencement of World War II in 1939 put an end to further planning for the time being.

1.8. In 1946, the Government of India undertook a fresh review of the prospects of electrification in the Calcutta area and entrusted Messrs Merz & McLellan with the task of conducting an investigation over the section Howrah to Moghalsari and later a separate investigation over the entire suburban areas of the Howrah and Sealdah Divisions.

1.9. At about the same time, they appointed the Calcutta Terminal Facilities Committee which included a partner of the firm of Messrs Merz & McLellan as one of the members. The report of the Terminal

Facilities Committee drew pointed attention to the necessity for a circular railway which was to griddle Calcutta by running along its extreme municipal boundaries on all the four sides and link up with the main lines of the Sealdah and Howrah Divisions at Dum Dum and Majerhat.

1.10. The report submitted by Messrs Merz & McLellan in December, 1947 on the proposed electrification from Howrah to Moghalsarai indicated that the project could not be financially justified but their later report dated March, 1949 on the suburban electrification forecast a satisfactory return on the capital expenditure.

1.11. In January, 1953 the Government of India appointed the Roy Committee to investigate the possibilities of running passenger train services over the Port Commissioners' Railway in Calcutta. The Committee submitted its report in April, 1953 recommending the extension of the suburban services on the Howrah and Sealdah Divisions on to the proposed circular railway mostly running over the Port Commissioners' Railway.

1.12. Shortly after in July, 1953 Shri S. Sarangapani was appointed as Project Officer to prepare a comprehensive scheme for the electrification of the Calcutta suburban railway services with extensions up to the coal fields/Kharagpur or Tatanagar and the Pakistan border. On the basis of preliminary reports of the Project Officer, the execution of the first phase of the Calcutta suburban electrification was sanctioned on the 4th June, 1954.

1.13. In his report Shri Sarangapani has examined the comparative economies of electric versus steam working. He has shown statistically how increase in capacity can be effected by electrification. According to him this increase is principally caused by:—

- (i) Better acceleration of electric locomotives which reduced the additional time required for starting passenger and goods trains after each halt.
- (ii) The higher average speed obtained with electric locomotives; while the difference in average speeds is marked even on level sections it is particularly noticeable on grades, as electric locomotives have a much greater overload capacity for limited periods and can draw almost unlimited power for short periods whenever necessary.
- (iii) The increase in average loads of trains brought about by the bigger capacity of electric locomotives.
- (iv) Cutting out of halts at watering stations, of between 20 and 30 minutes required for steam locomotives at intervals is of 25 to 50 miles.

- (v) The comparative independence of the human element in the case of the electric loco in its day to day performance. It is well known that the average speed of steam trains is often reduced by the inability of the crew to maintain steam. This difficulty is not shared by electric locomotives, and
- (vi) Less chances of goods trains being stopped *en route* for giving precedence to passenger trains. Due to the higher average speeds of electric locomotives it should rarely be necessary to stop through goods trains for giving precedence to passenger trains.

1.14. The table below shows the present and future line capacity for goods traffic of each of the sections surveyed by the Sarangapani Team and brings out clearly the increase in capacity which follows on electrification:—

Section	Present goods line capacity under steam traction		Increased goods line capacity under Elec. traction	
	UP	DOWN	UP	DOWN
Howrah-Burdwan Via (HEC)	21	22	39	39
Howrah-Bandel	12	18	30	30
Bandel-Burdwan	19	17	36	36
Burdwan-Ondal	42	42	80	80
Ondal-Asansol	36	36	80	80
Asansol-Dhanbad	20	20	36	36
Dhanbad-Gomoh	33	33	46	46
Gomoh-Gaya	20	20	35	35
Gyaa-Moghalsarai	23	23	40	40
Dankuni-Dum Dum Jn.	35	35	52	52
Dum Dum Jn.-K.P. Docks	20	20	24	24
Howrah-Kharagpur	18	13	25	25
Kharagpur-Tatanagar	9	9	11	11
Tatanagar-Chakradharpur	27*	27*	42	42
Asansol-Chakradharpur	23*	23*	37	37
Rajkharaswan-Donguaposi	11.5	11.5	21	21

*Capacity available after introduction of double line working.

1.15. The Sarangapani Team has noted that there is a definite programme to gradually replace steam traction by electric traction in most of the countries which the Engineer-in-Chief and the Deputy Chief Electrical Engineer of the Calcutta Electrification Project visited in March, 1955, namely, United Kingdom, France, Germany, Sweden, Holland, Belgium, Switzerland and Italy. The team has also noted that in the United States of America the replacement of steam locomotives by diesel locomotives has been in progress on a very large scale for some years. The Sarangapani team has cautioned that, "It would be unwise for the Indian Railways to lag behind in the race for modernisation. If immediate action is not taken to change over from steam to electric traction on a programmed basis, we shall be acquiring more and more steam locomotives and thereby perpetuating a system which is admittedly very uneconomic and wasteful to country's fuel resources".

1.16. The electrification of Howrah-Burdwan main line on 3000 DC was started in 1954 and completed in 1958.

1.17. On the eve of the Second Plan the Railway Board was actively considering the adoption of latest system of electric traction prevalent in advanced countries of the world and after detailed consideration and careful examination, a decision was taken early in 1957 to adopt a system of 25 KV AC as the future standard of electrification in India. It was also decided that the electrified lines working on the 3000 volts and 1500 volts systems in the Calcutta and Madras areas should be converted to suit the latest 25 KV system in due course.

1.18. Up to end of 1967-68, out of the total track kilometerage of 58,868 on the Indian Railways, a total of 2,874 RKM has been electrified.

1.19. Facilities have also been created at the Chittaranjan Locomotive Works, Chittaranjan, for manufacture of electric locomotives required by the Indian Railways. A beginning in this direction was made during the Second Plan with the manufacture of 1500 V DC electric locomotives required for use on Central Railway as a step towards achieving self-sufficiency and conserving foreign exchange. 21 locomotives of this type were manufactured and turned out during the period 1961-62 to 1963-64.

1.20. A beginning in the manufacture of AC locos was also made in the year 1963-64 at Chittaranjan Locomotives Workshop in collaboration with Messrs Group—a consortium of European firms for

electrification at 50 cycles. Up to March, 1968, 148 locos have been manufactured at Chittaranjan Locomotive Works. The manufacture of the locos is being adjusted to suit the requirements of the Indian Railways for the various electrified sections.

1.21. There are proposals also for manufacture of 57 DC locomotives required for Central Railway and action is also being taken to manufacture dual voltage AC/DC locos which would be required for the electrification of Virar-Sabarmati section of Western Railway.

1.22. For the manufacture of BG and MG AC electric multiple unit coaches required by the Indian Railways facilities have also been created at Integral Coach Factory, Parambur which so far manufactured 580 BG and 102 MG AC EMUs since 1962-63.

II

PLAN PROJECTS

(i) Choice of System of Traction

Three Modes of Traction: Steam, Diesel and Electric

2.1. From the beginning steam traction has remained the only and till today the principal form of traction on the Indian Railways. As already stated, prior to the Second World War, electric traction was introduced with 1500 V DC system on a route length of 380 KM only the section Bombay-Poona and Kalyan-Igatpuri of the Central Railway, Bombay Churchgate-Virar of the ex-BB&CI Railway (now Western Railway) and Madras Beach—Tambaram section of ex-South Indian Railway (now Southern Railway).

2.2. The growth of freight traffic on the Indian Railways during the First and Second Five Year Plans has been phenomenal. Originating tonnage has risen from a little over 93 million tones in 1950-51 to 115.8 million tonnes at the end of the First Plan 1955-56. This represents an increase of 24.5 per cent in the First Plan and a further increase of 34.8 per cent in the Second Plan period or a total increase of 68 per cent during the 10-year period from 1950-51 to 1960-61.

2.3. During the Second Plan period, the increase in the volume of traffic on certain sections of the Eastern and South-Eastern Railways, which were already congested, was anticipated to be so large that it became necessary to electrify these sections. To cater to the increase in traffic in the period during which electric overhead installations, sub-stations etc. could be put up, it was necessary to change over to diesel traction as an interim measure. A fleet of 100 diesel-electric locomotives was purchased from the USA and the main line diesel traction for hauling long distance freight trains was introduced on the Eastern and South-Eastern Railways in 1958-59 and 1959-60 respectively, as a spear-head to electrification which came in stages beginning from 1960. With a view to having a clear appreciation of the relative merits of dieselisation and electrification under varying Indian conditions of terrain and traffic density and to enable the Railway Board to formulate their future traction policy, a Committee was appointed by the Board headed by Shri P. Sahai, Director, Efficiency Bureau of the Railway Board and its report—"Study of

Electrification and Dieselisation on Indian Railways 1963” contained the following conclusions:

- “(i) Operationally, electric traction gives slightly higher through-put and speeds. The advantage increases/as the section becomes more and more graded;
- (ii) Technically, both electric and diesel tractions are expected to give efficient and reliable service. Diesel locomotives require a more diversified maintenance organisation; electrification involves additional maintenance of overhead equipment;
- (iii) Economically, while the total capital outlay for electric traction is generally more than for diesel traction, the capital cost per thousand trailing tonne kilometres is less for the level and slightly graded sections. In the case of the heavily graded section, the capital cost per thousand trailing tonne kilometres is appreciably higher for electric traction. The main reasons for this is that on this section, the outlay on overhead equipment, sub-stations etc. required for electric tractions is distributed over a much less potential density of traffic than on the other two sections. As far as annual recurring costs per thousand trailing tonne kilometres are concerned, electrification scores heavily over dieselisation on all the sections and the ‘break-even’ point shifts from 6.90 million trailing tonne kilometres per route kilometres per annum to 1.91 as the ruling gradient of the section changes from level to 1 in 60.”

2.4. Asked to clarify whether the Ministry undertook a detailed survey on the economics of steam, diesel and electric traction before deciding on large-scale electrification during the Second Plan period, the representative of the Ministry has stated during evidence that in the beginning of the Second Plan diesel oil had to be imported and there was no diesel traction in the country. Diesel traction came in subsequently. The study conducted by the Committee headed by Shri P. Sahai, Director Efficiency Bureau is the first systematic study conducted by the Indian Railways on the relative economics of steam, diesel and electric traction.

2.5. He has further stated that before any particular section is taken for electrification, the economics of steam, diesel and electric tractions are gone into for that particular section and only after it is found that electric traction will be more economic as compared to the other two tractions, it is adopted.

2.6. In this connection a study made by the Ministry of Railways (Railway Board) in respect of the cost of electrification of the entire Delhi-Howrah route *vis-a-vis* dieselisation and steam traction is given in Appendix I.

2.7. The Committee have been furnished with the following further information in regard to the basic norms adopted for working out the capital and annual recurring costs of the three types of tractions:

“For the purpose of working out the financial justification in different types of traction, the capital costs and the recurring annual costs of the different modes of traction have been taken into consideration. Capital costs comprise cost for diesel, steam and electric locomotives, fixed installations like OHE, sub-stations, switching stations, remote control centres, loco sheds, oil storage tanks etc. and annual recurring costs comprise depreciation charges on the capital, costs of repairs and maintenance of locos and fixed installations, running and operating costs, including costs of fuel oil, coal and electric energy.

The actual capital and recurring cost of steam and diesel tractions is proportionate to the traffic density and that for electric traction is heavily weighted by capital and annual recurring costs for fixed installations.

According to the basic norms adopted for working out the capital and annual recurring costs it has been accepted that electric traction becomes remunerative by way of yearly expenditure:

- compared to steam for traffic densities in excess of 6.5 million trailing tonne KM/Route/KM/annum.
- compared to diesel for traffic densities in excess of 8.25 million trailing tonne KM/Route/KM/annum.

As per Sahas Committee Report (1963), the break-even point for electric traction and diesel traction was at traffic density of 6.9 million TT KM/RKM/annum.

The current evaluation, however, takes into account the additional works like traction substations, telecommunication cabling, transmission lines, which were not under consideration of the Sahai Committee and were then not carried out by the Railways.

Efforts are continuously being made to make all modes of traction economical. Electrification, however, is considered over a section, when steam traction is not able to cope with the enhanced traffic anticipated. In these cases the study on the above lines is carried out and electrification is decided upon, if it is economical."

Choice of electric traction as between DC and AC

2.8. Upto 1936, 1500 V DC system of electric traction was adopted for electrification of the section Bombay-Poona and Kalyan-Igatpuri of the Central Railway, Bombay Churchgate—Virar of the ex-BB & CI Railway (now Western Railway) and Madras Beach—Tambaram-section of the ex-South Indian Railway (now Southern Railway).

2.9. On the basis of a report submitted by a project team of four officers who were appointed to go into the question of electrification in detail in 1953, it was decided in June, 1954 to electrify Howrah-Burdwan main line and Sheoraphuli—Tarakeswar branch line with 3000 V DC. At that time it was felt that the AC system was still in its infancy and the AC-traction motor loco was not considered suitable for heavy freight service. Besides, sufficient data were also not available to assess correctly the financial advantages claimed by this new system under Indian conditions.

2.10. Before taking any decision, the Railway Board sent one of the then senior chief electric engineers (Shri P. L. Verma) abroad in 1953 to study the 50 cycles single phase AC traction system in the Belgian-Congo, which was then under construction. After study of this new system and discussions with the traction engineers of the French National Railways, he came back in 1954 and reported that although the 50 cycles AC system had great potentialities, sufficient technical as well as operational data were not available. The following is the full text of this conclusions:

"The economic superiority of single-phase traction at 50 c/s, over 1500 or 3000 V DC systems, particularly at low traffic densities is unmistakable. The supply and distribution of energy at high voltage A.C. single phase 50 c/s to the contact-wire and the electrical equipment of traction, rolling stock, with the exception of the traction motors, present no difficulties. The system could not be brought into use, so long as a suitable AC single-phase 50 c/s traction motor was not available.

The rapid strides made in the field of design of motors have now made this possible. The experimental electrification

at 20 KV AC single phase 50 c/s at Mechy. France has proved this beyond doubt. This has been followed by the electrification at 22 KV single phase 50 c/s of the BCK Railway in the Belgian-Congo. The electrification of the railway at high voltage AC single phase 50 c/s should be considered success for the train loads and operating conditions existing over lines there.

In regard to its application in India, it may be stated that the system may be safely adopted for sections where economically justifiable, provided that—

- (1) trailing load do not exceed 600 tons and there is no future probability of the extension of electrification to the adjoining sections where trailing loads may be greater than 600 tons;
- (2) the unbalance caused by the single phase traction load on the power supply lines is within limits acceptable to the power supply authorities.

It is to be specifically emphasised that the economic design of electric locomotives with straight single phase 50 c/s motor for operation of train loads larger than 600 tons is still in a state of experiment on the Valenciennes—Thionville section of the SNCF in France and therefore, it appears that there would be a certain element of risk in the adoption of 50 c/s single phase traction for broad gauge where the trailing loads are normally more than 1000 tons.

As at present the electrification of Broad gauge sections having a comparatively high traffic density and heavier trailing loads is envisaged in India, the economic advantages which would be gained by the adoption of 50 c/s single phase traction would not be appreciable. Hence the adoption of 3000 V DC system for broad-gauge electrification appears to be advisable, particularly because this system has proved to be a great success and has been extensively adopted in countries like South Africa, Italy, Belgium and Spain.

2.11. When asked to explain the reasons for adoption of DC system in 1954, the representative of the Ministry has stated in evidence:

“As the Railways had certain amount of experience in Bombay and Madras areas on 1500 V DC system, a decision was taken to adopt 3000 V DC system for electrification of

suburban railways at Calcutta. Before adoption of this system the question, however, arose whether the Railways should go in for the 1500 V DC system or some other type of traction. 3000 V DC appeared better than 1500 V DC for obvious reasons because that would mean less copper wire and other things and, therefore, preference was given to 3000 V DC. The question of AC traction was also looked into. At the time in West European countries the railways had gone in for 15000 AC single phase traction and in France the railways were carrying on experiments with 25 KV AC single phase traction. After considering carefully the difficulties which were likely to come in adopting the AC traction,—as at that stage they were experiencing a lot of troubles—they felt at that time that AC traction could not be used in our country. As 3000 V DC was being utilised in South Africa, Belgium and Spain and was more economical than 1500 V DC, the Board adopted 3000 V DC system of traction.

But at that time rapid progress was being made in France with regard to 25 KV AC single phase traction and within two years they were able to develop a locomotive which gave satisfactory service—in fact, their progress was being watched all over the world—and the United Kingdom also decided to change over to the system of AC traction. The Railway Board also changed their policy within two years of these developments. Although the Railway Board in 1954 started with 3000 V DC traction on Howrah-Burdwan and Sheoraphuli-Tarakeswar section, within three years they changed their views and decided to go in for 25 KV 50 cycles AC system of traction.”

2.12. In this connection, attention of this Committee has also been invited to the recommendations of the Sarangapani Committee, constituted in July, 1953 to prepare a scheme for the electrification of the Calcutta suburban railway services with extensions upto the coal-fields|Kharagpur or Tatanagar and the Pakistan border. In an interim report received in 1954, that Committee made the following recommendation on the system of supply for electric traction:

“The electrified suburban railways in Bombay work on a pressure of 1500 volts DC. In line with modern practice, the system of supply at Calcutta will be 3000 volts DC. This voltage is already in successful operation in many foreign countries.

The other system of electrification in common use are, single phase low frequency (16-2/3 cycles) at a pressure of about 16000 V and single phase standard frequency (50 cycles) at 20 to 25 KV. The former system is very largely in use on the continent of Europe and at a slightly different frequency also in the USA, but mainly for main line electrification. For purely suburban electrification, the DC system is in general use. The single phase 50 cycles system has recently come into prominence with its adoption on certain sections of the French Railways and in the Belgian Congo and is favoured on account of its lower cost of overhead equipment compared to the DC system, especially on Railways where the traffic density cannot otherwise justify electrification. The results of the working of these sections are being watched with keen interest all over the world.

For a combined suburban and mainline electrification with high traffic density, 3000 volt DC has as yet no serious rival."

2.13. In their final report published in June 1956, the Sarangapani Committee accepted the superior economy of 3000 volts DC amongst the DC systems. In regard to the 25 KV 50 cycles AC system which had recently come to forefront in an attempt to reduce the capital cost of electrification schemes by making use of the existing grid systems of power distribution, thereby obviating the necessity for special power plants or a frequency conversion plant as in the case of the low frequency system, the Committee expressed the hope that it would be possible that this system would prove more and more attractive when the teething troubles had been satisfactorily solved. The principal recommendations of the Sarangapani Committee in regard to choice of system are as follows:—

"A decision has already been taken by the Board to carry out suburban electrification in the Calcutta area on 3000 V DC. This includes operation of main line traffic entering the Calcutta area from Kharagpur and Burdwan. The system to be adopted for extension of electrification beyond these stations will be settled after more details have become available for the results achieved by the 50 cycles single phase electrification in France.

"****Under Indian conditions, with the present low level of industrialisation, the railway traction load on a heavy main line may form a sizeable proportion of the total power available in an area, and cause serious difficulties

with unbalanced loads. The experience gained in France or the Belgian Congo may not be of much use in deciding on the extent of unbalance which can be permitted under Indian conditions. Full-scale experiment would appear to be necessary and for this purpose the electrification of a branch line with 50 cycles overhead equipment will be very desirable. Japan is carrying out such an experiment and there is no reason why Indian Railways should lag behind

“****In concluding, we would emphasise that in the national interests there should be no hesitation in carrying out experiments in this country to decide for ourselves what will be the best system of traction for the future. The experiments should obviously be conducted on one of the less important lines where cheap hydro-electric power is available, affording a clear justification for changing over from steam to electric traction.”

2.14. The Committee wanted to know whether the acceptance of AC system on an experimental basis, as recommended by the Sarangapani Committee, was adopted. The representative of the Ministry has stated in evidence that by the time the final report of the Sarangapani Committee came in 1956, the French railways had already put up their AC traction and many engineers from India had also seen it and many other countries had also adopted it. So, the Railway Board, instead of carrying out an experiment on AC system straightway went in for AC traction early in 1957.

2.15. In a written note, this Committee have further been informed that the question of appropriate system for Calcutta suburban areas which was then being progressed on 3000 V DC was also examined. It was considered that the adoption of the AC system in these areas including conversion of Howrah-Burdwan main line and Tarakeswar-Sheoraphuli branch section would not be more expensive than the adoption of DC for suburban areas. From operation point of view, the advantages of a unified AC system over the main line and also the suburban areas would be enormous. From technical considerations, the standardisation of equipment for maintenance of rolling stock, switching stations, overhead equipment, signalling equipment etc., if the same system was adopted throughout on the Eastern Railway, was a very important advantage. If two separate systems i.e., DC on Howrah-Burdwan main line and Tarakeswar-Sheoraphuli branch line and AC on the rest of the suburban areas (Howrah-Sealdah Divisions were maintained, a complicated system

would be required to be introduced at changeover stations of Howrah, Bandel and Burdwan and to counteract the effects of parallelism, additional costly equipment would be necessary. Weighing all considerations mentioned above, it was decided that electrification of Calcutta suburban section as well as main line sections should be operated on AC single phase 50 cycles system and Howrah-Bandel-Burdwan and Tarakeswar branch section to be converted from DC 3000 V to 25 KV AC single phase to have a unified system all over. In pursuance of this decision, part of the works on this residual portion were so carried out as to facilitate easy conversion to 25 KV AC system.

2.16. The electrification of this section (of 142 Route KM—407 Track KM) was executed by Calcutta Electrification Project under the administrative control of General Manager, Eastern Railway during 1955—58 and the total expenditure was Rs. 15·47 crores excluding cost of land, but including cost of rolling stock.

2.17. This section has since been converted from 3000 V DC to 25 KV 50 cycles AC. The approximate cost of conversion was estimated at Rs. 7·5 crores including cost of rolling stock. Cost of conversion for other than rolling stock was Rs. 3·47 crores.

2.18. The Committee note that before any particular section of the Railways is taken up for electrification, the comparative economics of steam, diesel and electric tractions are gone into for that particular section and only after it is found that electric traction will be more economical, is it adopted.

2.19. The Committee are, however, not fully convinced of the reasons for deciding in June, 1954 to electrify Howrah-Burdwan main line and Sheoraphuli-Tarakeswar branch line with 3000 Volt DC traction and not adopting 50 cycles AC system of traction when in the interim report submitted by Shri S. Sarangapani in 1954 it was clearly stated, "The single phase 50 cycles AC system has recently come into prominence with its adoption on certain sections of the French Railways and in the Belgian-Congo and was favoured on account of its lower costs of overhead equipment compared to the DC system especially on railways where the traffic density cannot otherwise justify electrification. The results of the working of these sections are being watched with keen interest all over the world." The Committee feel that without waiting for the final report of the Sarangapani Committee, the Railway Board could have initiated experiments to decide for themselves whether AC traction, which had come into prominence in France and some other countries, could be suitable under Indian conditions before

they went in for 3000 volt DC traction in the Calcutta area. The Committee are not able to appreciate the course of action adopted by the Railway Board and they feel that the expenditure amounting to about Rs. 7½ crores, which was subsequently necessitated for conversion from DC to AC traction in the Calcutta area within a period of two to three years, could perhaps have been avoided.

(ii) Plan Projects

2.20. With rapid growth of traffic in the coal and steel belt areas around Eastern and South Eastern Railways, electrification, which was hitherto confined mostly to suburban areas, became a necessity for the main lines on these railways. There was an immediate necessity to serve the new steel plants at Durgapur, Rourkela and Bhilai as well as plants already existing at Tatanagar and Burnpur that were being expanded.

SECOND PLAN SCHEMES

2.21. The Railway Board formulated schemes for the electrification of the following sections during the Second Plan period:—

SECOND PLAN SCHEMES

Railway	Section	Route KM	Track KM	Cost in crores of rupees
(1)	(2)	(3)	(4)	(5)
1. Eastern Railway	Durgapur- Mughalsarai via Grand Chord with Pradhankhanta- Pathardih, Dhanbad- Kusurda-Tetumari and Damodar-Kalipa- hari branches.	532	1416	45.19
2. South Eastern Railway	Asansol-Sini, Kharagpur Rourkela, Kandra- Gomharria and Raj- khsawan-Dangoa- posi.	456	1139	
		1078	2555	45.19

Third Plan Schemes

2.22. Electrification schemes in the Third Plan included important main line sections of the Eastern, South Eastern, Northern, Central and Southern Railways. The suburban electrification schemes around Calcutta and Madras included some new lines as well as conversion to 25 KV AC of the existing 3000 V DC system on the Howrah-Burdwan main line and the Sheoraphuli-Tarakeswar branch of the Eastern Railway and of the existing 1500 V DC system on the Madras Beach-Tambaram section of the Southern Railway. The electrification schemes (with the schemes for conversion) included in the Third Plan covered 1801 route KM or 4614 single-track KM.

2.23. The details of the Third Plan schemes are given below:

THIRD PLAN SCHEMES

Railway	Section	Route KM	Track KM	Cost in crores of rupees
(1)	(2)	(3)	(4)	(5)
(a) Eastern Railway	1. Sealdah-Ranaghat and Dum Dum-Bongaon	148	356	17.01
	2. Ranaghat-Krishana- nagar city, Kailinar- ayanpur-Santipur and Bandel-Naihati	50	100	included in item 3 below
	3. Sealdah South-Cann- ing Lakshmikanta- pur-Diamand Harbour and Budge Budge	154	265	11.53
	4. Waria-Burdwan	72	345	12.25
	5. Santigarh-Dum Dum Chitpur	93	214	14.05
	6. Howrah-Burdwan and Seoraphuli- Tarakeswar : Con- version from 3000V DC to 25 KV AC	142	407	7.46
	7. Pathardih P.F. to Pathardih Yard	2	9	included in item (b) 3 below
	8. Mughalsarai Yard	5	27	included in item (d) below
	9. Howrah Yard	—	37	included in item (b) 2 below
Sub-Total		661	1760	

(1)	(2)	(3)	(4)	(5)
(b) South Eastern Railway	1. Kharagpur-Tatanagar (Doubling)	—	177	2.49
	2. Howrah-Kharagpur	128	447	7.62 (excluding rolling stock)
	3. Adra/Anara-Rukni-Bhjudih-Jamadoba Washery	60	119	1.14
	4. Damodar-Radhanagar Ramakanali-Chourashi and Garadhru-beswar-Adra-Joychandipahar	26	38	0.43
	5. Dangoaposi-Gua, Padapahar-Banspani and Barajamda-Bolani Khadan	76	120	3.17
	6. Rourkela-Birmitrapur	25	36	0.60
	Sub-Total	315	937	
(c) Southern Railway	1. Tambaram-Villupuram and third line between Madras Egmore and Tambaram	134	212	5.52
	2. Madras Beach-Tambaram (Conversion from 1500 V DC to 25 KV AC)	29	77	1.70
(d) Northern Railway	Mughalsarai (Excl.)-Kanpur (Panki)	351	878	20.09
(e) Central Railway	Igatpuri-Bhusaval	311	750	18.13
	Grand Total	1801	4614	123.19

2.24. The Committee have been informed that 216 route KM and 640 track KM were actually energised on 25 KV AC system during the period August 1960 (when the first section was energised on 25 KV AC on the Indian Railways) to March 1961 and 1746 route KM

and 4164 track KM from 1-4-1961 to 31-3-1966 including 134 route KM and 212 track KM energised by the Southern Railway on the Madras—Villupuram section.

Fourth Plan Schemes.

2.25. In old Fourth Five Year Plan (1966-71) the following four sections were to be taken up for electrification:

	Route KM	Track KM
1. Rourkela-Durg	452	1120
2. Kanpur-Tundla	222	530
3. Virar-Sabarmati	442	1125
4. Madras-Vijayawada	484	1160
	1600	3935

2.26. The first three works have already been programmed. The Fourth work is being considered along with certain other new schemes for the new Fourth Five Year Plan (1969-74). The additional sections under consideration for electrification are as follows:

	Route KM
(i) Bailadilla-Visakhapatnam	475
(ii) Madras-Trivellore	42
(iii) Diva-Panvel-Uran	54
(iv) Panchkura-Haldia	72

2.27. An amount of Rs. 95 crores is tantatively provided in the Railway's new Fourth Plan for electrification. Out of this, a sum of Rs. 45 crores will be required for completing the work already programmed, leaving a balance of Rs. 50 crores for new sections to be taken up during the Fourth Plan period.

2.28. The following targets of expenditure set for the Second and the Third Plan periods and the period 1966-71 (old Fourth Five Year Plan) for the electrification of railway lines and the expenditure actually incurred have been furnished to the Committee:

Figures in crores of Rupees

Plan period	Expenditure		Shortfall
	Target	Achievement	
Second Plan	31·10	30·19	0·91
Third Plan 1961-62 to 1965-66	70·55	70·27	0·28
Period from 1966-67 to 1970-71	65·88	—	—

Explanatory note:

- (1) In the above figures of target and achievement, the expenditure on rolling stock has been included in the figures given for Second Five Year Plan and Third Five Year Plan. For the period 1966-67 to 1970-71, rolling stock has been excluded.
- (2) The target of expenditure for the Second and Third Plan periods has been taken as the total of the final grants given by the Railway Board for the respective years. This also corresponds to the latest target dates for the various groups as fixed by the Controlling Committee. The actual expenditure during the respective periods has been shown as achievement.
- (3) Groups 18 (Igatpuri-Nandgaon)—19 (Nandgaon-Bhusaval) and 20 (Villupuram-Tambaram)—21 (Tambaram-Madras Beach) executed by the Central Railway and the Southern Railway respectively, have not been included in the above figures.

2.29. In regard to physical spill-over of projects from the Second to the Third Plan period and from the Third to the subsequent period, the following details have been furnished to the Committee:

- (i) Electrification schemes carried over from the Second to the Third Plan period:

Saction	Railway	RouteKM	Track KM
(1) D odar Kalipahari	Eastern	14	15
(2) Gomoh-Gayag-Mughalsarai	do	376	910
(3) Dhanbad-KusudagTetamlari	do	10	18
(4) Tatanagar-Kharagpur (single phase)	South Eastern	128	165
(5) Asansol-Purulia	do	74	170
(6) Purulia-Chakradharpur- Rourkela, Sini-Tatanagar Kandra-Gomharia	do	260	624
TOTAL		862	1902

(ii) Electrification schemes carried over from Third Plan to subsequent period:

Section	Railway	Route KM	Track KM
(1) Tatanagar-Kharagpur (Second line)	South-Eastern	—	157
(2) Sealdah South	Eastern	108	125
(3) Howrah-Kharagpur	South Eastern	128	495
(4) Bannel-Howrah & Sheoraphuli Tarakeshwar (conversion)	Eastern	74	186
(5) Allahabad-Kanpur	Northern	192	473
(6) Igatpuri-Nandgaon	Central	149	370
(7) Nandgaon-Bhusaval	do	162	380
(8) Madras Beach-Tambaram (conversion)	Southern	29	70
(9) Dangoaposi-Gua, Barajamda-Bolanikhadan, Pedapahar-Banspani	South Eastern	68	112
TOTAL.		910	2368

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2.30. The financial targets for the period 1966-67 to 1970-71 have been given as follows:—

(Figures in crores of rupees)

Schemes	Estimated cost	Anticipated expenditure for the period 1966-69	Forecast for the period 1969-71	Total for the period 1966-71	Thrown forward beyond March 1971
Residual Third Plan works	—	12.87	—	12.87	—
Rourkela-Durg	24.97	15.09	9.88	24.97	—
Kanpur-Tundla	14.08	4.58	8.00	12.58	1.50
Virar-Sabarmati	29.46	1.10	14.36	15.46	14.00
				65.88	

NOTE: The estimated cost furnished above takes into account the effect of devaluation as well as of cabling on all the three sections and the cost of transmission lines on Kanpur-Tundla section.

2.31. In a written note the Committee have been informed that the targets of works set for the Second and the Third Plan periods and the period ending 1970-71 for the electrification of railway lines have been modified time and again for almost all sections at the Controlling Committee meetings. The Committee wanted to know whether the Railways formulated schemes according to predetermined norms and fixed time targets for the same. In a written note furnished to the Committee the Ministry have stated as under:

“Whenever any works are sanctioned, targets for its completion are invariably laid down in consideration of the quantum of work involved and urgency of requirement. Electrification works inherently take about four years for completion and entail concurrent co-ordination with power supply authorities and others and is subjected to various indeterminate factors and unforeseen difficulties. These difficulties were considerable in the initial stages as the available know-how in the initial stages was limited and we were in the process of imbibing the necessary technological details and also developing indigenous capacity for materials required. Despite the special features of the difficulties mentioned above, efforts were still made to stick to the targets initially laid down. As electrification projects do take time to complete, it would be appreciated that a project in a particular plan period was not likely to be completed and a spillover was inevitable as is also the case in other major construction projects like new lines and doubling.”

2.32. It has further been stated that—

“the electrification schemes sanctioned during the periods covered by the Second Five Year Plan (1956—61) and the Third Five Year Plan (1961—66) have been given the nomenclature—‘Second Five Year Plan schemes and Third Five Year Plan schemes respectively for convenience of reference only’, and there was no programme for completing these schemes during these plan periods, progress of schemes being dependent on many factors like yard-re-modelling, completion of P. & T. and power supply works, availability of locos etc.”

2.33. The Committee note that the railways have been able to energise a total of 1962 route KM and 4804 track KM on 25 KV AC

system during the period from August 1960 to 31st March 1966. The Committee are, however, distressed to note that a large number of schemes which were originally included in the Second and Third Five Year Plans, had to be carried forward to the Third and Fourth Five Year Plan periods respectively. Some schemes are likely to be thrown forward even beyond March, 1971. While appreciating that electrification works take considerable time for completion and entail concurrent co-ordination with different authorities—Central as well as State, the Committee fail to understand why firm target dates cannot be laid down on a realistic basis and strictly adhered to after fully taking into account the inherent difficulties like the supply of power, procurement of material and equipment, etc. They feel that it is better to take up such of the schemes as are likely to be completed within the scheduled time and within the resources available instead of dissipating energy and money on different schemes which do not stand any chance of being taken up and completed within the target dates.

2.34. The Committee are not satisfied with the explanation given by the Ministry that the electrification schemes sanctioned during the periods covered by the Second Five Year Plan and the Third Five Year Plan have been given the nomenclature "Second Five Year Plan schemes and the Third Five Year Plan schemes respectively for convenience of reference only." They feel that as far as possible, the schemes should be completed within the Plan period itself and should not be allowed to be spilled over to succeeding periods.

Perspective Planning

2.35. The Committee wanted to know if any perspective planning has been prepared in regard to electrification work. The representative of the Ministry has stated during the course of evidence:

"We have prepared a perspective plan for both dieselisation and electrification. This is being constantly reviewed based on the generation of traffic. So far as electrification is concerned, we are going ahead with Rourkela-Durg and Kanpur-Tundla already. We have also started working on Birar-Sabarmati. The question of electrification of Madras-Vijayawada and Madras-Trivellore is under consideration. Kottavalasa-Bailadilla also should be electrified, but is just in the initial stages."

2.36. Asked to clarify whether the Ministry have prepared a bigger plan beyond the Fourth Five Year Plan projects the representative of the Ministry has stated that they have no other plan for electri-

fication beyond the Fourth Plan schemes. They have a tentative programme for electrification and dieselisation, which synchronises with the National Plan.

2.37. The Committee are unhappy to note that the Ministry have not prepared any Perspective Plan in regard to electrification of lines beyond the Fourth Plan Schemes. They would strongly recommend that steps should be taken to prepare a Master Plan for the electrification of the Indian Railways on a long term basis so that a clear picture may emerge as to the quantum of work that has to be executed, for the benefit of the planners, basic industrial units of the public and private sectors as well as the related manufacturing industries in the country.

(iii) Progress of individual electrification projects

2.38. A statement showing electrification projects (Second and Third Plan schemes) with original target dates, period of completion and reasons for delay as furnished by the Ministry is reproduced below:

S. No.	Name of the Scheme	Original target date	whether completed within target date if not, how much delayed	Reasons for delay
(1)	(2)	(3)	(4)	(5)
<i>II.—Plan Schemes</i>				
1	Durgapur-Gaya including Pradhankhanta-Pathardih and Dhanbad-Katuda-Tetulmari—Branches	Jan'61	No Ten months	(i) Delay in completion of remodelling of yards, (ii) Paucity of traffic blocks; (iii) Delay in completion of P&T works.
2	Asansol-Sini, Tatanagar-Sini-Rourkela, Rajkharwan Dangoaposi	„	No one year	Do.
3	Gaya-Moghalsarai	June 1962	No One Month	Delay in remodelling of Moghalsarai Yard.
4	Kharagpur-Tatanagar (Single line)	„	No 6 months	(i) Non-completion of the remodelling works between Simpura and Kharagpur. (ii) Non-completion of work of erection of subsections and transmission lines by the Power supply authorities.

(1)	(2)	(3)	(4)	(5)
<i>III—Plan Schemes</i>				
5	Kharagpur-Tatanagar (Double line)	Sept. 1964	No 2 years ten months	Delay in completion of Nimpura Marshalling— Yard.
6	Nimpura through termi- nation yard.	Feb. 1965	Yes	—
7	Sealdah-Ranaghat-Dum Dum-Bangaon.	March 1965	No Ten months	Track between Dum Dum Junction and Dum Dum Cantt. was not in final position.
8	Ranaghat-Krishnanagar City, Kalinarayanpur- Shantipur and Bandel- Naihati.	Dec. 1963	No one year nine months	Delay in S.E.D's Check- ing and tower wagon inspection.
9	Sealdah South	March '65	No one year seven months	(i) Shortage of Steel. (ii) Difficulty in getting blocks in June, '66. (iii) Demonstration & stoppage of passenger trains in July/Aug '66. (iv) Strike in RE and Bangala Bandh in Sept. '66.
10	Howrah-Kharagpur	Sept. '65	No Two years 8 months	(i) Delay in remodelling of HWH & KGP Yards. (ii) Trouble at Changail (iii) Delay in completion of third line between Deulti and Macheda & Bridge works.
11	Burdwan-Waria	Dec. '64	No Seven months	Delay in remodelling of Andal Yard and short fall in the out put of galvanised steel struc- tures and inadequate supply of conductor due to bunching of works in various groups.
12	Chitpur-Dum Dum Sakti- garh.	Dec. '64	No Five months	Delay in remodelling.
13	Burdwan-Bundel (Conversion)	Dec. '64	No six months	Delay in remodelling of Bandel Yards.
14	Howrah-Bundel and the Sheoraphuli-Tarakeswar (Conversion)	Dec. '65	No one year and 8 months	Delay in introduction Route Relay inter-lock- ing at Howrah and non- availability of EMUs.
15	Mughalsarai-Allahabad	Sept. '65	No 7 months.	Delay in power supply by UPSEB and shortfall in the output of galvanised steel struc- tures and inadequate supply of conductors due to bunching of works in various groups.
16	Allahabad-Kanpur	Sep. '65	No one year and] 6 months	Do.

(1)	(2)	(3)	(4)	(5)
17	Anara-Rukni-Jamadoba Bhojidih Washery.	March '64	No one year 5 months	Shortage of copper conductors. Delay in remodelling of yard and lowering of track in Sudamdih-Pathardih Section.
18	Damodar-Radhanagar, Ramkanali—Chorashi, Adra-Garhhrubeshwar-Joychandipahar.	Aug '62	No 11 months	Shortage of copper conductors.
19	Dangoaposi-Gua-Barajamda—Bolanikhadan & Padapahar-Bansapani.	June '66	No Six months	Delay in power supply by OSEB.
20	Rourkela-Birmitrapur	Sept. '63	No 7 months	Delay in remodelling Birmitrapur Yard.
21	Igatpuri-Nandgaon	June '65	No 2 years 11 months	
	Nandgaon-Bhusaval	March '65	No 2 years 9 months	(i) Delay by MSEB in power supply arrangements for electric traction on Igatpuri-Bhusaval section. (ii) Delay in release of foreign exchange by the Ministry of Finance for 25 KV circuit breakers required by the MSEB for the sub-stations on'y in October 1966. (iii) Delay in receipt of insulators, steel and copper required in connection with the electrification of the section. (iv) Non-availability of contract wire due to strike in the works of M/s NICCO.
22	Madras-Tambaram-Villupuram.	Dec. '63	No one year 3 months	(i) Delay in receipt of electric locomotives from Japan; and (ii) Delay in completion of the P & T works.
23	Conversion of Madras Beach-Tambaram from 1500 V DC to 25 KV AC system of traction.	March '65	No one year 10 months	(i) Delay in receipt of MG-AC EMU required for Electric traction. (ii) Delay in receipt of material required for conversion work.

(1)	(2)	(3)	(4)	(5)
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(iii) Delay in receipt of booster transformers required for the section as the same were impounded by the Government of Pakistan.

Igatpuri-Bhusaval Section.

2.39. The Ministry in a written note have stated that the following target dates for the completion of the Igatpuri-Bhusaval section had to be extended twice:

- (i) Igatpuri-Nandgaon—December, 1967.
- (ii) Nandgaon-Bhusaval—March, 1968.

2.40. The target set for Igatpuri-Nandgaon section was revised to March, 1968 and the electrification of the section was completed in May, 1968. As regards completion of the electrification of the Nandgaon-Bhusaval section the target of March, 1968 was revised to June, 1968 and has further been put back to December, 1968 mainly due to the non-completion of the power house at Bhusaval by the Maharashtra State Electricity Board for making power available for introduction of electric traction of Nandgaon-Bhusaval.

2.41. Explaining the reasons for the delay, the representative of the Ministry has informed the Committee that they had to work in co-ordination with the State Electricity Board and others, and if somebody or other lagged behind, there were always difficulties and the target date had to be shifted. This was a common factor which the Railways had to accept.

Sealdah-Ranaghat and Sealdah Sections.

2.42. The Committee have also been informed in a written note that the slow progress of this section was on account of shortage of steel and difficulties in getting blocks in the sensitive sections in June, 1966 followed by demonstrations and stoppage of passenger trains in July/August 1966, strike in the Railway Electrification organisation and Bungla Bund in September, 1966. As a result of slow progress of electrification of Sealdah-Ranaghat and Sealdah South sections there was a saving of Rs. 2:94 crores in the revised estimate of the project during 1966-67.

2.43. Asked to explain how the non-availability of steel sections was affecting execution of projects within target dates, the representative of the Ministry has stated that there were certain categories of steel sections required by the Railways, which were not available with the public sector steel plants.

2.44. The Ministry in explaining the position in a written note have stated:

“Shortages of steel was felt for the work in Sealdah South section only.

Initially for works done by Calcutta Electrification Project as well as for six other groups of railway electrification, steel was imported. However, to save foreign exchange, indigenous suppliers were encouraged for supplying steel for all subsequent groups.

Bulk orders were placed for steel for various groups including Group 10, viz. Sealdah South section on Messrs HSL, Bhilai and Messrs TISCO. The steel for Group 10 was required from January, 1965.

By the end of 1964, it was known that the full supply of steel for Group 10 will not be received in time.

Trial orders were placed in December, 1964 on Messrs IISCO for 820 tonnes of an alternate section of BFB 200mm×200 to replace RSJ 8"×6". There were heavy rejections due to bad rolling and they could supply only 335 tonnes of acceptable steel up to August, 1965. Messrs IISCO could not successfully roll this section and further orders had to be cancelled.

Simultaneously use of fabricated masts was resorted to in Group 10 using channels of section 200mm×75 and 200mm×80. This required additional time for fabrication.

Kanpur-Tundla Section

2.45. Delay in finalisation of tariff of electricity has been stated to a factor in delay in execution of the Kanpur-Tundla section.

Asked to explain the delay in execution of the Mughalsarai-Kanpur section which was energised last year, the representative of the Ministry has informed the Committee during evidence that the Railways had considerable difficulty in negotiating a settlement with the U.P. State Government regarding supply of electricity when

Mughalsarai-Kanpur section was energised last year. The U.P. Government gave certain figure at one time; but at the time of energisation of completed electrification works, they wanted to increase the electricity tariff. After a lot of discussions with the Chief Secretary of the U.P. State Government an agreement was reached.

Howrah-Kharagpur Section

2.46. Asked to explain the reasons for delay in the completion of the Howrah-Kharagpur section, the representative of the Ministry has stated during evidence that the scheme was actually sanctioned in 1961, but the work could not be taken up because just after this was sanctioned, a decision was taken to add a third line which involved re-modelling of the yards between Howrah and Kharagpur.

Telecommunication Cabling

2.47. One of the factors contributing to delay in execution of electrification schemes, such as on Durgapur-Gaya and Madras-Tambaram-Villupuram sections, has been attributed to delay in completion of the P. & T. works. During evidence the Committee have been informed that so far the Indian Railways have been borrowing line wires from P. & T. for their railway circuits. Recently a decision has been taken that the Railways will own these circuits and the telecommunication cabling will have also to be done by the railways. In regard to the electrification jobs which are now in hand and those which will be done in future, the telecommunication cabling job is being done by the Railways themselves.

2.48. When asked to indicate the cost of electrification per track kilometre in 1953 as compared to the cost as at present, the Ministry have stated in a written note that in 1958, when AC electrification was executed in India, the cost worked out to about Rs. 1.79 lakhs per track kilometre including rolling stock and about Rs. 0.99 lakh per track kilometre excluding rolling stock, whereas the present cost of electrification on 25 KV AC is about Rs. 2.3 lakhs per track kilometre excluding rolling stock. The reasons for the variation in the cost of AC electrification from 1958 to 1968 have been stated as follows:

- (i) increase in cost of copper which in the initial stages was around £200 per ton, while its present price is around £400 ton;
- (ii) due to devaluation, the value of the import content of the equipment, components and copper has gone up appreciably; and

- (iii) general increase in the cost of labour and material within the country due to economic and inflationary pressures.

2.49. The Committee have been further informed that at the time of preparation of estimates, certain amount of escalation in prices is taken into account in consideration of the planned period of completion. As long as the works are completed within a reasonable period beyond the target date, no upward trend in the estimates is envisaged. In case any project is unduly delayed, there is bound to be an element of upward trend in the estimate which, it is maintained by the Ministry, can neither be avoided nor anticipated.

2.50. The Committee note that except in one case, all the railway electrification projects from the Second Five Year Plan onwards had to be carried forward beyond the target dates originally fixed for their completion.

2.51. The Committee also note that even though the Railways could not foresee such factors as strikes in their construction units, public demonstration and stoppage of passenger trains etc., they were directly responsible for such jobs as remodelling of yards and completion of (link) lines which were contributory factors for delay in execution of the schemes.

2.52. The Committee are of the opinion that while in some cases energising of electric traction lines had been delayed due to delay in completion of work of erection of sub-stations and transmission lines by the power supply authorities or delay in getting copper conductors, steel sections, AC EMUs and other material, there had not been proper planning and coordination with other authorities while preparing the final estimates of schemes and setting target dates for their implementation. As a result of this the period of completion of the projects had to be spread over resulting in upward revision of estimates and overhead expenses.

2.53. Now that the Railways have taken up the job of cabling of the long distance tele-communication circuits which had previously been the responsibility of the P. & T. Department, the Committee hope that delay in execution of electrification of railway lines on this score could henceforth be obviated.

2.54. The Committee desire that gaining from experience, the Railway Board would take urgent steps to ensure that there is no avoidable delay in completion of projects, after the target date is once fixed, so that rise in the cost of the projects and delay in energising the tracks are obviated.

(iv) Selection of Lines for Electrification

Railway Electrification Projects not taken up so far

2.55. The Railway administration have a number of schemes at various stages of processing, which have not been included in the above analysis. Along with progress of schemes already approved, the Committee desired information in respect of some of these schemes which have not been sanctioned so far.

Electrification of the Calcutta Suburban area: Proposal for a Circular Railway

2.56. From 1914 onwards a number of surveys were conducted for electrification of the suburban areas of Calcutta, but due to various reasons no electrification schemes could be taken up till the end of the Second World War.

(i) **Appointment of Calcutta Terminal Facilities Committee**

2.57. After the Second World War, the Government of India undertook a fresh review of the prospects of electrification in the Calcutta area and in 1946 entrusted Messrs Merz and McLellan with the task of conducting an investigation over the section Howrah to Mughalsarai and later a separate investigation over the entire suburban areas of the Howrah and Sealdah Divisions. At about the same time, they appointed the Calcutta Terminal Facilities Committee which included a partner of the firm of Messrs Merz and McLellan as one of its members. The report of the Terminal Facilities Committee drew pointed attention to the necessity for a circular railway which was to girdle Calcutta by running along its extreme municipal boundaries on all the four sides and link up with the main lines of the Sealdah and Howrah Divisions at Dum Dum and Majerhat.

(ii) **Roy Committee proposal for a Circular Railway**

2.58. In January, 1953, the Government of India appointed the Roy Committee to investigate the possibilities of running passenger train services over the Port Commissioner's Railway in Calcutta.

2.59. The Committee submitted its report in April, 1953 recommending the extension of the suburban services on the Howrah and Sealdah Divisions on to the proposed circular railway mostly running over the Port Commissioner's Railway. This Committee also made it clear that the working of the circular railway should be made a part of the suburban electrification as it would be impracticable to operate it under steam traction.

(iii) Sarangapani Committee Report—1956

2.60. The Sarangapani Committee Report (1956), while giving greater details of the proposal for the Calcutta circular railway, commended the scheme in the following words:

“Apart from the necessity of relieving congestion in the city, the circular railway is expected to open out a vast field for development in suburban traffic to and from the outer suburbs, as has already been achieved in Bombay.”

2.61. The Estimates Committee (Third Lok Sabha) in their Ninety-first Report made the following recommendations:

“The Committee have found that the passengers detained at Howrah have to face great difficulties to reach their destinations due to non-availability of conveyance, congestion on the Howrah bridge and on the Howrah bridge approaches on both sides. The responsibility of the Railways to their passengers in this regard should not be decided only on a legalistic or technical basis, but should be considered on the basis of a utility organisation of a welfare state. As such the Committee feel that it would be desirable and useful if the Railways take active interest in this problem and try to find a solution in collaboration with the State Government.”

2.62. In reply to the above recommendation, the Ministry of Railways have stated, *vide* Forty-fourth Report of the Estimates Committee (Fourth Lok Sabha—March, 1968 as follows:—

“Studies are . . . in progress by the Study Team on Metropolitan Transport set up by the Planning Commission and the Regional Transport Survey Unit (Eastern Region), Calcutta regarding transport problems of Calcutta Metropolitan area. Their recommendations will be considered by the parties concerned, including the Ministry of Railways.”

2.63. The Committee in their Forty-fourth Report (Fourth Lok Sabha) commented that they “would like to be informed about the further progress made by the end of the current financial year (1967-68).”

2.64. During the course of evidence the representative of the Ministry was asked to clarify whether in connection with the reorganisation of the Railway Electrification organisation, the future load of work in connection with the proposed electrification of the Calcutta

circular railway was taken into consideration. The representative of the Ministry stated that it was not known when the Calcutta circular railway would be sanctioned. Even a survey for the work had not been carried out. The State Government had been approached by the Railway Ministry with the request that the expenditure in respect of the services of the officers to be deputed by the Railways to carry out the survey should be met by that Government. No progress was, however, noticeable at the time.

2.65. It was further stated that there could be no need for an elaborate organisation for the project. A field organisation of the type working at Bilaspur would be sufficient for the job.

2.66. The Committee note that the Study Team on Metropolitan Transport set up by the Planning Commission is at present engaged in the studies of transport problems of the Calcutta Metropolitan area. They would, however, suggest that the Railway Board should maintain suitable liaison with the above Study Team of the Planning Commission and set up necessary machinery to proceed with the preliminaries of preparation of a project report of the proposed circular railway, as necessary, so as to avoid any loss of time in setting in motion the processes for execution of the scheme, if finally approved.

Madras-Vijayawada Section

2.67. The Committee have been informed that on the basis of detailed studies carried out broadly on the basis of norms laid down by the Sahai Committee (1963), suitably adjusted to take into account the increasing trends in costs of various constituents, the electrification of the Madras-Vijayawada section was found justifiable by the Railway authorities.

2.68. When asked about the progress of work on the project, the Ministry in a written note have stated that an abstract estimate amounting to Rs. 29 crores (excluding rolling stock) was duly prepared and submitted to the Railway Board by the Railway Electrification organisation in July, 1967. The foot-by-foot survey for 82 per cent of the section had been carried out by April, 1968 except for the portion between Gummidipundi-Gudur, where the second track is not yet in final position and remodelling of six yards was still in progress, when the work was sealed off. An economic study of the cost/benefit of the electrification of the section is currently being carried out with a view to assessing the financial justification of the scheme.

2.69. During evidence the Committee desired to know the circumstances in which sanction to the abstract estimates of the project was

held up when it had passed through all the stages which a project had to pass, viz. preliminary survey of traffic density, grading, optimum through-put under steam traction, feasibility-cum-cost investigation, foot-by-foot survey and preparation of project report and abstract estimate.

2.70. The representative of the Ministry has stated in reply that due to recession and various other reasons the traffic had not risen upto their expectation. The traffic last year was slightly lower than that in the previous year which had led to the reconsideration of the project. The project has not been sanctioned so far.

2.71. The Committee are unable to appreciate how a scheme which had been processed through all the phases prior to the accord of sanction could be put off due to a slight temporary fall in density of traffic in an intervening period. The Committee therefore recommend that the Ministry should endeavour to complete the economic study of the cost/benefit of electrification of the section which is currently being carried out for assessing the financial justification of the scheme and take a final decision for acceptance of the project for execution very early.

Sealdah-Lalgola section

2.72. When asked to indicate the latest studies that have been made with regard to electrification of the Sealdah-Lalgola section, the Ministry have furnished the following note for information of the Committee:

“Sealdah-Ranaghat-Krishnannagar City section of the Eastern Railway, out of the Sealdah-Lalgola section, is already electrified on 25 KV AC system. As regards the balance section Krishnannagar City-Lalgola, the existing traffic on steam traction as obtaining in 1966-67 and 1967-68 is only in the range of 6—8 trains each way as against the corresponding inherent line capacity which is 14 on Krishnannagar-City—Krishnannagar section and 24 on Krishnannagar-Lalgola section, representing goods traffic less than 1000 net ton KMS/RKMS/Day. It would, therefore, appear *prima facie*, that the requirements of existing and anticipated traffic on this section can easily worked with steam traction and as such electrification of this section has not been considered justified; nor has, therefore, any detailed study for electrification of this section been made.”

2.73. The Committee note that in the Sealdah-Lalgola section a part of the whole section is electrified on 25 KV AC system and a

small part is catered to by steam traction. They feel that economies are likely to result if the whole section is electrified. They would, therefore, suggest that studies may continue to be made on the basis of traffic carried during the last five or six years about the economics of electrifying the residual part of the Sealdah-Lalgola section.

(v) Assessment of Return

2.74. Asked to explain the procedure by which the Railway Board selected a particular track for electrification and the normal return expected from electrification of a track, the representative of the Ministry has stated during the course of evidence that when bottlenecks are discerned in regard to steam traction, a project-cum-cost survey of the traction is undertaken to see whether electrification could be done. If *prima facie* it is seen that electrification would be cheaper, a foot-by-foot survey is undertaken and a detailed estimate is worked out with reference to the economics of operation, etc. If it is found that electrification would remove the bottlenecks in the section and it would also be economical in terms of return, then the project is sanctioned subject to resources being made available. The representative of the Ministry has further stated that for the purposes of electrification of a section, a normal return of not less than seven per cent on the capital outlay is set down.

2.75. Asked to indicate whether the Railway Board have been able to get the returns anticipated in regard to the lines that have already been electrified, the representative of the Ministry has stated in evidence: "This study is being carried out and we will be able to give the information later." Subsequently, in a written note, the Ministry have furnished a statement showing the anticipated return as per sanctioned abstract estimates on a few groups already electrified on 25 KV system. The data furnished by the Ministry are reproduced below.

Anticipated return as per sanctioned abstract estimates on a few groups already electrified on 25 KV AC system.

Railway	Group No.	Name of section	% return	Year of sanction of estimate
1	2	3	4	5
Eastern	1-3 & 7	Waria-Moghalsarai	10.85	1959
S.E.	4-6	Asansol-Sini-Rourkela-Tatanagar	7.16	
S.E.	8	Kharagpur-Tata	5.5	1960
S.E.	8A	Kharagpur-Tata (doubling)	8.20	1963
E.	9	Sealdah-Ranaghat, Dum-Dum-Bongaon	5.71	1960

1	2	3	4	5
E.	10	Sealdah South-Canning, Krihsnagar—Lakshmitkantpur .	9.39	1960
S.E.	11	Howrah-Kharagpur.	8.78	1961
E.	12 & 13	Andal-Burdwan-Dankuni-Belur	9.29	1962
N.	16 & 17	Moghalsarai-Kanpur	18.66	1962
S.E.	22A	Anara-Rukni	21.36	1962
S.E.	22B	Gardhrubesar—Adra—Joychandipahar	—	1962
S.E.	23	Dangoaposi-Gua	9.84	1963
S.E.	24	Rourkela-Birmiritrapur	—	1963

NOTE:—Groups 22B and 24 were electrified as an operation necessity.

2.76. Question about the statistics relating to actual returns obtained against the anticipated returns, the Railway Board have explained:—

“The different sections of the Eastern and South Eastern Railways have been progressively energised from 1960 onwards and the actual expenditure for electric traction services on the Railways is not maintained section-wise and it is therefore not practicable to evaluate the return which can be readily reconciled with the figures of returns indicated in the estimates and mentioned above. Moreover, even though envisaged in the relevant estimates, all the passenger services on the various electrified sections have not yet been brought under electric traction and to that extent realistic indications regarding the percentage of return on the capital would perhaps be available within a year or two when electric traction would have been completely stabilised and all the traffic is brought under electric traction.

A progressive assessment has in the meantime been adopted for the 25 KV electrified sections of the South Eastern Railway from 1963-64 onwards. The actual annual returns (based on the average cost of steam and electric traction per 1000 GTKM on the Railway) on the capital invested for the electrified sections on SE Railway is given below:

1963-64	17.45%
1964-65	15.15%
1965-66	25.91%
1966-67	25.40%
1967-68	25.60%

2.77. In reply to the question whether the Railway Board had made any assessment of the relative economics of the conversion of 3000 VDC to 25 KV AC system and allowing the DC system to continue, the Committee has been informed in a written note that:—

“Study of economics of conversion of 3000 V DC to 25 KV AC was duly carried out in the case of Howrah-Burdwan main line section and Sheeraphuli-Tarakeswar branch line. The study showed that there would be a saving in working expenses at Rs. 10.91 lacs per annum if the section was converted from 3000 V DC to 25 KV AC system.”

2.78. The Committee note that the electrification of two sections, namely, Kharagpur-Tata Nagar and Sealdah-Ranaghat-Dum Dum Bongaon was sanctioned in 1960 by the Railway Ministry although the anticipated return on the projects was less than the normal return of 7 per cent. They also note that electrification of two sections, namely, Gardhrubeswar-Adra-Joychandipahar and Bourkela-Birmitrapur was done as an operational necessity. The Committee hope that while taking up electrification of new sections the Ministry would keep in view that the anticipated return does not normally fall below 7 per cent on the capital outlay which is the present norm laid down for the selection of a project for electrification.

2.79. The Committee are surprised to note that the Railway Board have no statistics to show the actual returns on the sections so far electrified as against the returns they had anticipated at the time the projects were sanctioned. They are of the view that the Ministry should set up the necessary machinery for evaluating the percentage of return on capital outlay in each project with a view to see to what extent their anticipations in regard to earnings have been realised.

III

AGENCY FOR EXECUTION

(i) Creation of "Railway Electrification"

3.1. For electrification of the mainlines on the Eastern and South Eastern Railways it was considered by the Railways that Calcutta would be an ideal place for the location of the headquarters of the railway electrification organisation as it was centrally located and was also the headquarters of the two railways whose electrification schemes were concentrated around Calcutta.

3.2. Consequently, in September, 1957 an independent organisation named Main Line Electrification Project under the charge of an Engineer-in-Chief was set up for the execution of electrification of main lines covering the steel, coal and the iron belts in the areas served by the Eastern and the South Eastern Railways on 25 KV AC 50 cycles single phase system.

3.3. On the 1st May, 1958 the Calcutta Electrification Project, an organisation formed in June, 1954 on the Eastern Railway for the electrification of Howrah-Burdwan main line and Tarakeswar branch line at 3000 V DC system, was also amalgamated with the newly-formed Main Line Electrification Project and a new administration called the Railway Electrification was set up under the administrative control of a General Manager and Chief Engineer. The organisation included engineers of branches, i.e. electrical, civil engineering, and signalling and telecommunication and was responsible for all works including design, procurement, commissioning of rolling stock and for coordination with other agencies, such as the power supply authorities, P & T Department as well as the open line railway administrations.

Collaboration with French National Railways

3.4. From its very inception, Railway Electrification organisation was largely assisted by engineers of the French National Railways (SNCF) who were the technical associates. This assistance continued till March, 1966. During this period, the French National Railways (SNCF) engineers helped the Railway Electrification organisation in regard to the preparation of designs and specifications for

fixed installations and rolling stock purchase of equipment rolling stock in India, supervision and co-ordination during the execution of all electrification work including assistance and supervision in operation, maintenance, repair and overhaul of electric locomotives and EMUs and training of Indian engineers.

Agreement with the French National Railways

3.5. The AC system being new to India, it was decided by the Railways in May 1957 to enlist the co-operation of some technical associates to plan and supervise the main line electrification schemes on the Eastern and South Eastern Railways and accordingly, global tenders were invited. 15 tenders were received and were examined in London by the Indian Railway Electrical Mission consisting of the Member, Engineering, Railway Board, the Additional Member, Finance, Railway Board and two Chief Electrical Engineers. After examining the various quotations, the offer of Messrs French National Railways (SNCF), which provided that they (SNCF) were prepared to offer their services as technical associates directly and not indirectly through Sofrerail, was considered to be most suitable for the purpose as it was evident that with their previous knowledge of the conditions in India, they would be in a position to deliver the goods more expeditiously than any other party. Moreover, the financial terms offered by them being more favourable as compared to other and accordingly, they were appointed as technical associates.

3.6. The agreement with the French National Railways (SNCF), who were appointed as technical associates to help in the task of electrification of large mileage on the Indian Railways, provided for technical guidance in the designs, construction and maintenance of 25 KV AC electric traction and rolling stock initially for the period from 15th August, 1957 to 1st September, 1961 in connection with the electrification of groups 1—1. The terms were that—

- (a) SNCF should submit a project report on the basis of data to be supplied by the Government.
- (b) SNCF should provide technical assistance partly through its technical service in France and partly through staff temporarily deputed to India for electrification work.
- (c) They should ensure supervision of operation and maintenance of OHE of each section of line and of every locomotive for a period of 12 months after each section or each locomotive was brought into service. SNCF had also the right to entrust the Societe Francaised etudes et de Realisations Ferroviaires—SOFRETRAIL (French Company

of Railway Design and Construction) with some of the above mentioned services. However, the responsibility to the Government for all technical assistance and services rested with the SNCF solely.

- (d) The Government were to place at the disposal of the members of the staff of SNCF and of SOFRERAIL deputed to India free of charge, suitable unfurnished lodging accommodation corresponding to their status and to provide them with lodging accommodation in a hotel, if no other suitable lodging accommodation is available.
- (e) Representatives of SNCF and SOFRERAIL visiting India on temporary mission were to be provided with suitable lodging accommodation in a hotel. Such accommodation was to be provided either at Calcutta or in the vicinity of the places of the work.
- (f) The Government were to provide for the members of the staff of SNCF and of SOFRERAIL all facilities needed for the proper exercise of their duties i.e.
 - (i) Office accommodation suitably fitted and air-conditioned;
 - (ii) All transport facilities on Indian Railways and Indian Airlines while travelling on duty;
 - (iii) Suitable transport facilities in Calcutta and at sites of work; and
 - (iv) A secretariat consisting of typists; interpreters, office messengers, all necessary equipment like telephones, typewriters, drawing materials etc.

Remuneration—For the entire technical services and assistance as mentioned above, the Government were to pay to SNCF a consolidated sum of 426,000 pounds sterling.

The agreement was, extended on 22nd February 1963 for the period from 1st September 1961 upto 1st September 1963 which was on the same basis as the original agreement. The scope, however, was enlarged to include the schemes already covered by the original agreement as also of the Third Plan works on the Eastern, South Eastern, Northern, Southern and Central Railways including the conversion from 3000 V DC to 25 KV AC of the Howrah-Burdwan and Tarakeswar branch and from 1500 V DC to 25 KV AC of Madras Beach to Tambaram (also Tatanagar-Kharagpur double line section which had since come up for electrification).

3.7. The Government were to pay for the services mentioned above a consolidated sum of £35,000 and 2,00,000 of Indian Rupees.

3.8. Gradually as the Indian Railway engineers assimilated the technical know-how, the scope of agreement with the French National Railways was reviewed. The agreement was extended on 5th September, 1964 from 1st September, 1963 upto 31st March, 1966 and required of the SNCF to provide technical assistance in regard to supervision of operation and maintenance of AC electric rolling stock in service and on order or likely to be available during the operation of the agreement. They were to give their opinion on drawings and designs of components relating to operation and maintenance of rolling stock, help in carrying out tests etc. and tender advice with regard to facilities to be provided in loco-shed etc.

The agreement with the SNCF was terminated on 31st March, 1966. It has been stated that during the period of agreement with SNCF, the SNCF had made available a fund of technical know-how which has been assimilated by Indian engineers and the technical know-how thus gathered has enabled the Indian Railways to take up the work of electrification on the various sections themselves, thus, completely eliminating dependence on the French National Railways.

Initially, the work of electrification was entirely concentrated in and around Calcutta and as such the field organisation and the headquarters organisation worked more or less with the same headquarters. Progressively, however, with the extension of electrification over Asansol-Gaya and Gaya-Kanpur sections, field organisations were set up at Gaya and subsequently at Allahabad.

On the 31st March 1964, the Research, Designs and Standards Organisation (RDSO), Lucknow was made responsible for preparation of designs in respect of rolling stock. Railway Electrification administration was left responsible for the basic design, research, indigenous development, detailed drawings, approval of working drawings, scrutiny of tenders and execution of field works pertaining to fixed installation like overhead equipment, sub-stations remote control equipment, establishment of locosheds and other civil engineering and signalling works like modifications of existing signals for 25 KV AC, provision of colour light signalling and track circuits.

3.9. In addition to the above, a lot of other teething troubles had to be encountered and solved before the organisation could take up its work in full swing. The problems included preliminary and subsequent detailed co-ordination with P&T Department, power supply

authorities including the Central Water and Power Commission, contractor with their principals in different countries of the world and open line railway administrations both during planning as well as during execution.

3.10. Asked to explain the reasons which led to the setting up of a separate organisation for the railway electrification and for locating it at Calcutta, the Ministry have informed the Committee in a written note as follows:

3.11. "While works on the railways are ordinarily entrusted to the zonal railways concerned for execution, in a few cases where special features exist e.g. the Ganga Bridge Project, Railway Electrification Project and Assam Railway Link Project, the DBK Project, etc., separate project organisations are created."

3.12. "The reasons which led to the formation of a separate organisation for electrification are mainly the following:—

- (i) The concept of 50 cycles 25 KV AC traction, which was adopted by the Indian Railways as a standard in 1957-58, was comparatively of recent origin. The technical know-how and field experience with the system, though initiated in a few countries, was initially limited. Even though Indian Railways had experience with 1500V DC system, complete technical know-how and experience with 25 KV AC traction was not available in India. It was in this context of the local reasons that a number of organisations charged with the work of electrification should be kept minimum so that available technical manpower of the Indian Railways was more extensively utilised after orientation and training where necessary. The administration of electrification projects was therefore concentrated in one separate organisation.
- (ii) Initially, the electrification works were concentrated on the geographically contiguous areas of the Eastern and South Eastern Railways and it was, therefore, considered that an exclusive railway electrification organisation located centrally in Calcutta will facilitate its functioning in its relation to the Eastern and South Eastern Railways.
- (iii) The investment of funds and the quantum of work were so large that at the initial stages it would have thrown a heavy burden on the open line railways affecting their performance adversely if they were to undertake such large magnitude of work involving new techniques, training of personnel etc."

(ii) Performance of "Railway Electrification"

3.13. The Committee have been informed that during the last ten years—from 1958 when it was set up till April, 1968—the Railway Electrification organisation at Calcutta has electrified 2534 Route KM/6247 Track KM. It has been claimed that the pace achieved by the organisation during the Second and Third Five Year Plan periods is well worth comparable with those of other advanced countries of the world.

Electrification by Zonal Railways

3.14. Simultaneously with the execution of electrification projects by the Railway Electrification organisation, the following electrification schemes were undertaken by the Central and Southern Railways:—

Railway	Section	Total tum of RKM	quan- work TKM	Date when started	Progress
(1)	(2)	(3)	(4)	(5)	(6)
Central	Igatpuri- Nandgaon	149	370	August 1964	149 RKM/363 TKM have been energised till May, 1968. Balance works are expected to be energised by October, 1968.
	Nandgaon- Bhusaval	162	380	March 1965	Works are well in progress and are expected to be completed by October, 1968.
Southern	Madras-Villu- puram and Madras-Egmore Tambaram	134	212	February 1963	Works completed and section energised in March, 1965.

3.15. Technical guidance was provided by Railway Electrification for the above electrification schemes of the zonal railways included in the Third Plan.

3.16. As an illustration of the impressive performance of the Railway Electrification, it has been stated:

- (i) Railway Electrification was able to achieve overall economy in standardising the design in overhead equipment and power supply installation and thus reduce overall cost of electrification.
- (ii) Railway Electrification was able to ensure availability and utilisation of critical items of supply like copper conductors, tubes, insulators etc. and to carry out a concur-

rent assessment of overall progress of all connected works under execution.

- (iii) Railway Electrification had been able to make an outstanding contribution in the development of indigenous items for overhead equipment, switching stations and remote control equipment over years and thus eliminate the use of imported equipment in the electrification works.
- (iv) Railway Electrification was responsible to great extent in the design of electric rolling stock, their import purchases, and also developing their manufacture in the country.
- (v) Railway Electrification took up for the first time for the Indian Railways cabling of the long distance tele-communication circuits which had hitherto been the responsibility of the P & T Department thereby increasing the overall control over the execution of projects.

3.17. The Committee have been further informed that the survey works of the Fourth Plan schemes like Virar-Sabarmati and Madras-Vijayawada sections were controlled from Railway Electrification headquarters at Calcutta by establishing field units at Bombay and Vijayawada respectively.

3.18. Asked to indicate the nature of technical guidance provided by the Railway Electrification, the Ministry have informed the Committee that technical details and know-how regarding 25 KV AC electrification as acquired from the collaboration with SNCF was furnished to the Central and Southern Railways in the form of basic engineering design, drawings for OHE, switching stations and other related works together with material and component specifications. Assistance was also given for preparation of projects study, tender papers, scrutiny of tenders and negotiations for power supply tariff.

3.19. When asked to indicate whether any personnel were deputed by the Railway Electrification, Calcutta for the above jobs to the respective zonal railways at the sites of work, the Ministry have stated in a written note that no personnel were deputed by the Railway Electrification for the above jobs. The required guidance was, however, provided by normal tours and correspondence by the Railway Electrification officers.

(iii) Reorganisation of Railway Electrification

3.20. The Ministry have stated that during the Second and Third Plan periods the electrification schemes were mainly concentrated in

and around Calcutta. With the completion of the electrification of Howrah-Kharagpur section, which was the last main line section to be electrified (carried over from the Third Plan), this position changed considerably. The new electrification schemes, i.e. Kanpur-Tundla, Virar-Sabarmati and possibly Madras-Vijayawada were spread over in three different regions. It was therefore, considered by the Railway Board that the Railway Electrification organisation with its headquarters in Calcutta would not have been able to execute these works smoothly and efficiently due to geographical remoteness of these sections from Calcutta. The Railway Board thus considered the necessity of structural changes in the railway electrification set up.

3.21. It was, therefore, decided by the Railway Board in December, 1967, to distribute the functions of the Railway Electrification to various organisations with effect from 1st July, 1968.

3.22. In this reorganisation, functions relating to basic engineering, indigenous development and purchase of certain critical items of stores and equipment were distributed between the Research Designs and Standards Organisation (RDSO), Lucknow and the Railway Board. The responsibility for the execution of individual projects currently being handled by the Railway Electrification organisation, as also those likely to be executed in future, were entrusted to the zonal railways on which such electrification was to take place.

3.23. The overall control and co-ordination of all the electrification activities was to be exercised by the Railway Board. The post of the General Manager, Railway Electrification was at that stage transferred to the Railway Board's Office and redesignated as Additional Member, Railway Electrification.

3.24. In the RDSO, Lucknow, 6 posts of gazetted officers were created; while in the zonal railways 2 posts of gazetted officers were created.

3.25. In the Railway Board, in addition to the post of the Additional Member, Railway Electrification, the following gazetted posts were created:

- (i) Joint Director, Railway Electrification Stores,
- (ii) Deputy Director, Railway Electrification (Signals),
- (iii) Deputy Director, Railway Electrification (Steel), at Calcutta,
- (iv) Deputy Director, Electrical Engineering,
- (v) Section Officer, Railway Electrification.

3.26. The post of the Chief Engineer, Railway Electrification organisation at Calcutta was redesignated as Chief Administrative Officer with the powers of a General Manager.

3.27. With effect from the 1st July, 1968, the Railway Electrification organisation at Calcutta has been placed under the administrative control of the General Manager, South Eastern Railway.

3.28. Partial decentralisation of the railway electrification set-up was initially tried out on the Central and Southern Railways on a small scale by entrusting the work of electrification of Igatpuri-Bhusaval and Madras Beach-Tambaram-Villupuram sections, respectively, and it has been observed that the open line railways have been able to execute the schemes successfully.

3.29. Asked to indicate how far survey work of projects pertaining to the Western, Southern and South-Eastern Railways were conducted by the Railway Electrification from Calcutta, the Ministry have stated in a written note that about 96 per cent of the survey for Virar-Sabarmati was completed by 31-1-1968 when the work was transferred to Western Railways.

3.30. 82% of survey for Madras-Vijayawada was completed by the Railway Electrification by 31-3-1968 when the work was sealed off. There were 11 officers for Madras-Vijayawada survey work and 8 for Virar-Sabarmati. One officer stationed at Calcutta for finalising designs was looking after both the sections.

3.31. 99% of the survey for Kanpur-Tundla was completed in May, 1966. The balance could not be completed as some remodelling was to be done in Bhampur, Panki and Tundla. The scheme was transferred to Northern Railway with effect from 1-4-1968.

3.32. Foot-by-foot survey for Rourkela-Drug section was completed in May, 1966.

3.33. As, in the initial stages, the concept of 25 KV AC system was comparatively new and the technical know-how as well as experience on this system was limited on the Indian Railways and with a view to make the maximum use of collaboration with SNCF, all works concerned with design, research, indigenous development, preparation of specifications, invitation of tenders, scrutiny of tenders, approval of working drawings, progress of contracts and commissioning of electric rolling stock as well as AC traction was also entrusted to Railway Electrification, Calcutta.

3.34. The Rolling Stock Wing, which was managed by one Engineer-in-Chief in Railway Electrification, was separated in 1964 and transferred to the Research Designs and Standards Organisation, (RDSO), Lucknow under a Director. With the re-organisation of the Railway Electrification, the overhead equipment designs wing has been transferred to RDSO with effect from February, 1968 and placed in the charge of the Joint Director (Traction Installation), RDSO. The design wing of power supply sections comprising switching station, sub-station, traction sub-stations, booster station etc., is also planned to be transferred to the RDSO some time next year. With effect from 1-10-1968, the traction installation organisation (comprising entire design wing for railway electrification) has been placed under a Director, Traction Installation. It has been assured that due care has been exercised to transfer the functions in complete units to avoid any over-lapping whatsoever.

3.35. Asked to indicate how co-ordination would be maintained between the different organs concerned in the electrification of railways after the recent decentralisation of the unified electrification agency with its headquarters in Calcutta, the Ministry have stated in a written note that complete sections have been transferred as independent self-contained units to the RDSO and should any matter need joint deliberations of the RDSO and the zonal railways, it is expected to be settled in bilateral meetings. Besides, matters of common interest for railway electrification schemes are expected to be effectively co-ordinated and controlled by Railway Board through the Railway Electrification (in the new set-up) and through the Progress Evaluation Committee meetings, which are held at interval of two months with the Zonal Railway and RDSO officers.

3.36. When the Committee desired to know specifically the circumstances which led to the Railway Board to take the decision of decentralisation of the Railway Electrification, Calcutta, the representative of the Ministry has stated during evidence that the Eastern and South Eastern Railways during the Second Five Year Plan were very busy carrying out lots of work connected with traffic. The traffic went up to 156 million tons at the end of the Second Five Year Plan. As these railways serving the new steel plants were very busy and could not be entrusted with any mode construction works, a decision was taken for setting up an organisation to carry out electrification in that zone at that time. One more reason for setting up the separate organisation, as stated by the Ministry's representative, was the necessity of a centralised agency for collaboration

with the consulting engineers at the early stages. The representative of the Ministry has further stated:

“Just as Assam Railway Link Project was wound up and just as the Ganga Bridge Authority was wound up, so also this organisation, which was functioning in Calcutta and which could not possibly now carry out works in Madras, Bombay and Delhi, had to be changed and some sort of new organisation had to be set up. So we thought of the change. Now that the workload on the railways in connection with the doubling etc. has come down and that the railways are in a position to take up this additional work as enough technical knowhow is available with the railway engineers and the RDSO, Lucknow are also the repository of all the technical knowledge concerning Indian Railways, we thought they could also deal with the work so far as electric rolling stock was concerned. As far back as 31st March, 1964 this work was taken from Railways Electrification and handed to RDSO. So far as OHE was concerned, that also we thought RDSO must have all this knowledge so that in future as and when any electrification is to be done they are the consulting engineers with the Railway Board and the zonal railways.”

3.37. When asked to indicate whether a centralised railways electrification organisation with its headquarters at a place other than Calcutta could not have been entrusted with further electrification on the Indian Railways, without re-organising it, the representative of the Ministry has indicated during evidence that the Railway Electrification as it was constituted could not possibly carry out the electrification all over the country. He has added:

“Considerable changes will have to be made before it is possible to carry out electrification in the far flung areas. The reason why it has been done, apart from economy, is efficiency.”

3.38. The Committee desired to know if there would be additional expenditure on the establishment as a result of the reorganisation of Railway Electrification or there would be economy in expenditure of establishment. In a written note furnished to the Committee by the Ministry of Railways it has been stated that the strength of

gazetted officers in the Railway Electrification headquarters office at Calcutta as on 1st December 1967, i.e. prior to its reorganisation, was 40 and the average monthly expenditure for the above officers was about Rs. 65,127. The strength of the gazetted officers in this organisation as on 1-7-1968 i.e. after re-organisation has been stated to be 32 and the monthly average expenditure on them is about Rs. 51,000. The Committee has further been informed that as on 1-10-1968 the strength of gazetted officers in the Railway Electrification has been reduced to 24 and the monthly average expenditure has come down to Rs. 25,355. However, on re-organisation 6 posts of gazetted officers have been created in the Railway Boards office with the monthly average expenditure of Rs. 10,960, 6 posts of gazetted officers have been created in RDSO, Lucknow with an average monthly expenditure of Rs. 9,650 and 2 posts of gazetted officers have been created in the Zonal Railway with an average monthly expenditure of Rs. 3,500.

3.39. Asked to clarify how, in the light of the additional expenditure to be incurred in future on establishment in the wake of the decentralisation, the Railways could claim that reorganisation of Railway Electrification would lead to economy, the Ministry have furnished the following note:

'No retrenchment of gazetted and non-gazetted regular staff (casual labour) is contemplated.

Railway Electrification organisation as constituted upto December 1967, could not have carried out the electrification work of the far flung areas like Madras-Vijayawada, Virar-Sabarmati and Kanpur-Tundla sections and would necessarily have needed to be strengthened to be able to cope with the workload. Instead of strengthening, the Railway Electrification work has been re-organised with a view to streamlining its functioning in the alternate set up. It is to emphasise that the said re-organisation has been carried out mainly for efficiency of the organisation. It may further be added that the residuary Railway Electrification organisation is gradually shrinking and ultimately it is expected that the overall economies will be achieved in the alternate set up."

"The re-organisation now adopted is still in the course of implementation. The impact of this re-organisation will be known only in the course of time. Since all the departments including electrification units for each railway will be under the unified control of the same General Manager, works will progress smoothly."

3.40. In a reply to a question asked in the Lok Sabha on 30th April, 1968 about the reasons for Government's decision to convert the Railway Electrification organisation into a multi-unit project, the Minister of Railways stated:

"The decision to re-organise the Railway Electrification organisation has been taken purely for administrative reasons as it was considered that after the completion of electrification carried over from Second and Third Plan by June, 1968 the Railway Electrification organisation as at present constituted at Calcutta will not be able to handle satisfactorily the widely dispersed electrification schemes of Kanpur-Tundla and Virar-Sabarmati sections included in the current Plan because of the geographical remoteness of those sections. Moreover, in the altered set up, the Zonal Railways will have more direct participation in electrification of their respective sections and thus achieve integrated progress of the works within the overall needs of the zonal railways."

3.41. The Committee desired to know the manner in which the accounting with regard to electrification work and expenditure would be maintained by the zonal railways after re-organisation of the Railway Electrification. The representative of the Ministry has stated in evidence:

"It goes under a separate head. The expenditure involved on electrification is treated as a new item of work in the year's works programme. So far these accounts were dealt with in the GMRE's Office; now it will be dealt with in the zonal railways. As far as the Board and the accounting to Parliament is concerned, it goes on as before; electrification expenditure will come under electrification and other things will remain where they are."

3.42. The Committee are of the opinion that the reason advanced for the decentralisation of the centralized Railway Electrification organisation, i.e. economy and efficiency, are not amply borne out by the facts as brought out before the Committee. In the past, preliminary survey, estimating and even technical advise etc. for electrification projects at places like Virar Sabarmati, Madras-Vijayawada, Igatpuri-Bhusaval and Madras Beach-Villupuram, which were far away from the headquarters at Calcutta, had been directly conducted by the Railway Electrification organisation as it existed at Calcutta

before re-organisation. The Ministry of Railways themselves have commended the good work done by the organisation. Moreover, while the establishment of Railway Electrification organisation is being gradually reduced at Calcutta, expansion in the strength of officers and staff is taking place in the Railway Board, New Delhi, the RDSO, Lucknow and the zonal railways. As and when in future any electrification work is taken up by the zonal railways, it is more likely than not, there will be expansion in the strength of officers and staff there also. In these circumstances the Committee are doubtful whether it has been a wise step to decentralise a well-knit compact organisation which had acquired the technical know-how and which is stated to have achieved a pace of work comparable with that of other advanced countries of the world.

3.43. Now that the de-centralisation of the Railway Electrification organisation at Calcutta has already taken place due to administrative convenience, the Committee would not like to make any further comments on this issue for the present. They would, however, suggest that the Ministry of Railways should keep a careful watch over the developments in this regard and report to Parliament after a couple of years as to what extent economy and efficiency has been achieved as a result of re-organisation of the "Railway Electrification."

3.44. The Committee would also urge that proper accounting of the work-load of electrification of the railways, the expenditure incurred thereon and the progress made therein should be maintained in the zonal railways as also in the Ministry of Railways so that a clear indication about the progress of work and expenditure involved in electrification of railways is clearly discernible.

IV

BUDGET AND FINANCE

Broad details

4.1. A sum of Rs. 13.95 crores has been provided during 1968-69 for Railway Electrification (capital expenditure including development fund expenditure on open line works) by the Ministry of Railways. The works to be executed during this year include the spill over portions of the Third Five Year Plan schemes, viz. electrification of Howrah-Kharagpur section, Mughalsarai-Kanpur section and in addition, electrification of Kanpur-Tundla section of the Northern Railway, Rourkela Durg section of the South Eastern Railway and Virar-Sabarmati section of the Western Railway.

4.2. The expenditure has been anticipated and provided for on the basis of progress of electrification works achieved in the previous years. The statement furnished to the Committee indicating the basis on which the provisions for 1968-69 have been made is appended (Appendix II). The provision also includes some payments for the International Development Association (IDA) schemes which have been left over. The costing has been done on the basis of the latest figures available from other electrification schemes executed earlier. The cost of material etc. has been based on the latest quotations received from the various sources. The cost of execution by the contractors for various items of works has also been taken from the latest tenders.

Analysis of estimates and actual expenditure

4.3. The Committee have been furnished with the following analysis of original estimates, revised estimates and actual expenditure under each sub-head during each of the preceding three years (1965-66 to 1968-69) together with reasons for variations:

Demand No. 14—Construction of New Lines.

Demand No. 15—Open Line Works, Capital, Depreciation Reserve Fund and Development Fund.

Year	Budget sub-head/primary head	Original estimates (Voted)	Revised Estimates	Actual expenditure	Variations between Cols. 3 & 4 Excess(+) Savings(—)	Variations between Cols. 4 & 5 Excess(+) Savings(—)	Reasons for variations under Col. 6	Reasons for variations under Col. 7
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1965-66	• Demand No. 14 Demand No. 15	17.27 0.15	19.91 0.16	19.72 0.14	+2.64 +0.01	-0.19 -0.02	(a) (b)	(c) (d)
1966-67	• Demand No. 14 Demand No. 15	14.83 0.84	11.19 0.14	8.25 -0.02	-3.64 -0.34	-2.94 -0.16	(e) (f)	(g) (h)
1967-68	• Demand No. 14 Demand No. 15	12.86 0.32	10.02 0.32	9.90* 0.32*	-2.84 —	-0.12	(i)	(j)
1968-69	• Demand No. 14 Demand No. 15	13.40 0.55	— —	— —	— —	— —	— —	— —

* Approximate as accounts have not yet been closed.

- (a) Increase was mainly due to more provision require for post-budget increase in the rate of customs duty (2.30) and additional provision for EMU coaches; partly counterbalanced by less expenditure on overhead equipment on the Kanpur-Mughalsarai section and more credits for loco spares transferred to Railways.
- (b) The variation was minor.
- (c) The small saving was the net aggregate result of minor variations.
- (d) The saving was minor.
- (e) Reduction was due to the slower tempo of works than anticipated on the Sealdah South Section, Mughalsarai-Kanpur and Kharagpur-Tatanagar double line sections (1.49) surrender of provision for Tikiapara car shed that was decided to be constructed by the Eastern Railway (1.08) and delay of a few months in the commencement of work due to various reasons on the Kanpur-Tundla (0.51) and the Rourkela-Durg (0.61) sections.
- (f) Reduction was due to less debits from Open Line in respect of certain works and less payments on the Kanpur-Tundla section for the reason explained in (e) above.
- (g) Saving was mainly due to less expenditure on overhead equipment on the Sealdah-Ranaghat and Sealdah South sections due to slower progress of works.
- (h) Saving was mainly due to slower progress on the Kanpur-Tundla and Rourkela-Durg sections.
- (i) Reduction was due to the surrender of provision for the Kanpur-Tundla (1.35), Rourkela-Durg (0.81) and Virar-Sabarmati (1.33) sections due to the progress of works on these sections being slower than was programmed; partly offset by purchase of copper by Railway Electrification itself mainly for the Sealdah-South, Howrah-Kharagpur and Mughalsarai-Kanpur sections, which was originally to have been purchased by the contractor (0.61) and other minor causes (0.04).
- (j) The saving was small and due to the net aggregate result of minor variations.

4.4. The reasons for slower tempo of works leading to savings in the expenditures during the last three years have already been commented upon earlier. The Committee would only like to point out that there have been variations between the original estimates and the revised estimates and between the revised estimates and actual expenditure during the last three years, which indicates scope for realistic budgeting and efficient implementation of schemes.

V

ADMINISTRATION

Staff strength

5.1. The Committee have been informed of the following position of staff working on the Railway Electrification organisation as it existed on 31st March, 1967, i.e. before reorganisation:

<i>Category</i>	<i>No. of posts filled</i>
<i>Gazetted</i>	
Senior Administrative	7
Intermediate Administrative	1
Junior Administrative	7
Senior scale	53
Junior scale	53
Total	121
<i>Non-Gazetted</i>	
Technical	493
Non-technical	967
Work supervisors	174
Material checkers	292
Casual labour and regular Class IV	4704
Total	6630

5.2. The following is the break-up of the total of non-gazetted staff of 6630 as between the field staff and the headquarters staff in the Railway Electrification as on 31-3-1967:

Headquarters staff	Position as on 31-3-1967
Technical	108
Non-technical	405
Works supervisors	3
Material checkers	11
Class IV (regular)	15
Casual labour	321
Total	863

Field staff	Position as on 31-3-1967
Technical	385
Non-technical	562
Works supervisor	171
Material checkers	281
Class IV (regular)	86
Casual labour	4282
Total	5767
Grand Total	6,630

5.3. The Committee have been further informed in a written note that at the headquarters office at Calcutta the Railway Electrification had the following 40 gazetted officers as on 1st December, 1967 (prior to reorganisation):

General Manager	1
Senior Administrative (higher grade)	3
Senior Administrative (Junior Grade)	2
Junior Administrative	3
Senior scale	15
Junior scale	16
Total	40

5.4. After re-organisation, the strength of gazetted officers in Railway Electrification as on 1-7-1968 came down to 32 as detailed below:

Senior Administrative (higher grade)	1
Senior Administrative (lower grade)	2
Junior Administrative	5
Senior scale	12
Junior scale	12
Total	32

5.5. As against the reduction, the following posts have simultaneously been created as a consequence of the re-organisation of Railway Electrification with effect from 1st July, 1968:

- (i) Posts created in the Railway Board Office—
 Additional Member, Railway Electrification,
 Joint Director, RE (Stores),
 Dy. Director, RE (Signals),
 Dy. Director, RE (Steel) at Calcutta,
 Dy. Director, Electrical Engineering,
 Section Officer, Railway Electrification.
- (ii) Posts created in the zonal railways—
 Dy. CEE, Northern Railway,
 DSTE, Northern Railway.
- (iii) Posts created in the RDSO, Lucknow—
 Director, Standards (Traction Installation)
 Joint Director, Standards (Traction Installation)
 Dy. Director, Standards (Traction Installation),
 Dy. Director, Standards (Civil)
 Asstt. Director, Standards (OHE)
 Asstt. Director, Standards (Civil).

Non-gazetted staff

5.6. In regard to non-gazetted staff, the Committee have been furnished with the following statement showing the number of such staff of all categories in the Railway Electrification as on 30th June, 1968, i.e. prior to re-organisation and the number of staff as on 31st July, 1968, i.e. after the re-organisation:

Number of non-gazetted staffs in the headquarters office in Calcutta of Railway Electrification as—

	on 30-6-1968	on 31-7-1968
Technical	75	59
Non-technical	353	344
Works supervisors	3	3
Material checkers	7	7
Class IV (regular)	15	15
Total	453	428

5.7. Number of non-gazetted staff in field units as—

	on 30-6-1968	on 31-7-1968
Technical	347	347
Non-technical	543	528
Works supervisors	107	101
Material checkers	106	110
Class IV (regular)	99	132
Total	1202	1218

5.8. The reduction of 25 in the staff strength of the headquarters office of the Railway Electrification from 30-6-1968 to 31-7-1968 has been explained by the Ministry in the following manner:

“25 non-gazetted staff went on transfer to ENC|BSP, RDSO| Lucknow, Dy. Director (Steel) and open line on 30-6-61968 (AN). There was no retrenchment or reversion.”

“The strength of staff in the field units is necessarily related to development of work-load and variations like this cannot be ruled out. It is, however, to confirm that this variation has nothing to do with the re-organisation of Railway Electrification.”

5.9. The Committee have been informed that a number of non-gazetted posts have been created in various organisations as a result of re-organisation of the Railway Electrification.

(i) The following are the details of non-gazetted staff created in the Railway Board:

Technical assistants	4
Progress inspector	1
Assistants	4
Upper division clerk	1
Lower division clerk for steno-duty	1
Tracers	2
Total	15

- (ii) The following are the details of non-gazetted staff created in the office of DDRE (Steel), Railway Board, Calcutta:

Jr. field officers	.	.	.	.	2
Movement inspector	.	.	.	.	1
Assistant bridge inspector	.	.	.	.	1
Clerks	.	.	.	.	4
Steno	.	.	.	.	1
Typist	.	.	.	.	1
					<hr/>
Total	.	.	.	.	10

- (iii) The following are the details of non-gazetted staff created in the RDSO, Lucknow:

Senior design assistant	.	.	.	.	1
Senior inspectors	.	.	.	.	3
Design assistant (A)	.	.	.	.	2
Design assistant (B)	.	.	.	.	1
Design assistant (C)	.	.	.	.	2
Draftsman A	.	.	.	.	1
Draftsman B	.	.	.	.	1
Draftsman C	.	.	.	.	1
Junior inspectors	.	.	.	.	2
Junior inspectors	.	.	.	.	2
					<hr/>
Total	.	.	.	.	15

- (iv) Details regarding the creation of the non-gazetted posts in the zonal railways on account of their having taken up these electrification field works, are not readily available with the Ministry. It is anticipated that a few non-gazetted posts like those of technical assistance or steno-graphers that are likely to be created will actually be part of the field organisation.

5.10. When asked to indicate the number of gazetted officers as on the 1st July, 1968 in the Railway Electrification, Calcutta, who have been retrenched, transferred to other departments, reverted from

their permanent grades, and absorbed in the zonal railways (open line) subsequent on the re-organisation, the Ministry have stated in a written note that while none of the gazetted officers has been re-trenched and transferred to other departments as CE(C) and 3 officers were transferred out of Railway Electrification on 1-7-1968, one each to RDSO, CLW and Railway Board. One more officer (FA&CAO) was returned to IA&AS from where he had come to Railway Electrification on deputation.

5.11. When asked to indicate the number of non-gazetted officers rendered surplus due to decentralisation of the Railway Electrification organisation, the Ministry have furnished the following statement for information of the Committee:

Chief design assistant	1
Draughtsmen	4
Head clerks	2
Stanographer	1
Typist	1
Clerks	7
Total	20

5.12. The above 20 officers have been absorbed as under:

Transferred to VSRE	2
Transferred to RDSO	1
Transferred to ENC, RE Allahabad	1
Transferred to ENC/Bilaspur	2
Absorbed in other vacancies of Calcutta unit of RE	3
Transferred back to Eastern Railway in existing grade as per option of staff concerned	9
Transferred back to SE Railway in the existing grade as per option of staff concerned	2
Total	20

5.13. It has been stated by the Ministry that the re-organisation of the Railway Electrification headquarters has no bearing on the strength of staff in the field units, which is based purely on the quantum and progress of works and is unrelated to the headquarters organisation. In the figures given above, the staff rendered surplus in

the field due to completion of works have not been taken into account as they would have in any case been rendered surplus irrespective of the nature of the headquarters organisation.

5.14. When asked to indicate the proposals of Government for utilising the services of personnel of the Railway Electrification at Calcutta with their long experience, the representative of the Ministry has stated during evidence:

“We are not going to retrench any of them. Those of them who are prepared to go to the open lines, would be sent there.”

5.15. Asked to indicate whether the Railways have got any plan to see that as far as possible the staff which is likely to be retrenched will be absorbed in Calcutta, the representative have further intimated during evidence:

“We do not contemplate retrenchment. It is only the casual labour which is not employed further. Otherwise, we do not discharge any body at all.”

5.16. When asked to indicate whether it is a fact that the employees while being transferred to the zonal railways are not given their grades which they attained during their service in the Railway Electrification organisation, the representative of the Ministry has informed the Committee during evidence:

“This is the position; e.g. in the South Eastern Railway, there were a very large number of officers of Class III service who were officiating in the higher grades, but they had to be reverted on the closing of the construction works. In a construction organisation *ad hoc* promotions are given but the people have to be reverted on the closing of the construction work.

“They are promoted to work in the open lines. That is exactly what happened on the South Eastern Railway. When the construction work came to a close, there were 10 officers who had to be reverted; there were officers of Class II who were reverted to Class III. In such cases large scale reversions are inevitable when the construction work closes; the contraction of the cadre takes place; it cannot be avoided. It depends on our requirements. I really cannot find any other way. When the work has been reduced the number of people I would require

would also be less. The people have got to go back to their substantive posts on their old, basic scale of pay.

“Whenever construction comes to an end, there are reversions right from the top.”

5.17. The Committee wanted to know whether casual labour get any preference when such labour are recruited in any nearby project, the representative of the Ministry has stated during the evidence:

“When selections are held for any permanent vacancy, casual labour who were working in the railway electrification scheme had to take their chance along with the other casual labour of the railways. They have to appear before a regularly constituted selection board.”

5.18. The Committee further desired to know whether the Railways have any co-ordination in the matter of recruitment and demobilisation of casual labour considering the fact that, while after the completion of a project the vast majority of them are demobilised in one part of the country, in some other part of the country casual labour are recruited on a large scale. The representative of the Ministry has stated during evidence:

“It is difficult to transfer people all over the country. People who are prepared to work for Rs. 3 a day in a certain area, say in Bihar, are not prepared to go to Maharashtra and work there.****So, we have got to treat each district of the railways as a separate unit for this purpose, and as far as possible we try to see that the people are employed in the same district or in adjacent districts, but it is not possible to transfer these people from one end of the country to another.”

5.19. In a written note the Committee have been informed that no casual labour with 5 to 10 years of service have been retrenched after re-organisation of the Railway Electrification organisation.

5.20. Asked to indicate whether any construction allowance is being paid to the staff of the Railway Electrification organisation and if not, the reasons therefor, the Ministry have stated in a written note:

“Railway Electrification is a construction project in terms of the principles laid down by the Railway Board.

The staff of the Railway Electrification was not sanctioned any construction allowance for reasons as under:

- (i) All the staff posted in Railway Electrification were either posted on the Railway heads or in areas where compensatory city and house rent allowances were prescribed.
- (ii) As the staff employed in doubling were not eligible for this allowance, on the same analogy the staff employed in Railway Electrification were also not considered eligible.
- (iii) In view of the above, it was not considered necessary to make any specific reference in this point to the Railway Board.
- (iv) The Board did not also issue any specific order for granting construction allowance to Railway Electrification staff."

5.21. In reply to the question whether the casual labour recruited through the selection boards were given the Central Pay Commission scales and whether the officers in Class III were also given the above scales of pay, the representative of the Ministry has stated during evidence:

"The labour engaged on electrification was paid casual labour rates. It is a general principle that labour engaged in creation of assets, for example, doubling of track etc. is usually paid casual labour rates. It is only labour engaged in maintenance such as repairing of track etc. who are paid the Central Pay Commission scales of pay, provided such work exists for a period of six months."

When asked to indicate how many court cases are pending before the Calcutta High Court and what issues are involved in these cases, the representative of the Ministry has stated during the evidence:

"In the case of casual labour, they brought some injunction petitions; and out of 19, 15 were vacated, I believe, and the staff have been retrenched. 4 more are still pending involving about 300 labourers. That case is now going on in the Calcutta High Court. As far as possible we have attempted to give these people a chance to work in the adjacent railways by permitting them to apply along with others for direct recruitment. The case of railway electrification labour has been dealt with very sympa-

thetically and they have been treated on par with the casual labour of the railways. Each railway has got its own casual labour who have been doing work for years in the hope of getting some permanent employment some time. Along with them, these people have been considered, many of them have been screened and about 600 people have already been absorbed."

5.22. The representative of the Ministry has also informed the Committee that during the last seven or eight years a total of about 6000 casual labour was involved in the Railway Electrification and about 10 per cent of it had been absorbed. The court cases were only in regard to retrenchment. The Railways have been transferring them, as far as possible, to other zonal railways.

5.23. Asked to indicate whether there are no other cases with regard to admissibility of the Central Pay Commission scales and project allowance etc., the representative of the Ministry has stated during evidence that there are some cases where some of the casual labourers have asked for the Central Pay Commission scales and these matters are now *sub judice*.

5.24. During evidence the representative of the Ministry in reply to a query has agreed with the view that when an officer who has earned promotion (by dint of long service and good records) in a construction project gets reverted on completion of the project, he feels a sense of discontentment.

5.25. The Committee regret to note that when such projects as railway electrification, for which a separate organisation was specially created about 14 years ago, are completed, there is large scale reversion of employees and retrenchment of casual labour. The Committee need hardly point out, as had already been admitted by the representative of the Ministry of Railways, that such reversions create a sense of discontentment among the officers and staff. The Committee would, therefore, like to suggest that the Ministry of Railways should give a thorough and careful consideration to this aspect and consider the feasibility of absorbing the employees in equivalent grades or posts in other projects which might be progressing under the Railways in any other part of the country.

5.26. As regards the casual labour, the Committee note that they have to take their chance along with other casual labour whenever regular vacancies occur. The Committee trust that in filling up regular vacancies of labour, due consideration is given to the work done and experience gained by labour in various railway projects.

5.27. The Committee have no doubt that the Ministry will ensure, as promised to the Committee, that there is no retrenchment in the cadre of gazetted and non-gazetted employees of the erstwhile Railway Electrification organisation and steps will be taken to utilise the experience and expertise acquired by them during the last 14 years to the benefit of the entire railway organisation.

VI

PURCHASE OF ELECTRICITY AND STORES

Organisation

6.1. In a written note the Committee have been informed that prior to 1-7-1968 (the date of reorganisation), the organisational set-up for the purchase of stores and maintenance consisted of one Controller of Stores assisted by two Senior Stores Officers and one Assistant Stores Officer in the headquarters office at Calcutta. The stores depots at Raipur and Allahabad were each under a Deputy Controller of Stores and the depot at Kharagpur was under an Assistant Controller of Stores.

6.2. There are two construction stores depots—one at Kharagpur and the other at Raipur which are under the administrative control of Engineer-in-Chief, Railway Electrification, South Eastern Railway, Bilaspur and another construction depot headed by a Deputy Controller of Stores under the control of Engineer-in-Chief at Allahabad.

6.3. The Naihati Stores Depot which was under Controller of Stores (Railway Electrification) has been handed over to Eastern Railway with effect from 1-7-1968. There are, however, certain residual materials belonging to the erstwhile Railway Electrification organisation lying in this depot and necessary action for disposal of the same is being taken by the Railway Electrification organisation of the South Eastern Railway.

6.4. For the Fourth Plan works, depots will be established with the zones of works to suit local needs.

Electricity

6.5. The Committee have been informed that the Indian Railways purchase most of the power required by them from the State Electricity Boards except in Bombay where they have their own generating station. The Railways pay a certain rate per unit for purchase of electricity, and that rate is taken into account for determination of the economics of electrification. The State Electricity Boards take all the factors of production into account for demanding a certain price for electricity. So, for the purpose of determination of the economics of electrification, the price at which electricity will be available is also taken into account.

6.6. When asked to indicate the total quantum of electricity consumed by the Indian Railways annually and the price paid therefor, the Committee have been informed in a written note that the Railways consumed Rs. 14.19 crores worth of electricity during 1967-68 as per details given below:

Cost of electricity consumed by the Indian Railways on sections having electric traction during 1967-68.

Railway	KWH (Millions)	Cost (Rs. in crores)
<i>AC Traction</i>		
Eastern	449.53	4.40
South Eastern	176.00	1.74
Northern	84.84	1.07
Southern	32.19	0.26
Total	742.56	7.49
<i>DC Traction</i>		
Central	381.24	4.35
Western	116.50	1.35
Total	497.74	6.70
Grand Total of AC & DC	1240.30	14.19

6.7. Asked to indicate broadly the details of agreements with the State Electricity Boards for supply of electricity, the representative of the Ministry has stated during evidence that the period of an agreement is five years. The State Governments would not tie themselves for a longer period because of the prices of material and wages of labour going up. There is a tendency on the part of some State Governments that soon after an agreement has been finalised or even before the agreement has been finalised they try to push up the price of electricity, etc. The Railways are suffering on that account.

6.8. The Committee wanted to know whether the Railways have at any time thought of a procedure for evolving an all-India formula for determining a uniform tariff so far as their electricity requirements are concerned, the difference due to variations of tariff from State to State being made good to the State Electricity Boards by the Central Government. The representative of the Ministry has stated that no such proposal was considered, but the Railways have been thinking of setting up their own generating stations at some places

where they find that the rates quoted by the State Electricity Boards are high.

6.9. Asked to indicate the latest position in regard to cost per unit of electricity charged by the various State Electricity Boards, the Ministry have furnished the following table for information of the Committee:

Statement showing cost for electricity per unit charged from the Railways by the State Electricity Boards

Sl. No.	Supply Authority	Overall rate of supply of 40% LF including ceiling rates/rebates wherever applicable	Voltage supplied by supply authority	Plan period when supply negotiated/offered	Remarks
1	2	3	4	5	6
1	DVC	7.72 P/Unit 8.88 P/Unit	25 KV 25 KV	2nd Plan 3rd Plan	Prior to 1-4-65 After 1-4-65
2	BSEB	8.94 P/Unit to 10.52 P/Unit	25 KV	2nd & 3rd Plan	BSEB purchases power from various supply authorities at different rates.
3	MHSEB	10.21 P/Unit	25 KV	2nd & 3rd Plan	
4	MSEB	8.00 P/Unit (flat rate)	110 KV	3rd Plan	
5	UPSEB	11.00 P/Unit 13.02 P/Unit (flat rates)	25 KV 25 KV	3rd Plan 3rd Plan	Upto Sept., '67 After Sept., '67
6	OSEB	9.00 P/Unit (flat rate)	25 KV	3rd Plan	
7	MPSEB	9.95 P/Unit	132 KV	4th Plan	
8	OSEB	9.00 P/Unit (flat rate)	132 KV	4th Plan	

1	2	3	4	5	6
9	UPSEB	10.26 P/Unit*	132 KV	4th Plan	
10	MHSFB	8.75 P/Unit (flat rate)	132 KV	4th Plan	
11	MSEB	8.5 P/Unit (flat rate)	110 KV	4th Plan	
12	APSEB	8.75 P/Unit (flat rate)	132 KV	4th Plan	
13	GEB	8.00 P/Unit (flat rate)	132 KV	4th Plan	

NOTE : Unit rates of Sl. Nos. 1 to 4 include capital surcharge and fuel surcharge.

Unit rates of Sl. Nos. 7 to 9 include fuel surcharge.

*At 60% LF as supply taken at a single point at Panki.

6.10. The Committee note that the Railways are one of the major consumers of electricity and any fluctuation in its tariff will have repercussions on the operating costs of the Railways. The Committee find that the present overall rate per unit of electricity purchased by the Railways from different agencies varies from 8 to 13.2 paise. The Committee suggest that the Government may examine the feasibility of evolving a uniform formula for determining tariff payable by the Railways for purchase of electricity from different State Electricity Boards. They also suggest that before starting their own generating stations at considerable cost, the Railways should explore the possibilities of obtaining electricity at reasonable rates from Electricity Boards, by entering into long term agreements with them.

Foreign Exchange

6.11. In a written note the Committee have been informed that during last three years Rs. 561.79 lakhs worth of foreign exchange was utilised for Railway Electrification as per details given below:

	Figures in thousands of rupees
Equipment (indicating fitting installations etc.)	1,10,10
Copper	4,40,23
Cadmium	10,83
Zinc	63
TOTAL	5,61,79

6.12. In addition to the above, foreign exchange to the tune of Rs. 54,85,010 sanctioned prior to 1965-66 was actually utilised during the last three years for payment of imported rolling stock and rolling stock components.

6.13. The foreign exchange utilised for electric rolling stock during the years 1965-66, 1966-67 and 1967-68 by the production units at CLW and ICF is estimated at Rs. 10.88 crores.

Procedure for purchase of stores|equipment

6.14. In a written note the Committee have been informed of the following procedure for the purchase of railway stores|equipment:

6.15. Prior to 1st July, 1968, purchase of railway stores|equipment both imported and indigenous required for railway electrification work was undertaken by the General Manager and the Controller of Stores, Railway Electrification, Calcutta. The procedure for procurement followed was that the purchase of stores was arranged directly by the Controller of Stores through the medium of advertised (open and global) tenders for item valued over Rs. 10,000 and through limited|bulletin tenders for items valued below Rs. 10,000. In the case of open tenders purchases were finalised on the basis of a Tender Committee's recommendations in conjunction with the associated finance. Cases of tenders valued below Rs. 10,000 were decided by the purchasing officers competent to do so in association with finance. For items for which the planning and distribution is indigenously controlled, procurement has been arranged through the controlling agency e.g. through Joint Plant Committee for steel, and for zinc and copper through Director General of Supplies and Disposals.

6.16 The value of stores purchased in India and abroad during the last three financial years is as follows:—

(i) Indigenous stores	Rs. 786.73 lakhs
(ii) Imported stores	Rs. 536.88 lakhs.

6.17. From the 1st July 1968, the demands that have arisen on the zonal railways for electrification works are being purchased like other items of stores under powers delegated to each zonal railway, i.e. the demand arising for the Virar-Sabarmati project would be dealt with by the General Manager and Controller of Stores, Western Railway. For items which are only imported, for items for which indigenous production is insufficient and for items for which indigenous production is still under development, the purchases are being arranged by the Railway Board.

6.18. When asked to indicate whether the authorities had to face any difficulty in procurement of stores, the Ministry has stated in a written note:

“There have been delay and difficulty in procurement of stores. The supply of material is progressed well in advance of actual field work, and as and when difficulties or delays occur, every possible action is taken to overcome delays. Alternative action is also taken to avoid set back in the progress of work. During the past years, materials had been ordered for different groups and if supplies against a particular group were delayed, similar materials ordered for other groups were diverted to avoid hold up in work, depending on priorities and progress.”

Fostering indigenous industry

6.19. When asked to indicate whether attempts were being made to locate and develop indigenous sources of supply for items which were imported in the past, the Ministry have informed the Committee in a written note as follows:

“Attempts have been made by Railway Electrification organisation to locate and develop indigenous capacity for stores which were imported in the past. Examples of successful development of such items are:

Isolators,

Interruptors,

Circuit breakers,

Solid core insulators of types partially to met our requirements,

Stainless steel fasteners,

Power, booster, potential and current transformers,

Regulating equipment,

Relays, and

Signalling cables for AC electrified section.

6.20. The Committee have been informed during evidence by the representative of the Ministry that the foreign exchange involved in the initial stages was about Rs. 24,000 per track KM, excluding copper which is an imported item even now; now, this figure has been brought down to Rs. 1400 per track KM.

6.21. Asked to indicate the steps taken to see that there is a progressive reduction in the foreign exchange component in the present day capital and annual recurring cost of diesel traction and electric traction, the representative of the Ministry has stated that in 1965, the foreign exchange element in the capital cost of a diesel locomotive was 83 per cent. In 1968, it has come down to 52 per cent. In 1970, it will be 30 per cent. It is hoped by 1975, it will be just 10 per cent. In the case of electric locos, the figure which stood at 59 per cent in 1965 has already come down to 43 per cent and it is expected to come down to 10 per cent by 1975.

6.22. The Committee are glad to be told that there is a gradual reduction in the foreign exchange component in the capital cost of diesel traction and electric traction and this would be reduced to 10 per cent in 1975 as against 83 per cent in 1965. The Committee trust that this reduction will be achieved.

6.23. Asked to indicate the present holding of electric rolling stock (locomotives, EMUs), the principal sources of supply of electric locomotives and the experience of the Railways in regard to the quality of the locomotives supplied by different firms, the Ministry have furnished the following for the information of the Committee:

Holding of Electric Locos and Electric multiple unit coaches on various Railways as on 31.6.1968 and their source of supply

(i) *Electric Locos*

Type	Manufacturer	Total No. of Locos	Holding on Railways				
			CR (BG)	ER (BG)	NR (BG)	SER (BG)	SR (MG)
WAM1	European Group	100	..	64	28	8	..
WAM2	Mitsubishi Japan	36	..	36	..	..	..
WAM3	Do.	2	..	2	..	..	..
WAG1	European Group	30	..	..	..	30	..
WAG1	CLW, India	79	..	..	..	79	..
WAG1	Do.	2	..	..	..	2	..
WAG2	Hitachi-Japanese Group	45	..	45	..	..	..
WAG3	European Group	10	..	10	..	..	..
WAG4	CLW, India	48	4	4	40	..	..
YAM1	Mitsubishi Japan	20	..	..	..	..	20
TOTAL		372	4	161	68	119	20

(ii) EMUs

Manufacturer	Total No. of coaches	Holding on Railways		
		ER (BG)	SE (BG)	SR (MG)
1. Integral Coach Factory with equipments from Hitachi—Japan	136	136		
2. Integral Coach Factory with equipments from AEI-UK	8	8		
3. Integral Coach Factory with equipments supplied by M/S HEIL, Bhopal	350	326	24	..
4. M/s Jessops—India Electrical equipment by AEI-UK	49	49		..
5. M/S SIG-Switzerland	37	37		..
6. Integral Coach Factory with equipments from Nichimen Japan	98			98
7. English Electric UK modified and used with new motor coach built by ICF with equipment from Nichimen, Japan	54			54
8. Breda Itlay	9	..	..	9

NOTE: In the figures mentioned above, 114 DC locos running on Central Railway, 459 DC EMU coaches on Central Railway and 326 DC EMU coaches on the Western Railway are not included as the DC sections were electrified prior to the formation of Railway Electrification organisation.

6.24. Quantity of locomotives:

European Group (WAM1 Type)

Teething troubles were experienced with these locomotives and there were failures of ignition tubes, traction motor bearings, intermediate pinions, arno convertors and smoothing reactors. Replacements of certain components by newly designed components and other modifications were carried out. These locomotives are now behaving satisfactorily.

Mitshubishi Japan (WAM2 and WAM3)

These locomotives have given generally satisfactory service except for a few failures of ignition tubes, certain relays, reverser etc.

European Group (WAG1 and WAG3)

These locomotives have given generally satisfactory service although there have been a few failures of inter-elastic gear wheel, checking of Jacquemin drive, cardan rings, failure of exhaust motors and burning of a few blower motors. These items are receiving attention.

Chittaranjan (WAG1 and WAG4)

These locos, manufactured for the first time in India, have been fitted with a number of indigenously produced auxiliary equipment like compressors, exhaustors, contractor and auxiliary generators and blowers. These equipments have been giving trouble as also some other items of mechanical parts. Rigorous testing has been introduced at the manufacturing works and the conditions are now improving.

Hitachi-Japanese Group (WAG2 Type)

On this type of locos several items of equipment have been giving trouble. Leakage of oil from gear case, breakage of labyrinth seal, perishing of silent blocks and pivots, excessive wear of carbon brushes, over heating of relays, defects on bearings of main cog wheels, failure of transformers have been experienced. The matter have been taken up with the manufacturers and they are arranging for replacement and modifications of the defective parts.

Mitsubishi (YAM1 Type)

The performance of these locos has been generally satisfactory.

6.25. The representative of the Ministry has informed the Committee during evidence that the Railways have stopped buying any electric locos from European or any other outside sources.

6.26. The Committee are happy to note that the Railways have stopped buying any electric locos from foreign sources. The Committee hope that it will be possible for the Railway authorities to reduce the cost of locos produced in India.

NEW DELHI;

February, 12, 1969.
Magha 23, 1890 (Saka).

P. VENKATASUBBAIAH,

Chairman,
Estimates Committee.

APPENDIX I

(Vide para 2.6 of Report)

Cost of electrification of the entire Delhi-Howrah route vis-a-vis dieselisation and steam traction

The decision for electrification of mainline section and adoption of 25 KV single phase A.C. traction system on the Indian Railways was taken simultaneously in 1957, while the electrification of Howrah-Burdwan section was already well under way on 3000 V DC system as an operational necessity. Electrification of mainline also differs both in scope as well as in performance from the electrification of suburban section like Howrah-Burdwan. Accordingly electrification of Waria (Durgapur). Delhi route instead of Howrah-Delhi route as asked for in the question would be more representative of the pattern of mainline electrification and throw up realistic data required. As designed the capital and annual recurring cost for electrification of the various sections on Durgapur-Delhi route as included in the relevant Estimates (except Tundla-Delhi for which the Estimates has yet to be sanctioned) are reproduced hereunder:

A. Capital Costs :

(Figures in crores of rupees)

	Electric			Diesel	Steam
	Cost other than R.S.	Interest during construction	Rolling Stock		
Waria-Mughalsarai 1960-62 .	14.26	0.78	9.20	11.04*	8.57
Mughalsarai-Kanpur 1965-67	11.53	1.06	9.08	13.28*	4.07
Kanpur-Tundla 1968-70	14.56	1.77	5.65	7.16	4.86
Tundla-Delhi 1972-73 .	13.08	1.74	4.71	8.63	3.07
	53.43	5.35	28.66	40.11	20.57
		87.44			

B. Annual Recurring Expenditure :

	Electric	Diesel	Steam
Waria-Mughalsarai 1960-62	3·24	5·65*	4·84
Mughalsarai-Kanpur 1965-67	2·76	5·74	5·20
Kanpur-Tundla 1968-70	1·89	2·98	3·36
Tundla-Delhi	1·79	2·70	2·63
	10·68	17·07	16·03

*Diesel costs were taken on the basis of costs prevalent in 1963 because Diesel came into existence in India after 1961:

Return over diesel:

Saving in annual recurring expenses	=	17·07—10·68=	Rs. 6·39 crores.
Extra capital cost in electrification over diesel	=	87·44—40·11=	Rs. 47·33 crores.
Return for electrification over diesel	=	$\frac{6·39 \times 100}{47·33}$	=13%

Return over Steam :

Saving in annual recurring expenses	=	16·03—10·68=	Rs. 5·35 crores.
Extra capital cost in electrification over steam	=	87·44—20·57=	Rs. 66·87 crores.
Return for electrification over steam	=	$\frac{5·35 \times 100}{66·87}$	=8%

APPENDIX II

(Vide para 4.2 of Report)

RAILWAY ELECTRIFICATION

Provision made in the estimates for electrification of Railway Lines during 1968-69

(Figures in thousands of Rupees)

Name of Project	Anticipated cost	Outlay expected upto the end of 1967-68	Outlay proposed for 1968-69	Balance to complete project	Basis on which the provisions have been made in the estimates for 1968-69
(1)	(2)	(3)	(4)	(5)	(6)
Electrification of					
1. Howrah-Kharagpur	8,56,22	7,27,36	99,49	29,37	The scheme is in progress and the work is expected to be completed some time in June/July, 1968. Estimates for 1968-69 are based on the anticipated payments to the Contractors, departmental charges to be incurred and likely adjustments during the financial year 1968-69 for Overhead Equipment, Civil Engineering, General Electrical and Signal and Tele-communication works.
2. (a) Moghalsarai-Allahabad (b) Allahabad-Kanpur	14,66,84	14,58,50	5,82	2,52	The electrification of the sections have been completed in 1967.

Provisions in 1968-69 estimates have been made on the basis of anticipated payments to the contractors, departmental charges, debits expected from the open line railways, and likely adjustment during the financial year 1968-69 for Civil Engineering, General Electrical and Signalling and Tele-communication works.

3. Kanpur-Fundia	14,10,95	1,22,62	13,35,55	9,52,78	This is IVth plan scheme and contracts for supply and erection of overhead Equipment, Switching Stations, Traction Substation and remote control equipment have been awarded. The actual field work for the electrification of the section is currently in progress. The project is expected to be completed some time in 1970-71. Provisions made in the 1968-69 estimates are based on the anticipated progress of the works and the payments likely to be made to the Contractors, departmental charges, purchase of stores, Overhead Equipment and likely adjustments during the financial year 1968-69 for Civil Engineering, General Electricals
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(1)	(2)	(3)	(4)	(5)	(6)
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4. Rurkela-Durg	•	5,91,26	8,50,57	9,80,54	and Signalling and Telecommunication works and General charges.
5. Brar-Sabarmati	•	6,22	1,03,57	25,36,82	Do. This is a IVth plan scheme. Orders for supply and erection of overhead Equipment and traction sub-station and Remote Control - Equipment for the electrification of the section which would entail bulk of the expenditure are yet to be placed. The actual field work is expected to start by the end of the current year. Provisions in the estimates for 1968-69 have, therefore been made only on the basis of the works expected to be taken up by March, 69 and corresponding payments to be made to the Contractors and likely payments for purchase of materials which are to be supplied by the Railway to Contractors and other Civil Engineering works like construction of contractors' depots, OHE maintenance depots etc., General Electrical & Signalling & Telecommunication works and General charges.

APPENDIX III

(vide para 4 of Introduction)

Summary of Conclusions/Recommendations contained in the Report

Sl. No.	Reference to para number of the Report	Summary of conclusions/recommendations
1	2	3
1.	2.18	The Committee note that before any particular section of the Railways is taken up for electrification, the comparative economics of steam, diesel and electric tractions are gone into for that particular section and only after it is found that electric traction will be more economical, is it adopted.
2.	2.19	The Committee are, however, not fully convinced of the reasons for deciding in June, 1954 to electrify Howrah-Burdwan main line and Sheoraphuli-Tarakeswar branch line with 3000 Volt DC traction and not adopting 50 cycles AC system of traction when in the interim report submitted by Shri S. Sarangapani in 1954 it was clearly stated, "The single phase 50 cycles AC system has recently come into prominence with its adoption on certain sections of the French Railways and in the Belgian-Congo and was favoured on account of its lower costs of overhead equipment compared to the DC system especially on railways where the traffic density cannot otherwise justify electrification. The results of the working of these sections are being watched with keen interest all over the world." The Committee feel that without waiting for the final report of the Sarangapani Committee, the Railway

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Board could have initiated experiments to decide for themselves whether AC traction, which had come into prominence in France and some other countries, could be suitable under Indian conditions before they went in for 3000 volt DC traction in the Calcutta area. The Committee are not able to appreciate the course of action adopted by the Railway Board and they feel that the expenditure amounting to about Rs. 7½ crores, which was subsequently necessitated for conversion from DC to AC traction in the Calcutta area within a period of two to three years, could perhaps have been avoided.

3.

2.33

The Committee note that the railways have been able to energise a total of 1962 route KM and 4804 track KM on 25 KV AC system during the period from August 1960 to 31st March 1966. The Committee are, however, distressed to note that a large number of schemes which were originally included in the Second and Third Five Year Plans had to be carried forward to the Third and Fourth Five Year Plan periods respectively. Some schemes are likely to be thrown forward even beyond March, 1971. While appreciating that electrification works take considerable time for completion and entail concurrent co-ordination with different authorities—Central as well as State, the Committee fail to understand why firm target dates cannot be laid down on realistic basis and strictly adhered to after fully taking into account the inherent difficulties like the supply of power, procurement of material and equipment, etc. They feel that it is better to take up such of the schemes as are likely to be completed within the scheduled time and within the resources available instead of dissipating energy and money on different schemes which do not stand any chance of being taken up and completed within the target dates.

1	2	3
4.	2.34	<p>The Committee are not satisfied with the explanation given by the Ministry that the electrification schemes sanctioned during the periods covered by the Second Five Year Plan and the Third Five Year Plan have been given the nomenclature "Second Five Year Plan schemes and the Third Five Year Plan schemes respectively for convenience of reference only." They feel that as far as possible, the schemes should be completed within the Plan period itself and should not be allowed to be spilled over to succeeding periods.</p>
5	2.37	<p>The Committee are unhappy to note that the Ministry have not prepared any Perspective Plan in regard to electrification of lines beyond the Fourth Plan schemes. They would strongly recommend that steps should be taken to prepare a Master Plan for the electrification of the Indian Railways on a long term basis so that a clear picture may emerge as to the quantum of work that has to be executed, for the benefit of the planners, basic industrial units of the public and private sectors as well as the related manufacturing industries in the country.</p>
6.	2.50	<p>The Committee note that except in one case, all the railway electrification projects from the Second Five Year Plan onwards had to be carried forward beyond the target dates originally fixed for their completion.</p>
7.	2.51	<p>The Committee also note that even through the Railways could not foresee such factors as strikes in their construction units, public demonstration and stoppage of passenger trains etc., they were directly responsible for such jobs as remodelling of yards and completion of (link) lines which were contributory factors for delay in execution of the schemes.</p>

1	2	3
8.	2.52	The Committee are of the opinion that while in some cases energising of electric traction lines had been delayed due to delay in completion of work of erection of sub-stations and transmission lines by the power supply authorities or delay in getting copper conductors, steel sections, AC EMUs and other material, there had not been proper planning and coordination with other authorities while preparing the final estimates of schemes and setting target dates for their implementation. As a result of this the period of completion of the projects had to be spread over resulting in upward revision of estimates and overhead expenses.
9.	2.53	Now that the Railways have taken up the job of cabling of the long distance tele-communication circuits which had previously been the responsibility of the P & T Department, the Committee hope that delay in execution of electrification of railway lines on this score could henceforth be obviated.
10.	2.54	The Committee desire that gaining from experience, the Railway Board would take urgent steps to ensure that there is no avoidable delay in completion of projects, after the target date is once fixed, so that rise in the cost of the projects and delay in energising the tracks are obviated.
11.	2.66	The Committee note that the Study Team on Metropolitan Transport set up by the Planning Commission is at present engaged in the studies of transport problems of the Calcutta Metropolitan area. They would, however, suggest that the Railway Board should maintain suitable liaison with the above Study Team of the Planning Commission and set up necessary machinery to proceed with the preliminaries of preparation of a project report of the proposed circular railway,

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as necessary, so as to avoid any loss of time in setting in motion the processes for execution of the scheme, if finally approved.

12. 2.71 The Committee are unable to appreciate how a scheme which had been processed through all the phases prior to the accord of sanction could be put off due to a slight temporary fall in density of traffic in an intervening period. The Committee therefore recommend that the Ministry should endeavour to complete the economic study of cost|benefit of electrification of the section which is currently being carried out for assessing the financial justification of the scheme and take a final decision for acceptance of the projects for execution very early.
13. 2.73 The Committee note that in the Sealdah-Lalgola section a part of the whole section is electrified on 25 KV AC system and a small part is catered to by steam traction. They feel that economies are likely to result if the whole section is electrified. They would, therefore, suggest that studies may continue to be made on the basis of traffic carried during the last five or six years about the economics of electrifying the residual part of the Sealdah-Lalgola section.
14. 2.78 The Committee note that the electrification of two sections, namely, Kharagpur-Tata Nagar and Sealdah-Ranaghat, Dum-Dum-Bongaon was sanctioned in 1960 by the Railway Ministry although the anticipated return on the projects was less than the normal return of 7 per cent. They also note that electrification of two sections, namely, Gardh rubeswar-Adra-Jyochandipahar and Rourkela-Birmitrapur was done as an operational necessity. The Committee hope that while taking up electrification of new sections the Ministry would keep in view that the anticipated return does not normally fall below 7 per
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		cent on the capital outlay which is the present norm laid down for the selection of a project for electrification.
15.	2.79	The Committee are surprised to note that the Railway Board have no statistics to show the actual returns on the sections, so far electrified as against the returns they had anticipated at the time the projects were sanctioned. They are of the view that the Ministry should set up the necessary machinery for evaluating the percentage of return on capital outlay in each project with a view to see to what extent their anticipations in regard to earnings have been realised.
16	3.42	The Committee are of the opinion that the reasons advanced for the decentralisation of the centralized Railway Electrification organisation, i.e. economy and efficiency, are not amply borne out by the facts as brought out before the Committee. In the past, preliminary survey, estimating and even technical advice etc. for electrification projects at places like Virar, Sabarmati, Madras-Vijayawada, Igatpuri-Bhusaval and Madras Beach-Villupuram, which were far away from the headquarters at Calcutta, had been directly conducted by the Railway Electrification organisation as it existed at Calcutta before re-organisation. The Ministry of Railways themselves have commended the good work done by the organisation. Moreover, while the establishment of Railway Electrification organisation is being gradually reduced at Calcutta, expansion in the strength of officers and staff is taking place in the Railway Board, New Delhi, the RDSO, Lucknow and the zonal railways. As and when in future any electrification work is taken up by the zonal railways, it is more likely than not, there will be expansion in the strength of officers and staff there also. In these circumstances the

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Committee are doubtful whether it has been a wise step to decentralise a well-knit compact organisation which had acquired the technical know-how and which is stated to have achieved a pace of work comparable with that of other advanced countries of the world.

17. 3.43 Now that the de-centralisation of the Railway Electrification organisation at Calcutta has already taken place due to administrative convenience, the Committee would not like to make any further comments on this issue for the present. They would, however, suggest that the Ministry of Railways should keep a careful watch over the developments in this regard and report to Parliament after a couple of years as to what extent economy and efficiency has been achieved as a result of re-organisation of the "Railway Electrification."
18. 3.44 The Committee would also urge that proper accounting of the work-load of electrification of the railways, the expenditure incurred thereon and the progress made therein should be maintained in the zonal railways as also in the Ministry of Railways (Railway Board) so that a clear indication about the progress of work and expenditure involved in electrification of railways is clearly discernible.
19. 4.4 The reasons for slower tempo of works leading to savings in the actual expenditures during the last three years have already been commented upon earlier. The Committee would only like to point out that there have been variations between the original estimates and the revised estimates and between the revised estimates and actual expenditure during the last three years, which indicates scope for realistic budgeting and efficient implementation of schemes.
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20.	5.25	<p>The Committee regret to note that when such projects as railway electrification, for which a separate organisation was specifically created about 14 years ago, are completed, there is large scale reversion of employees and retrenchment of casual labour. The Committee need hardly point out, as had already been admitted by the representative of the Ministry of Railways, that such reversions create a sense of discontentment among the officers and staff. The Committee would, therefore, like to suggest that the Ministry of Railways should give a thorough and careful consideration to this aspect and consider the feasibility of absorbing the employees in equivalent grades or posts in other projects which might be progressing under the Railways in any other part of the country.</p>
21.	5.26	<p>As regards the casual labour, the Committee note that they have to take their chance along with other casual labour whenever regular vacancies occur. The Committee trust that in filling up regular vacancies of labour, due consideration is given to the work done and experience gained by labour in various railway projects.</p>
22.	5.27	<p>The Committee have no doubt that the Ministry will ensure, as promised to the Committee, that there is no retrenchment in the cadre of gazetted and non-gazetted employees of the erstwhile Railway Electrification organisation and steps will be taken to utilise the experience and expertise acquired by them during the last 14 years to the benefit of the entire railway organisation.</p>
23.	6.10	<p>The Committee note that the Railways are one of the major consumers of electricity and any fluctuation in its tariff will have repercussions on the operating costs of the Railways. The Committee find that the present overall rate per unit</p>

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of electricity purchased by the Railways from different agencies varies from 8 to 13.2 paise. The Committee suggest that the Government may examine the feasibility of evolving a uniform formula for determining tariff payable by the Railways for purchase of electricity from different State Electricity Boards. They also suggest that before starting their own generating stations at considerable cost, the Railways should explore the possibilities of obtaining electricity at reasonable rates from State Electricity Boards, by entering into long term agreements with them.

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The Committee are glad to be told that there is a gradual reduction in the foreign exchange component in the capital and annual recurring cost of diesel traction and electric traction and this would be reduced to 10 per cent in 1975 as against 83 per cent in 1965. The Committee trust that this reduction will be achieved.

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The Committee are happy to note that the Railways have stopped buying any electric locos from foreign sources. The Committee hope that it will be possible for the Railway authorities to reduce the cost of locos produced in India.

APPENDIX IV

(vide para 5 of Introduction)

Analysis of Conclusions/Recommendations contained in the Report

I. CLASSIFICATION OF RECOMMENDATIONS :

A. recommendations for improving the organisation and working :

Serial Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25.

B. Recommendations for effecting economy :

Serial No. 17.

II. ANALYSIS OF THE RECOMMENDATIONS DIRECTED TOWARDS ECONOMY :

Sl. No.	Sl. No. as per Summary of recommendations [Appendix III]	Particulars
I	17	The Committee have suggested that the developments in regard to decentralisation of the unified "Railway Electrification" organisation at Calcutta and making the zonal railways responsible for electrification of their respective sections should be carefully watched and a report should be submitted to Parliament after about a couple of years about the extent of economy and efficiency achieved as a result of this re-organisation.

Sl. No.	Name of Agent	Agency No.	Sl. No.	Name of Agent	Agency No.
DELHI					
24.	Jain Book Agency, Connaught Place, New Delhi.	1	33.	Oxford Book & Stationery Company, Scindia House, Connaught Place, New Delhi—1.	68
25.	Sat Narain & Sons, 3141, Mohd. Ali Bazar, Mori Gate, Delhi.	3	34.	People's Publishing House, Rani Jhansi Road, New Delhi.	76
26.	Atma Ram & Sons, Kashmere Gate, Delhi-6.	9	35.	The United Book Agency, 48, Amrit Kaur Market, Pahar Ganj, New Delhi.	88
27.	J. M. Jaina & Brothers, Mori Gate, Delhi.	11	36.	Hind Book House, 82, Janpath, New Delhi.	95
28.	The Central News Agency, 23/90, Connaught Place, New Delhi.	15	37.	Bookwell, 4, Sant Narakari Colony, Kingsway Camp, Delhi-9.	96
29.	The English Book Store, 7-L, Connaught Circus, New Delhi.	20	MANIPUR		
30.	Lakshmi Book Store, 42, 1 Municipal Market, Janpath, New Delhi.	23	38.	Shri N. Chaoba Singh, News Agent, Ramlal Paul High School Annexe, Imphal.	77
31.	Bahree Brothers, 188 Lajpatrai Market, Delhi-6.	27	AGENTS IN FOREIGN COUNTRIES		
32.	Jayana Book Depot, Chaparwala Kuan, Karol Bagh, New Delhi.	66	39.	The Secretary, Establishment Department, The High Commission of India India House, Aldwych, LONDON, W.C.—2.	59

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