

**ESTIMATES COMMITTEE
1962-63**

THIRTIETH REPORT

(THIRD LOK SABHA)

MINISTRY OF IRRIGATION AND POWER (POWER)

Central Water & Power Commission (Power Wing)

Central Electricity Authority

Central Electricity Board

Central Board of Irrigation and Power (Power)

- Power Research Institutes



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**LOK SABHA SECRETARIAT
NEW DELHI**

March, 1953/Phalgun, 1884 (Saka)

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1962-63**

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*Elected w.e.f. 15th November, 1952 *vice* late Shri B. J. Singh.

**Elected w.e.f. 18th August, 1962 *vice* Shri Shivram Rango Rane resigned.

INTRODUCTION

1. The Chairman, Estimates Committee, having been authorised by the Committee to submit the Report on their behalf, present this Thirtieth Report on the Ministry of Irrigation and Power(Power).

2. It would be recalled that 12 years ago, the Estimates Committee (1950-51) had examined the estimates of the erstwhile Ministry of Works, Mines and Power and presented the Fourth Report (March, 1951) which dealt *inter alia* with the Central Electricity Commission and the Central Electricity Authority. In the following year the Estimates Committee (1951-52) examined the estimates relating to Central Water and Power Commission and Multi-Purpose River Valley Schemes and presented their Fifth Report (March, 1952). Action taken by Government on the recommendations contained in the aforementioned Fourth and Fifth Report was examined by the Estimates Committee (1956-57) who presented the Forty-fourth and Forty-ninth Reports respectively on the subject.

3. The Committee took evidence of the representatives of the Ministry of Irrigation and Power on the 7th, 8th, 10th and 11th December, 1962. They wish to express their thanks to the Secretary and other officers of the Ministry, and the Chairman and Member (HE) of the Central Water and Power Commission for placing before them the material and information that they wanted in connection with the examination of the estimates.

4. They also wish to express their thanks to the Secretary and other officers of the Department of Atomic Energy; the Member (E) and Additional Member (Finance) and other officers of the Railway Board for placing before them the material and information that they wanted.

They also wish to extend their thanks to the Director, Indian Standards Institution; the Chairmen of State Electricity Boards of Gujarat, Kerala, Maharashtra, Mysore and West Bengal; the Chairman and other officers of the Damodar Valley Corporation; and the representatives of the All India Manufacturers' Organisation and the Federation of Electricity Undertakings of India, for giving evidence and making valuable suggestions to the Committee.

5. The Report was considered and adopted by the Committee on the 15th March, 1963.

6. A statement showing an analysis of the recommendations contained in this Report is also appended to the Report (Appendix XV).

H. C. DASAPPA,

Chairman,

Estimates Committee.

New DELHI-1;
The 19th March, 1963.
Phalgun 28, 1884 (Saka).

FUNCTIONS AND ORGANISATION

A. Functions

The Ministry of Irrigation and Power besides laying down the general policy for the development of water and power resources, performs the following main functions in respect of power:—

**Ministry
of Irrigation and
Power.**

- (i) rendering technical assistance;
- (ii) examination of schemes formulated by the States for inclusion in the Plans;
- (iii) watching the progress of execution of projects in the power sector and of costs against estimates;
- (iv) arranging for foreign exchange requirements of the projects.

2. The Central Water and Power Commission is an attached office of the Ministry and advises it on all technical problems. The organisational chart and detailed functions of the Power Wing of the Commission, are given in Appendices I and II respectively. The Commission is also responsible for initiating and coordinating schemes for multi-purpose river development, for preparing integrated plans for power development, transmission and utilisation of electric energy, navigation and for dealing with flood problems.

**Central
Water and
Power
Commission.**

The Central Electricity Authority and the Central Electricity Board are two other bodies with which the Ministry is directly concerned.

3. The Central Electricity Authority has been constituted under the provisions of Section 3 of the Electricity (Supply) Act, 1948. Under the Act, it is required to exercise such functions and perform such duties and in such a manner as the Central Government may prescribe or direct, and in particular to—

**Central
Electricity
Authority.**

- (i) develop a sound, adequate and uniform national power policy, and particularly to coordinate the activities of the planning agencies in relation to the control and utilisation of national power resources;
- (ii) act as arbitrators in matters arising between the State Governments or the Board and a licensee or other person as provided in the Act;
- (iii) carry out investigations and to collect and record the data concerning the generation, distribution and utilisation of power and the development of power resources; and

- (iv) make public from time to time information secured under the Act and to provide for the publication of reports and investigations.

4. Under Section 29 of the Electricity (Supply) Act, 1948, no sanction is to be accorded by the State Electricity Boards to any scheme or part of a scheme estimated to result in a capital expenditure exceeding one crore of rupees without prior consultation with the Central Electricity Authority.

Section 30 of the Electricity (Supply) Act, 1948 provides that "The Authority shall, before making any recommendations in respect of a scheme upon which it has been consulted under the first proviso to sub-section (2) of section 29, have particular regard to whether or not in its opinion—

- (a) any river-works proposed by the Board will prejudice the prospects for the best ultimate development of the river or its tributaries for power generation, consistent with the requirements of irrigation, navigation and flood control and for this purpose the Authority shall satisfy itself that an adequate study has been made of the optimum location of dams and other river works;
- (b) the proposed scheme will prejudice the proper combination of hydro-electric and thermo-electric power necessary to secure the greatest possible economic output of electric power;
- (c) the proposed main transmission lines will be reasonably suitable for regional requirements;
- (d) the scheme provides reasonable allowances for expenditure on capital and revenue account;
- (e) the estimates of prospective supplies of electricity and revenue therefrom contained in the scheme are reasonable."

5. The Central Electricity Authority has not appointed any staff of its own. The technical examination of all such power schemes is in fact carried out by the Central Water and Power Commission.

B. Multiplicity of organisations for scrutiny

Scrutiny of Power Projects.

6. The Committee were informed that after a scheme report involving power generation was received from the State Government/State Electricity Board in the Central Water and Power Commission, immediate arrangements were made to distribute copies of the same to various

Directorates of the Commission and to the Technical Section of the Ministry of Finance for scrutiny and comments. After the comments were received and coordinated, the State Government/State Electricity Board was addressed in case any clarification was required or in case it was found necessary to modify the scheme. The clarifications/data received from the State Government/State Electricity Boards were examined and if found satisfactory, the final comments were prepared and submitted for consideration of the Advisory Committee on Irrigation, Flood Control and Power Projects which comprised representatives of the Planning Commission, Ministry of Irrigation and Power, Ministry of Finance, Central Water and Power Commission and consultants of the Government of India. The Committee is presided over by the Minister of State for Irrigation and Power. After obtaining clearance of the project report from this Committee, the formal approval to the scheme is issued by the Planning Commission.

A number of State Electricity Boards have expressed to the Committee their dis-satisfaction over the multiplicity of the Central organisations and cumbersome procedure followed by them in undertaking scrutiny of the schemes which had resulted in serious delays. The Committee would like to quote the following passage from the memorandum furnished by a State Electricity Board :—

“In many of these matters, the Ministry of Irrigation and Power is able to act only as a recommendatory body, the final sanctions or orders being issued either by the Planning Commission or by the other Ministries of the Government of India. It is felt that since the Ministry of Irrigation and Power is not able to act and take decisions all by itself in the majority of the matters mentioned above, there is inevitable delay in the execution of power projects. The Ministry of Irrigation and Power has heavy responsibilities to shoulder but it does not appear to have the necessary authority to act speedily. It is, therefore, desirable that the question of clothing this Ministry with adequate authority to enable quick decisions being taken is given immediate attention.”

The Central Water and Power Commission Reorganisation Committee (Gokhale Committee) have also drawn attention to the “erosion of authority of the Central Water and Power Commission that has been steadily taking place in relation to the functions originally assigned to it in the 1951 Resolution” and made the following observations:—

“The Planning Commission has asked for a second opinion on a few technical issues on which the

Central Water and Power Commission had already tendered advice. Special Committees were appointed to consider those issues."

The representative of the Ministry stated during evidence that the project schemes were technically examined by the Central Water and Power Commission and submitted directly to the Planning Commission and not through the Ministry. The representative of the Ministry of Finance added that the Technical Advisory Committee being under the Planning Commission ensured automatically that after a scheme was approved by it, the approval of the Planning Commission was given as a matter of course. If it were under the Ministry, the Planning Commission would theoretically reserve the right to include it or not in the plan or to set up their own technical organisation to review the decision of the Technical Advisory Committee.

7. In this connection the Committee would like to draw attention to the history of sanction of fourth generating unit at the Bokaro Thermal Plant.*

The Committee note that though the Damodar Valley Corporation had initiated the proposal for installing the fourth power generation unit at Bokaro as early as April, 1953, the project was cleared for execution by the Government of India only in May, 1956. This period of more than three years was passed in correspondence and conference between the Ministry of Irrigation and Power, Damodar Valley Corporation, Central Water and Power Commission, the participating Governments and the Planning Commission. This is but one of the instances which goes to show how multiplicity of organisations for vetting power schemes result in delay. The multiplicity of organisations also make it difficult to pinpoint the responsibility for such delays. The Committee cannot therefore too strongly stress the need for streamlining the procedure so that power schemes are vetted and sanctioned more expeditiously.

8. The Committee note that Gokhale Committee had also examined the procedure and working of the Central Electricity Authority and made the following recommendation:—

"The procedure now is that the schemes from the States are received in the Central Water and Power Commission; they are subjected to technical examination and are then put up for clearance to the Advisory Committee appointed by the

*The expansion of Bokaro Thermal Plant—Case Study—Indian Institute of Public Administration, pp. 348 to 371—July-Sept. 1962.

Planning Commission. Subsequently, the same schemes are put up to the Central Electricity Authority. This procedure, besides leading to delay does not seem to serve any purpose except that of formal compliance with the statute."

* * *

"The functions of the Central Electricity Authority other than arbitration, as laid down in Section 3 of the Electricity (Supply) Act, 1948, should, by an amendment of the Act, be taken out of its purview. The Central Electricity Authority should be renamed as the Standing Arbitration Board."

The Government have not accepted the above recommendation for the following main reasons:—

- (i) The Central Electricity Authority is charged *inter alia* with the development of a sound, adequate and uniform national power policy and particularly with the coordination of the activities of the planning agencies in relation to the control and utilisation of national power resources. In view of the heavy programme of power development in the country, any change in the constitution of the Central Electricity Authority and reduction of its functions to a mere Arbitration Board would be a retrograde step;
- (ii) The Central Water and Power Commission is at present serving as the Secretariat of the Central Electricity Authority and calls for information from private sector under the power vested in the Central Electricity Authority in this regard. If the functions of the Electricity Authority are restricted to arbitration only, the Central Water and Power Commission will have no authority to call for such information; and
- (iii) The Central Electricity Authority has no separate staff of its own and, therefore, no economies are likely to result by amending the Electricity (Supply) Act, 1948.

The Committee were informed by a number of State Electricity Boards that the functions relating to development of a sound, adequate and uniform national power policy were not in actual practice being performed by the Central Electricity Authority.

The Central Water and Power Commission had also confirmed this by stating that the Authority was mainly discharging arbitral functions and that the other functions

of investigation and coordination of the activities of the planning agencies were not being discharged.

During the course of evidence, the representative of the Ministry while accepting the position stated that there was a proposal to amend the Electricity (Supply) Act, 1948 when the matter would be examined. He added that the functions would have to be 'very radically modified' to decide what should be the functions of the Planning Commission, Central Water and Power Commission and the Ministry of Irrigation and Power so far as 'sound, adequate and uniform national power policy' was concerned.

The Committee suggest that the proposed review of the Electricity (Supply) Act, 1948 may be made at an early date.

Need for closer contact with Chairmen of State Electricity Boards.

9. The Committee were informed by some of the Chairmen of the State Electricity Boards that the Ministry had not convened a meeting of all the Chairmen of the State Boards since the last meeting held in 1960.

The Committee feel that there is need to establish closer contact with the Chairmen of the State Electricity Boards in the matter of planning for power. They recommend that meetings may be held periodically which may not be less than once a year.

C. Regional and Central Agencies for Power Development

Phenomenal rate of Power Requirements.

10. Looking to the pace of industrial development in the country, the power requirements are found to grow at a phenomenal rate. This calls for exploitation of the natural resources in the most economical manner for the benefit of the entire nation.

Power Survey Conference, 1963.

11. The Committee note that the First Annual Power Survey Conference which was held in February, 1963 and was attended by the representatives of the State Electricity Boards, Electricity Undertakings and the Planning Commission, considered that future power plans could not be related, as at present, merely to resources and requirements of individual States due to the fact that national resources of the country were not evenly distributed over the various political divisions of the country into States and zones.

Coordinated National Power Policy.

12. The Committee also note that the Third Five Year Plan. while discussing the problem of a coordinated national power policy states that "this calls for exploitation of the natural resources in the most economical manner for the benefit of the entire region regardless of State boundaries. Thus, steam power stations should be sited near collieries, washeries and oil refineries. The cheapest hydro

sites in any river basin should be harnessed in an appropriate order of priority. Nuclear power stations should be located in regions where other resources of energy are inadequate or expensive."

The Committee feel that time has come when the power plan should not merely be related to the resources and requirements of an individual State but should be related also to the interests of a region. It may well be that power resources in one State may have to be developed at an accelerated pace to enable utilisation of power in the neighbouring States. Similarly, the pattern of hydro-electric development in a State may have to be shaped in the light of requirements for coordinated operation of nuclear or thermal stations in adjacent States.

13. As regards the agencies for administering power stations, the representative of the Ministry informed the Committee during evidence that the Government were gradually going in the direction of regional generation of power and establishment of authorities. He added that "gradually it may mean taking over of the entire business of generation, supplies, operation etc. by the central generating authority."

**Central and
Regional
Power
Agencies.**

The Committee note that the subject of regional and central agencies for generation of power had also figured at the Eighth Irrigation and Power Seminar held at Ootacamund in September, 1962. A Sub-Committee of the Seminar, which had gone into the question, had *inter alia* stated in its report—

"The pattern of organisation for achieving the above objectives was discussed at length by the sub-committee and it was agreed that regional agencies with full responsibility for the planning of new power stations and major transmission lines and integrated operation of the generating stations and the grid systems in the regions and also a central agency entrusted with the overall responsibility for national planning and coordination of the activities of regional agencies will be desirable.

The scope of the regional agencies and the Central agency and the powers to be exercised by these agencies and other ancillary matters should be examined by a committee consisting of the representatives of the State Electricity Boards and the Centre and a report should be submitted at the earliest to the Irrigation and Power Ministry for consideration."

**Narmada
Power
Project.**

14. The representative of the Ministry stated during evidence that the State Electricity Boards had agreed in principle to the above proposal for setting up regional agencies for planning and generation of power. The Committee were informed that four States namely, Maharashtra, Madhya Pradesh, Gujarat and Rajasthan had already shown their readiness to co-operate with the regional generation of power from the Narmada. There was also great deal of understanding and collaboration in such matters between the States of Jammu & Kashmir, Punjab, Rajasthan and Delhi.

**Electric
Power
Survey
Committee.**

15. The Committee also note that the Executive Group of the Electric Power Survey Committee had recommended at its meeting held in February, 1963 that the country might be demarcated into the following seven regions keeping in view the existing and future transmission systems in each State and the proximity of the power system in adjacent States:—

Region I.—Western Ghats comprising the States of Kerala, Madras, Mysore and South Andhra;

Region II.—Eastern Ghats comprising the northern part of Andhra Pradesh, southern part of Orissa, the eastern part of Maharashtra and the central and southern parts of Madhya Pradesh State;

Region III.—Satpura region comprising the entire State of Gujarat, Western Maharashtra, the western portion of Madhya Pradesh and the southern extremity of Rajasthan;

Region IV.—Western Himalayas comprising the entire States of Jammu & Kashmir, Himachal Pradesh, Punjab, Delhi and Rajasthan.

Region V.—Central Himalayas comprising the entire State of Uttar Pradesh and the northern-most part of Madhya Pradesh;

Region VI.—Eastern Himalayas comprising the entire States of Bihar, West Bengal, D.V.C. and the northern part of Orissa; and

Region VII.—Comprising the entire States of Assam, Manipur, Tripura, NEFA and Nagaland.

It has been proposed that the regional power agency should be vested with the responsibility of planning new power stations and major transmission lines and integrated operation of power systems in the region as a whole. The agency would comprise technical representatives of the State Electricity Boards concerned and organisations like D.V.C., Delhi Electric Supply Undertaking etc. and a representative of the Central Electricity Authority. Where

there is no State Electricity Board, a representative of the State Electricity Department would be included. A representative of the Regional Association of the Federation of Electricity Undertakings in India would also be included in the Regional Power Agency, wherever necessary.

16. The Committee note that the Third Five Year Plan envisages that:— **Regional and Super-grids.**

“All power stations should be inter-connected to form State, Zonal or super-grids so that the energy is pooled and used to the best advantage of the region. Inter-connected operation of power stations and power systems will improve the performance of electricity supply undertakings by raising the load factor, reducing the requirements of standby machinery and enabling the efficient operation of the available plant.”

System inter-connections assume great importance today as it is possible by this means to create additional load-carrying capacity in a much shorter time and at a much lesser cost without establishing new, separate generating units.

17. The Committee were informed that the following inter-State links would be established in the Southern Region during the Third Plan period:— **Southern Region Grid.**

(i) *Between Kerala and Madras:*

220 kV single-circuit line from Pamba in Kerala State to Madurai in Madras State.

(ii) *Between Madras and Mysore:*

220 kV single-circuit line between Singarapet in Madras State and Bangalore in Mysore State.

(iii) *Between Madras and Andhra:*

220 kV single-circuit line between Singarapet in Madras State and Cuddapah in Andhra State.

It is estimated that, when the four systems are inter-connected and operated on an integrated basis, there will be a saving of about 265 MW in installed capacity by the end of the Third Plan period on account of diversity in system demands and reduction in standby capacity. In terms of economic benefit, apart from other benefits inherent in such operation, it is estimated that there will be a saving of Rs. 22.73 crores in the capital outlay and Rs. 2.60 crores in the annual running charges after allowing for the capital and running charges involved in the construction of the inter-State links mentioned above together with the

associated grid sub-station equipment and a Central Load Frequency Control Station.

**Eastern
Region
Grid.**

18. Similarly in the Eastern Region, it has been proposed to evolve suitable inter-connections between the Damodar Valley Corporation power system and the West Bengal and Bihar power systems so that integrated operation of various generating stations may become possible. As a result of inter-connection and integrated operation of the various power systems in the Eastern Region, it is estimated that there will be a saving of about 350 MW in installed capacity by the end of the Third Plan period on account of diversity in system demands and reduction in standby capacity. Besides other benefits that will accrue from integrated operation of the power systems in the Eastern Zone, there will be a saving of about Rs. 27·15 crores in the capital outlay and Rs. 4·8 crores in the annual running charges after making due allowance for the capital and running charges involved in the construction of the various inter-State links together with the associated Grid sub-station equipment and a Central Load Frequency Control Station.

**National
Grid, U.K.**

19. One of the advantages of national grids as pointed out by the Committee of Inquiry into the Electricity Supply Industry in the United Kingdom (popularly known as the Herbert Committee) was improvement in thermal efficiency. Thermal efficiency had increased from 21·22 per cent. in 1948-49 to 23·83 per cent. in 1954-55 and to 26·80 per cent. in 1960-61 and had yielded a total coal saving of about 17 million tons, and a total cost saving of some £ 53 million. It had led not only to a more effective pooling of plant and increased efficiency of generation, but the cost of production had been reduced by the concentration of output at the most efficient stations and through the considerable capital saving arising from the reduced margin of spare generating capacity required after the connection of stations to the grid.

The Committee note that the above studies indicate that large scale economies could be achieved by integrated operation of power systems in the country.

The Committee feel that the establishment of regional grids and regional power agencies seem to be developments in the right direction. They note that a committee composed of representatives of the State Electricity Boards and the Centre will examine the scope of the regional agencies and the central agency and their powers and ancillary matters. The proposal is of sufficient importance for a Committee to go into the question in detail and bring out all the implications after ascertaining the reactions in the places which would be affected by the proposal for it is necessary to have the fullest cooperation of the States concerned in such a development.

II PLANNING FOR POWER

20. The per capita generation of electricity in India was 16 kWh in 1951, 28 kWh in 1956 and 45 kWh in 1961 and is expected to be about 95 kWh in 1966. Though the percentage increase in each of the five year plan periods works out to about 100 per cent and even more, the fact remains that the kWh generated per capita in India is very low as compared to advanced countries. This would be clear from the table given below:

Name of country	Annual generation in million kWh			kWh generated per capita		
	1938	1958	Per-centage Increase	1938	1958	1961
Norway . . .	10,500	27,180	159	n.a.	7,708	9,300
Canada . . .	26,024	96,744	272	2,328	15,674	20,000
U.S.A. . . .	1,41,000	7,24,008	413	1,092	4,155	4,780
Sweden . . .	8,148	30,420	273	2,172	4,102	..
Switzerland . . .	7,044	16,872	139	1,692	3,254	..
U. K. . . .	30,696	98,508	220	648	1,906	2,420
West Germany . . .	55,236	94,212	71	732	1,807	2,260
France . . .	18,576	61,800	233	n.a.	1,389	1,662
Japan . . .	26,712	80,280	200	372	875	1,252
India . . .	3,396	12,372	264	8.4	31	45.8

As "kWh generated per capita" is a sure index of country's industrial growth, the Committee feel that if India is to advance along the path of industrialisation, planning for power should receive high priority.

21. The study made by the National Council of Applied Economic Research, New Delhi in their publication entitled "Demand for Energy in India 1960—1975" has revealed that demand for electricity not only tends to grow more rapidly than that of other types of energy but also at a much higher rate than the net national output. The Council has drawn the following conclusion:

"A doubling period of ten years corresponds to an annual rate of industrial growth of about 4.25 per cent which is a normal rate for countries

with highly developed industrial economies. According to our calculations, the rate of growth in India will be between 8 and 9 per cent annually, that is, almost double the rate of growth corresponding to a ten year doubling period. It is, therefore, to be expected that the doubling period in India will continue to be five years as long as the rate of industrial growth is sustained at this high place."

The Committee find from the following table indicating the pattern of utilisation anticipated in 1965-66 as compared to the years 1951-61 that the largest consumer of power is industry:

Category	Anticipated Consumption in 1965-66 (Million kWh)	Percentage of total generation	
		1965-66	Range of variation during 1951-61
Domestic or residential light and small power	3,400	7.6	7.5 to 8.0
Commercial light and small power	1,900	4.2	4.2 to 4.8
Industry	28,400	63.1	61.3 to 62.9
Traction	1,800	4.0	2.3 to 4.4
Public Lighting	400	0.9	0.9 to 1.0
Irrigation	1,900	4.2	2.4 to 4.2
Public water works and sewage pumping	900	2.0	2.3 to 2.8
Transmission losses, consumption in auxiliaries etc.	6,300	14.0	14.4 to 16.3
TOTAL	45,000	100.0	

The Committee note that the requirements of power for industry have increased from 61.3 in 1951 to 62.9 in 1961 and are expected to further increase to 63.1% in 1965-66. This underlines the importance of co-ordinating power programmes with industrial programmes.

Economics of Planning for Surplus Power.

22. The Committee understand that the capital investment required to consume certain amount of electric power in industries like textiles, consumer goods production,

machine tool production or heavy industry, is between five to ten times the capital investment required to produce the same amount of power. If too much power were installed, say by 10%, the excess expenditure on power would be between 1 to 2 per cent of the total expenditure on the industrial part of the plan. If on the other hand, too little power were installed by 10%, the entire industrial production would go down by 10%.

Since the cost of installing 1 kW of electric power is but a fraction of the capital investment required to utilise it, it is obvious that if in any eventuality power generating capacity was underutilised it would entail less overall loss to national economy than would be the case if productive machinery was to be rendered idle on account of power deficit. Past experience, in India and other countries, clearly shows that in a developing economy the demand for power nearly always outruns the available supply. Planning for surplus power is, therefore, essential for achieving an optimum rate of growth in the country. The Committee strongly recommend that power being a primary source of energy should be one step ahead of industrial and other requirements.

23. Under the existing procedure of power planning, it is aimed to provide additional generating capacity just sufficient to meet the demands anticipated at the end of a particular plan period. As it takes 3 to 5 years to instal and commission a power project after sanction, it is evident that if work on these projects is only started after the new plan period commences, serious power shortage would be experienced in the intervening period. This is borne out by the experience of the first two years of the Third Five Year Plan.

**Avoiding
Serious
Power
Shortage in
the First
half of a
Plan
period.**

A Chairman of State Electricity Board has stated in his memorandum to the Committee:

“Under the present procedure of power planning, we are aiming to provide additional generating capacity just sufficient to meet the demands anticipated at the end of a particular plan period. As new projects to be sanctioned and taken up in the next plan period cannot be brought to beneficial use till the middle of that plan period, there will always be shortage of power during the initial years of the plan period which results in pent up demands. The solution, therefore, is to plan in the first instance for meeting the anticipated load demands from the middle of a plan period to the middle of the next plan period rather than from a beginning of a plan period to the end of the same plan period.”

Sachdev Committee who had gone into the reasons for power failure in Bihar and West Bengal in 1961 had also recommend that "it is imperative to go into the question of power requirements during the Fourth Plan period almost immediately. It will be helpful if the new power plants to be installed during the Fourth Plan could be sanctioned by the end of 1962 so that all preliminary steps could be taken in good time and the period of shortage of power in the early years of the Fourth Plan reduced to the minimum. Unless this is done, we visualise serious shortage of power during the early years of the Fourth Plan period".

The Estimates Committee are glad to learn that the Central Water and Power Commission have prepared a tentative list of new power generation schemes in respect of which advance action is called for during the current plan period so that benefits therefrom are available in the first two years of the Fourth Five Year Plan period. A detailed note on the subject received from the Ministry of Irrigation and Power is reproduced in Appendix III. It will be seen therefrom, that an outlay of Rs. 62 crores is required for creating an additional generating capacity of 2 million kW by 1966-67 and that another Rs. 67 crores are required for creating a further generating capacity of 2 million in 1967-68. It was stated that the tentative draft of the Fourth Five Year Plan and of the perspective plan for power development for 1966—81 had been circulated to various State Governments. Comments had started coming in from the State Governments and were being studied. Discussions were also being held on the subject in the Central Water and Power Commission by the State Electricity Board authorities. As soon as these discussions were over, the programme for the first two years of the Fourth Plan could be finalised in consultation with the Planning Commission.

The Committee hope that Government would not allow the phenomenon of shortage of power, which has handicapped the industrial and developmental plans in the first two years of the Third Plan to recur in the next plan period. They would like to emphasise that Government should sanction in time the power projects required to meet the additional requirements in 1966-67 and 1967-68.

The Committee are glad to note that perspective plans of power requirements till 1981 have been drafted. Planning for power is in fact a continuous process and the perspective plans have to be reviewed in the light of requirements revealed by power surveys. The Committee would like the Government to pay close and continuous attention to perspective planning so that the targets fixed are fully in consonance with the requirements.

Exploring Water Power Resources.

24. The potential of water power has been generally estimated to be about 41 million kW distributed as shown below:

**Large
untapped
Hydro
Power
Potential.**

Geographical Region	Power potential in million kW
West-flowing South Indian rivers	4.35
East-flowing South Indian rivers	8.63
Central Indian rivers	4.29
Rivers of Ganga basin	4.83
Rivers of Indus basin	6.58
Brahmaputra and others	12.49
TOTAL	41.17

The representative of the Ministry stated during evidence that Government had carried out preliminary studies on the basis of topographical maps and other available data and come to the conclusion that it would be economically feasible to develop 238 hydro schemes in the country with total power potential of 41 million kW at 60 per cent load factor. Of these schemes, 28 major hydro-schemes were in operation, 45 were included in the Third Plan and 62 were under investigation by the State Governments with the help of the United Nations Special Fund for inclusion in the Fourth Plan.

As it is an established fact that hydel is the cheapest source of power in India, the Committee would urge the Government to investigate and prepare blue prints of all the remaining hydro-electric schemes so that they can be readily available for being taken up to meet the increasing demands. This is all the more desirable as India has all the requisite experience for undertaking investigation and preparation of project reports as also the implementation of hydel-schemes.

III

PLAN—PERFORMANCE AND TARGETS

A. First and Second Five Year Plans.

25. The table below indicates the targets for power development and achievement during the First and Second Five Year Plans:

(In Million kW.)

Plan	Installed Capacity at the commencement of Plan	Target	Achievement
First Five Year Plan	2.30	3.70	3.42
Second Five Year Plan	3.42	6.90	5.60

The Committee were informed that difficulties were experienced in achieving the targets during the Second Five Year Plan due to shortage of foreign exchange and scarcity of certain construction materials like steel and cement. Furthermore, many power projects had received a set-back on account of foreign exchange crisis during the period 1956 to 1958 when an embargo was placed on the import of power plants and equipment. As a result of reappraisal of the Second Plan in 1958, some of the power schemes originally included in the plan were classified as "non-core" projects.

One of the Chairmen of the State Electricity Boards stated during his evidence "I will say that the Planning Commission had done an unwise thing. At any rate, in the light of the experience we now have, we can say that had they included the power projects in the core projects, many difficulties that were experienced subsequently in the industrial development in greater part of the economy would not have arisen."

The above statement was also corroborated by the other Chairmen of the State Electricity Boards during their evidence before the Committee.

The representative of the Ministry also stated during evidence that some of the power projects originally included in the Second Plan were put in the 'non-core' as a result of which their execution was delayed and the country was paying for it to-day. He also read out the following extract from the speech made by the Deputy Chairman of the Planning Commission before the Federation of Indian Chambers of Commerce and Industry in September, 1962:

"When the Second Plan was reappraised in 1958, and plan projects came to be divided between 'core' and 'non-core' schemes, power development received a serious setback. It was realised then that cuts in foreign exchange allocations for the power programme would lead to difficulties later, specially, in the early phases of the Third Plan. It was, however, not sufficiently appreciated that to secure a balance between different sectors of the economy even at a somewhat reduced tempo of development, there had to be corresponding adjustments in other sectors, specially in relation to licensing of industrial capacities in the private sector. The fact that industrial licensing continued as before while the expansion of power facilities had to be slowed down was an important element in accentuating shortages in later years specially in some parts of the country."

A note furnished by the Ministry regarding efforts made by them to get all the major power schemes included in the core of the Second Five Year Plan, is reproduced in Appendix IV.

The Committee note that the Third Five Year Plan contains also an admission to the effect that delays in the execution of some of the power projects such as Bhakra-Nangal, Koyna, Rihand and Hirakud was another factor contributing to the shortfall.

The Committee consider it unfortunate that there was shortfall of 1.20 million kW in the installed generating capacity during the Second Five Year Plan due firstly to a number of power schemes being relegated into the non-core group of the Plan, on the ground of foreign exchange difficulties and because of delays in the execution of some of the important projects such as Bhakra-Nangal, Koyna, Rihand and Hirakud.

B. Third Five Year Plan.

**Targets
Insufficient
to Meet
Growing
Tempo of
Industria-
lisation.**

26. The following table suggests the likely phasing of benefits during the Third Plan:

Year	Additions during the year (million kW)	Aggregate installed generating capacity by the end of the year (million kW)
1961-62	0.58	6.18
1962-63	0.65	6.83
1963-64	1.17	8.00
1964-65	2.00	10.00
1965-66	3.45	13.45

It will be seen that by the end of the Third Plan, 13.45 million kW are expected to be in commercial operation.

The basis for inclusion of generation schemes has been stated in the Third Plan as follows:—

“The expected load demand in the next few years has been the main criterion in determining the size of the power programme in the States during the Third Plan. Detailed load surveys conducted by the Central Water and Power Commission towards the end of the Second Plan indicated much higher demands than were assessed at the time of the preliminary load surveys in 1958. The former along with the proposed industrial programme have formed the basis for inclusion of generation schemes in the Third Plan.”

The Committee were furnished with a statement showing the installed and firm generating capacities, the anticipated demands and shortage or surplus of power in various States during each year of the Third Five Year Plan which is given in Appendix V. They were, however, informed that due to certain subsequent changes, this statement was under revision and similar details in respect of the Union Territories (excluding Delhi) had not been prepared. Based on the figures detailed therein, the following table indicates the position regarding the estimated demand, firm generating capacity and surplus/shortage for

the entire country, except Union Territories (excluding Delhi), during the years 1961 to 1966:—

Year	Estimated Demand	Firm Generating Capacity	Surplus(+) Shortage(-)
	(MW)	(MW)	(MW)
1961	3629.6	3276.5	(-) 353.1
1962	4530.3	3792.9	(-) 737.4
1963	5423.5	4403.4	(-) 1020.1
1964	6577.8	5206.9	(-) 1370.9
1965	7612.9	6700.5	(-) 912.4
1966	9417.6	8962.3	(-) 455.3

It is a matter of concern that firm generating capacity in the country would continue to lag behind the anticipated demand throughout the Third Five Year Plan. The position is likely to improve somewhat during the last year of the Third Plan but the Committee note that the overall shortage would in fact increase from 353.1 MW in 1961 to 455.3 MW in 1966. Power supply at the end of the Plan is expected to be short in all the States, except Jammu and Kashmir, Kerala, Rajasthan and Delhi. The shortage is expected to be the heaviest (202.5 MW) in Bihar—D.V.C.—West Bengal region. The additional requirements of power for the defence-based industries may further aggravate the shortage.

**C. Measures proposed for augmenting Supply.
Additional generating capacity.**

27. The Committee were informed that with a view to augmenting power generation in certain States, the Planning Commission had included the following new schemes over and above the schemes originally included in the Third Five Year Plan:—

More power Schemes sanctioned in 1962.

Schemes	Addition Capacity (MW)
(1) Extension of Durgapur Coke Oven Power Station (West Bengal) 1 x 75 MW	75
(2) Installation of sixth generating unit at Rihand (U.P.) 1 x 50 MW	50
(3) Extension of Kanpur Thermal Station (U.P.) 2 x 30 MW	60
(4) Narywal-Bibra Thermal Station (Assam) 2 x 30 MW	60
(5) Installation of fifth generating unit at Bhakra right bank Power Station (Punjab) 1 x 70/120 MW	70

Schemes	Additional Capacity (MW)
(6) Installation of gas-turbine generation unit (Andhra Pradesh) 2 x 10 MW	20
(7) Installation of gas-turbine generating unit (Mysore) 2 x 10 MW	20
(8) Installation of additional diesel generating sets (Assam) 10 x 1 MW	10
(9) Installation of package plants (West Bengal) 6 x 1.5 MW	9
10) Kalakote Thermal Station (Punjab) 2 x 30 MW	60
(11) Nichahom Thermal Scheme (Jammu and Kashmir) 2 x 7.5 MW	15
TOTAL	449

In addition to the scheme noted above, against 2 x 30 MW generating units tentatively approved under the Third Plan for installation at Barauni in Bihar, revised sanction has been accorded for the installation of 2 x 50 MW units. Similarly for the Pathratu Thermal Power Station (Bihar), sanction has been accorded to raise the total installed capacity from 350 MW to 400 MW. All these schemes aggregating to a generating capacity of 559 MW were stated to have been sanctioned only during the year 1962 and arrangements were on hand for early implementation of those schemes (including ordering of plants). These extensions were primarily intended to meet additional demands from industries and were expected to yield benefits only during the latter period of the Third Plan.

The Committee were informed by the representative of the Ministry during evidence that orders had been placed for 4 units of 10 MW each in the U.S.A. and 10 units of 1 MW each in West Germany. Besides the above, 6 units of 1.5 MW each had been ordered for installation in West Bengal which were likely to be commissioned during July to September, 1963.

The Committee are glad to note that Government have taken some measures in 1962 to augment power generation. It is yet to be seen as to how far in actual practice these measures are able to relieve the acute shortage of power which is already being experienced in several States in the current year and which is likely to become even more acute in 1964. The Committee hope that Government would ensure that the additional capacity sanctioned by them is brought into commission as early as possible to relieve shortage. In particular they would like to suggest that package units, for which orders have already been placed be imported at an early date. These

could be installed with expedition in areas which are experiencing the most acute shortage of power for industrial and defence needs. The Committee would also suggest that the position may be kept constantly under review so that necessary steps can be taken without avoidable delay to relieve power shortage as much as possible.

28. In response to a query, the representative of the Ministry stated during evidence that Government had proposals for obtaining standby plants of a total capacity of 100,000 kW for meeting the emergency requirements. This would be in the shape of mobile units, gas-turbo units and diesel units. The power generated would be made available at places where the emergent requirements cannot be met by the existing sources. The Committee understand that Government have only sanctioned up to 25,000 kW for the present and that the proposal for the remaining 75,000 kW had been kept in suspense.

**Standby
Power
Plants.**

In view of the need for meeting power requirements on emergent basis, the Committee recommend that urgent action may be taken to procure the standby units to the entire capacity of 100,000 kW.

29. The Committee have already referred in para 26 above to the fact that the shortage of power is expected to be the heaviest (202.5 MW) in Bihar—D.V.C.—West Bengal region. This is in no small measure due to the inability of D.V.C. to meet the load in this heavily industrialised area. The attention of the Committee has been drawn to the report of Sachdev Committee. In particular the Committee view with serious concern the following observations made by Sachdev Committee:

**Set-up of
D.V.C.**

“During our discussions we found that there were some serious differences in the approaches of the participating Governments and the D.V.C. in the matter of power development within the Valley and outside it.

* * *

“We feel that such differences must inevitably lead to friction and want of smooth and harmonious working when consultations with the participating Governments are necessary and there are basic differences in approach in some important matters. It is necessary that in the light of the difficulties mentioned above and the existing provisions of the D.V.C. Act, the entire working of the D.V.C. should be reviewed by the Central Government in consultation with the Governments of Bihar and West Bengal so as to evolve

suitable procedures as would make for smooth and harmonious working."

The Committee have given careful thought to the question of smooth and effective functioning of the Damodar Valley Corporation in so far as it relates to generation and transmission of power in Bihar-West Bengal region. They cannot but agree with the following views expressed by the Public Accounts Committee in their Fifth Report (Third Lok Sabha) on the Audit Report on the Accounts of the Corporation for the year 1960-61:—

".....They feel that time has come to make an overall assessment of the working of the Corporation and also to examine what amendments, if any, in the D.V.C. Act are called for to achieve the objectives for which the Corporation was set up."

D. Proper upkeep of plant and generating units.

30. The Committee were informed during evidence that the Ministry had carried out a census of generating units in the country which were either not in use or required repairs.

These units should serve not only as additional standby capacity but also to augment the present short supply in the country. The Committee, would, therefore, urge the Government to devise suitable measures whereby the existing power resources could be exploited to the best advantage of the country by (i) pressing into service all grounds of economy; (ii) ensuring full availability of power supply by careful operation and maintenance of both new and old plants; and (iii) taking good and timely care to see that all essential spare parts are kept in stock for carrying out immediate repairs in case of breakdowns.

E. Rural Electrification

31. One of the important objectives of the Third Plan is to develop efficient small scale industries in small towns and in rural areas so as to increase employment opportunities and diversify rural economy. The Third Plan points out that electricity is being increasingly used for irrigation pumping and its scope is likely to increase rapidly. Thus, in relation to the development of the rural economy, rural electrification has a growing importance and its value cannot be assessed only in terms of immediate economic benefits. The major limiting factor in achieving these aims is the lack of power. The Third Plan provides for an outlay of Rs. 105 crores for rural electrification. The following table gives the distribution of towns and villages in terms

**Keeping
Power
Plants in
running
order.**

**More power
needed for
develop-
ment of
rural eco-
nomy.**

of population range, number electrified during different plan periods and those expected to be electrified by the end of the Third Plan:—

Population range		Total number according to 1951 Census	Number electrified 31st March of			Number expected to be electrified by March, 1966
			1951	1956	1961 (estimates)	
Over	100000	73	49	73	73	73
50000 to	100000	111	88	111	111	111
20000 to	50000	401	240	366		401
10000 to	20000	856	260	350	756	856
5000 to	10000	3101	258	1200	1800	3101
Less than	5000	556565	2792	5300	19861	38458
TOTAL		561107	3687	7400	23000	43000

It is expected that by the end of the Third Plan, all towns and villages with population exceeding 5000 may be electrified.

32. As regards the requirements of power in rural areas, two statements showing (i) rural and urban consumption for the year 1960-61 and (ii) anticipated rural consumption in 1965-66, are given in Appendices VI and VII. It is seen therefrom that the total consumption of power would increase from 3,398.8 million kWh in 1960-61 to 3,723.5 million kWh in 1965-66. The Committee were informed that the Union Minister for Irrigation and Power had addressed a letter to the Chief Ministers in September, 1961 on rural electrification. The Minister had urged in his letter that in areas where adequate power supply was available to meet all demands, the State Electricity Boards should take special promotional steps for stepping up the pace of rural electrification. In other cases where adequate power was not available, the demands of rural areas might be met as far as possible even though no fresh loads could be given in urban areas.

Priority for Rural Electrification.

The Committee would urge that high priority should be given to power for irrigation pumping as this is one of the most practical ways of stepping up agricultural production.

The representative of the Ministry stated during evidence that the State Electricity Boards were asking for subsidies for rural electrification schemes to which the Central Government was not agreeable. This question was also discussed at the Eighth Irrigation and Power

Seminar held at Ootacamund on the 22nd September, 1962. The Seminar felt that rural electrification would not be able to meet the interest, depreciation and operational charges, and that normally a scheme would take about ten years to meet the recurring expenses. In order to avoid the recurring loss to the State Boards, the Seminar had suggested the following steps:

- (i) the deficit in return from the areas may be made good by other Development Departments or Government;

or alternatively

- (ii) Government may give loans to the State Electricity Boards at no interest for a period of at least five years to cover the capital cost of rural electrification.

The Committee hope that decision on the above recommendation of the Eighth Irrigation and Power Seminar (1962) would be taken soon so that the important schemes of rural electrification make rapid headway.

**Small
Hydro-
Plants.**

33. For insolated areas, the Third Plan envisages installation of small hydro-plants from 10 to 100 kW each which can be set up at a moderate cost. Small hydro-units upto 100 kW capacity are now being manufactured in the country. It is stated that these will be more economical than diesel alternating sets as they are relatively easy to maintain and would not involve any foreign exchange for their procurement and installation. As this aspect of power development is of special significance for hilly areas, a Cell has been functioning in the Central Water and Power Commission for initiating and assisting in field surveys and in installation of such plants. The Committee were informed that 103 sites had been surveyed in this connection and that recommendations had been made for installation of small hydro-electric sets at 35 of these sites. The representative of the Ministry stated that the response of the State Governments had been poor to these proposals for installation of micro hydro-electric sets and only 12 sets had actually been installed.

The Committee suggest that the reasons for poor progress in installation of micro-hydel sets may be investigated with a view to extend their use.

IV

ADMINISTRATIVE DELAYS AND BOTTLENECKS

34. The present procedure of sanctioning projects for effective implementation consists of many stages. The first stage is the preparation of the project for administrative sanction in a State. The second stage is to get it included in the Plan. The third stage is to establish a priority among projects for allocation of resources and the fourth stage is actual implementation and phasing that may be necessitated for various reasons. So far as power projects are concerned, the first and fourth stages are the responsibility of the State Governments. So far as the middle stages are concerned, the Central Water and Power Commission is required to ensure that all necessary investigations have been carried out, the estimates of expenditure are reasonably correct and the estimates of revenue are based on adequate data, before the schemes are finally scrutinised by 'Technical Advisory Committee, constituted by the Planning Commission to examine the projects proposed by the State Governments and to advise the Planning Commission on the technical and financial soundness of the various proposals'.

**Procedure
for Pro-
cessing
Plan
Schemes.**

A. Incomplete investigation of projects

35. Unsatisfactory position regarding the investigation and finalisation of the projects has been commented upon both in the Second and Third Five Year Plans. It is observed in the Second Plan that in the case of a number of schemes, for which project reports were received and examined by the Technical Advisory Committee, it was found that the investigations were not complete and the reports lacked details essential for technical and financial scrutiny. However, a number of such projects had been provisionally included in the Plan for 'regional and other considerations', in anticipation of further investigation and detailed revision of the scope and estimate of the projects.

**Incom-
plete inves-
tigations—
a chronic
Feature.**

The Third Five Year Plan also contains a pointed reference to lack of availability of information about public sector projects included in the Plan in the following words :—

"In the course of the preparation of the Third Plan, although to a smaller extent than in the Second, it was observed that many of the projects proposed for inclusion were not worked out fully, nor were they presented adequately. For a considerable number of projects included in the Third Plan, the information available even at this stage leaves much to be desired".

A statement showing the major power schemes (hydel, thermal and nuclear) included under the Third Plan together with particulars relating to installed capacity, construction schedules etc is given at Appendix VIII. The Committee were informed that the necessary investigations in respect of all the schemes in the Third Plan had not been completed as yet and that complete information regarding schemes under investigation was not readily available. They were, however, furnished with a list of schemes in respect of which project reports had not been received but were 'still under investigation'. The list of such schemes, is given at Appendix IX.

The Committee are surprised to note that out of the total plan provision of Rs. 1039 crores in the public sector, an amount of Rs. 100 crores i.e. 9.6 per cent of the total provision, has been provided on account of 58 schemes in respect of which reports have not been received by the Central Government.*

It is obvious that project schemes would have to be prepared and sanctioned before any start can be made in the implementation of the projects. Since two years of plan period are nearly over without the submission of power development schemes envisaged in the Plan, there is bound to be delay in their execution.

The Estimates Committee recommend that work relating to investigation of schemes included in the Third Five Year Plan may be completed without delay.

They would also urge that project studies relating to the Fourth Five Year Plan may be taken in hand forthwith. These should be completed sufficiently early so that as far as possible, fully investigated schemes may be included in the Fourth Five Year Plan.

B. Delays in sanctioning of projects

Administrative Delays.

36. As regards delay involved in scrutiny of projects, Gokhale Committee (1959) had made the following observations in their Report:—

“...considerable time is taken by each Directorate to offer its comments even on small projects. This lends weight to the complaint made by the States that the consideration of the projects gets delayed while they are under scrutiny by the Central Water & Power Commission. The position in the power-side is that the projects have to undergo scrutiny by the Central Electricity Authority in addition to the Central Water and Power Commission and the Advisory Committee.”

*Out of Rs. 100 crores, power development schemes aggregating to estimated expenditure of Rs. 13.65 crores had been received by the Central Water and Power Commission.

A State Electricity Board brought to the notice of the Committee some concrete instances where several months had been taken by the Central Water and Power Commission in according sanction to their scheme reports. The Committee asked for specific details regarding the date of receipt of the scheme reports and the date of communication of sanction by the Central Water and Power Commission. They find from the information furnished by the Ministry that the time taken by the Central Water and Power Commission in according sanction ranges between 4 to 8 months.

In this connection, the Committee would like to draw attention to Section 31 of the Electricity (Supply) Act, 1948 which lays down that the Central Electricity Authority should forward its recommendation to the State Electricity Board within a period of six months from the date of receipt.

The Committee consider that now that the Central Water and Power Commission have a fund of experience of more than a decade, it should be possible for them to conduct technical examination of proposals received from the State Electricity Boards in a more expeditious manner. They recommend that the Central Water and Power Commission may carefully review the procedure for processing such schemes so as to reduce the time to the minimum.

C. Difficulties in execution of Projects

37. The Committee were informed that a Reviewing Team consisting of the Joint Secretary, Ministry of Irrigation and Power, Member (Hydro-electric), Central Water and Power Commission and Adviser, Planning Commission, had visited various States in 1961 for assessing the main difficulties and bottlenecks experienced by the project authorities. Some of these difficulties related to target dates, coordinated action, delays in foreign exchange, procurement of steel, cement, explosives, supplies from Heavy Electricals and other organisational defects. A note showing the action taken by Government to resolve the difficulties pointed out by the Team, is reproduced in Appendix X.

**Need for
timely
Removal
of Diffi-
culties
Experienced
by
Project
Authorities**

38. It was brought to the notice of the Study Group of the Estimates Committee that visited the Sharavathy Hydro-electric Project* in September, 1962 that a number of difficulties like shortage of steel, non-availability of foreign exchange and cumbersome procedure for import of

**Delay in
Execution
of S hara-
vathy
Hydro-
Electric
Project.**

*The Sharavathy Valley Hydro-electric Project is one of the biggest power projects in Asia contemplating generation of electric power of nearly one million kW in the final stage at a cost of Rs. 68.43 crores. Power from this project is expected to be generated at a low cost of Rs. 720 per kW.

machinery and equipment had been experienced by the authorities in the execution of the project. The Study Group were given to understand that detailed investigations had not been made before the project was sanctioned. The result was that the design for foundations of some portion of the dam and tunnel had to be modified in the light of subsequent detailed investigations. The Study Group also observed that as a result of heavy rains during the last monsoon, huge quantities of soft soil and debris from the hill slopes had been washed down into the power channel which had been dug and was being lined with cement concrete. Soft soil and debris had also been washed down during the last rains into the concrete base erected for the installation of the power house.

The Committee were informed by the Ministry that the scheme report on the Sharavathy Hydro-electric Scheme Stage I was received by the Central Water and Power Commission from the Government of Mysore in January, 1955. The sanction of the Planning Commission to Stage I of the Scheme estimated to cost Rs. 22.97 crores was accorded on the 7th June, 1956. The reason for the intervening period of one year and six months to process the scheme was stated to be due to the fact that the Advisory Committee at its first meeting held on the 11th February, 1955 had desired to have certain additional details on its hydrology etc. which led to changes in the scope of the project, cost estimates etc. necessitating re-examination of the report *de novo*. The original and revised target dates for the commencement of construction and commissioning of various units of the power house were stated to be as follows:—

Unit	Date of commencement		Date of commissioning	
	Original	Revised	Original	Revised
I	Aug. 61	Dec. 62	Dec. 62	June 64
II.	Oct. 61	Jan. 63	To follow after 3 to 4 months	Dec. 64
III.	Not yet started		...	Dec. 64
IV	Do		...	April 65
V	Do		...	Aug. 65
VI	Do		...	Dec. 65
VII	Do		...	April 66
VIII	Do		...	Aug. 66

The representative of the Central Water and Power Commission stated during evidence that delays in the execution of the project were due partly to the time taken in

the construction of the dam and partly to landslide during the monsoon.

It is unfortunate that the erection of the first two units of the Sharavathy Hydro-electric project would be delayed by about 18 months.. In view of the acute shortage of power being experienced in Mysore State particularly by Defence industries, the Committee have no doubt that Government would make every endeavour to speed up the execution of Sharavathy Power Project.

D. Watching Progress of Schemes

39. The instance cited above highlights the need for maintaining a continuous watch on the execution of major power projects. The Committee were informed that the Central Water and Power Commission had set up an Implementation Cell (Power projects) in August, 1962 to undertake the following functions:—

Need for ensuring strict compliance with Time Schedule.

- (1) continuous review of the stage of execution of each power project included in the Plan;
- (2) assessment of the needs of each power project for ensuring its timely implementation;
- (3) removal of difficulties and bottlenecks experienced by the project authorities in regard to the timely implementation of the power projects;
- (4) liaison work between State Governments, Ministries of Irrigation and Power and Finance, Development Wing of the Ministry of Commerce and Industry and Licensing authorities.

The representative of the Ministry stated during evidence that a senior officer had been appointed in the Ministry to see that the bottlenecks relating to foreign exchange or raw materials were promptly removed.

As regards progress reports of power generation projects costing more than Rs. 1 crore, the Committee were informed that there were a number of projects in respect of which the State authorities had not sent reports in spite of repeated requests. The *pro forma* for submission of progress reports had been recently revised and simplified in consultation with the Planning Commission to make it easier for the authorities to send in time the quarterly progress report. The result of the revision of form for submission of progress reports would be known only after April, 1963, when the first Progress Report on it would be received.

The Committee stress the need for timely receipt of periodical progress reports on major projects from State authorities. Such progress reports should be analysed immediately on receipt in the Central Water and Power Commission in order that immediate action could be taken to resolve the bottlenecks.

They are firmly of the view that once the Government have sanctioned a particular project, all impediments coming in the way of its smooth progress should be removed expeditiously to ensure adherence to plan targets.

E. Problem of Co-ordination

40. The principal bottlenecks in the implementation of construction schedules arise mainly due to delays in:—

- (i) release of foreign exchange and grant of import licences;
- (ii) timely availability of equipment and spare parts; and
- (iii) shortage of scarce material such as steel, cement, explosives, electrical accessories etc.

Foreign Exchange.

The Committee have received general complaints from almost all the State Electricity Boards and representative organisations regarding abnormal delays in the release of foreign exchange. One of the State Electricity Boards has represented:

“Even when the source from which the foreign currency expenditure for any particular project is to be met is known, detailed investigations are made to determine whether the equipment even if it forms a small part of the project as a whole, can be procured from indigenous sources. Considerable amount of time has to elapse before the Development Wing decides the extent to which foreign exchange could be released for any proposals made for such releases.

* * * *

Once a clearance from the Development Wing is obtained, the time involved in actually effecting release of foreign exchange by the Irrigation and Power Ministry is at present excessive.

* * * *

Similarly, once the foreign exchange release by the Irrigation and Power Ministry is sanctioned, the present procedure of issuing the necessary import licence also takes excessive time.”

A Chairman of one of the State Boards had advanced a number of measures for rationalising the procedure for release of foreign exchange and issue of import licences. Two of these measures are mentioned below:—

- (i) The Ministry of Finance may make an *ad hoc* allocation of foreign exchange to the Ministry of Irrigation and Power say for every quarter, and on the basis of this allocation, the Ministry of Irrigation and Power may release foreign exchange.

- (ii) The Development Wing* may every six months draw up comprehensive list of items required for power projects which may be imported during a specific period. On the basis of this list, the project authorities may be permitted to import equipment and for such items it may not be necessary for the Central Water and Power Commission to consult the Development Wing*.

The representative of the Ministry stated during evidence that the question of rationalising the procedure for the release of foreign exchange had already been taken up in conjunction with the Ministry of Economic and Defence Coordination. He stated that the two measures mentioned above were under consideration.

41. The Committee note that the Eighth Seminar on Irrigation and Power held at Ootacamund in September, 1962 had also gone into the question of removal of bottlenecks. The Seminar had recommended: Ooty Seminar.

- (1) streamlining of procedure for the release of foreign exchange and grant of import licences and suitable enhancement of the direct powers of the Ministry of Irrigation and Power in respect of foreign exchange;
- (2) the requirements of machinery and foreign exchange should be planned well in advance of the commencement of the project and the applications for release of foreign exchange should be sent by the project authorities, as far in advance as possible, of the actual needs;
- (3) surplus equipment in each State should be operated in a pool for optimum utilisation, controlled by a properly organised State Mechanical Unit. The surplus spare parts should be physically pooled in each State and the rest should be controlled by a Central inventory so as to reduce the sickness of equipment and burden of carrying stocks of spares in each State;
- (4) it will be the responsibility of the State to furnish up-to-date inventories to the Central Water and Power Commission of the surplus machinery and spare parts. Utilisation of machinery and spares, once declared surplus, should be with the prior concurrence of the Central Water and Power Commission. For discharging this function, the Central Water and Power Commission should be suitably equipped;

*Now Department of Technical Development under the Ministry of Economic and Defence Coordination.

- (5) streamlining of procedure for allocation of all material in scarce supply and requirement of all such material to be planned well in advance to ensure timely supply;
- (6) progressive study of requirement of technical personnel should be taken up.

Since a number of Ministries are intimately connected in finding a solution to these problems, the Committee suggest that the question of setting up a Committee composed of representatives of the Ministries of Irrigation and Power (including Central Water and Power Commission), Finance, Commerce and Industry, Steel and Heavy Industries, and Economic and Defence Coordination for removing the bottlenecks encountered by the project authorities in the procurement of foreign exchange, machinery, equipment, steel, cement, explosives, etc. may be examined. They also suggest that early action should be taken to rationalise the procedure for release of foreign exchange and issue of import licences so as to cut out all delays.

F. Manufacture of Electrical Equipment.

Need for Expanding Manufacture of Heavy Electrical Equipment.

42. The Third Plan provides for an increase in the generating capacity from 5.6 million kW in 1961 to 13.45 million kW in 1966. In consonance with this increase in the generating capacity, the electrical engineering industries will have to be given more attention and resources to cope with the requirements.

The Committee would urge that the manufacture of generators, transformers, high tension switch gears and heavy industrial motors etc. may be geared up to meet the plan requirements.

43. The representative of the Ministry stated during evidence that the Central Water and Power Commission and the State Electricity Boards were not represented on the Board of Directors of the Heavy Electricals Ltd., Bhopal*.

The Committee consider that there should be close liaison between the Heavy Electricals Ltd., Bhopal on the one hand and the Central Water and Power Commission and the State Electricity Boards on the other.

Standardisation of Power Equipment.

44. Experience has shown that economy in cost and speed in installation can be achieved by standardisation of equipment.

During evidence the representative of the Ministry stated that Government had already taken some steps towards standardisation. For example, 14 generating sets of 50,000 kW each of standard design had been ordered in

*At the stage of factual verification of the Report, the Ministry pointed out that the Ministry of Heavy Industries had agreed to appoint two more Directors on the Board of Directors of Heavy Electricals Limited.

bulk for various power projects in the country like Talcher, Ramagundam, Delhi, Satpura, Paras, etc. It was hoped to effect thereby a saving of Rs. 3 crores in foreign exchange (approximately 25 per cent).

Heavy Electricals had also been requested to manufacture only six designs of transformers which would cover nearly 25 different existing designs. Heavy Electricals had also been requested to standardise the generating plants to 3 designs.

The Committee are glad to note that the Ministry have initiated action to standardise power equipment. The Committee feel that with the setting up of the Power Research Institute and the Specialised Engineering Organisation, it should be possible to extend standardisation to other important items of electrical equipment.

V

ASSESSMENT OF DEMAND

Load Planning related to Industrial and Economic planning.

45. Assessment of demand for power is the *sine qua non* of all planning for power development. This was recognised in the First Five Year Plan in the following words.—

“The pattern of power utilisation has to be laid down in advance and the load development has to be carefully planned for every generating unit. The development of power generating capacity should be coordinated with the development of load. If the lag between power generation and load buildings is long, interest charges on capital mount up and make the undertaking uneconomic. Load planning for any large power system is integrally related to the industrial and economic planning of the regions within a reasonable distance of the generating station. Carefully worked out schemes for building up the load must be planned and executed along with schemes of generation.”

A. All India Load Survey Scheme

Load Surveys being made on ad hoc basis.

46. The Government of India decided in 1954 that a systematic power load survey of different regions and the country as a whole might be undertaken by the Power Wing of the Central Water and Power Commission as a National Project. To carry out this assignment four regional load survey offices at Meerut, Calcutta, Bombay and Bangalore were set up in 1955 to function under the overall control of the Director, Load Survey and Load Development. The preliminary load survey reports for all the States (prior to their reorganisation under the States Reorganisation Act, 1956) were completed and issued by the middle of 1957. A revised report was published in the form of a compendium under the name 'Forecast of Power Demand in India—1955-56 to 1970-71 in September, 1958. This quick appraisal was made to facilitate finalisation of power programme for the Second Five Year Plan.

For formulating proposals for the Third Plan, detailed Load Survey Reports were prepared to cover a period of 25 years from 1955-56 to 1980-81. While the detailed load survey of various States in the country was under progress, the Planning Commission desired in 1960 to have a

quick appraisal of load estimates for all the States so as to enable them to discuss the Third Plan projects with the States concerned. The particulars were compiled with the help of data already collected during the detailed load surveys and furnished to the Planning Commission. The progress made in completing detailed load survey till July 1962 is indicated below:---

- | | |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (i) Reports completed and issued: | Andhra Pradesh, Madhya Pradesh, Rajasthan, Orissa, Uttar Pradesh, Delhi, Gujarat, Madras, Assam, Maharashtra, Goa, Himachal Pradesh, Pondicherry and Punjab. |
| (ii) Reports under scrutiny and finalisation : | Jammu and Kashmir, West Bengal. |
| (iii) Reports under preparation: | Bihar, Kerala. |
| (iv) Field Survey in progress: | Mysore. |

The Committee were informed that it was expected to complete detailed load surveys by about March, 1963.

The representative of the Federation of Electricity Undertakings in India stated during evidence that "the load surveys get out of date by the time they are published and made available. If it could be processed quickly and made available to the industrialists, perhaps, they would know what exactly is the latest picture of the load surveys".

A Chairman of a State Electricity Board in his evidence before the Committee also stated that the load surveys conducted so far had proved inadequate.

The representative of the Ministry admitted during evidence that the Ministry had not for sometime past been satisfied with the progress of load surveys.

The need for accurate load forecasting as a pre-requisite condition for systematic planning for power development requires hardly any stress. Unless power load surveys are carried out and results made known early, they lose their value as basis for power planning and economic development. It is, therefore, a matter of regret that the work of power load survey of different regions and the country as a whole which was taken up in 1954 and has already cost the Government about Rs. 20 lakhs has not been completed so far.

B. Decentralisation of Load Survey Work

**Need for
laying down
guiding
principles
for Load
Surveys.**

47. Gokhale Committee had made the following observations regarding the decentralisation of work relating to load surveys:

“.... The State Electricity Boards should make their own arrangements for load survey. This is their function and the expenditure is legitimately chargeable to their estimates. The Central Water and Power Commission has taken over this work on the assumption that the States inflate their figures and thus vitiate the data on which decisions are taken regarding the relative priorities of the projects. We do not fully share the apprehensions of Central Water and Power Commission, nor has any tangible evidence been produced before us indicating that this is the general practice.”

The Committee were informed that the Government had decided that “the State Electricity Boards should themselves undertake detailed load surveys of the area within their jurisdiction. The first load surveys in hand may, however, be completed by the Central Water and Power Commission in accordance with the existing arrangement”.

In pursuance of the above decision, Chairmen of State Electricity Boards|Chief Engineers were advised in May, 1961 to undertake load survey of the areas under their jurisdiction after the first detailed load survey of the country had been completed by the Central Water and Power Commission. It was also indicated that the Commission would draw up instructions for the conduct of the load surveys by the Boards etc. and prescribe procedures, standards and norms, wherever possible in the light of the experience gained from the first detailed load survey of the country which was expected to be completed by March, 1963.

The Committee note that an official of the Central Water and Power Commission has been deputed to the United States to study power forecasting in that country. They also note that work relating to power forecasting has already been taken in hand by Government and that assistance of American experts would also be taken, wherever necessary.

The Committee would in this connection like to refer to the periodical publications brought out by the Edison Electric Institute of the United States which present in a succinct manner relevant statistics regarding electric power supply and manufacture of electric power equipment. It was understood that semi-annual electric power

surveys were published by this Institute which gave the forecast of demands and the capacity to meet it. The representative of the Ministry stated during evidence that these forecasts by the Edison Electric Institute were found to be very accurate and were relied upon by everybody in the United States including the industry and the Government. The Committee note that Mr. Walker Cisler who is connected with the Edison Electric Institute is represented on the Electric Survey Committee which has been recently appointed by the Government to go into the whole field of planning and development of power. (The terms of reference and composition of the Electric Survey Committee are reproduced in Appendix XI.)

The Committee hope that load surveys would be completed shortly and that work relating to power forecasting would be completed speedily. They would urge that broad principles for undertaking load surveys and power forecasting may be laid down by the Central Water and Power Commission at an early date for the guidance of the State Electricity Boards so that there is uniformity of approach in the detailed load surveys to be carried out by the State Electricity Boards. They would also urge that as in the United States, arrangements may be made to bring out periodically, at least once every year, a publication containing vital statistics about load surveys and power development programmes for the different States, Union Territories and the country as a whole.

VI

POWER FOR RAILWAY ELECTRIFICATION SCHEMES

Advantages of Electric Traction.

48. Indian Railways have in recent years been switching over from steam traction to diesel and electric traction to meet the growing volume of traffic. Though electric traction involves high capital cost it has three distinct advantages:

- (i) it makes for high acceleration and operating speed;
- (ii) its cost of operation and maintenance is low; and
- (iii) using thermal power source the efficiency of an electric locomotive is about 14%* as compared to overall thermal efficiency of 4.5% (approx.) of a steam locomotive.

Electric traction would also reduce the requirements of high grade coal for Railways as thermal power can be generated with low grade coals.

49. In view of the above considerations the Expert Committee on Coal Consumption on Railways (1958) recommended that "endeavours should be made to reach a target of at least 30% electric traction..... by 1975".

50. Electric traction programme was initiated by Indian Railways in a big way in 1954 and so far 1218 route kilometres have been electrified. Another significant development which needs to be mentioned in connection with Railway electrification is that since 1957 Railways have adopted 25 KV single phase AC at the industrial frequency of 50 cycles per second as the standard for all new electric traction as the experience of foreign countries, particularly France, had indicated that it was the most economical system for electric traction.

*At the time of factual verification the Ministry of Railways stated that 'Using thermal power source from a modern generating station, the overall efficiency of an electric locomotive is about 21 to 23%

The following table indicates the power requirements for electrification programme on the Indian Railways for the Third Five Year Plan:

Railway	Section	Ultimate Power requirements in MW (allowing for diversity)	Source of Supply	Target date for Power Supply
Eastern Railway	(a) Durgapur-Gaya	36.0	D.V.C.	Energised.
	(b) Durgapur-Howrah Docks <i>via</i> Chord	14.0	D.V.C.	Oct. 1964.
	(c) Howrah—Burdwan Mainline A.C.	14.0	D.V.C.	Dec. 1965.
	(d) Sealdah South and North	30.0	D.V.C. through West Bengal S.E.B.*	April, 1963/ Jan. 1965.
	(e) Gaya—Moghalsarai	14.4	Rihand** and D.V.C.	Energised.
South Eastern Railway	(a) Kharagpur—Tatanagar	10.0	D.V.C.	Nov. 1962.
	(b) Howrah---Kharagpur	11.7	D.V.C.	Oct. 1965.
	(c) Asansol—Tatanagar—Rourkela	46.4	D.V.C. and Hirakud	Energised.
	(d) Additional Branch lines of South--Eastern Railway.	5.4	Do.	End 1962 to Jan. 1964.
	Additional load due to anticipated increase in traffic.	8.4		
Northern Railway	(a) Moghalsarai—Allahabad.	22.0	Uttar Pradesh S.E.B.*	July, 1964.
	(b) Allahabad—Kanpur	20.0	Do.	July, 1965.
Central Railway	(a) Igatpuri-Nandgaon	16.0	Maharashtra S.E.B.	April, 1965.
	(b) Nandgaon—Bhusaval	15.0	Do.	Jan. 1966.
Southern Railway	(a) Tambaram-Villupuram	9.6	Madras* S.E.B.	Dec. 1963.
	(b) Madras Suburban	4.0 (including 3 D.C.).	Do.	March, 1965.

*S.E.B. stands for State Electricity Board.

**25 MW firm power and 15 MW temporarily, until DVC's Chandrapura Power House is Commissioned, has been allotted for Rihand for Railway electrification in the Eastern Zone.

Eastern and South Eastern Railways

**Sachdev
Committee's Pro-
posals.**

51. The requirements of power for Eastern and South Eastern Railways had been reviewed in detail in 1961 by Sachdev Committee, appointed by Government, "to enquire into the causes of Recent Failure of Power supply in West Bengal and Bihar". The proposals made by the Sachdev Committee for supply of power for electric traction as compared to the original proposals of 1958 are indicated in the table below:

Power Supply authorities	Original Proposals (in M W)	Sachdev Committee's Proposal (in M W)
D.V.C.	125 + 20 DC	120 + 20 DC
West Bengal S.E B.	...	43.75
Bihar S.E. B.		22
Rihand	25	...
Hirakud	25	...
	<u>175 + 20DC</u>	<u>185.75 + 20DC</u>

It would be observed that in the original proposals for supply of power to the Railways, the State Electricity Boards of West Bengal and Bihar were not to supply any power but according to the proposals of the Sachdev Committee these Boards are required to supply 43.75 and 22 M W of power for railway traction.

**Apprehensions of
Power
shortage.**

52. The Ministry of Railways have stated in their memorandum that power supply originally envisaged for electric traction was altered as above without inviting their views in the matter. The revised allocation arrangements were dependent upon the West Bengal and Bihar State Electricity Boards being able to develop adequate generating capacity, transmission lines etc. to make available the requisite power. It was added that no clear indication had yet been given by the Ministry of Irrigation and Power about the extent to which the Sachdev Committee's recommendation in the above behalf would be given effect to.

In particular it was apprehended that there would be a shortage of 15 MW from June 1963 to March, 1964 and 20 MW from March, 1964 to September, 1964. This shortage could be overcome if power was made available from other sources including Gouripur Electric Supply Company's station near Naihati.

A shortage of 29MW is expected between September, 1964 to December, 1964 and this could be overcome by advancing the date of commissioning of Chandrapura Power House from December, 1964 to September, 1964.

The Committee hope that the Ministry of Irrigation and Power would take necessary action to ensure that the power requirements of Railways which constitute the nation's life line are fully met. The West Bengal and Bihar State Electricity Boards should supply power as envisaged by the Sachdev Committee or in the alternative Rihand and Hirakud Power should continue to be made available. They would also like to emphasise that the generation of power in Chandrapura should be advanced to as early a date as possible, but not later than September, 1964 so as to meet fully the railway requirements.

Northern, Central and Southern Railways

53. The Committee also hope that the Ministry of Irrigation and Power would similarly ensure that the requisite power for the Third Five Year Plan is made available for electrification on Northern Railway by U.P. State Electricity Board, on Central Railway by the Maharashtra State Electricity Board and on the Southern Railway by the Madras State Electricity Board.

54. The Committee would also urge that a close watch may be kept on the installation of transmission lines so that there is no delay on this account in making the power available at the points needed for railway electrification. In this connection they would, particularly, like to draw attention to the need for completing the transmission lines to carry power, for electrification of Sealdah-Ranaghat and Dum Dum—Bongoan Section of Sealdah Division of Eastern Railway.

55. The Committee understand that Railways are experiencing difficulties to secure additional power supplies for some Railway Workshops. The Committee urge that high priority may be accorded for meeting the urgent requirements of Railway Workshops so that the Railways' maintenance and production programmes do not suffer.

56. It was stated by the representative of Railways that as it took several years to establish a Power House there was need for perspective Planning for power requirements. He added that a tentative plan of railway electrification for Fourth and Fifth Five Year Plans had been prepared. Certain routes for electrification had been tentatively decided, but the actual traffic which would have to be carried on those routes had yet to be precisely ascertained. A tentative picture of the Fourth-Five Year Plan had been sent to the Planning Commission, but no discussion had yet been held with them. One of the factors was the lack of certainty about the availability of diesel oil for diesel traction. It was hoped that in about six months time* a clearer picture of electric traction requirements would emerge.

*The representative of Ministry of Railways appeared before the Committee on 17.11.1962.

The Committee would like to draw attention in this connection to the recommendation made by the Sachdev Committee that new power plants for installation during the Fourth Five Year Plan should be sanctioned by the end of 1962. The Committee cannot too strongly emphasise the need for undertaking perspective planning for electric traction in greater detail and with greater expedition so that the Railway requirements can be fully taken into account while sanctioning the power projects for the first two years of the Fourth Five Year Plan.

Where hydel power is available at reasonable rates the advantage of it should be taken for electrification of railways in the areas especially when they are far removed from coal bearing areas. The Committee would suggest a comprehensive examination of the possibilities of electrification in the different Zonal Railways.

The Committee would further suggest that to end uncertainty about the supply of power for railway traction, the Central Electricity Authority may at the time of sanctioning new projects of State Electricity Boards and other generating authorities earmark the power which they have to make available for railway traction.

Closer Co-ordination between Generation and Supply Authorities necessary.

57. The Committee would also like to emphasise the need for closer co-ordination between the generation and supply authorities so that the work progresses according to schedule in a most economical manner. In this connection, the Ministry of Railways had pointed out that in the earlier stages there was lack of co-ordination between Bihar State Electricity Board, D.V.C. and Rihand in the commissioning of Pipri—Sonenagar Transmission Line in the matter of metering and synochronising equipment, arrangement for parallel operation, settlement of energy charges etc. with the result that the scheduled date of June, 1961 had to be put off by one year. Similar lack of co-ordination between Bihar State Electricity Board, Damodar Valley Corporation and Hirakud authorities was alleged to be responsible for delay in utilisation of Goilkera—Rourkela Transmission Line which was required to feed reliable supply for the vital railway lines to steel mills to carry raw materials*.

It was also pointed out by the Ministry of Railways that there was duplication of substations at Purulia and Sonenagar between Damodar Valley Corporation and West Bengal State Electricity Board which resulted in needless over-capitalisation and duplication of operating personnel. The Committee would urge the Central Water and Power Commission to use its good offices to ensure close co-ordination between the diverse generation and supply authorities who are catering for Railway traction.

*Closer Co-ordination, however, has since achieved according to the Ministry of Railways in both the above Cases.

58. The Ministry of Railways have furnished to the Committee a comparative statement (Appendix XII) showing the rates charged or proposed to be charged for electrical energy by various supply authorities for railway traction. **Tariff Rates for Railway Electrification.** The Committee are surprised to note that there are wide variations in the overall charges, for example, from 7.53 nP for D.V.C. Power to 13.78 nP for Hirakud Power at 40% load factor.

The Railways have represented in a memorandum of July, 1962 to the Planning Commission and the Ministry of Irrigation and Power that Electricity Undertakings were taking undue advantage of their autonomous position to quote excessive tariffs for railway traction and therefore it was necessary to lay down guiding principles for drawing up equitable tariffs for railway electrification schemes. It is understood that in Britain the National Grid Supply Authority is taken as one supplier and the British Railways drawing the power from the Grid are treated as one consumer. The Ministry of Railways have urged in their memorandum to the Planning Commission that "supplies to the Railway electrification loads from the same source of power generation (i.e. belonging to one particular agency) should have a unified tariff so far M.D. and energy charges are concerned, and the Railway drawing power at various substations should be treated as one consumer, even though the supplies may be made through several agencies transmission lines, and substations". They have also urged that "the tariff should be evolved with due consideration to the actual cost of generation, the cost of power at the point of supply and the fact that supply is taken in bulk. To this a reasonable margin of profit may be added and the tariff so evolved should have the approval of the Central Water and Power Commission".

"...Speaking broadly, electricity rates for electric traction should not be appreciably higher than what it would cost the Railways had they generated their own power".

"The period of integration of the maximum demand for railways should be 30 minutes as in the case of other bulk consumers and not 15 minutes".

The Railways have also pointed out that power supply authorities were adopting very liberal designs for substations which were uneconomic and resulted in over-capitalisation. In this connection, it has been pointed out that "so far as Railways are concerned, experience has revealed that average cost of a 132/25 KV single phase traction substation being set up by different supply authorities is about Rs. 20 lakhs while it would not cost the Railways anything more than about Rs. 10 lakhs". The Railways have expressed a feeling that "they are in effect being used for subsidising the development programme" of the Electricity Boards and other supply authorities.

Scope for Eliminating over-capitalisation by Supply Authorities.

The Committee understand that the proposals made by the Railways for rationalisation of tariffs for Railway elec-

trification had been examined by the Ministry of Irrigation and Power who had furnished their comments to the Planning Commission.

The Committee hope that Government would go into the matter at an early date and in the larger interest of the country would lay down general principles as far as possible for determining equitable tariff rates for supply of power for railway electrification.

VII

ADMINISTRATION OF ELECTRICITY ACTS AND RULES

A. Central Electricity Board.

59. The Central Electricity Board was constituted in 1937 under the provisions of Section 36-A of the Indian Electricity Act, 1910. The functions of the Board are to make rules to regulate the generation, transmission, supply and use of energy, and, generally to carry out the purposes and objects of the Act.

60. The Board consists of a Chairman and nine members nominated by the Central Government to represent Defence Ministry, the C.P.W.D., Indian Posts and Telegraphs Department, All India Radio and the Atomic Energy Establishment at Bombay, each of the Union Territories of Delhi and Himachal Pradesh, the Union Territories of Manipur, Tripura and the Andaman and Nicobar Islands and the Federation of Electricity Undertakings of India, members nominated by the State Governments and the State Electricity Boards, and one member each nominated by the Railway Board, the Chief Inspector of Mines, Dhanbad and the Indian Standards Institution, New Delhi.

Composition of the Board.

The Indian Electricity Rules were last revised by the Central Electricity Board in 1956. Since the revision of Rules, the Board has met only once in November, 1957.

Meetings of the Board.

The Board is stated to have received since its last meeting in November, 1957, 138 proposals for amending the Rules. Out of them, only 4 have so far been disposed of by circulation. *The Committee are constrained to note that even though 134 proposals for amending the Rules have been pending, the Central Electricity Board has not met even once during the last 5 years. They cannot too strongly emphasise the need for prompt processing of all proposals which are received for amending the Rules so that the shortcomings brought to notice in the application of Rules are rectified without delay.*

The Committee hope that the meeting of the Central Electricity Board will be held at an early date and that in future also such meetings will be held as often as necessary, at least once a year, so that the pros and cons of important proposals received for amendment of Electricity Rules are discussed before decisions are reached.

It would also be useful to review periodically the Rules as a whole once in five years so as to take full cognisance of advances made in power transmission, electrical appliances and other allied matters which have a bearing on the working of Rules.

B. State Electricity Boards

Functions.

61. State Electricity Boards have been set up by all the State Governments under Section 5 of the Electricity (Supply) Act, 1948. The State Electricity Boards are charged with the responsibility of promoting co-ordinated development of generation, supply and distribution of electricity within their States in the most efficient and economical manner.

Composition.

62. The State Electricity Boards are to consist of not less than three and not more than seven members *vide* Section 5(2) of the Act. The Act also lays down qualifications for appointment of members to the Boards by the State Governments.

Need for uniformity in State Boards' set up and Functions.

The Estimates Committee note that a Committee of the Government of India (consisting of Sarvashri B. S. Nag, K. P. S. Nair and P. P. Agarwal) which reviewed the power development programme in 1961 pointed out that members of some of the Boards had been appointed on full-time basis while others were working with part-time members. Another matter about which uniform procedure had not been followed was with regard to transfer of electricity systems to the State Electricity Boards. Some States had transferred all the power projects and systems to the Boards on their constitution. In others, only the distribution system and projects under construction had been handed over to the Boards while the execution of new projects had been retained by the State Governments. It was also noted that procedure for staffing the Boards differed from State to State. While in some States, the entire staff of the Electricity Department which existed before the constitution of the Boards was transferred to the Boards on permanent basis, in others, the staff had been sent to the Boards on deputation and the State Governments continued to exercise disciplinary control over it.

The Committee note that Ministry of Irrigation and Power had addressed a questionnaire in January, 1962 to State Governments to gather detailed information about composition, functioning and financial structure of the Electricity Boards, with a view to bringing about some uniformity in the set-up and working of the Boards. The Committee feel that the Union Government should have kept a watch on the composition and working of the Electricity Boards from their very inception so as to ensure uniform development. They would urge the Government to complete their proposed study at an early date and use their good offices to bring about uniformity as far as possible, in the set up and functioning of the State Electricity Boards.

C. Inspection Machinery

63. Section 36 of the Indian Electricity Act, 1910 authorises the State Governments to appoint duly qualified Electrical Inspectors. Rule 5 of the Indian Electricity Rules, 1956 lays down the scope of inspections to be done by the Electrical Inspectors in order to ensure that the provisions of the Electricity Act are being fully observed. One of the leading Associations of Electrical Contractors has stated in a memorandum to the Study Group of the Committee that "from experience it has been found that the system of the Electrical Inspectorates consisting of officers lent by the State Electricity Boards has not been conducive to the effective functioning of the Inspectorates inasmuch as these officers lent to the Inspectorate find it irksome to discharge their obligations strictly and fearlessly when the provisions of the Indian Electricity Act and Rules are not complied with by the Electricity Board officers who very often happen to be their seniors in their parent organisation".

Inspection Machinery in the States.

The representative of the Ministry stated during evidence that electrical inspectors constituted a very small cadre and if they were separated from the Electricity Board they would not have adequate opportunity of promotion. It was added that the subject had also been considered at one of the Conferences of the State Electricity Boards and the consensus of opinion was that the existing arrangement should continue.

It was also stated that the Electrical Inspectors submitted their reports to the State Governments. Under the Rules, the State Electrical Inspectors were not required to send any report to the Union Government.

The Committee consider that as the Electrical Inspectors are intimately connected with the working of the Indian Electricity Rules, which are framed by the Central Electricity Board, it is but appropriate that an annual report may be called for from the State Electrical Inspectors. The Report may prove of use to the Central Electricity Board to review annually the working of the Indian Electricity Rules. The Ministry may also examine how best the Electrical Inspectors can be enabled to discharge their statutory responsibility in an independent manner.

64. With the growing development of electric power and the increasing use of domestic electrical appliances in India, a need was felt for prescribing minimum safety and performance requirements for these appliances. The Indian Standards Institution has published a number of specifications on domestic electrical appliances, since 1951. It was expected that publication of the Indian Standards Institution standards would go a long way towards improving the quality of Indian manufactured appliances, but the Electrical Accessories Sectional Committee of the Indian

Compulsory Testing of Electrical Appliances.

●

Standards Institution, after a careful review, were forced to the conclusion that the quality of electrical products had not improved. They recommended at their meeting held on the 6th July, 1958 that:

“The Electrical Accessories Sectional Committee of this Institution views with considerable disappointment that Indian Standards for electrical accessories which were published a number of years back have not found any substantial application in the manufacture of such accessories as is evident from the availability in the market of unsafe and poor quality goods. It is understood that the Indian Electricity Rules are being modified to include reference to the Indian standards. The Committee strongly recommends that the Government of India should, in the interests of safety of the users, take early steps to review the position and take necessary steps to encourage manufacture of electrical accessories to specifications and prevent actively the manufacture of non-standard domestic electrical appliances.”

The above recommendation of Electrical Accessories Sectional Committee was brought to the notice of the Development Wing*, who advised the manufacturers of domestic appliances and wiring accessories borne on their list to adopt the Indian standard specifications. The Indian Standards Institution also approached the Small Industries Service Institute, Delhi as a number of small scale units were manufacturing electrical appliances. It is understood that the Small Industries Service Institute, after making a study of the problem had felt that it was necessary to have compulsory quality control on the manufacture of domestic electrical appliances.

The Indian Standards Institution had accordingly approached the Ministry of Commerce and Industry in 1958 to make the quality control on electrical domestic appliances compulsory.

65. The Development Council for the Heavy Electrical Industries also recommended at their Eighth meeting held in 1958 that legislation should be brought forward for prohibiting the manufacture and sale of electrical equipment not conforming to the requisite standards, particularly in the case of wires and cables, domestic appliances etc. used on voltages upto 660 volts. The Development Council also recommended that “until the legislation is

* Zow Department of Technical Development under the Ministry of Economic and Defence Co-ordination.

passed, the Government of India should pass executive orders to ensure that all electrical equipment commonly used up to 660 volts bearing Indian Standards Institution Certification Mark should only be sold and this should be made obligatory”.

It is understood that the Ministry of Commerce and Industry had issued in October, 1959 directions to the Directors of Industries of all State Governments and Union territories to issue suitable executive instructions ‘to ensure that only such electrical equipment commonly used on voltage upto 660 volts should be permitted to be sold as bear the Indian Standards Institution Certification Mark’.

The Committee understand that the question of introducing compulsory quality control for domestic electrical appliances is still under the consideration of Government. They also understand that in several foreign countries such as Sweden, Australia, Germany, Denmark, Norway, Finland and Canada, compulsory testing of electrical equipment is in force. A brief note furnished by the Indian Standards Institution on the procedure obtaining in the aforementioned foreign countries for compulsory testing of domestic electric appliances is reproduced in Appendix XIII.

66. The representative of the Ministry of Irrigation and Power when asked about the extent to which the Indian Electricity Rules, 1956 could be evoked for ensuring safety of electrical appliances, stated that in terms of Rule 29 of the Electricity Rules the Electrical Inspector was concerned with ensuring that “construction of electric supply line and apparatus shall be sufficient in power and of sufficient mechanical strength for the work they may be required to do and, so far as is practicable, shall be constructed, installed, protected, worked and maintained in accordance with the standards of the Indian Standards Institution so as to prevent danger”. He stated that the use of words ‘so far as is practicable’ diluted the power given to the Electrical Inspectors to prevent the use of apparatus which was not in accordance with the standards of the Indian Standards Institution. He added “probably, this can be enforced indirectly. If the State Governments put in a condition that no licences will be issued to the manufacturers unless they conform to the standards of Indian Standards Institution, it is possible to ensure safety in the use of electrical goods.”

The Committee feel that the Government should take appropriate legislative and administrative measures for ensuring the manufacture and supply of intrinsically safe domestic electrical equipment, accessories and wiring materials for use in homes and other non-industrial premises.

'Code for Safe operations and Maintenance of Transmission and Distribution system.'

67. It was represented to the Committee by the Federation of Electricity Undertakings of India that greater co-ordination could be achieved in the administration of Electricity Rules if the 'Code for Safe Operations and Maintenance of Transmission and Distribution System' is finalised and implemented. The Committee were informed during evidence that work on the Code was taken up four years ago and that the comments of the Electricity Boards, Electrical Inspectors etc. had been invited and it was hoped to place the Code before the next meeting of the Central Electricity Board, which was expected to be convened in a few months time.

The Committee recommend that in view of the importance of the Code for ensuring safety in operation and maintenance of transmission and distribution systems it should be finalised and implemented at an early date.

VIII

POWER RESEARCH INSTITUTE AND STATE RESEARCH UNITS

A. Power Research Institute, Bangalore.

68. The establishment of a Power Research Institute was intended to fulfil the long felt need for a Central organisation for undertaking applied research on problems connected with generation, transmission and utilisation of electric energy. The Ministry of Irrigation and Power appointed a Planning Committee in 1955 with Prof. M. S. Thacker as Chairman. This Committee recommended in September 1956 the setting up of a Power Research Institute with a Unit at Bangalore and another Unit at Bhopal. The Bangalore Unit was intended to work in close collaboration with the Indian Institute of Science and to deal with research problems on all phases of power engineering while the Unit at Bhopal was to devote its attention to switch-gear testing and development and high current phenomena working in association with the Heavy Electrical Ltd.—a Government of India public undertaking. Historical
Back-
ground.

The scheme as recommended by the Planning Committee was estimated to cost Rs. 420 lakhs extending over a period of 7 years and was included in the Second Five Year Plan with a provision of Rs. 300 lakhs. However, due to lack of personnel for detailed planning work and due to foreign exchange shortage, little progress was made on the scheme during the first three years of the Second Plan. Early in 1958, a Planning Officer (of the rank of Director) was appointed in the Power Wing of the Central Water and Power Commission and the detailed planning of the scheme was taken in hand. It was also decided that the scheme should be sponsored for assistance from the U.N. Special Fund and that pending the outcome, a short-term scheme termed "First Stage" should be initiated at Bangalore in co-operation with the Indian Institute of Science with such facilities as might be available by adding a minimum of essential extra equipment. The "First Stage" scheme, which was estimated at Rs. 36.42 lakhs and was spread over a period of three years was sanctioned by the Government in January, 1960.

In the meantime the U. N. Special Fund examined the main scheme in all its aspects through their experts and eventually decided to give a grant in foreign exchange equivalent to Rs. 91.85 lakhs. Rs. 18.53 lakhs out of this are for the Bangalore Unit and the balance of Rs. 73.32

lakhs for the Bhopal Unit. The scope of the scheme accepted by the U. N. Special Fund was incorporated and finalised in the 'Plan of Operations' in January, 1960.

The Committee understand that there are only 12 such Power Research Institutes in the World. They are happy that the Government have decided to set up the Power Research Institute in the country. They hope that the Institute will fulfil the long felt need of a Central organisation for applied research in power.

Bangalore unit.

69. Nearly 140 acres of land are needed for setting up the buildings, laboratories and staff colony for the Institute. Out of this, 10 acres have already been obtained and 30 acres are shortly to be allotted by the Mysore Government. The balance of 100 acres belong to private parties and are expected to be acquired by 1963-64.

The Unit at Bangalore would work in close collaboration with the Indian Institute of Science and would deal with research problems on all phases of power engineering. It would have four fully equipped laboratories for dealing with problems concerning the electric power supply industry and to some extent the electrical equipment manufacturing industry.

Research Problems.

The technical work of the Power Research Institute would be classified into the following 10 sections:—

1. Insulating materials.
2. Power System Planning.
3. Generating Plant testing.
4. Thermal Power Plant techniques.
5. Design of electrical power equipment.
6. Transmission and Distribution Structures.
7. High Voltage Transmission (Electrical)
8. Instrumentation.
9. Engineering Physics.
10. Engineering Chemistry.

Pending establishment of its laboratories the Institute had taken up following items for investigation with the assistance afforded to it at the Indian Institute of Science:—

- (1) sub-station grounding and earthing resistivity;
- (2) economical construction of pre-stressed concrete poles;
- (3) application of Digital computers to power system studies;
- (4) lightning currents on transmission towers; and
- (5) humidity correction for Bushings and Insulators.

70. Twenty acres of land for the Testing Laboratory at Bhopal Bhopal have been taken in the factory area of the Heavy Electricals Ltd. and 40 acres of land for construction of staff colony have also been obtained from the Madhya Pradesh Government. Broad details of the scheme and equipment required have been finalised and orders for supply of equipment placed. **Bhopal Unit**

The Bhopal Unit would work in close collaboration with the Heavy Electricals Ltd., Bhopal and devote itself to switchgear testing and development and research on high current phenomena.

The Committee suggest that a phased programme for development of the two units of Power Research Institute at Bangalore and Bhopal may be drawn up. They feel that as foreign exchange required for the equipment of the Institute has been assured by the United Nations Special Fund, there should be no difficulty in adhering to the schedule.

71. The Committee have referred earlier in Chapter II to the development of regional grids. The Committee learn that the establishment of these grids involves a great deal of study of the power systems on the net-work analyser. The Committee understand that digital computers are being utilised in Western countries for getting accurate and quick solution to many power problems and designs. The Committee learn that one of the officers of the Power Research Institute has been deputed for special training in this subject in the United States. **Study of Power Problems : (i) Digital Computers.**

Studies of power systems are at present being made by the Power Research Institute with the help of a small computer installed in the Hindustan Aircraft Ltd.

72. A Study Group of the Estimates Committee which visited the Power Research Institute at Bangalore were informed that a detailed study made of the optimum voltage for transmission of power over Southern Zone grid had indicated that it should be pitched at 400 kV. It was stated that the Indian Institute of Science was setting up a 400 kV transmission line. The Power Research Institute would undertake detailed research and investigation with the help of this line for ascertaining the suitability of 400 kV instead of 220 kV which is in use at present. **(ii) Optimum Voltage Transmission**

The Committee understand that the Central Electricity Generating Board of the United Kingdom had taken a decision to adopt 400 kV as future voltage for main transmission instead of the existing 275 kV.

The Committee are glad that a practical beginning in undertaking studies for optimum voltage for regional power grids is being made in the Power Research Institute. They

recommend that these studies should be expedited so that concrete suggestions for adoption of optimum voltage for transmission on the regional grids are forthcoming early.

Another important matter which the Committee would like the Power Research Institute to examine expeditiously is the development of most economical and practical methods for making supports for power lines particularly in the rural areas. The Committee are glad to note that the Power Research Institute is conducting some studies on the subject. They would like these to be expedited so that their suggestions can be put to practical use.

B. Research Units in States

73. Government have allocated Rs. 30 lakhs as grant-in-aid during the Third Five Year Plan for research on fundamental and basic problems on power by the testing laboratories attached to the State Electricity Boards. The Committee were informed during evidence that only five State Electricity Boards had so far established research units. The Committee would urge the Government to stress on the remaining State Boards the necessity of setting up research units at an early date.

Inadequate Assistance to State Boards.

It has been represented to the Committee that financial assistance given by the Central Board of Irrigation and Power to the State Electricity Boards is not sufficient for obtaining the necessary equipment for research. It has also been represented that the procedure for import of research equipment is cumbersome and needs to be simplified.

The Committee would like the Government to look into these and other related difficulties being experienced by the State Electricity Boards so that the State research units do not feel handicapped in the matter of equipment.

IX

TECHNICAL SPECIALISTS FOR POWER PROJECTS

74. Government have assessed their requirements of technical specialists for Power Projects in the country during the Third and Fourth Five Year Plans as under:—

	<i>Electrical Graduates</i>	<i>Electrical Diploma Holders</i>
Third Plan	3273	5112
Fourth Plan	4600	7600

Requirements of Technical Specialists for power Projects.

The Committee have been informed that Government have taken the following steps to train technical specialists for power projects.

Arrangements for Training in CWPC.

Facilities have been afforded in the Central Water and Power Commission for training in:

- (a) Design, layout and specification relating to—
 - (i) Hydro Electric Power Projects (including Civil Engineering Works);
 - (ii) Thermal Power Stations;
 - (iii) High voltage transmission systems (including transmission layouts based upon net work analyser studies);
 - (iv) Distribution systems (including sub-stations);
- (b) Load survey, commercial engineering (e.g., statistics, tariffs, electricity legislation, etc.).

The above facilities have been made available to (i) serving engineers in the various States; and (ii) Post-graduate students. In the case of the former, engineers come either for a specified period of training or on deputation. The graduate students generally come for a period of six months.

Where necessary the Central Water and Power Commission arrange for training of serving engineers in the method of design and construction of large power plants, transmission systems, etc. in the country with the assistance of the State and Project authorities.

75. Facilities have been developed in recent years with the help of T.C.M. Engineers for imparting training in the method of Hot Line maintenance of high voltage transmission lines. It was stated that training in the hot line technique would help to increase the reliability of supply as its adoption would enable the Electricity Undertakings to carry out maintenance jobs on overhead power lines without switching off power. The Committee understand that so far 190 trainees drawn from the State Electricity Boards

Training in Hot Line Maintenance.

and major private undertakings had been trained in the Hot Line Training Centres.

The Committee are glad to learn of the progress made and hope that the training would enable the Electricity Undertakings to increase the reliability of supply.

Training in Foreign countries.

76. Suitable candidates are also being sponsored annually by the Central Water and Power Commission and the State Governments for getting training abroad under the various aid programmes such as T.C.M., Colombo Plan, Indo-French Technical Co-operation, United Nations Special Fund, United Nations Expanded Programme of Technical Assistance, etc.

Shortage of Technical Personnel.

77. It has been represented to the Committee by one of the State Electricity Boards that it is 'finding extremely difficult to recruit a sufficient number of trained personnel particularly in lower categories'. Another State Electricity Board has pointed out that 'facilities available in the country for practical training of electrical technicians and engineers are very meagre'. The Committee have been informed by the Ministry that one of the main reasons for delay in the execution and commissioning of power projects by the target dates laid down in the Third Five Year Plan is shortage of trained personnel.

The Committee consider that as power targets are likely to be perceptibly increased in the Fourth and succeeding Plans, there is bound to be steep increase in the requirements of technical personnel. They are glad to note that one of the terms of reference of the Power and Energy Survey Committee is to go into 'the requirement of skilled manpower for construction, operation and maintenance of power systems'. The Committee hope that suitable action would be taken by Government to augment training facilities to meet the requirements of technical personnel in the light of findings of the Power and Energy Survey Committee.*

Foreign Consultants for Power Projects.

78. The Committee desired to know the amounts paid to foreign consultants for hydel and thermal power projects during the Second Five Year Plan and the estimated amount to be paid during the Third Five Year Plan. The Committee have been informed by the Ministry that the amounts paid to foreign consultants for power projects for the Second Five Year Plan are not available with them. As regards the Third Five Year Plan, the Ministry have furnished the following information in respect of payments made/to be made during the Third Five Year Plan in connection with the services of foreign consultants already engaged for hydro and thermal power projects:

Hydro Projects

Foreign currency
Local currency

Rs. 105.58 lakhs
Rs. 9.39 lakhs

*See Appendix XI

Thermal Projects

Foreign currency	Rs. 394.39 lakhs
Local currency	Rs. 213.31 lakhs

Asked as to why foreign consultants were required for hydel projects for which country had the requisite experience the representative of Central Water and Power Commission stated that for projects financed by the World Bank or Agency for International Development, foreign consultants had to be appointed. For example, they had to appoint foreign consultants for the Koyna Power Project. *The Committee feel that as India has enough of experience in the designing and construction of hydel works, it should be possible to persuade the International agencies and countries giving foreign aid not to insist on employment of foreign consultants.*

79. The Committee are glad to learn that a Specialised Engineering Organisation for rendering consulting engineering services had been sanctioned by the Government in the Power Wing of the Central Water and Power Commission in March, 1961. Its function is to undertake complete engineering design, procurement and installation of large thermal and hydro power stations in the country.

**Specialised
Engineering
Organisation.**

80. For the first phase of the Organisation, the following posts have been sanctioned:

Chief Engineer	..	2
Dy. Chief Engineer	..	1
Director	..	4
Dy. Director	..	15
Asst. Director	..	30
Extra Asst. Director	..	24

**Training of
Personnel
for the
Specialised
Organisation.**

In order to equip the Organisation for the specialised task ahead, advantage is being taken to dovetail the training of officers under the various technical assistance programmes, such as Colombo Plan, T.C.M., etc. In the meanwhile, majority of the officers are being given the necessary training and experience while employed on certain projects in hand. Officers earmarked for the Specialised Organisation are also to be deputed to thermal and hydro projects under construction in the country for periods upto 60 days at a stretch for on-the-spot study of various problems connected with the field of their assignment.

It is stated that by suitably coordinating the three-pronged action, viz., (i) foreign training, (ii) on the job training, and (iii) training on projects under execution in the country, it would be possible to render specialised services to the State Government, State Electricity Boards and project authorities.

81. The Committee have been informed that the Planning Cell in Madras, which was set up in 1956, is being treated as part of the Specialised Engineering Organisation.

**Planning
Cell.**

The Study Group of the Estimates Committee which visited the Planning Cell at Madras in September, 1962 were informed that the Cell had been able to effect a substantial saving to the tune of several lakhs, which would have otherwise been paid to the Russians by way of consultation fees for designing, installation, etc. of the Neyveli Thermal Power Station.

The Committee are glad to learn of the saving. The Study Group were also glad to learn that the Planning Cell was confident of preparing detailed designs for power equipment and supervise its installation and operation thus discharging all the functions of the technical consultants.

**Shortage
of Techni-
cal Officers.**

82. Certain shortages in the category of Technical Officers in the Planning Cell were brought to the notice of the Study Group during its visit to Madras in September, 1962. The representative of the Ministry stated during evidence that so far as planning work was concerned technical personnel had been provided to the Planning Cell. However, for advancing the programme of construction of the Neyveli Power Station it had not been possible to provide the Cell with technical persons. It was added that two things stood in the way of recruiting the requisite number of persons. First, there was shortage of personnel and secondly the people who were recruited did not remain for long, as there were attractive avenues elsewhere. The Committee were informed that steps had been taken to attract and retain technical persons by giving them extra increments and by discouraging them from applying for outside jobs.

The Committee hope that the shortage of technical staff in the Planning Cell would be made good at an early date.

The Committee would like the Government to so organise the Specialised Engineering Organisation that it is able to discharge fully the responsibilities of technical consultants.

The Committee are also glad to note that Tatas have set up a consultant organisation (Tata Ebasco Services Ltd.) in collaboration with a foreign firm which would be largely manned by Indian engineers.

The Committee hope that no effort would be spared in developing the Specialised Engineering Organisation and other consultancy services within the country without further loss of time. They feel confident that if a proficient technical consultant service is built up within the country it should not be too difficult to persuade even the countries giving aid for power schemes not to insist on employment of foreign consultants so that as much of foreign exchange as possible is saved.

H. C. DASAPPA,
Chairman,
Estimates Committee.

NEW DELHI;
The 19th March, 1963
Phalguna 28, 1884 (Saka)

APPENDIX II

(Vide para 2)

Functions of the Power Wing of the Central Water and Power Commission

The functions of the Power Wing of the Central Water and Power Commission as contained in the Ministry of Natural Resources & Scientific Research Resolution No. EL-I-201 (5), dated the 21st April, 1951, are as follows:—

The Power Wing will be charged with the general responsibility of initiating, co-ordinating and furthering, in consultation with the State Governments concerned, schemes for the utilisation of water resources throughout the country for the purpose of water-power generation, as well as schemes of thermal power development and also schemes of transmission and utilisation of electric energy throughout the country. The Power Wing will, if so required, also undertake the construction and execution of any such schemes. In exercise of the above responsibilities it will be the function of the Power Wing—

- (a) to make all necessary investigations and surveys and when so required, to prepare schemes and designs:
 - (i) for the development of water resources in respect of power generation; and
 - (ii) for thermal electric power development;
- (b) to undertake construction work on any electric power development schemes on behalf of the Government of India or State Governments concerned;
- (c) to advise and assist, when so required, the State Governments (Commissions, Corporations or Boards that may be set up) in the investigation, surveys and preparation of power development schemes for particular areas and regions and in the surveying of potential sources of load, the forecasting of revenue from electricity supply and the formulation of electricity tariffs;
- (d) to advise the Central and State Governments on the administration of electricity legislation and control of electric utilities;

- (e) to advise the Government of India in regard to all matters relating to electric power development, Public electric utilities both private and State-owned;
- (f) to advise the Government of India in regard to the settlement of priorities for plant, materials and foreign exchange as between various river valley development and power projects;
- (g) to collect, maintain and publish statistical data relating to the generation, distribution and utilisation of electricity throughout India and to act as the Central Bureau of Information on all matters relating to the public electricity supply;
- (h) to initiate schemes and arrange for the training of Indian Engineers in India and abroad in all aspects of electricity supply industry.
- (i) to review and lay down for the whole of India standard voltages and practices for generation, transmission and distribution of electrical energy;
- (j) to conduct and co-ordinate research on the various aspects of power development etc. and the connected structural and design features; and
- (k) to conduct experiments, research, propaganda and generally to carry out such other activities as will promote the spread and use of electricity throughout the country, in particular in the semi-urban and rural areas.

2. Since the above functions were laid down in 1951, the following additional functions have been assigned to the Power Wing:—

- (i) to provide secretariat assistance to the Central Electricity Authority;
- (ii) to carry out Power Load Survey of the country on an all-India basis as a national project;
- (iii) to render Consulting Engineering Services covering engineering design, procurement and installation of large thermal and Hydro Power Stations in the country.
- (iv) to carry out investigations and research on various problems connected with development and utilisation of energy resources and to conduct studies for promotion of technical efficiency and economy in various aspects of power supply industry;

- (v) to impart training in the repairs and maintenance of overhead lines in an energized state (technically known as Hot Line Training);
- (vi) to carry out inspections of Electrical Installations in the Union Territories (excluding Delhi) and similar installations under the All India Radio, Civil Aviation and the C.P.W.D.; and
- (vii) to plan and establish an All India Super Grid.

APPENDIX III

(Vide para 23)

A note on additional funds required for stepping up the Power Programme in the Third Plan

A review of the progress on the implementation of the third Plan power projects has shown that the generating capacities that will be brought into Commission during each year of the third Plan will be as follows:—

	MW
1961-62	580
1962-63	758
1963-64	937
1964-65	1992
1965-66	3160

By the end of 1965-66, it is expected that with the above additions the total installed capacity in the country will be 12.97 mil. kW. It will be seen that in the early years of the third Plan there is considerable deficit in power and this has been mainly due to the postponing or slowing down of some of the second Plan projects due to foreign exchange difficulties. In order to have adequate power availability, so that industrial progress may not suffer a setback, it is necessary to increase the generating capacity each year progressively and not on a pattern obtained during the second Plan period.

2. This subject was discussed by the Member (NR) in the Planning Commission during the preliminary discussions on the approach to the fourth Plan. It was considered desirable that by the second year of the fourth Plan the generating capacity in the country should be brought up to a level of about 17 million kW. and for this purpose, it was suggested that the action to be taken should be indicated. It is seen that the benefits from the power schemes which are being implemented during the third Plan and which will spillover to the first two years of the fourth Plan, will be about 1.97 million kW. bringing the total to about 15.0 million kW. If a target of 17 million kW has to be achieved, then additional schemes totalling about 2 million kW will have to be taken up during the third Plan so as to have the power stations commissioned not later than 1957-58. Considering that even if an authorization is given during the course of 1962-63, there will be only five years time left, such new schemes with the

exception of one or two extensions to hydro power stations currently being executed, will have to be thermal. A list of the schemes already included in the III Plan and from which benefits could be obtained during the fourth Plan is attached herewith.* It will be seen from this statement that some of the schemes could be commissioned during the first two years of the IV Plan bringing an additional benefit of about 2 million kW installed capacity. Similarly, a suggested list of schemes which may have to be taken up preferably not later than the end of 1962-63 for completion before the end of 1967-68, that is, second year of the fourth Plan, is also attached.* It may be mentioned that most of these schemes have been already proposed in the draft fourth Five Year Plan prepared by the Central Water and Power Commission.

3. For bringing into effect all this programme of achieving generating capacity of 17 million kW by the second year of the fourth Plan, additional allocation of funds will have to be provided for some of the schemes in the third Plan and fresh allocation made for the new schemes which will have to be taken up not later than the end of 1962-63. The additional funds to be provided in the third Plan for the schemes already included has been estimated to be about Rs. 62 crores with a foreign exchange component of Rs. 24 crores. With regard to new schemes to be taken up in the third Plan so as to give a benefit of 2 million kW in the first two years of the fourth Plan, the funds to be provided in the third Plan have been estimated to be Rs. 67 crores with a foreign exchange component of Rs. 16 crores. In addition a sum of Rs. 3 crores may be required for transmission and distribution schemes. Thus, the total funds to be provided in the third Plan to achieve an installed capacity of 17 million kW by end of the second year of the fourth Plan will be $\text{Rs. } 62 + 67 + 3 = \text{Rs. } 132$ crores—say Rs. 160 crores—with a foreign exchange component of $\text{Rs. } 24 + 16 + 3 = \text{Rs. } 43$ crores.

*Not printed.

APPENDIX IV

(Vide para 25)

Efforts made by the Ministry of Irrigation and Power to get all the major power schemes included in the core of the Second Five Year Plan

The power development programme under the Second Five Year Plan was intended to fulfil the following three objectives:—

1. To meet the normal load growth in the existing systems.
2. To provide the requisite capacity for reasonable expansion of the areas of supply.
3. To meet the needs of industries which were proposed to be established in the second Plan.

It was then estimated that about 1·4 million kW of additional power demand would arise on account of the normal development of medium and small industries and of commercial and domestic consumption. In addition to this, a further demand of 1·3 million kW was expected on account of new programme of industrial development included in the second Plan. Making allowance for requisite standby capacity and other causes of variation etc., it was estimated that an addition of 3·5 million kW would be required during the second Plan period. In other words, it was programmed to increase the total installed capacity in the country from 3·4 million kW in March, 1956 to 6·9 million kW by March, 1961. Accordingly, to meet the above objectives certain major power schemes were selected to form the core of the Plan. Apparently every major power scheme could not be included in this core, as otherwise the very objective of forming the core would have been defeated.

At its meeting on the 3rd and 4th May, 1958, the National Development Council considered the question of the total outlay to be undertaken in the public sector during the balance period of the second Plan, keeping in view the progress made during the first two years. In this meeting it was decided by the National Development Council that the total outlay for the second Plan should be maintained at Rs. 4,800 crores, but this allocation should be divided into two parts: Part (A) core projects involving a total outlay of Rs. 4,500 crores. Part (B) remaining schemes with

a total outlay of Rs. 300 crores. The core projects comprised such of the national projects as were in the interest of increasing agricultural production, or were in an advanced stage of construction or were otherwise inescapable projects having a direct bearing upon the needs of industries which were proposed to be established in the second Plan. Out of this total plan allocation the outlay for irrigation and power sector was Rs. 860 crores, out of which projects worth Rs. 820 crores were core projects under Part (A) and the balance of Rs. 40 crores were placed under Part (B). These provisions were considered on 13th May 1958, in a meeting in the room of Secretary, I. & P., where Planning Commission were also represented. It was decided that our suggestions in regard to the revised allocations for the Irrigation and Power Sector might be framed and sent to the Planning Commission. The Chairman, Central Water & Power Commission compiled information in respect of the power projects. Out of Rs. 860 crores for Irrigation & Power Sector, provision for the Second Five Year Plan for Power Projects was Rs. 412 crores. In the note prepared by the Chairman, C.W. & P.C. it was stated that the actual provision for the Second Five Year Plan after considering the excess spill-over from first plan schemes and adding for the additional generating capacity in the D.V.C. would be Rs. 476 crores. As against this suggestion of increasing the plan allocation for power projects, the Planning Commission had suggested a reduction of about 56 crores. On reviewing the suggestion, it was estimated that a minimum of Rs. 435 crores for power sector of the Second Five Year Plan should be made available. In support of this proposal statements showing the minimum revised requirements of power projects were prepared. It was mentioned that even with the provision of Rs. 435 crores the power programme would have a serious set-back.

As a result of the reappraisal of the second plan provisions for Irrigation and Power Sector, which took into consideration the resources of all the States, the Planning Commission allocated a sum of Rs. 833 crores instead of Rs. 860 crores decided by the National Development Council. But in this reappraisal the allocation for power scheme was increased from Rs. 412 crores to 425 crores.

APPENDIX V

(Vide para 26)

Statement of Installed Capacity, Firm Capacity, Demand, Shortage/Surplus during Third Plan

Year commencing April	Installed capacity	Firm Capacity + Bulk Supply (MW)	Estimated Demand (MW)	Estimated Shortage(—) or Surplus(+) (MW)
1	2	3	4	5
<i>Andhra Pradesh</i>				
1961 . .	228.2	146.0	185.4	(—) 40.4
1962 . .	228.2	145.0	205.0	(—) 60.0
1963 . .	228.2	145.0	245.7	(—) 99.7
1964 . .	257.0	151.0	366.9	(—) 215.9
1965 . .	347.0	227.0	391.9	(—) 164.9
1966 . .	587.0	367.0	478.3	(—) 111.3
<i>Assam</i>				
1961 . .	19.4	11.6	10.1	(+) 1.5
1962 . .	25.45	17.0	20.4	(—) 3.4
1963 . .	25.4	17.0	23.9	(—) 6.9
1964 . .	34.4	29.4	62.8	(—) 33.4
1965 . .	91.0	74.5	78.6	(—) 4.1
1966 . .	148.6	103.3	119.3	(—) 16.0
<i>Bihar—DVC—West Bengal</i>				
1961 . .	1104.5	755.0	875.2	(—) 120.2
1962 . .	1104.5	755.0	1051.8	(—) 296.8
1963 . .	1134.5	777.0	1190.8	(—) 413.8
1964 . .	1308.5	935.0	1399.3	(—) 464.3
1965 . .	1821.5	1361.0	1627.2	(—) 266.2
1966 . .	2546.5	1822.0	2024.5	(—) 202.5

1	2	3	4	5
<i>Gujarat</i>				
1961	. .	333.3	228.0	251.5 (-) 23.5
1962	. .	367.3	246.0	304.8 (-) 58.8
1963	. .	411.3	287.0	340.8 (-) 53.8
1964	. .	539.3	407.0	383.4 (+) 23.6
1965	. .	669.3	471.0	415.3 (+) 55.7
1966	. .	669.3	471.0	499.5 (-) 28.5
<i>Jammu & Kashmir</i>				
1961	. .	13.0	4.5 +4.5	12.0 (-) 3.0
1962	. .	22.0	12.0 +9.5	20.0 (+) 1.5
1963	. .	31.0	21.0 +9.5	25.0 (+) 5.5
1964	. .	31.0	21.0 +9.5	30.0 (+) 0.5
1965	. .	41.0	30.0 +9.5	38.0 (+) 1.5
1966	. .	61.0	45.01 +19.5	48.0 (+) 16.5
<i>Kerala</i>				
1961	. . .	137.5	119.5	131.0 (-) 11.6
1962	. .	167.3	119.5	141.0 (-) 21.5
1963	. .	182.9	134.5	164.0 (-) 29.5
1964	. .	215.9	178.5	229.0 (-) 50.5
1965	. .	351.3	296.5 -50	246.0 (+) 0.5
1966	. .	551.3	446.5 -50	325.0 (+) 71.5
<i>Madhya Pradesh</i>				
1961	. .	299.0	139 +15.0	147.7 (+) 6.3
1962	. .	244.5	150.5 +15.0	228.4 (-) 62.9
1963	. .	254.5	160.5 +15.0	289.5 (-) 114.0
1964	. .	914.5	216.5 +25.0	378.8 (-) 137.3
1965	. .	502.0	388.0 +25.0	456.0 (-) 43.0
1966	. .	754.0	510.0 +10.0	550.0 (-) 30.0
<i>Madras</i>				
1961	. .	517.5	391.0	453.6 (-) 62.6
1962	. .	552.5	426.0 + 50.0	540.0 (-) 64.0
1963	. .	552.5	426.0 +150.0	662.0 (-) 86.0
1964	. .	552.5	426.0 +200.0	740.0 (-) 114.0
1965	. .	747.5	504.0 +218.0	838.0 (-) 56.0
1966	. .	917.5	709.0 +278.0	1012.0 (-) 26.0

	1	2	3	4	5
<i>Maharashtra</i>					
1961	.	759.5	611.5 — 15.0	619.0	(—) 22.5
1962	.	759.5	611.5 — 15.0	671.2	(—) 74.7
1963	.	939.5	789.5 — 15.0	758.9	(+) 15.6
1964	.	1029.5	877.0 — 15.0	998.2	(—) 136.2
1965	.	1149.5	920.5 — 15.0	1120.0	(—) 214.5
1966	.	1544.5	1249.5	1312.4	(—) 62.9
<i>Mysore</i>					
1961	.	198.3	151.4	184.3	(—) 32.9
1962	.	316.3	169.4	244.0	(—) 74.6
1963	.	249.5	194.4	311.0	(—) 116.6
1964	.	443.9	392.0	362.0	(+) 30.0
1965	.	632.1	566.0	466.0	(+) 100.0
1966	.	800.3	654.6	660.0	(—) 5.4
<i>Orissa</i>					
1961	.	170.7	119.0 +50.0	133.5	(+) 35.5
1962	.	170.7	119.0 +50.0	187.8	(—) 18.8
1963	.	317.7	246.0 +50.0	250.5	(+) 45.5
1964	.	317.7	246.0 +50.0	319.8	(—) 23.8
1965	.	377.7	302.0 +50.0	374.7	(—) 22.7
1966	.	557.7	418.4 +50.0	475.3	(—) 6.9
<i>Punjab</i>					
1961	.	246.4	185.0 —27.0	245.9	(—) 87.9
1962	.	430.4	391.0 —73.5	409.7	(—) 92.2
1963	.	432.4	392.0 —73.5	475.0	(—) 156.5
1964	.	455.4	407.0 —74.5	512.0	(—) 179.5
1965	.	455.4	407.0 —74.5	573.0	(—) 240.5
1966	.	649.1	607.0 —89.5	616.0	(—) 98.5
<i>Rajasthan</i>					
1961	.	135.8	63.0	25.9	(+) 37.1
1962	.	180.3	85.5	57.7	(+) 27.8
1963	.	183.3	87.5	95.1	(—) 7.6
1964	.	193.3	95.5	117.7	(—) 22.2
1965	.	280.8	173.0	151.7	(+) 21.3
1966	.	394.1	299.0	281.3	(+) 17.7

1	2	3	4	5
<i>Uttar Pradesh</i>				
1961	. .	397.4	244.5	267.3 (—) 22.8
1962	. .	651.4	388.5	325.8 (+) 63.2
1963	. .	736.4	469.0	448.9 (+) 20.1
1964	. .	776.4	492.0 —10.0	507.6 (—) 25.6
1965	. .	922.9	563.0 —10.0	643.5 (—) 90.5
1966	. .	1089.9	772.0 —10.0	805.0 (—) 43.0
<i>Delhi</i>				
1961	. .	76.3	60.0 +20.0	86.1 (—) 6.1
1962	. .	76.3	60.0 +60.0	122.2 (—) 2.2
1963	. .	76.3	60.0 +60.0	142.4 (—) 22.4
1964	. .	121.3	88.0 +60.0	170.3 (—) 22.3
1965	. .	131.3	144.0 +60.0	193.0 (+) 11.0
1966	. .	241.3	200.0 +80.0	210.0 (+) 70.0

APPENDIX

(Vide para

Statement showing Rural and Urban Consumption

(in million kWh)

Sl. No.	State	Domestic light and small power		Commercial light and small power		Industrial power		Public lighting	
		Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
1	Andhra Pradesh	33.4	37.4	14.3	17.0	186.0	207.3	7.0	7.8
2	Assam	0.8	9.1	0.3	3.9	1.0	10.8	0.2	2.7
3	Bihar	6.3	38.0	4.3	25.5	110.0	666.4	0.5	3.1
4	Gujarat	12.3	63.2	5.5	26.1	139.0	666.5	2.6	12.6
5	J & K	5.3	17.2	0.2	0.8	5.1	16.9	0.3	1.0
6	Kerala	8.6	42.4	0.6	3.2	68.0	335.7	1.4	7.0
7	M.P.	20.6	24.7	9.3	11.5	136.0	165.3	4.1	5.0
8	Madras	90.0	62.9	92.0	64.7	560.0	393.0	20.0	14.0
9	Maharashtra	22.4	238.6	17.2	181.0	160.0	1692.6	1.7	18.1
10	Mysore	18.2	57.2	5.1	16.2	168.0	525.0	4.6	14.2
11	Orissa	0.2	18.1	0.1	7.7	6.0	461.1	..	1.5
12	Punjab	21.0	48.9	18.5	42.8	111.0	258.0	2.7	6.3
13	Rajasthan	2.0	18.7	1.5	14.3	2.8	25.8	0.5	4.7
14	U.P.	32.6	90.1	19.7	55.0	132.0	371.9	3.7	10.1
15	West Bengal	29.8	323.7	10.0	105.8	156.0	1704.1	1.9	21.4
Total		303.5	1,090.4	198.6	575.5	1,940.9	7,500.4	51.2	129.5

Note.—Irrigation is shown mainly as rural consumption and traction mainly as urban.

V1

32)

of Electricity for the year 1960-61

(in million kWh)

Traction		Irrigation		Public water works and sewage pumping		Total	
Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
..	..	58.8	..	3.4	3.9	302.9	273.4
..	..	..	..	0.1	0.4	2.4	26.9
..	..	18.2	..	1.7	10.5	141.0	743.5
..	..	19.6	..	6.8	32.7	185.8	801.1
..	..	0.7	..	0.8	2.7	12.4	38.6
..	..	18.2	..	1.3	6.5	98.1	394.8
..	..	3.9	..	11.4	14.8	185.3	221.3
..	15.0	382.4	..	8.5	5.9	1152.9	555.5
..	338.0	14.7	..	3.0	32.1	219.0	2500.4
..	..	28.7	..	14.1	45.8	238.7	658.4
..	..	0.7	..	..	2.3	7.0	490.7
..	..	74.8	..	2.7	6.4	230.7	362.4
..	..	3.6	..	1.9	17.6	12.3	81.3
..	..	200.0	..	16.0	44.6	404.0	571.7
..	95.0	0.6	..	8.0	88.0	206.3	2338.0
..	448.0	5824.9	..	79.7	314.2	3398.8	10,058.0

consumption.

APPENDIX VII

(vide para 32)

Statements showing Anticipated Rural Consumption of Electricity in 1965-66

Sl. No.	Name of the State	Category of Rural Consumption				Total Rural Consumption million kWh	Quantum of generating capacity needed to meet the Rural Demand (kW)
		Domestic & Commercial Lighting & Small Power	Public Lighting	Small Medium Industries	Irrigation Dewatering		
1	2	3	4	5	6	7	8
1	Andhra Pradesh	33.0	14.0	64.0	192.0	303.0	99,557
2	Assam .	7.5	0.9	12.0	..	20.4	6,703
3	Bihar .	13.0	0.5	20.2	126.0	159.7	52,475
4	Gujarat .	31.0	5.0	45.0	134.0	215.0	70,643
5	Jammu & Kashmir .	4.0	0.5	5.0	4.5	14.0	4,600
6	Kerala .	20.2	5.2	12.6	66.0	104.0	34,171
7	Madhya Pradesh	27.0	4.5	51.0	71.0	153.5	50,436
8	Madras .	75.0	17.0	123.0	724.0	939.0	308,528
9	Maharashtra	33.0	6.8	62.0	223.0	324.8	106,720
10	Mysore .	31.5	6.8	36.8	198.9	273.1	89,733
11	Orissa .	5.0	2.4	7.4	11.0	25.8	8,477
12	Punjab. .	58.0	4.0	93.0	455.0	590.0	193,857
13	Rajasthan .	18.0	3.0	30.5	25.0	76.5	25,136
14	Uttar Pradesh	21.0	3.6	63.0	372.0	459.6	151,011
15	West Bengal	18.0	1.3	25.0	9.2	53.5	17,578
16	Delhi .	7.5	0.9	0.7	2.5	11.6	3,811
TOTAL .		402.7	76.4	651.2	2,593.2	3,723.5	1,233,434

Notes.—(1) The generating capacities given in the last column are only approximate as they are arrived at on the basis of 3,500 kWh per kW installed and allowing 15% for the losses in transmission and distribution and auxiliaries.

(a) The consumption figures are based on the estimates of L. S. & L. D. Directorate.

APPENDIX VIII

(Vide para 35)

Statement of Major Power Schemes included in the Third Five Year Plan and their Target Dates for Completion.

Name of Scheme	Capacity in MW	Target dates for completion	Remarks
1	2	3	4

ANDHRA PRADESH

(a) *Hydel Schemes*

1. Tungabhadra H.E. Scheme Stage I 9 1963-64
2. Tungabhadra H.E. Scheme Stage II 27 1963-64
3. Upper Sileru H.B. Scheme Stage I 120 1965-66

(b) *Thermal Schemes*

1. Nellore Thermal Station 30 1964-65
2. Ramagundam Thermal Station Extension 60 1965-66
3. Kothagudam Thermal Scheme 120 1965-66

ASSAM

(a) *Hydel Schemes*

1. Umiam (Barapani) H.E. Scheme Stage I 36 1965-66
2. Umiam H.E. Scheme Stage II 17.8 1965-66

(b) *Thermal Schemes*

1. Nahorkatiya Thermal Station 69 1965-66
2. Nangwal Bibra Thermal Station 60 1965-66

BIHAR
(a) ^{Hy}Hydel Schemes

1. Kosi H.E. Scheme 20 1965-66

(b) Thermal Schemes

1. Barauni Thermal Station 30 1963-64

2. Barauni Thermal Station Extension. 115 65 MW will be commissioned by 1965-66. Benefit of 50 MW will accrue in 4th Plan.

3. Pathratu Thermal Station 100 1964-65

4. Pathratu Thermal Station Extension 300 200 MW will be commissioned by 1965-66. Benefit of 100 MW will accrue in 4th Plan.

GUJARAT

(a) ^{Hy}Hydel Schemes Nil

(b) Thermal Schemes

1. Shapur Thermal Extension 10 1963-64

2. Ahmedabad Thermal Station (Private sector) 60 1962-63

3. Cambay (Dhuvaran) Thermal Station 240 1963-64

4. Kandla Thermal Station Extension 10 1964-65

JAMMU & KASHMIR
(a) Hydel Scheme

1. Ganderbal. Power House Extension 9 1961-62

2. Mohora Power Stn. 9 1962-63

3. Chenani H.E. Project 15 10 MW will be commissioned by 1965-66. Benefit of 5 MW will accrue in 4th Plan.

	1	2	3	4
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(b) *Thermal Schemes*

- | | | | | |
|---------------------------------------------|----|---------|--|--|
| 1. Kalakote Thermal Station | 20 | 1964-65 | | |
| 2. Nichahom Thermal Power Station | 15 | 1965-66 | | |

KERALA

(a) *Hydel Schemes*

- | | | | | |
|------------------------------------|-----|----------------------------------------|--|-----------------------------------------------|
| 1. Nariamangalam H.E. Scheme | 30 | 1962-63 | | |
| 2. Panniar H.E. Scheme | 30 | 1963-64 | | |
| 3. Sholayar H.E. Scheme | 54 | 1964-65 | | |
| 4. Sabragiri H.E. Scheme | 300 | 1965-66 | | |
| 5. Kuttiadi H.E. Scheme | 75 | 50 MW will be commissioned in 1965-66. | | Benefit of 25 MW will accrue in the 4th Plan. |

- | | | | | |
|--------------------------------------|--|--|-----|--|
| (b) <i>Thermal Schemes</i> | | | NIL | |
|--------------------------------------|--|--|-----|--|

MADHYA PRADESH

(a) *Hydel Schemes*

- | | | | | |
|------------------------------------------------------|-----|--------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------|
| 1. Chambal H.E. Project Stage I (4th unit) | 23 | 1963-64 | | MP's share is 11.5 MW. |
| 2. Ranapratapsagar H.E. Scheme | 172 | 86 MW will be commissioned by 1965-66, out of which 43 MW is the share of M.P. | | Benefit of 86 MW will accrue in 4th Plan, out of which 43 MW is MP's share. |
| 3. Kotah Power House | 100 | During 4th Plan. | | Out of this the share of M.P. is 50 MW. |
| 4. Chambal (Gandhisagar) 5th unit | 23 | 1965-66 | | M.P.'s share is 11.5 MW. |
| 5. Tawa H.E. Project | 42 | During 4th Plan. | | |

1	2	3	4
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(b) Thermal Schemes

1. Chandni (Korba) Thermal Station Extension	10	1963-64	
2. Amarkantak Thermal Station	60	1964-65	
3. Korba Thermal Station Extn.	200	1965-66	
4. Satpura Thermal Station	300	1965-66	M.P.'s share out of this is 180 MW.

MADRAS*Hydel Schemes*

1. Kaudah Stage III	245	1964-65	
2. Mettur Tunnel H.E. Scheme	200	1965-66	
3. Periyar 4th unit I & II (Stage II)	35	1963-64	
4. Parambikulam H.E. Project	180	100 MW will be commissioned in 1965-66.	Benefit of 80 MW will accrue in 4th Plan.
5. Neyveli Lignite Thermal Station	400	1965-66	

MAHARASHTRA**(a) Hydel Schemes**

1. Koyna H.E. Stage I	240	1962-63	
2. Koyna H.E. Stage II	340	225 MW will be commissioned in 1965-66.	Benefit of 115 MW will accrue in 4th Plan.

(b) Thermal Schemes

1. Khaperkheda Thermal Station Extn.	60	1963-64	
2. Bhusawal Thermal Station	60	1965-66	
3. Paras Thermal Station	60	1965-66	
4. Trombay Thermal Station Extension (Private sector)	125	1965-66	

MYSORE
Hydel Schemes

	1	2	3	4
1. Sharavathi Stage I	178.2	1964-65		
2. Badra H.E. Project	33.2	1953-64		
3. Tungabhadra left bank Power House	27	1953-64		
4. Sharavathi Stage II	534.6	356.4 MW	will be commissioned by 1965-66.	Benefits of balance 178.2 MW will accrue in 4th plan.
5. Tungabhadra Right Bank Stages I & II	36	1963-64		Mysor.'s share out of this is 7.2 MW only.

ORISSA*(a) Hydel Schemes*

1. Hirakud H.E. Project Stage II	147	1963-64
--------------------------------------------	-----	---------

(b) Thermal Schemes

Talcher Thermal Station	240	1965-66
-----------------------------------	-----	---------

PUNJAB*(a) Hydel Schemes*

1. Bakra right bank Power House	280	210 MW will be commissioned by 1965-66, out of which Punjab's share is 178 MW.	Benefit of balance 70 M Plan
2. Uhl River Extension	45	15 MW will be commissioned in 3rd Plan.	Benefit of 50 MW will accrue in 4th Plan.

Thermal Schemes

1. Thermal Plant at Delhi	60	1965-66
2. Faridabad Thermal Station	15	1964-65

RAJASTHAN
(a) Hydel Schemes

1	2	3	4
1. Chambal Stage I	23	1963-64	Share of Rajasthan is 11.5 MW.
2. Ranapratapsagar Power Station	172	86 MW will be commissioned by 1965-66, out of which 43 MW is the share of Rajasthan.	
3. Right Bank Power House at Bhakra.	280	210 MW by 1965-66 Rajasthan's share is 32 MW.	70 MW in 4th Plan Rajasthan's share is 10.6 MW.
4. Chambal (Gandhisagar) 5th unit.	23	1965-66	Share of Rajasthan is 11.5 MW.
5. Kota Dam—Power House	100	During 4th Plan.	Share of Rajasthan is 50 MW.
(b) Thermal Schemes			
Satpura	300	1965-66	Rajasthan's share is 120 MW.

UTTAR PRADESH**(a) Hydel Schemes**

1. Rihand Project	250	1961-62	
2. Yamuna Stage I	56.5	1965-66	
3. Matatila Project	30	10 MW will be commissioned by 1965-66.	Benefits of balance 20 MW will accrue in 4th Plan.
4. Obra H.E. Project	100	67 MW will be commissioned by 1965-66.	Benefits of balance 33 MW will accrue in 4th Plan.

	1	2	3	4
(b) Thermal Schemes				
1. Harduaganj Stage I, Thermal Extn.	60	During 1962-63		
2. Singarauli Thermal Project	250	150 MW will be commissioned by 1965-66.	Benefit of balance 100 MW will accrue in 4th Plan.	
3. Kanpur Thermal Station Extn.	60	1964-65		
4. Harduaganj Extension Stage II	30	1964-65		
5. Martin Burn Extn. (Private Sector)	20	1963-64		
WEST BENGAL				
(a) Hydel Schemes				
1. Jaljhaka Stage I	18	1964-65		
(b) Thermal Schemes				
1. Durgapur Cokeoven Plant Thermal Extension	150	1963-64		
2. Bandel Thermal Extension	300	1964-65		
3. Durgapur Coke Oven Plant Extension Stage II	75	1965-66		
4. Calcutta Electric Supply Co. (Private Sector)	50	1963-64		
DAMODAR VALLEY CORPORATION				
Thermal Schemes				
1. Chandrapura and Durgapur Thermal Plant	560	420 MW will be commissioned by 1965-66.	Benefits of balance 140 MW will accrue in 4th Plan.	
DELHI				
Thermal Schemes				
1. Delhi 'C' Stn.	30	1963-64		
2. Delhi Thermal Station Extn.	120	1965-66		
3. 15 MW Thermal Station	15	1964-65		

APPENDIX IX

(Vide para 35)

Statement in respect of power development schemes for which scheme reports have not yet been received.

Sl. No.	Name of Scheme/State	Plan Provision (Rs. lakhs.)	Remarks
1	2	3	4
A. Hydro Schemes			
1	Vaitarna	100·0	
2	Sahasrakunda	50·0	
3	Tail race Sharavathi	50·0	
4	Kalinadi	50·0	
5	Balimela—ORISSA	1150·00	Provision inclusive of Andhra's share.
6	Baspā—HIMACHAL PRADESH	5·0	
7	Improvement to Leimakhong	7·20	
8	Yairok	18·0	
B. Thermal Schemes			
1	Pathratu—Bihar	2974·0	
2	Kalakote—Jammu & Kashmir	100·0	
3	Obra Thermal—Uttar Pradesh	1600·0	
4	Package units—West Bengal	..	
5	Diesel Power Stations—NEFA	11·0	
C. Transmission, Distribution and Rural Electrification Schemes.			
1	Rural Electrification—Bihar	300·00	Part schemes costing a total of Rs. 169·86 lakhs approved.
2	Extension of lines in Jammu & Kashmir area—J.&K.	..	Schemes costing more than the Plan provisions have already been received.

1	2	3	4
3	Other Transmission and Distribution—Mysore	975.0	
4	Rly. Track Electrification—Orissa.	..	
5	Rural Electrification in Ajmer including 33 kV line from Ajmer to Beawar. } Rajasthan.	16.92	
6	Chambal Transmission Stages II and III. }	948.5	State II works costing Rs. 911.79 lakhs approved already.
7	Distribution works } NDMC } Delhi	150.0	
8	Inter State Link. . }	200.00	Includes provision for 15 MW set al.o. Scheme report for Rs. 178 lakhs received.
9	Rural Electrification works in Hill Area } Manipur	40.0	Scheme costing Rs. 33.10 lakhs approved.
10	Transmission.Distribution—NEFA	32.00	
D. Other Schemes			
1	Midget Station—Andhra	20.0	
2	Small Hydels. }	5.0	
3	Investigations. } Assam	35.0	
4	Workshop and Testing Laboratory. }	8.0	
5	Investigation and Small Hydel-Bihar	40.0	
6	Acquisition of Private supply undertaking—Bihar	10.0	
7	Extension of Testing Laboratory-DVC.	25.0	
8	Small Hydel and Investigation - Gujarat	30.0	
9	Salal (Investigation) }	25.0	
10	Small Hydels. } J&K	30.0	
11	Survey Investigations }	12.0	
12	Other Micro Hydel Schemes. } Madhya Pradesh	20.0	Scheme costing Rs. 3.91 lakhs already approved.
13	Investigation	100.00	

1	2	3	4
14	Loans to licensees —Madras .	200.0	
15	Investigation:—Mysore .	50.0	
16	Low Head Hydro Schemes. } Orissa	10.0	
17	Investigation. }	70.0	
18	Small Hydels—Punjab . .	100.00	Diesel Schemes for Rs. 60.0 lakhs approved already.
19	Acquisition of and loans to licensees. }	50.00	
20	Testing Laboratory } Rajasthan	5.0	
21	Investigations. }	15.0	
22	Small Hydels }	40.0	
23	Investigation } U.P.	120.0	
24	Uttarkhand Schemes }	75.0	Schemes costing Rs. 26.87 lakhs approved. Plain provision for these schemes is Rs. 12.47 lakhs.
25	Street lighting works—Delhi .	70.0	
26	Micro Hydels. } Himachal Pra-	10.00	
27	Investigations. } desh	3.0	
28	Micro Hydels } Manipur	5.0	
29	Investigations }	5.0	
30	Investigation schemes—Tripura .	3.57	Provision inclusive of continuing schemes also.
31	Normal Capital Works Extension. }	10.0	
32	Investigations. } NEFA	2.0	
33	Diesel Stations }	19.3	
34	Investigations. }		
35	Improvement to Electric Supply in Nicobar-Andaman Nicobar.	1.5	

APPENDIX X

(Vide para 37)

Note showing action taken by Government to resolve the difficulties pointed out by the Reviewing Team

(i) Target dates for various Stages and Components.

In many of the States there was no systematic attempt to prepare a realistic schedule of works and to adhere to the same to the maximum extent.

The visits of the Reviewing Team made it incumbent upon the Project Authorities to draw up realistic schedules of works to be undertaken each year for each Project. The schedule of civil works, date of issue of specifications, date of receipt of tenders, date of placing orders, delivery schedule, date of completion, have now been obtained for each project. Besides, a revised set of pro forma for submitting progress reports of each project was prepared by the Ministry and forwarded to all the Project Authorities. The information to be received on the revised pro forma will enable the C.W. & P. C. to get a correct picture of the progress being made on each item of work of the Project.

(ii) Lack of co-ordinated action in proceeding with various components of projects.

Although work on major items of a Project was taken up, a number of items which might be of relatively small cost as compared with the main work but which, if not arranged for in time, might hold up the progress of the main project, were not receiving adequate attention. Action for procurement of certain items such as power house cranes, gates, valves, cables, etc., had not been taken in time, in some cases, thus delaying completion of the projects. In certain other projects, although action had been taken for ordering the main generating plant, sufficiently speedy attention was not paid for the procurement of ancillary items, like water treatment plant piping, coal, and ash handling plant, etc.

The Team impressed upon the Project Authorities the need for taking co-ordinated action in the construction of civil works, procurement of power plant and equipment required for the completion of the project.

(iii) Delays in getting foreign exchange.

There were general complaints regarding delays in the release of foreign exchange. The Project Authorities had, however, not appreciated the difficulties in securing foreign

exchange and the necessity to scrutinise each proposal with a view to ensure optimum utilisation of indigenous manufacturing capacity.

The question of simplifying the procedure for release of foreign exchange is being actively pursued by the Ministry of Irrigation and Power with the Development Wing. The Development Wing have been requested to dispose of cases referred to them promptly. The Project Authorities were also advised that they should take sufficiently early action to apply for release of foreign exchange and issue of import licence.

(iv) Delay in procurement of steel.

Many of the Project Authorities were slow in estimating the categorywise requirements of steel for the power projects and placing their indents with the Iron & Steel Controller sufficiently in advance.

The questions arising out of steel supply were also taken up with the Iron & Steel Controller by the Ministry of Irrigation & Power. It was brought home to the Iron & Steel Controller that high priority should be given for meeting the steel requirements of power projects and where it was not possible to supply the steel from indigenous sources, permission should be given to import certain quantities of steel urgently required, which has been agreed to. All the high tensile steel plates required for the penstocks will be more or less covered by these imports.

(v) Shortage in supply of explosives and cement.

Some of the projects, particularly in Kerala and Madras, experienced inadequate supplies of explosives and cement.

The question of adequate supplies of explosives was discussed by the Ministry of I. & P. with the Ministry of Commerce and Industry and it was agreed that certain quantities of explosives should be imported by Imperial Chemical Industries, till such time as there is adequate indigenous capacity for meeting the demands for explosives. As regards cement, while the quarterly allocations by the Regional Cement Controller appeared satisfactory, the actual deliveries fell far short of these figures. The position was brought to the notice of the State Trading Corporation who control the production and distribution of cement.

(vi) Supplies from Heavy Electricals Ltd.

Many of the Project Authorities who had placed orders with Heavy Electricals for certain items like transformers, switchgear, etc., had not been informed of the delivery schedule and the prices for such equipment.

Discussions have been held with Heavy Electricals and a programme of manufacture of important items for the next three to four years has been ascertained. As a result of these discussions, it was found necessary to import cer-

tain equipment, such as step-up transformers and switch-gear for the Cambay Power Station to suit the targets date (July, 1963) for commissioning the plant.

(vii) Organisational Defects.

In some of the States like Andhra Pradesh, Maharashtra, Mysore and U.P., the responsibility for power generation, transmission and distribution is not vested with any single authority. For instance, in Maharashtra two separate Departments of the Government, namely Irrigation and Power and Industries & Labour are involved—the former being in charge of the Koyna Project and some transmission lines, while the latter looks after the work of the State Electricity Board.

The State Governments have been advised to see that single department is made responsible for handling all matters connected with power development.

(viii) Investigations.

One of the causes which affected speedy implementation of the projects was the lack of thorough and detailed investigations before deciding to go ahead with the scheme and preparing the project report.

The project authorities have been advised to complete detailed investigations of projects to be taken up in the fourth Plan. The Project Authorities have also been requested to intimate to the Ministry the progress of investigations on a regular pro forma.

The Team's review has highlighted the need for high level co-ordination at the Centre for speedy implementation of Plan Projects. Having regard to the size of the Power Plan to be implemented and also to the dependence of Project Authorities on the Centre for co-ordination regarding steel, cement, foreign exchange and import licences, a high level officer has been appointed in the Ministry of Irrigation and Power for giving undivided attention towards the implementation of power projects. Similarly a new Directorate has been set up in the C.W. & P.C. for watching the progress of projects, finding out the difficulties of project authorities in the implementation of projects and rendering as much assistance as possible. It has also been decided to undertake a similar review of power projects regularly each year. The second review is currently in progress.

(ix) Land acquisition for power house, sub-stations etc., should be pursued more vigorously.

(x) Decision on tenders should be taken more expeditiously.

(xi) Coal requirements of new thermal stations should be brought to the notice of the Coal Controller and the Railway Board well in advance.

APPENDIX XI

(Vide para 47)

Terms of Reference & Composition of the power and Electrical Survey Committee.

(a) The Government have appointed a top Advisory Group and a Power and Energy Survey Committee. In the light of the prospective demands for power by the various States and Regions and the category of consumers to be expected by March, 1971, the Committee will consider appropriate measures required to meet the same. In particular, the Committee will consider for the said period:—

(a) *Development of power resources.*

(i) hydro-electric.

(ii) thermal (this includes coal, lignite, oil and gas) and

(iii) atomic energy.

The Committee will make recommendations as to the phasing in which these should be brought into use progressively.

(b) Fuel for thermal power stations: availability of fuel, best location and sizes of plants. The fuel to be considered would be coal, oil, gas and atomic energy.

(c) The outline plan for regional and All-India grids and dovetailing (both in respect of timing and in respect of potential) of hydro-electric, thermal, and atomic energy stations into grids with recommendations for appropriate voltage levels.

(d) Survey of local production of generation, transmission and distribution equipment, consideration being given *inter-alia*, to capacities of equipment and possibilities of standardisation. In this connection the Committee will make a review of facilities available for transport of equipment and make appropriate recommendations.

(e) Investments necessary in generation, transmission and distribution, split up, to the extent possible, on an annual basis.

(f) Importation necessary giving due allowance to existing and recommended local production. The extent of standardisation might also be indicated so as to permit bulk purchase.

- (g) Requirements of skilled manpower for construction, operation and maintenance of power systems.

N.B. 1. *The work relating to power forecasting is already in hand and it is necessary that this should be completed as speedily as possible. This work will be completed by the Indian power experts, who recently visited the U.S.A. to study power forecasting in that country and they will be assisted by experts from U.S.A.*

2. *The Committee will also give consideration to organisational pattern for power surveys in future.*

The Committee may review and make recommendations in respect of important organisational and financial matters bearing on power development in the country, with particular reference to

- (i) adequacy of existing electricity supply legislation in the light of past experience and future development—improvement at State, regional or Central level in the organisation for development;

(ii) Electricity tariff and financial policies.

(b) The members of the Committee are: Shri M. R. Sachdev, Secretary, Ministry of Irrigation and Power, Mr. Walker Cisler, USA., Prof. Austin Robinson, U.K., Mr. De Heem, Belgium, Mr. Jacques Desrousseaux, France, Shri S. S. Kumar, Shri H. R. Bhatia, Shri K. P. S. Nair, Shri V. P. Appadurai, Shri S. Bose, Shri B. S. Nig, Shri Pitamber Pant, and Shri M. S. Ram (Member-Secretary).

The Committee will have powers to co-opt other experts from time to time.

The Advisory Group consists of: Shri C. M. Trivedi, Member, Planning Commission, Dr. H. J. Bhabha, Chairman, Atomic Energy Commission, Shri M. S. Thacker, Secretary, S.R. & C.A., and Shri M. R. Sachdev, Secretary, I. & P.

(c) The Power Survey Committee is expected to submit its report by July, 1963 and the Energy Survey Committee is expected to submit its report by December, 1963.

APPEN

(vide para

Comparative Statement of Tariffs for Railway Electrification

Sl. No.	Description	B. S.			
		D.V.C	W.B.S.E.B.	D.V.C. Power	Rihand Power
1	Nature of Generation	Hydro & Thermal	Hydro & Thermal ^(a)	Hydro & Thermal	Hydro
2	Maximum demand charge per month (15 Minutes)	Rs. 7.7 per kVA	Rs. 10.0 per kVA	Rs. 7.7 per kVA (30 min)	Rs. 10.0 per kVA (30 min)
3	Energy charge per kWh | . . . .	nP 2.14	nP 2.35	nP 2.14	nP 2.90
4	Ceiling cost per unit (after paying cost of maximum demand)	nP 6.25*	..	nP 6.25	..
5	Coal adjustment charge per kWh per cent rise in the basic cost of coal of nP 40/million BThU.	nP 0.006/nP 1.26/ kWh as on date).	nP 0.0065 (nP 1.365/ kWh).	nP 0.006 (1.26)	..
6	Annual charges on capital cost of s/s & transmission lines required for effecting supply at 25 kV. . . .	10%	10%	11%	11%
7	Annual charge referred in item 6 above, per substation per month	Rs. 6170	Rs. 15278	Rs. 23833	Rs. 23833
8	Overall cost per unit assuming 10 MVA maximum demand at .7 power factor and				
	(a) 40% load factor]				
	(i) Demand Charge	3.82	4.96	3.82	4.96
	(ii) Capital Charge	0.31	0.76	1.18	1.18
	(iii) Energy Charge	2.14	2.35	2.14	2.90
	(iv) Fuel Surcharge	1.26	1.37	1.26	..
		<u>7.53&</u>	<u>9.44</u>	<u>8.40&</u>	<u>9.04</u>
	(b) 60% load factor				
	(i) Demand Charge	2.55	3.31	2.55	3.31
	(ii) Capital Charge	0.21	0.50	0.79	0.79
	(iii) Energy Charge	2.14	2.35	2.14	2.90
	(iv) Fuel Surcharge	1.26	1.37	1.26	..
		<u>6.16</u>	<u>7.53</u>	<u>6.74&</u>	<u>7.00</u>

DIX XII

53)

Schemes offered by different power supply Generating Authorities

E.B.		ORISSA		Madras State Electricity Board	Tariffs as per Power Interchange agreement between Tatas & C. Rly.	Remarks
Hirakud Power		Final	Provisional	Thermal	Thermal	
Final	Provisional					
Hydro	Hydro	Hydro	Hydro	Thermal	Thermal	Power is being purchased from DVC at the standard rate i. e. Max Demand charges per month (30 months) Rs. 7.7 per kVA & energy charge per kWh nP 2.14.
Rs. 365.1 W per year (30 min)	Rs. 4.95 per kVA	Rs. 365.1 kW per ci (30 min)	Rs. 4.9 per kVA	Rs. 6.0	For interchange of Power. For supply by Rlys. to Tatas 4.61 nP in addition to a fixed annual charge for peaking assistance. The rate for supply from Tatas to Railways is 3 nP per unit.	*It is understood that DVC are considering reduction of this figure to 6 nP.
..	nP 7.2	..	nP 7.2	3 nP		
..	nP 8.1	..	nP 8.1	10 pias		
..		
..		
Rs. 65,389	Rs. 65,389	..	..	
10.56	..	10.56	..			
3.21	3.22	..	..	
..	8.10	..	8.10			
..			
13.78	11.32&	10.56	8.10&			
7.04	..	7.04	..			
2.15	2.15	..	..	
..	8.10	..	8.10			
..			
9.19	10.21	7.04	8.10&			

& In these cases for the overall cost per Unit including capital charge, the ceiling cost given in item 4 above will operate.

APPENDIX XIII

(Vide para 65)

Note furnished by the Indian Standards Institution on the procedure obtaining in various countries with respect to compulsory testing of domestic electrical appliances.

Sweden

Compulsory testing of electrical equipment in Sweden is stipulated by orders of the Royal Board of Trade. According to this, equipment listed below must be approved by Svenska Elektriska Material Kontrollanstalten (SEMKO) before it may be sold, delivered or used in the country.

Electrical Accessories. Electrical Wires and Cables, Conduit for Electrical Wiring, Lighting Fittings, Hand Lamps, Electrical Domestic Appliances, Radio and Television Receivers, Fluorescent Lamp Auxiliaries, Bell and Toy Transformers.

The licence to use the S mark of approval, is granted by the SEMKO which is a non-profit making society recognized by Government in 1935. The specifications used as a basis for granting the mark are the SEMKO testing specifications. The specifications are drawn up by technical committees appointed by the SEMKO Board and relate mainly to the safety requirements.

Members of laboratory staff travel through different parts of Sweden, visiting contractors, wholesalers, retailers and selecting samples for testing at the laboratory. Penalties are prescribed, in case of an ascertained failure, which include fines and revocation of licence.

The technical activities of the Swedish Bureau of Testing Electrical Equipment of SEMKO Ltd. are directed by a Technical Board consisting of 9 members appointed by the Government and 6 members appointed by the three associations constituting the SEMKO Ltd. The Government-nominated members represent State Authorities, small manufacturers, electrical contractors, importers and users; the other six members are representatives of Electricity Supply Undertakings, large manufacturers and fire protection interests.

The Technical Board appoints the Testing Committee for analysing the results of testing done by the Swedish Bureau of Testing Electrical Equipment with a view to

granting the approval of marking to the individual manufacturer; and required number of Testing Standard Committees for the preparation of necessary standards against which products shall be tested. The Board also determines the fees to be charged for the tests made by the Bureau and passes resolutions on all other activities relating to testing activities.

Australia

In Australia, control of electricity in all its aspects is a function of the State Governments, as distinct from Federal Government. In each State in Australia, there is now a statutory Electricity Body, bearing responsibility under an Act of Parliament, for safety of electrical equipment. The details of approval schemes are incorporated in regulations. According to the approval schemes, for certain classes of electrical equipment proclaimed from time to time in Government Gazette, there is a complete prohibition on the sale or marketing in any way of such equipment, unless it has been submitted to and approved by the statutory authority concerned.

A form of marking to indicate such approval is laid down in the regulation. This is not, however, regarded as Certification Mark in the normal sense of the term, as it is not registered in the Trade Marks Act of Commonwealth of Australia. It is a statutory device for indicating that the manufacturer claims that the article complies with the relevant requirements, after submission of a sample for type approval.

In all States the criteria for approval are the approval and test specifications laid down by the Standards Association of Australia.

The equipment at present covered under the statutory order includes electric bread toasters, electric radiators, portable immersion heaters, electric kettle, electric jug, electric iron, earth leakage, circuit breakers, plugs and plug sockets, wall switches, electric soldering iron, electric hand lamp and electric room heater.

For industrial electrical equipment, the scheme of marking is voluntary.

Germany

In Germany, there exists a legislation by which power energy plants and appliances consuming power energy, are to be installed and maintained according to the approved rules of the electrotechnical industry. Such Rules are given in VDE-Book of Regulations (Regulations of the Association of German Electrical Engineers). This book includes regulations for wires and cables for power system; and consumer appliances besides for power plants and such other machinery.

In order to prove the conformity of products with the *VDE-Regulations*, the VDE grants the mark "VDE". In order to ensure the observation of these regulations, the workshops of the licensees are inspected by the officials of VDE-test service, the first time before granting the licence to use the VDE-mark and afterwards from time to time. The records are checked and the products marked with the VDE-stamp are taken at random and examined in the VDE-test laboratory. The licence to use the VDE mark is withdrawn in case the provisions for the grant of the licence have not been met. The marking of electrical appliances with the VDE-stamp is intended to certify the fulfilment of SAFETY requirements up to now, no regulations are in existence with respect to the control of other quality characteristics of domestic electrical appliances. DIN, however, proposes to include quality specifications for domestic electrical appliances in the DIN standards and to ensure the observation of these specifications by the controlled marking with the DIN stamp.

Up to now the VDE-mark has been granted for the following domestic electrical appliances:

"Room heating devices, flat iron, electrical ranges, cooking and baking appliances, boiling plates, stationary hot water supply boiler, water boiler and similar appliances, immersion heaters and similar appliances, feed stewar, toaster, grill soldering irons and other electrical tools, refrigeration machines (absorber and compressor type), heating pads, vacuum cleaner, floor polishing machines. combined domestic appliances with motor drive, machines for treatment of spoiled linen, sewing machines, coffee grinders, combined kitchen appliances with motor drive, hair drying appliance (air flow type), hair clipping and animal shearing machines, ventilators and electrical tools with motor drive."

Denmark

In Denmark, according to the Heavy Current Act, electrical equipment, etc., as detailed below which are used in or supplied from low voltage utilization system shall be approved by Danmarks Elektriske Materialkontrol (DEMKO) before it may be sold, delivered or used in the country. The term low voltage utilization systems denotes system with rated RMS voltages over 24 volt and up to and including 250 volts.

The following is the list of equipment for which DEMKO's approval is necessary before sale, delivery or use in the country:

Electrical accessories, electrical wires and cables, conduit for electrical wiring auxiliaries for

fluorescent lighting, hand lamps, electrical domestic appliances, radio and television receivers, electric fence controllers, measuring instruments and isolating transformers.

DEMKO is a Board appointed by the Ministry of Public Works for granting approval to the manufacturers in respect of the equipment listed above. The only aim of DEMKO is to protect the public against the risk which may result from the use of equipment of poor quality with particular regard to the danger to life or of fire. All approvals from DEMKO cover only the equipment as specified in DEMKO's certificate of approval and it is exactly the same as the samples covered by the certificate. It is the duty of the holder of the approval only to sell or deliver equipment in complete accordance with the approval. It is forbidden to sell, deliver or use equipment in the country until the applicant has received written approval. Other authorities in the country have other regulations and restrictions concerning the sale and use of equipment and the holders of the approvals are responsible to these authorities and must themselves make inquiries as to special requirements of these authorities. When sold, delivered or used in the country, approved equipment is provided with the registered mark of approval D.

Norway

In Norway, there exists a legislation according to which all electrical household equipment have to be tested and approved by a particular governmental institution called Norges Elektriske Materialkontrol (NEMKO). The equipment is to be sold with the legally protected certification mark N of that station before it may be used in the country. The use of this certification mark is thus made compulsory. The main object of the testing is to test the electrical safety but the station may also refuse to approve appliances and apparatus in cases where they fail to meet the requirements as regards other kinds of safety when used or fail to meet reasonable requirements as to function, economy and durability.

The equipment covered under this legislation includes refrigerators, washing machines, water heaters, etc.

Finland

In Finland, there exists a legislation by which all portable appliances to be connected to heavy current circuit by means of a flexible cord and plug shall be tested and approved by Electrical Inspectorate before marketing. Even electrical installation material for low voltage installations is subject to obligatory testing and approval.

At present, there is no national certification marking system for approved electrical equipment in Finland.

Canada

In Canada enforcement of safety requirements for electrical installations and granting of approval and policing of sales of electrical equipment are the responsibility of provincial authorities.

The Canadian Standards Association is responsible for preparation of the standards and the standards prepared by CSA, become mandatory only after they are adopted by the provincial authorities.

There are two avenues open for the manufacturers to get the approval for the products manufactured by them; (1) to directly approach each of the inspection authorities and convince them that their products meet with the requirements of the standard and thereby obtain their approval, (2) to submit their products to the CSA Testing Laboratories for certification. In such a case, the CSA Laboratory will, after testing the equipment and making sure that the product complies with the Canadian Standard, circulate copies of the test report together with all other details to the various inspecting authorities and get their approval by postal ballot.

There is also an Approval Council in existence whose primary function is to maintain contact with the provincial electrical inspection authorities and provide the necessary co-ordination between them and the CSA Testing Laboratories. This Council is an advisory body to the Testing Laboratories to assist in promoting uniformity in interpretation and enforcement of the standards.

APPENDIX XIV

Statements showing the summary of recommendations/conclusions

Sl.No.	Reference to para No. of the Report	Summary of recommendations/ conclusions
1	7	The Committee note that though the Damodar Valley Corporation had initiated the proposal for installing the fourth power generating unit at Bokaro as early as April, 1953, the project was cleared for execution by the Government of India only in May, 1956. This period of more than three years was passed in correspondence and conferences between the Ministry of Irrigation and Power, Damodar Valley Corporation, Central Water and Power Commission, the participating Governments and the Planning Commission. This is but one of the instances which goes to show how multiplicity of organisations for vetting power schemes result in delay. The multiplicity of organisations also make it difficult to pinpoint the responsibility for such delays. The Committee cannot therefore too strongly stress the need for streamlining the procedure so that power schemes are vetted and sanctioned more expeditiously.
2	8	The Committee suggest that the proposed review of the Electricity (supply) Act, 1948 may be made at an early date.
3	9	The Committee feel that there is need to establish closer contact with the Chairmen of the State Electricity Boards in the matter of planning for power. They recommend that meetings may be held by the Ministry with the Chairmen of the State Electricity Boards periodically, which may not be less than once a year.

1	2	3
4	12	<p>The Committee feel that time has come when the power plan should not merely be related to the resources and requirements of an individual State but should be related also to the interests of a region. It may well be that power resources in one State may have to be developed at an accelerated pace to enable utilisation of power in the neighbouring States. Similarly, the pattern of hydro-electric development in a State may have to be shaped in the light of requirements for co-ordinated operation of nuclear or thermal stations in adjacent States.</p>
5	19	<p>The Committee note that the studies indicate that large scale economics could be achieved by integrated operation of power systems in the country.</p> <p>The Committee feel that the establishment of regional grids and regional power agencies seem to be developments in the right direction. They note that a Committee composed of representatives of the State Electricity Boards and Centre will examine the scope of the regional agencies and the central agencies and their powers and ancillary matters. The proposal is of sufficient importance for a Committee to go into the question in detail and bring out all the implications after ascertaining the reactions in the places which would be affected by the proposal for it is necessary to have the fullest cooperation of the States concerned in such a development.</p>
6	20	<p>As "kWh generated per capita" is a sure index of country's industrial growth, the Committee feel that if India is to advance along the path of industrialisation, planning for power should receive high priority.</p>
7	22	<p>Since the cost of installing 1 kW of electric power is but a fraction of the capital investment required to utilise it, it is obvious that if in any eventuality power generating capacity was underutilised it would entail less overall loss to national economy than would be the case if productive machinery was to be rendered idle on account of power deficit. Past experience, in India and other countries, clearly shows that in a developing economy the demand for power nearly always outruns the available supply. Planning for surplus power is, therefore, essential for achieving an optimum rate of growth in the country. The Committee strongly recommend that power being a primary source of energy should be one step ahead of industrial and other requirements.</p>

1	2	3
8	23	<p>The Committee hope that Government would not allow the phenomenon of shortage of power, which has handicapped the industrial and developmental plans in the first two years of the Third Plan to recur in the next Plan period. They would like to emphasise that Government should sanction in time the power projects required to meet the additional requirements in 1966-67 and 1967-68.</p> <p>The Committee are glad to note that perspective plans of power requirements till 1981 have been drafted. Planning for power is in fact a continuous process and the perspective plans have to be reviewed in the light of requirements revealed by power surveys. The Committee would like the Government to pay close and continuous attention to perspective planning so that the targets fixed are fully in consonance with the requirements.</p>
9	24	<p>As it is an established fact that hydel is the cheapest source of power in India, the Committee would urge the Government to investigate and prepare blue prints of all the remaining hydro-electric schemes so that they can be readily available for being taken up to meet the increasing demands. This is all the more desirable as India has all the requisite experience for undertaking investigation and preparation of project reports as also the implementation of hydel schemes.</p>
10	25	<p>The Committee consider it unfortunate that there was shortfall of 120 million kW in the installed generating capacity during the Second Five Year Plan due firstly to a number of power schemes being relegated into the non-core group of the Plan on the ground of foreign exchange difficulties and secondly on account of delays in the execution of some of the important projects such as Bhakra Nangal, Koyna, Rihand and Hirakud.</p>
11	26	<p>It is a matter of concern that the firm generating capacity in the country would continue to lag behind the anticipated demand throughout the Third Five Year Plan. The position is likely to improve somewhat during the last year of the Third Plan but the Committee note that the overall shortage would in fact increase from 353.1 MW in 1961 to 455.7 MW in 1966. Power supply at the end of the Plan is expected to be short in all the States, except Jammu and Kashmir, Kerala, Rajasthan and Delhi. The shortage is expected to be the heaviest (202.5 MW) in Bihar-DVC-West Bengal region. The additional requirements of power for the defence-based industries may further aggravate the shortage.</p>

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12	27	<p>The Committee are glad to note that Government have taken some measures in 1962 to augment power generation. It is yet to be seen as to how far in actual practice these measures are able to relieve the acute shortage of power which is already being experienced in several States in the current year and which is likely to become even more acute in 1964. The Committee hope that Government would ensure that the additional capacity sanctioned by them is brought into commission as early as possible to relieve shortage. In particular they would like to suggest that package units, for which orders have already been placed, be imported at an early date. These could be installed with expedition in areas which are experiencing the most acute shortage of power for industrial and defence needs. The Committee would also suggest that the position may be kept constantly under review so that necessary steps can be taken without avoidable delay to relieve power shortage as much as possible.</p>
13	28	<p>The Committee understand that Government have only sanctioned upto 25,000 kW for the present and that the proposal for the remaining 75,000 kW had been kept in suspense.</p> <p>In view of the need for meeting power requirements on emergent basis, the Committee recommend that urgent action may be taken to procure the standby units to the entire capacity of 100,000 kW.</p>
14	29	<p>The Committee have given careful thought to the question of smooth and effective functioning of the Damodar Valley Corporation in so far as it relates to generation and transmission of power in Bihar-West Bengal region. They cannot but agree with the following views expressed by the Public Accounts Committee in their Fifth Report (Third Lok Sabha) on the Audit Report on the Accounts of the Corporation for the year 1960-61:—</p> <p>“ . . . They feel that time has come to make an overall assessment of the working of the Corporation and also to examine what amendments, if any, in the D.V.C. Act are called for to achieve the objectives for which the Corporation was set up.”</p>
15	30	<p>The generating units which were either not in use or required repairs as revealed in the census carried out by the Ministry should serve not only</p>

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- as additional standby capacity but also to augment the present short supply in the country. The Committee would, therefore, urge the Government to devise suitable measures whereby the existing power resources could be exploited to the best advantage of the country by (i) pressing into service all small units which may have been closed down on grounds of economy; (ii) ensuring full availability of power supply by careful operation and maintenance of both new and old plants; and (iii) taking good and timely care to see that all essential spare parts are kept in stock for carrying out immediate repairs in case of breakdowns.
- 16 32 The Committee would urge that high priority should be given to power for irrigation pumping as this is one of the most practical ways of stepping up the agricultural production.
- 17 32 The Committee hope that decision on the recommendation of the Eighth Irrigation and Power Seminar (1962) that (i) the deficit in return from the rural areas may be made good by other Development Departments of Government; or alternatively (ii) Government may give loans to the State Electricity Boards at no interest for a period of at least five years to cover the capital cost of rural electrification, would be taken soon so that the important schemes of rural electrification make rapid headway.
- 18 33 The Committee suggest that the reasons for poor progress in installation of micro-hydel sets may be investigated with a view to extend their use.
- 19 35 The Committee are surprised to note that out of the total plan provision of Rs. 1039 crores in the public sector, an amount of Rs. 100 crores *i.e.* 9.6 per cent of the total provision, has been provided on account of 58 schemes in respect of which reports have not been received by the Central Government.

It is obvious that project schemes would have to be prepared and sanctioned before any start can be made in the implementation of the projects. Since two years of the Plan period are nearly over without the submission of power development schemes envisaged in the Plan, there is bound to be delay in their execution.

The Estimates Committee recommend that work relating to investigation of schemes included in the Third Five Year Plan may be completed without delay.

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		They would also urge that project studies relating to the Fourth Five Year Plan may be taken in hand forthwith. These should be completed sufficiently early so that as far as possible fully investigated schemes may be included in the Fourth Five Year Plan.
20	36	The Committee consider that now that the Central Water and Power Commission have a fund of experience of more than a decade, it should be possible for them to conduct technical examination of proposals received from the State Electricity Boards in a more expeditious manner. They recommend that the Central Water and Power Commission may carefully review the procedure for processing such schemes so as to reduce the time to the minimum.
21	38	It is unfortunate that the erection of the first two units of the Sharavathy Hydro-electric project would be delayed by about 18 months. In view of the acute shortage of power being experienced in Mysore State particularly by Defence industries, the Committee have no doubt that Government would make every endeavour to speed up the execution of the Sharavathy Power Project.
22	39	The Committee stress the need for timely receipt of periodical progress reports on major projects from State authorities. Such progress reports should be analysed immediately on receipt in the Central Water and Power Commission in order that immediate action could be taken to resolve the bottlenecks.
		They are firmly of the view that once the Government have sanctioned a particular project, all impediments coming in the way of its smooth progress should be removed expeditiously to ensure adherence to plan targets.
23	41	Since a number of Ministries are intimately connected in finding a solution to these problems, the Committee suggest that the question of setting up a Committee composed of representatives of the Ministries of Irrigation and Power (including Central Water and Power Commission), Finance, Commerce and Industry, Steel and Heavy Industries and Economic and Defence Coordination for removing the bottlenecks encountered by the project authorities in the

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		<p>procurement of foreign exchange, machinery, equipment, steel, cement, explosives, etc. may be examined. They also suggest that early action should be taken to rationalise the procedure for release of foreign exchange and issue of import licences so as to cut out all delays.</p>
24	42	<p>The Committee would urge that the manufacture of generators, transformers, high tension switch gears and heavy industrial motors etc. may be geared up to meet the plan requirements.</p>
25	43	<p>The Committee consider that there should be close liaison between Heavy Electricals Ltd., Bhopal on the one hand and the Central Water and Power Commission and the State Electricity Boards on the other.</p>
26	44	<p>The Committee are glad to note that the Ministry have initiated action to standardise power equipment. The Committee feel that with the setting up of the Power Research Institute and the Specialised Engineering Organisation, it should be possible to extend standardisation to other important items of electrical equipment.</p>
27	46	<p>The need for accurate load forecasting as a pre-requisite condition for systematic planning for power development requires hardly any stress. Unless power load surveys are carried out and results made known early, they lose their value as basis for power planning and economic development. It is, therefore, a matter of regret that the work of power load survey of different regions and the country as a whole which was taken up in 1954 and has already cost the Government about Rs. 20 lakhs has not been completed so far.</p>
28	47	<p>The Committee hope that load surveys would be completed shortly and that work relating to power forecasting would be completed speedily. They would urge that broad principles for undertaking load surveys and power forecasting may be laid down by the Central Water and Power Commission at an early date for the guidance of the State Electricity Boards so that there is uniformity of approach in the detailed load surveys to be carried out by the State Electricity Boards.</p>

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29	47	The Committee would also urge that as in the United States, arrangements may be made to bring out periodically, at least once every year, a publication containing vital statistics about load surveys and power development programmes for the different States and Union Territories and the country as a whole.
30	52	The Committee hope that the Ministry of Irrigation and Power would take necessary action to ensure that the power requirements of Railways which constitute the nation's life-line are fully met. The West Bengal and Bihar State Electricity Boards should supply power as envisaged by the Sachdev Committee or in the alternative Rihand and Hirakud Power should continue to be made available. They would also like to emphasise that the generation of power in Chandrapura should be advanced to as early a date as possible, but not later than September, 1964 so as to meet fully the railway requirements.
31	53	The Committee also hope that the Ministry of Irrigation and Power would similarly ensure that the requisite power for the Third Five Year Plan is made available for electrification on Northern Railway by U.P. State Electricity Board, on Central Railway by the Maharashtra State Electricity Board and on the Southern Railway by the Madras State Electricity Board.
32	54	The Committee would also urge that a close watch may be kept on the installation of transmission lines so that there is no delay on this account in making the power available at the points needed for railway electrification. In this connection they would, particularly, like to draw attention to the need for completing the transmission lines to carry power for electrification of Sealdah-Ranaghat and Dum Dum-Bongoan Section of Sealdah Division of Eastern Railway.
33	55	The Committee urge that high priority may be accorded for meeting the urgent requirements of Railway Workshops so that the Railways maintenance and production programmes do not suffer.
34	56	The Committee cannot too strongly emphasise the need for undertaking perspective planning for electric traction in greater detail and with greater expedition so that the railway requirements can be fully taken into account while sanctioning the power projects for the first two years of the Fourth Five Year Plan.

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		Where hydel power is available at reasonable rates the advantage of it should be taken for electrification of railways in the areas especially when they are far removed from coal bearing areas. The Committee would suggest a comprehensive examination of the possibilities of electrification in the different zonal Railways.
35	56	The Committee would further suggest that to end uncertainty about the supply of power for railway traction, the Central Electricity Authority may at the time of sanctioning new projects of State Electricity Boards and other generating authorities earmark the power which they have to make available for railway traction.
36	57	The Committee would also like to emphasise the need for closer coordination between the generation and supply authorities so that the work progresses according to schedule in a most economical manner. In this connection the Ministry of Railways had pointed out in the earlier stages that there was lack of coordination between the Bihar State Electricity Board, D. V. C. and Rihand in the commissioning of Pipri—Sonenagar Transmission Line in the matter of metering and synchronising equipment, arrangement for parallel operation, settlement of energy charges etc. with the result that the scheduled date of June, 1961 had to be put off by one year. Similar lack of coordination between Bihar State Electricity Board, D. V. C. and Hirakud authorities was alleged to be responsible for the delay in utilisation of Goilkera—Rourkela Transmission Line which was required to feed reliable supply for the vital railway lines to steel mills to carry raw materials.
		It was also pointed out by the Ministry of Railways that there was duplication of sub-stations at Purulia and Sonenagar between D. V. C. and West Bengal State Electricity Board which resulted in needless over-capitalisation and duplication of operating personnel. The Committee would urge the Central Water and Power Commission to use its good offices to ensure close coordination between the diverse generation and supply authorities who are catering for Railway traction.
37	58	The Committee are surprised to note that there are wide variations in the overall charges, for example, from 7.53 nP. for D. V. C. power to 13.78 nP for Hirakud power for Railway electrification at 40% load factor.

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		<p>The Committee understand that the proposals made by the Railways for rationalisation of tariffs for Railway electrification had been examined by the Ministry of Irrigation and Power who had furnished their comments to the Planning Commission.</p>
		<p>The Committee hope that Government would go into the matter at an early date and in the larger interest of the country would lay down general principles as far as possible, for determining equitable tariff rates for supply of power for railway electrification.</p>
38	60	<p>The Committee are constrained to note that even though 134 proposals for amending the Rules have been pending, the Central Electricity Board has not met even once during the last 5 years. They cannot too strongly emphasise the need for prompt processing of all proposals which are received for amending the Rules so that the shortcomings brought to notice in the application of Rules are rectified without delay.</p>
		<p>The Committee hope that the meeting of the Central Electricity Board will be held at an early date and that in future also such meetings will be held as often as necessary, at least once a year, so that the <i>pros and cons</i> of important proposals received for amendment of Electricity Rules are discussed before decisions are reached.</p>
39	60	<p>It would also be useful to review periodically the Electricity Rules as a whole once in five years so as to take full cognisance of advances made in power transmission, electrical appliances and other allied matters which have a bearing on the working of Rules.</p>
40	62	<p>The Committee feel that the Union Government should have kept a watch on the composition and working of the Electricity Boards from their very inception so as to ensure uniform development. They would urge the Government to complete their proposed study of composition, functioning and financial structure of the State Electricity Boards at an early date and use their good offices to bring about uniformity as far as possible.</p>
41	63	<p>The Committee consider that as the Electrical Inspectors are intimately connected with the working of the Indian Electricity Rules, which are framed by the</p>

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		Central Electricity Board, it is but appropriate that an annual report may be called for from the State Electrical Inspectors. The Report may prove of use to the Central Electricity Board to review annually the working of the Indian Electricity Rules. The Ministry may examine how best the Electrical Inspectors can be enabled to discharge their statutory responsibility in an independent manner.
42	65-66	The Committee understand that the question of introducing compulsory quality control for domestic electrical appliances is still under the consideration of Government. They also understand that in several foreign countries such as Sweden, Australia, Germany, Denmark, Norway, Finland and Canada compulsory testing of electrical equipment is in force. They feel that the Government should take appropriate legislative and administrative and other requisite measures for ensuring the manufacture and supply of intrinsically safe domestic electrical equipment, accessories and wiring materials for use in homes and other non-industrial premises.
43	67	The Committee recommend that in view of its importance the Code for safe operation and maintenance of transmission and distribution systems should be finalised and implemented at an early date.
44	68	The Committee understand that there are only 12 Power Research Institutes in the World. They are happy that the Government have decided to set up the Power Research Institute in the country. They hope that the Institute will fulfil the long-felt need of a Central organisation for applied research in power.
45	70	The Committee suggest that a phased programme for development of the two units of Power Research Institute at Bangalore and Bhopal may be drawn up. They feel that as foreign exchange required for the equipment of the Institute has been assured by the United Nations Special Fund there should be no difficulty in adhering to the schedule.
46	72	The Committee are glad that a practical beginning in undertaking studies for optimum voltage for regional power grids is being made in the Power Research Institute. They recommend that these studies should be expedited so that concrete suggestions for adoption of optimum voltage for transmission on the regional grids are forthcoming early.

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47	72	Another important matter which the Committee would like the Power Research Institute to examine expeditiously is the development of most economical and practical methods for making supports for power lines particularly in the rural areas. The Committee are glad to note that the Power Research Institute is conducting some studies on the subject. They would like these to be expedited so that their suggestions can be put to practical use.
48	73	The Committee were informed during evidence that only five State Electricity Boards had so far established research units for undertaking research on fundamental and basic problems on power. The Committee would urge the Government to stress on the remaining State Boards the necessity of setting up research units at an early date.
49	73	It has been represented to the Committee that financial assistance given by the Central Board of Irrigation and Power to the State Electricity Boards is not sufficient for obtaining the necessary equipment for research. It has also been represented that the procedure for import of research equipment is cumbersome and needs to be simplified. The Committee would like the Government to look into these and other related difficulties being experienced by the State Electricity Boards so that the State research units do not feel handicapped in the matter of equipment.
50	75	The Committee are glad to learn of the progress made in imparting training in the method of hot line maintenance of high voltage transmission lines. They hope that the training would enable the electricity undertakings to increase the reliability of supply.
51	77	The Committee consider that as power targets are likely to be perceptibly increased in the Fourth and succeeding Plans, there is bound to be steep increase in the requirements of technical personnel. They are glad to note that one of the terms of reference of the Power and Energy Survey Committee is to go into 'the requirement of skilled manpower for construction, operation and maintenance of power systems'. The Committee hope that suitable action would be taken by Government to augment training facilities to meet the requirements of technical personnel in the light of findings of the Power and Energy Survey Committee.

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52	78	The Committee feel that as India has enough of experience in the designing and construction of hydel works, it should be possible to persuade the International agencies and countries giving foreign aid not to insist on employment of foreign consultants.
53	81-82	<p>(i) The Committee are glad to learn that the Planning Cell at Madras had been able to effect a substantial saving to the tune of several lakhs, which would have otherwise been paid to the Russians by way of consultation fees for designing, installation etc. of the Neyveli Thermal Power Station. The Study Group were also glad to learn that the Planning Cell was confident of preparing detailed designs for power equipment and supervise its installation and operation thus discharging all the functions of the technical consultants.</p> <p>(ii) Certain shortages in the category of Technical Officers in the Planning Cell were brought to the notice of the Study Group during its visit to Madras in September, 1962. The Committee hope that the shortage of technical staff in the Planning Cell would be made good at an early date.</p> <p>(iii) The Committee would like the Government to so organise the Specialised Engineering Organisation that it is able to discharge fully the responsibilities of technical consultants.</p> <p>(iv) The Committee are also glad to note that Tatas have set up a consultant organisation (Tata Ebasco Services Ltd.) in collaboration with a foreign firm which would be largely manned by Indian engineers.</p> <p>(v) The Committee hope that no effort would be spared in developing the Specialised Engineering Organisation and other consultancy services within the country without further loss of time. They feel confident that if a proficient technical consultant service is built up within the country it should not be too difficult to persuade even the countries giving aid for power schemes not to insist on employment of foreign consultants so that as much of foreign exchange as possible is saved.</p>

APPENDIX XV

Analysis of recommendations contained in the Report

I. Classification of recommendations :

A. Recommendations for improving the organisation and working:

S.No. 1 to 4, 6 to 23, 25, 28 to 31, 34, 35, 38, 39 to 41 and 45.

B. Recommendations for effecting economy:

S.No. 5, 26, 36, 37, 47, 52 and 53.

C. Miscellaneous:

S. Nos. 24, 27, 32, 33, 42, 43, 44, 46, 48, 49, 50 and 51.

II. Analysis of the more important recommendations directed towards economy:

S.No.	No. as per summary of recommendations	Particulars
1	2	3
1	5	Effecting large scale economies by integrated operation of power systems in the country.
2	26	Effecting economy in cost and speed in installation by standardisation of power equipment.
3	36	Need for closer co-ordination between the generation and supply authorities catering for Railway traction to avoid over-capitalisation and duplication of operating personnel.
4	37	Laying down general principles for determining tariff rates for supply of power for railway electrification.

1	2	3
5	47	(i) Optimum voltage for transmission of power on regional grids should be determined. (ii) Development of most economical and practical methods for making supports for power lines particularly in the rural areas.
6	52	Persuading the International agencies and countries giving foreign aid not to insist on employment of foreign consultants for hydro-power stations.
7	53	Organising the Specialised Engineering Organisation to discharge fully the responsibilities of technical consultants.

**ESTIMATES COMMITTEE
1962-63**

THIRTIETH REPORT

(THIRD LOK SABHA)

MINISTRY OF IRRIGATION AND POWER (POWER)

Central Water & Power Commission (Power Wing)

Central Electricity Authority

Central Electricity Board

Central Board of Irrigation and Power (Power)

- Power Research Institutes



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**ESTIMATES COMMITTEE
1962-63**

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Shri Avtar Singh Rikhy—Deputy Secretary.

*Elected w.e.f. 15th November, 1952 *vice* late Shri B. J. Singh.

**Elected w.e.f. 18th August, 1962 *vice* Shri Shivram Rango Rane resigned.

INTRODUCTION

1. The Chairman, Estimates Committee, having been authorised by the Committee to submit the Report on their behalf, present this Thirtieth Report on the Ministry of Irrigation and Power(Power).

2. It would be recalled that 12 years ago, the Estimates Committee (1950-51) had examined the estimates of the erstwhile Ministry of Works, Mines and Power and presented the Fourth Report (March, 1951) which dealt *inter alia* with the Central Electricity Commission and the Central Electricity Authority. In the following year the Estimates Committee (1951-52) examined the estimates relating to Central Water and Power Commission and Multi-Purpose River Valley Schemes and presented their Fifth Report (March, 1952). Action taken by Government on the recommendations contained in the aforementioned Fourth and Fifth Report was examined by the Estimates Committee (1956-57) who presented the Forty-fourth and Forty-ninth Reports respectively on the subject.

3. The Committee took evidence of the representatives of the Ministry of Irrigation and Power on the 7th, 8th, 10th and 11th December, 1962. They wish to express their thanks to the Secretary and other officers of the Ministry, and the Chairman and Member (HE) of the Central Water and Power Commission for placing before them the material and information that they wanted in connection with the examination of the estimates.

4. They also wish to express their thanks to the Secretary and other officers of the Department of Atomic Energy; the Member (E) and Additional Member (Finance) and other officers of the Railway Board for placing before them the material and information that they wanted.

They also wish to extend their thanks to the Director, Indian Standards Institution; the Chairmen of State Electricity Boards of Gujarat, Kerala, Maharashtra, Mysore and West Bengal; the Chairman and other officers of the Damodar Valley Corporation; and the representatives of the All India Manufacturers' Organisation and the Federation of Electricity Undertakings of India, for giving evidence and making valuable suggestions to the Committee.

5. The Report was considered and adopted by the Committee on the 15th March, 1963.

6. A statement showing an analysis of the recommendations contained in this Report is also appended to the Report (Appendix XV).

H. C. DASAPPA,

Chairman,

Estimates Committee.

NEW DELHI-1;
The 19th March, 1963.
Phalgun 28, 1884 (Saka).

FUNCTIONS AND ORGANISATION

A. Functions

The Ministry of Irrigation and Power besides laying down the general policy for the development of water and power resources, performs the following main functions in respect of power:—

**Ministry
of Irrigation and
Power.**

- (i) rendering technical assistance;
- (ii) examination of schemes formulated by the States for inclusion in the Plans;
- (iii) watching the progress of execution of projects in the power sector and of costs against estimates;
- (iv) arranging for foreign exchange requirements of the projects.

2. The Central Water and Power Commission is an attached office of the Ministry and advises it on all technical problems. The organisational chart and detailed functions of the Power Wing of the Commission, are given in Appendices I and II respectively. The Commission is also responsible for initiating and coordinating schemes for multi-purpose river development, for preparing integrated plans for power development, transmission and utilisation of electric energy, navigation and for dealing with flood problems.

**Central
Water and
Power
Commission.**

The Central Electricity Authority and the Central Electricity Board are two other bodies with which the Ministry is directly concerned.

3. The Central Electricity Authority has been constituted under the provisions of Section 3 of the Electricity (Supply) Act, 1948. Under the Act, it is required to exercise such functions and perform such duties and in such a manner as the Central Government may prescribe or direct, and in particular to—

**Central
Electricity
Authority.**

- (i) develop a sound, adequate and uniform national power policy, and particularly to coordinate the activities of the planning agencies in relation to the control and utilisation of national power resources;
- (ii) act as arbitrators in matters arising between the State Governments or the Board and a licensee or other person as provided in the Act;
- (iii) carry out investigations and to collect and record the data concerning the generation, distribution and utilisation of power and the development of power resources; and

- (iv) make public from time to time information secured under the Act and to provide for the publication of reports and investigations.

4. Under Section 29 of the Electricity (Supply) Act, 1948, no sanction is to be accorded by the State Electricity Boards to any scheme or part of a scheme estimated to result in a capital expenditure exceeding one crore of rupees without prior consultation with the Central Electricity Authority.

Section 30 of the Electricity (Supply) Act, 1948 provides that "The Authority shall, before making any recommendations in respect of a scheme upon which it has been consulted under the first proviso to sub-section (2) of section 29, have particular regard to whether or not in its opinion—

- (a) any river-works proposed by the Board will prejudice the prospects for the best ultimate development of the river or its tributaries for power generation, consistent with the requirements of irrigation, navigation and flood control and for this purpose the Authority shall satisfy itself that an adequate study has been made of the optimum location of dams and other river works;
- (b) the proposed scheme will prejudice the proper combination of hydro-electric and thermo-electric power necessary to secure the greatest possible economic output of electric power;
- (c) the proposed main transmission lines will be reasonably suitable for regional requirements;
- (d) the scheme provides reasonable allowances for expenditure on capital and revenue account;
- (e) the estimates of prospective supplies of electricity and revenue therefrom contained in the scheme are reasonable."

5. The Central Electricity Authority has not appointed any staff of its own. The technical examination of all such power schemes is in fact carried out by the Central Water and Power Commission.

B. Multiplicity of organisations for scrutiny

Scrutiny of Power Projects.

6. The Committee were informed that after a scheme report involving power generation was received from the State Government/State Electricity Board in the Central Water and Power Commission, immediate arrangements were made to distribute copies of the same to various

Directorates of the Commission and to the Technical Section of the Ministry of Finance for scrutiny and comments. After the comments were received and coordinated, the State Government/State Electricity Board was addressed in case any clarification was required or in case it was found necessary to modify the scheme. The clarifications/data received from the State Government/State Electricity Boards were examined and if found satisfactory, the final comments were prepared and submitted for consideration of the Advisory Committee on Irrigation, Flood Control and Power Projects which comprised representatives of the Planning Commission, Ministry of Irrigation and Power, Ministry of Finance, Central Water and Power Commission and consultants of the Government of India. The Committee is presided over by the Minister of State for Irrigation and Power. After obtaining clearance of the project report from this Committee, the formal approval to the scheme is issued by the Planning Commission.

A number of State Electricity Boards have expressed to the Committee their dis-satisfaction over the multiplicity of the Central organisations and cumbersome procedure followed by them in undertaking scrutiny of the schemes which had resulted in serious delays. The Committee would like to quote the following passage from the memorandum furnished by a State Electricity Board :—

“In many of these matters, the Ministry of Irrigation and Power is able to act only as a recommendatory body, the final sanctions or orders being issued either by the Planning Commission or by the other Ministries of the Government of India. It is felt that since the Ministry of Irrigation and Power is not able to act and take decisions all by itself in the majority of the matters mentioned above, there is inevitable delay in the execution of power projects. The Ministry of Irrigation and Power has heavy responsibilities to shoulder but it does not appear to have the necessary authority to act speedily. It is, therefore, desirable that the question of clothing this Ministry with adequate authority to enable quick decisions being taken is given immediate attention.”

The Central Water and Power Commission Reorganisation Committee (Gokhale Committee) have also drawn attention to the “erosion of authority of the Central Water and Power Commission that has been steadily taking place in relation to the functions originally assigned to it in the 1951 Resolution” and made the following observations:—

“The Planning Commission has asked for a second opinion on a few technical issues on which the

Central Water and Power Commission had already tendered advice. Special Committees were appointed to consider those issues."

The representative of the Ministry stated during evidence that the project schemes were technically examined by the Central Water and Power Commission and submitted directly to the Planning Commission and not through the Ministry. The representative of the Ministry of Finance added that the Technical Advisory Committee being under the Planning Commission ensured automatically that after a scheme was approved by it, the approval of the Planning Commission was given as a matter of course. If it were under the Ministry, the Planning Commission would theoretically reserve the right to include it or not in the plan or to set up their own technical organisation to review the decision of the Technical Advisory Committee.

7. In this connection the Committee would like to draw attention to the history of sanction of fourth generating unit at the Bokaro Thermal Plant.*

The Committee note that though the Damodar Valley Corporation had initiated the proposal for installing the fourth power generation unit at Bokaro as early as April, 1953, the project was cleared for execution by the Government of India only in May, 1956. This period of more than three years was passed in correspondence and conference between the Ministry of Irrigation and Power, Damodar Valley Corporation, Central Water and Power Commission, the participating Governments and the Planning Commission. This is but one of the instances which goes to show how multiplicity of organisations for vetting power schemes result in delay. The multiplicity of organisations also make it difficult to pinpoint the responsibility for such delays. The Committee cannot therefore too strongly stress the need for streamlining the procedure so that power schemes are vetted and sanctioned more expeditiously.

8. The Committee note that Gokhale Committee had also examined the procedure and working of the Central Electricity Authority and made the following recommendation:—

"The procedure now is that the schemes from the States are received in the Central Water and Power Commission; they are subjected to technical examination and are then put up for clearance to the Advisory Committee appointed by the

*The expansion of Bokaro Thermal Plant—Case Study—Indian Institute of Public Administration, pp. 348 to 371—July-Sept. 1962.

Planning Commission. Subsequently, the same schemes are put up to the Central Electricity Authority. This procedure, besides leading to delay does not seem to serve any purpose except that of formal compliance with the statute."

* * *

"The functions of the Central Electricity Authority other than arbitration, as laid down in Section 3 of the Electricity (Supply) Act, 1948, should, by an amendment of the Act, be taken out of its purview. The Central Electricity Authority should be renamed as the Standing Arbitration Board."

The Government have not accepted the above recommendation for the following main reasons:—

- (i) The Central Electricity Authority is charged *inter alia* with the development of a sound, adequate and uniform national power policy and particularly with the coordination of the activities of the planning agencies in relation to the control and utilisation of national power resources. In view of the heavy programme of power development in the country, any change in the constitution of the Central Electricity Authority and reduction of its functions to a mere Arbitration Board would be a retrograde step;
- (ii) The Central Water and Power Commission is at present serving as the Secretariat of the Central Electricity Authority and calls for information from private sector under the power vested in the Central Electricity Authority in this regard. If the functions of the Electricity Authority are restricted to arbitration only, the Central Water and Power Commission will have no authority to call for such information; and
- (iii) The Central Electricity Authority has no separate staff of its own and, therefore, no economies are likely to result by amending the Electricity (Supply) Act, 1948.

The Committee were informed by a number of State Electricity Boards that the functions relating to development of a sound, adequate and uniform national power policy were not in actual practice being performed by the Central Electricity Authority.

The Central Water and Power Commission had also confirmed this by stating that the Authority was mainly discharging arbitral functions and that the other functions

of investigation and coordination of the activities of the planning agencies were not being discharged.

During the course of evidence, the representative of the Ministry while accepting the position stated that there was a proposal to amend the Electricity (Supply) Act, 1948 when the matter would be examined. He added that the functions would have to be 'very radically modified' to decide what should be the functions of the Planning Commission, Central Water and Power Commission and the Ministry of Irrigation and Power so far as 'sound, adequate and uniform national power policy' was concerned.

The Committee suggest that the proposed review of the Electricity (Supply) Act, 1948 may be made at an early date.

Need for closer contact with Chairmen of State Electricity Boards.

9. The Committee were informed by some of the Chairmen of the State Electricity Boards that the Ministry had not convened a meeting of all the Chairmen of the State Boards since the last meeting held in 1960.

The Committee feel that there is need to establish closer contact with the Chairmen of the State Electricity Boards in the matter of planning for power. They recommend that meetings may be held periodically which may not be less than once a year.

C. Regional and Central Agencies for Power Development

Phenomenal rate of Power Requirements.

10. Looking to the pace of industrial development in the country, the power requirements are found to grow at a phenomenal rate. This calls for exploitation of the natural resources in the most economical manner for the benefit of the entire nation.

Power Survey Conference, 1963.

11. The Committee note that the First Annual Power Survey Conference which was held in February, 1963 and was attended by the representatives of the State Electricity Boards, Electricity Undertakings and the Planning Commission, considered that future power plans could not be related, as at present, merely to resources and requirements of individual States due to the fact that national resources of the country were not evenly distributed over the various political divisions of the country into States and zones.

Coordinated National Power Policy.

12. The Committee also note that the Third Five Year Plan, while discussing the problem of a coordinated national power policy states that "this calls for exploitation of the natural resources in the most economical manner for the benefit of the entire region regardless of State boundaries. Thus, steam power stations should be sited near collieries, washeries and oil refineries. The cheapest hydro

sites in any river basin should be harnessed in an appropriate order of priority. Nuclear power stations should be located in regions where other resources of energy are inadequate or expensive."

The Committee feel that time has come when the power plan should not merely be related to the resources and requirements of an individual State but should be related also to the interests of a region. It may well be that power resources in one State may have to be developed at an accelerated pace to enable utilisation of power in the neighbouring States. Similarly, the pattern of hydro-electric development in a State may have to be shaped in the light of requirements for coordinated operation of nuclear or thermal stations in adjacent States.

13. As regards the agencies for administering power stations, the representative of the Ministry informed the Committee during evidence that the Government were gradually going in the direction of regional generation of power and establishment of authorities. He added that "gradually it may mean taking over of the entire business of generation, supplies, operation etc. by the central generating authority."

**Central and
Regional
Power
Agencies.**

The Committee note that the subject of regional and central agencies for generation of power had also figured at the Eighth Irrigation and Power Seminar held at Ootacamund in September, 1962. A Sub-Committee of the Seminar, which had gone into the question, had *inter alia* stated in its report—

"The pattern of organisation for achieving the above objectives was discussed at length by the sub-committee and it was agreed that regional agencies with full responsibility for the planning of new power stations and major transmission lines and integrated operation of the generating stations and the grid systems in the regions and also a central agency entrusted with the overall responsibility for national planning and coordination of the activities of regional agencies will be desirable.

The scope of the regional agencies and the Central agency and the powers to be exercised by these agencies and other ancillary matters should be examined by a committee consisting of the representatives of the State Electricity Boards and the Centre and a report should be submitted at the earliest to the Irrigation and Power Ministry for consideration."

**Narmada
Power
Project.**

14. The representative of the Ministry stated during evidence that the State Electricity Boards had agreed in principle to the above proposal for setting up regional agencies for planning and generation of power. The Committee were informed that four States namely, Maharashtra, Madhya Pradesh, Gujarat and Rajasthan had already shown their readiness to co-operate with the regional generation of power from the Narmada. There was also great deal of understanding and collaboration in such matters between the States of Jammu & Kashmir, Punjab, Rajasthan and Delhi.

**Electric
Power
Survey
Committee.**

15. The Committee also note that the Executive Group of the Electric Power Survey Committee had recommended at its meeting held in February, 1963 that the country might be demarcated into the following seven regions keeping in view the existing and future transmission systems in each State and the proximity of the power system in adjacent States:—

Region I.—Western Ghats comprising the States of Kerala, Madras, Mysore and South Andhra;

Region II.—Eastern Ghats comprising the northern part of Andhra Pradesh, southern part of Orissa, the eastern part of Maharashtra and the central and southern parts of Madhya Pradesh State;

Region III.—Satpura region comprising the entire State of Gujarat, Western Maharashtra, the western portion of Madhya Pradesh and the southern extremity of Rajasthan;

Region IV.—Western Himalayas comprising the entire States of Jammu & Kashmir, Himachal Pradesh, Punjab, Delhi and Rajasthan.

Region V.—Central Himalayas comprising the entire State of Uttar Pradesh and the northern-most part of Madhya Pradesh;

Region VI.—Eastern Himalayas comprising the entire States of Bihar, West Bengal, D.V.C. and the northern part of Orissa; and

Region VII.—Comprising the entire States of Assam, Manipur, Tripura, NEFA and Nagaland.

It has been proposed that the regional power agency should be vested with the responsibility of planning new power stations and major transmission lines and integrated operation of power systems in the region as a whole. The agency would comprise technical representatives of the State Electricity Boards concerned and organisations like D.V.C., Delhi Electric Supply Undertaking etc. and a representative of the Central Electricity Authority. Where

there is no State Electricity Board, a representative of the State Electricity Department would be included. A representative of the Regional Association of the Federation of Electricity Undertakings in India would also be included in the Regional Power Agency, wherever necessary.

16. The Committee note that the Third Five Year Plan envisages that:— **Regional and Super-grids.**

“All power stations should be inter-connected to form State, Zonal or super-grids so that the energy is pooled and used to the best advantage of the region. Inter-connected operation of power stations and power systems will improve the performance of electricity supply undertakings by raising the load factor, reducing the requirements of standby machinery and enabling the efficient operation of the available plant.”

System inter-connections assume great importance today as it is possible by this means to create additional load-carrying capacity in a much shorter time and at a much lesser cost without establishing new, separate generating units.

17. The Committee were informed that the following inter-State links would be established in the Southern Region during the Third Plan period:— **Southern Region Grids.**

(i) *Between Kerala and Madras:*

220 kV single-circuit line from Pamba in Kerala State to Madurai in Madras State.

(ii) *Between Madras and Mysore:*

220 kV single-circuit line between Singarapet in Madras State and Bangalore in Mysore State.

(iii) *Between Madras and Andhra:*

220 kV single-circuit line between Singarapet in Madras State and Cuddapah in Andhra State.

It is estimated that, when the four systems are inter-connected and operated on an integrated basis, there will be a saving of about 265 MW in installed capacity by the end of the Third Plan period on account of diversity in system demands and reduction in standby capacity. In terms of economic benefit, apart from other benefits inherent in such operation, it is estimated that there will be a saving of Rs. 22.73 crores in the capital outlay and Rs. 2.60 crores in the annual running charges after allowing for the capital and running charges involved in the construction of the inter-State links mentioned above together with the

associated grid sub-station equipment and a Central Load Frequency Control Station.

**Eastern
Region
Grid.**

18. Similarly in the Eastern Region, it has been proposed to evolve suitable inter-connections between the Damodar Valley Corporation power system and the West Bengal and Bihar power systems so that integrated operation of various generating stations may become possible. As a result of inter-connection and integrated operation of the various power systems in the Eastern Region, it is estimated that there will be a saving of about 350 MW in installed capacity by the end of the Third Plan period on account of diversity in system demands and reduction in standby capacity. Besides other benefits that will accrue from integrated operation of the power systems in the Eastern Zone, there will be a saving of about Rs. 27·15 crores in the capital outlay and Rs. 4·8 crores in the annual running charges after making due allowance for the capital and running charges involved in the construction of the various inter-State links together with the associated Grid sub-station equipment and a Central Load Frequency Control Station.

**National
Grid, U.K.**

19. One of the advantages of national grids as pointed out by the Committee of Inquiry into the Electricity Supply Industry in the United Kingdom (popularly known as the Herbert Committee) was improvement in thermal efficiency. Thermal efficiency had increased from 21·22 per cent. in 1948-49 to 23·83 per cent. in 1954-55 and to 26·80 per cent. in 1960-61 and had yielded a total coal saving of about 17 million tons, and a total cost saving of some £ 53 million. It had led not only to a more effective pooling of plant and increased efficiency of generation, but the cost of production had been reduced by the concentration of output at the most efficient stations and through the considerable capital saving arising from the reduced margin of spare generating capacity required after the connection of stations to the grid.

The Committee note that the above studies indicate that large scale economies could be achieved by integrated operation of power systems in the country.

The Committee feel that the establishment of regional grids and regional power agencies seem to be developments in the right direction. They note that a committee composed of representatives of the State Electricity Boards and the Centre will examine the scope of the regional agencies and the central agency and their powers and ancillary matters. The proposal is of sufficient importance for a Committee to go into the question in detail and bring out all the implications after ascertaining the reactions in the places which would be affected by the proposal for it is necessary to have the fullest cooperation of the States concerned in such a development.

II

PLANNING FOR POWER

20. The per capita generation of electricity in India was 16 kWh in 1951, 28 kWh in 1956 and 45 kWh in 1961 and is expected to be about 95 kWh in 1966. Though the percentage increase in each of the five year plan periods works out to about 100 per cent and even more, the fact remains that the kWh generated per capita in India is very low as compared to advanced countries. This would be clear from the table given below:

Name of country	Annual generation in million kWh			kWh generated per capita		
	1938	1958	Per- centage Increase	1938	1958	1961
Norway . . .	10,500	27,180	159	n.a.	7,708	9,300
Canada . . .	26,004	96,744	272	2,328	15,674	..
U.S.A. . . .	1,41,000	7,24,008	413	1,092	4,155	4,780
Sweden . . .	8,148	30,420	273	2,172	4,102	..
Switzerland . . .	7,044	16,872	139	1,692	3,254	..
U. K. . . .	30,696	98,508	220	648	1,906	2,420
West Germany . . .	55,236	94,212	71	732	1,807	2,260
France . . .	18,576	61,800	233	n.a.	1,389	1,662
Japan . . .	26,712	80,280	200	372	875	1,252
India . . .	3,396	12,372	264	8.4	31	45.8

As "kWh generated per capita" is a sure index of country's industrial growth, the Committee feel that if India is to advance along the path of industrialisation, planning for power should receive high priority.

21. The study made by the National Council of Applied Economic Research, New Delhi in their publication entitled "Demand for Energy in India 1960—1975" has revealed that demand for electricity not only tends to grow more rapidly than that of other types of energy but also at a much higher rate than the net national output. The Council has drawn the following conclusion:

**Demand
for power.**

"A doubling period of ten years corresponds to an annual rate of industrial growth of about 4.25 per cent which is a normal rate for countries

with highly developed industrial economies. According to our calculations, the rate of growth in India will be between 8 and 9 per cent annually, that is, almost double the rate of growth corresponding to a ten year doubling period. It is, therefore, to be expected that the doubling period in India will continue to be five years as long as the rate of industrial growth is sustained at this high place."

The Committee find from the following table indicating the pattern of utilisation anticipated in 1965-66 as compared to the years 1951-61 that the largest consumer of power is industry:

Category	Anticipated Consumption in 1965-66 (Million kWh)	Percentage of total generation	
		1965-66	Range of variation during 1951-61
Domestic or residential light and small power	3,400	7.6	7.5 to 8.0
Commercial light and small power	1,900	4.2	4.2 to 4.8
Industry	28,400	63.1	61.3 to 62.9
Traction	1,800	4.0	2.3 to 4.4
Public Lighting	400	0.9	0.9 to 1.0
Irrigation	1,900	4.2	2.4 to 4.2
Public water works and sewage pumping	900	2.0	2.3 to 2.8
Transmission losses, consumption in auxiliaries etc.	6,300	14.0	14.4 to 16.3
TOTAL	45,000	100.0	

The Committee note that the requirements of power for industry have increased from 61.3 in 1951 to 62.9 in 1961 and are expected to further increase to 63.1% in 1965-66. This underlines the importance of co-ordinating power programmes with industrial programmes.

Economics of Planning for Surplus Power.

22. The Committee understand that the capital investment required to consume certain amount of electric power in industries like textiles, consumer goods production,

machine tool production or heavy industry, is between five to ten times the capital investment required to produce the same amount of power. If too much power were installed, say by 10%, the excess expenditure on power would be between 1 to 2 per cent of the total expenditure on the industrial part of the plan. If on the other hand, too little power were installed by 10%, the entire industrial production would go down by 10%.

Since the cost of installing 1 kW of electric power is but a fraction of the capital investment required to utilise it, it is obvious that if in any eventuality power generating capacity was underutilised it would entail less overall loss to national economy than would be the case if productive machinery was to be rendered idle on account of power deficit. Past experience, in India and other countries, clearly shows that in a developing economy the demand for power nearly always outruns the available supply. Planning for surplus power is, therefore, essential for achieving an optimum rate of growth in the country. The Committee strongly recommend that power being a primary source of energy should be one step ahead of industrial and other requirements.

23. Under the existing procedure of power planning, it is aimed to provide additional generating capacity just sufficient to meet the demands anticipated at the end of a particular plan period. As it takes 3 to 5 years to instal and commission a power project after sanction, it is evident that if work on these projects is only started after the new plan period commences, serious power shortage would be experienced in the intervening period. This is borne out by the experience of the first two years of the Third Five Year Plan.

**Avoiding
Serious
Power
Shortage in
the First
half of a
Plan
period.**

A Chairman of State Electricity Board has stated in his memorandum to the Committee:

“Under the present procedure of power planning, we are aiming to provide additional generating capacity just sufficient to meet the demands anticipated at the end of a particular plan period. As new projects to be sanctioned and taken up in the next plan period cannot be brought to beneficial use till the middle of that plan period, there will always be shortage of power during the initial years of the plan period which results in pent up demands. The solution, therefore, is to plan in the first instance for meeting the anticipated load demands from the middle of a plan period to the middle of the next plan period rather than from a beginning of a plan period to the end of the same plan period.”

Sachdev Committee who had gone into the reasons for power failure in Bihar and West Bengal in 1961 had also recommend that "it is imperative to go into the question of power requirements during the Fourth Plan period almost immediately. It will be helpful if the new power plants to be installed during the Fourth Plan could be sanctioned by the end of 1962 so that all preliminary steps could be taken in good time and the period of shortage of power in the early years of the Fourth Plan reduced to the minimum. Unless this is done, we visualise serious shortage of power during the early years of the Fourth Plan period".

The Estimates Committee are glad to learn that the Central Water and Power Commission have prepared a tentative list of new power generation schemes in respect of which advance action is called for during the current plan period so that benefits therefrom are available in the first two years of the Fourth Five Year Plan period. A detailed note on the subject received from the Ministry of Irrigation and Power is reproduced in Appendix III. It will be seen therefrom, that an outlay of Rs. 62 crores is required for creating an additional generating capacity of 2 million kW by 1966-67 and that another Rs. 67 crores are required for creating a further generating capacity of 2 million in 1967-68. It was stated that the tentative draft of the Fourth Five Year Plan and of the perspective plan for power development for 1966—81 had been circulated to various State Governments. Comments had started coming in from the State Governments and were being studied. Discussions were also being held on the subject in the Central Water and Power Commission by the State Electricity Board authorities. As soon as these discussions were over, the programme for the first two years of the Fourth Plan could be finalised in consultation with the Planning Commission.

The Committee hope that Government would not allow the phenomenon of shortage of power, which has handicapped the industrial and developmental plans in the first two years of the Third Plan to recur in the next plan period. They would like to emphasise that Government should sanction in time the power projects required to meet the additional requirements in 1966-67 and 1967-68.

The Committee are glad to note that perspective plans of power requirements till 1981 have been drafted. Planning for power is in fact a continuous process and the perspective plans have to be reviewed in the light of requirements revealed by power surveys. The Committee would like the Government to pay close and continuous attention to perspective planning so that the targets fixed are fully in consonance with the requirements.

Exploring Water Power Resources.

24. The potential of water power has been generally estimated to be about 41 million kW distributed as shown below:

**Large
untapped
Hydro
Power
Potential.**

Geographical Region	Power potential in million kW
West-flowing South Indian rivers	4.35
East-flowing South Indian rivers	8.63
Central Indian rivers	4.29
Rivers of Ganga basin	4.83
Rivers of Indus basin	6.58
Brahmaputra and others	12.49
TOTAL	41.17

The representative of the Ministry stated during evidence that Government had carried out preliminary studies on the basis of topographical maps and other available data and come to the conclusion that it would be economically feasible to develop 238 hydro schemes in the country with total power potential of 41 million kW at 60 per cent load factor. Of these schemes, 28 major hydro-schemes were in operation, 45 were included in the Third Plan and 62 were under investigation by the State Governments with the help of the United Nations Special Fund for inclusion in the Fourth Plan.

As it is an established fact that hydel is the cheapest source of power in India, the Committee would urge the Government to investigate and prepare blue prints of all the remaining hydro-electric schemes so that they can be readily available for being taken up to meet the increasing demands. This is all the more desirable as India has all the requisite experience for undertaking investigation and preparation of project reports as also the implementation of hydel-schemes.

III

PLAN—PERFORMANCE AND TARGETS

A. First and Second Five Year Plans.

25. The table below indicates the targets for power development and achievement during the First and Second Five Year Plans:

(In Million kW.)

Plan	Installed Capacity at the commencement of Plan	Target	Achievement
First Five Year Plan	2.30	3.70	3.42
Second Five Year Plan	3.42	6.90	5.60

The Committee were informed that difficulties were experienced in achieving the targets during the Second Five Year Plan due to shortage of foreign exchange and scarcity of certain construction materials like steel and cement. Furthermore, many power projects had received a set-back on account of foreign exchange crisis during the period 1956 to 1958 when an embargo was placed on the import of power plants and equipment. As a result of reappraisal of the Second Plan in 1958, some of the power schemes originally included in the plan were classified as "non-core" projects.

One of the Chairmen of the State Electricity Boards stated during his evidence "I will say that the Planning Commission had done an unwise thing. At any rate, in the light of the experience we now have, we can say that had they included the power projects in the core projects, many difficulties that were experienced subsequently in the industrial development in greater part of the economy would not have arisen."

The above statement was also corroborated by the other Chairmen of the State Electricity Boards during their evidence before the Committee.

The representative of the Ministry also stated during evidence that some of the power projects originally included in the Second Plan were put in the 'non-core' as a result of which their execution was delayed and the country was paying for it to-day. He also read out the following extract from the speech made by the Deputy Chairman of the Planning Commission before the Federation of Indian Chambers of Commerce and Industry in September, 1962:

"When the Second Plan was reappraised in 1958, and plan projects came to be divided between 'core' and 'non-core' schemes, power development received a serious setback. It was realised then that cuts in foreign exchange allocations for the power programme would lead to difficulties later, specially, in the early phases of the Third Plan. It was, however, not sufficiently appreciated that to secure a balance between different sectors of the economy even at a somewhat reduced tempo of development, there had to be corresponding adjustments in other sectors, specially in relation to licensing of industrial capacities in the private sector. The fact that industrial licensing continued as before while the expansion of power facilities had to be slowed down was an important element in accentuating shortages in later years specially in some parts of the country."

A note furnished by the Ministry regarding efforts made by them to get all the major power schemes included in the core of the Second Five Year Plan, is reproduced in Appendix IV.

The Committee note that the Third Five Year Plan contains also an admission to the effect that delays in the execution of some of the power projects such as Bhakra-Nangal, Koyna, Rihand and Hirakud was another factor contributing to the shortfall.

The Committee consider it unfortunate that there was shortfall of 1.20 million kW in the installed generating capacity during the Second Five Year Plan due firstly to a number of power schemes being relegated into the non-core group of the Plan, on the ground of foreign exchange difficulties and because of delays in the execution of some of the important projects such as Bhakra-Nangal, Koyna, Rihand and Hirakud.

B. Third Five Year Plan.

**Targets
Insufficient
to Meet
Growing
Tempo of
Industria-
lisation.**

26. The following table suggests the likely phasing of benefits during the Third Plan:

Year	Additions during the year (million kW)	Aggregate installed generating capacity by the end of the year (million kW)
1961-62	0.58	6.18
1962-63	0.65	6.83
1963-64	1.17	8.00
1964-65	2.00	10.00
1965-66	3.45	13.45

It will be seen that by the end of the Third Plan, 13.45 million kW are expected to be in commercial operation.

The basis for inclusion of generation schemes has been stated in the Third Plan as follows:—

“The expected load demand in the next few years has been the main criterion in determining the size of the power programme in the States during the Third Plan. Detailed load surveys conducted by the Central Water and Power Commission towards the end of the Second Plan indicated much higher demands than were assessed at the time of the preliminary load surveys in 1958. The former along with the proposed industrial programme have formed the basis for inclusion of generation schemes in the Third Plan.”

The Committee were furnished with a statement showing the installed and firm generating capacities, the anticipated demands and shortage or surplus of power in various States during each year of the Third Five Year Plan which is given in Appendix V. They were, however, informed that due to certain subsequent changes, this statement was under revision and similar details in respect of the Union Territories (excluding Delhi) had not been prepared. Based on the figures detailed therein, the following table indicates the position regarding the estimated demand, firm generating capacity and surplus/shortage for

the entire country, except Union Territories (excluding Delhi), during the years 1961 to 1966:—

Year	Estimated Demand	Firm Generating Capacity	Surplus(+) Shortage(-)
	(MW)	(MW)	(MW)
1961	3629.6	3276.5	(-) 353.1
1962	4530.3	3792.9	(-) 737.4
1963	5423.5	4433.4	(-) 1020.1
1964	6577.8	5206.9	(-) 1370.9
1965	7612.9	6700.5	(-) 912.4
1966	9417.6	8962.3	(-) 455.3

It is a matter of concern that firm generating capacity in the country would continue to lag behind the anticipated demand throughout the Third Five Year Plan. The position is likely to improve somewhat during the last year of the Third Plan but the Committee note that the overall shortage would in fact increase from 353.1 MW in 1961 to 455.3 MW in 1966. Power supply at the end of the Plan is expected to be short in all the States, except Jammu and Kashmir, Kerala, Rajasthan and Delhi. The shortage is expected to be the heaviest (202.5 MW) in Bihar—D.V.C.—West Bengal region. The additional requirements of power for the defence-based industries may further aggravate the shortage.

*C. Measures proposed for augmenting Supply.
Additional generating capacity.*

27. The Committee were informed that with a view to augmenting power generation in certain States, the Planning Commission had included the following new schemes over and above the schemes originally included in the Third Five Year Plan:—

More power Schemes sanctioned in 1962.

Schemes	Addition Capacity (MW)
(1) Extension of Durgapur Coke Oven Power Station (West Bengal) 1 x 75 MW	75
(2) Installation of sixth generating unit at Rihand (U.P.) 1 x 50 MW	50
(3) Extension of Kanpur Thermal Station (U.P.) 2 x 30 MW	60
(4) Narywal-Bibra Thermal Station (Assam) 2 x 30 MW	60
(5) Installation of fifth generating unit at Bhakra right bank Power Station (Punjab) 1 x 70/120 MW	70

Schemes	Additional Capacity (MW)
(6) Installation of gas-turbine generation unit (Andhra Pradesh) 2 x 10 MW	20
(7) Installation of gas-turbine generating unit (Mysore) 2 x 10 MW	20
(8) Installation of additional diesel generating sets (Assam) 10 x 1 MW	10
(9) Installation of package plants (West Bengal) 6 x 1.5 MW	9
10) Kalakote Thermal Station (Punjab) 2 x 30 MW	60
(11) Nichahom Thermal Scheme (Jammu and Kashmir) 2 x 7.5 MW	15
TOTAL	449

In addition to the scheme noted above, against 2 x 30 MW generating units tentatively approved under the Third Plan for installation at Barauni in Bihar, revised sanction has been accorded for the installation of 2 x 50 MW units. Similarly for the Pathratu Thermal Power Station (Bihar), sanction has been accorded to raise the total installed capacity from 350 MW to 400 MW. All these schemes aggregating to a generating capacity of 559 MW were stated to have been sanctioned only during the year 1962 and arrangements were on hand for early implementation of those schemes (including ordering of plants). These extensions were primarily intended to meet additional demands from industries and were expected to yield benefits only during the latter period of the Third Plan.

The Committee were informed by the representative of the Ministry during evidence that orders had been placed for 4 units of 10 MW each in the U.S.A. and 10 units of 1 MW each in West Germany. Besides the above, 6 units of 1.5 MW each had been ordered for installation in West Bengal which were likely to be commissioned during July to September, 1963.

The Committee are glad to note that Government have taken some measures in 1962 to augment power generation. It is yet to be seen as to how far in actual practice these measures are able to relieve the acute shortage of power which is already being experienced in several States in the current year and which is likely to become even more acute in 1964. The Committee hope that Government would ensure that the additional capacity sanctioned by them is brought into commission as early as possible to relieve shortage. In particular they would like to suggest that package units, for which orders have already been placed be imported at an early date. These

could be installed with expedition in areas which are experiencing the most acute shortage of power for industrial and defence needs. The Committee would also suggest that the position may be kept constantly under review so that necessary steps can be taken without avoidable delay to relieve power shortage as much as possible.

28. In response to a query, the representative of the Ministry stated during evidence that Government had proposals for obtaining standby plants of a total capacity of 100,000 kW for meeting the emergency requirements. This would be in the shape of mobile units, gas-turbo units and diesel units. The power generated would be made available at places where the emergent requirements cannot be met by the existing sources. The Committee understand that Government have only sanctioned up to 25,000 kW for the present and that the proposal for the remaining 75,000 kW had been kept in suspense.

**Standby
Power
Plants.**

In view of the need for meeting power requirements on emergent basis, the Committee recommend that urgent action may be taken to procure the standby units to the entire capacity of 100,000 kW.

29. The Committee have already referred in para 26 above to the fact that the shortage of power is expected to be the heaviest (202.5 MW) in Bihar—D.V.C.—West Bengal region. This is in no small measure due to the inability of D.V.C. to meet the load in this heavily industrialised area. The attention of the Committee has been drawn to the report of Sachdev Committee. In particular the Committee view with serious concern the following observations made by Sachdev Committee:

**Set-up of
D.V.C.**

“During our discussions we found that there were some serious differences in the approaches of the participating Governments and the D.V.C. in the matter of power development within the Valley and outside it.

* * *

“We feel that such differences must inevitably lead to friction and want of smooth and harmonious working when consultations with the participating Governments are necessary and there are basic differences in approach in some important matters. It is necessary that in the light of the difficulties mentioned above and the existing provisions of the D.V.C. Act, the entire working of the D.V.C. should be reviewed by the Central Government in consultation with the Governments of Bihar and West Bengal so as to evolve

suitable procedures as would make for smooth and harmonious working."

The Committee have given careful thought to the question of smooth and effective functioning of the Damodar Valley Corporation in so far as it relates to generation and transmission of power in Bihar-West Bengal region. They cannot but agree with the following views expressed by the Public Accounts Committee in their Fifth Report (Third Lok Sabha) on the Audit Report on the Accounts of the Corporation for the year 1960-61:—

".....They feel that time has come to make an overall assessment of the working of the Corporation and also to examine what amendments, if any, in the D.V.C. Act are called for to achieve the objectives for which the Corporation was set up."

D. Proper upkeep of plant and generating units.

30. The Committee were informed during evidence that the Ministry had carried out a census of generating units in the country which were either not in use or required repairs.

These units should serve not only as additional standby capacity but also to augment the present short supply in the country. The Committee, would, therefore, urge the Government to devise suitable measures whereby the existing power resources could be exploited to the best advantage of the country by (i) pressing into service all grounds of economy; (ii) ensuring full availability of power supply by careful operation and maintenance of both new and old plants; and (iii) taking good and timely care to see that all essential spare parts are kept in stock for carrying out immediate repairs in case of breakdowns.

E. Rural Electrification

31. One of the important objectives of the Third Plan is to develop efficient small scale industries in small towns and in rural areas so as to increase employment opportunities and diversify rural economy. The Third Plan points out that electricity is being increasingly used for irrigation pumping and its scope is likely to increase rapidly. Thus, in relation to the development of the rural economy, rural electrification has a growing importance and its value cannot be assessed only in terms of immediate economic benefits. The major limiting factor in achieving these aims is the lack of power. The Third Plan provides for an outlay of Rs. 105 crores for rural electrification. The following table gives the distribution of towns and villages in terms

**Keeping
Power
Plants in
running
order.**

**More power
needed for
develop-
ment of
rural eco-
nomy.**

of population range, number electrified during different plan periods and those expected to be electrified by the end of the Third Plan:—

Population range		Total number according to 1951 Census	Number electrified 31st March of			Number expected to be electrified by March, 1966
			1951	1956	1961 (estimates)	
Over	100000	73	49	73	73	73
50000 to	100000	111	88	111	111	111
20000 to	50000	401	240	366		401
10000 to	20000	856	260	350	756	856
5000 to	10000	3101	258	1200	1800	3101
Less than	5000	556565	2792	5300	19861	38458
TOTAL		561107	3687	7400	23000	43000

It is expected that by the end of the Third Plan, all towns and villages with population exceeding 5000 may be electrified.

32. As regards the requirements of power in rural areas, two statements showing (i) rural and urban consumption for the year 1960-61 and (ii) anticipated rural consumption in 1965-66, are given in Appendices VI and VII. It is seen therefrom that the total consumption of power would increase from 3,398.8 million kWh in 1960-61 to 3,723.5 million kWh in 1965-66. The Committee were informed that the Union Minister for Irrigation and Power had addressed a letter to the Chief Ministers in September, 1961 on rural electrification. The Minister had urged in his letter that in areas where adequate power supply was available to meet all demands, the State Electricity Boards should take special promotional steps for stepping up the pace of rural electrification. In other cases where adequate power was not available, the demands of rural areas might be met as far as possible even though no fresh loads could be given in urban areas.

Priority for Rural Electrification.

The Committee would urge that high priority should be given to power for irrigation pumping as this is one of the most practical ways of stepping up agricultural production.

The representative of the Ministry stated during evidence that the State Electricity Boards were asking for subsidies for rural electrification schemes to which the Central Government was not agreeable. This question was also discussed at the Eighth Irrigation and Power

Seminar held at Ootacamund on the 22nd September, 1962. The Seminar felt that rural electrification would not be able to meet the interest, depreciation and operational charges, and that normally a scheme would take about ten years to meet the recurring expenses. In order to avoid the recurring loss to the State Boards, the Seminar had suggested the following steps:

- (i) the deficit in return from the areas may be made good by other Development Departments or Government;

or alternatively

- (ii) Government may give loans to the State Electricity Boards at no interest for a period of at least five years to cover the capital cost of rural electrification.

The Committee hope that decision on the above recommendation of the Eighth Irrigation and Power Seminar (1962) would be taken soon so that the important schemes of rural electrification make rapid headway.

**Small
Hydro-
Plants.**

33. For insolated areas, the Third Plan envisages installation of small hydro-plants from 10 to 100 kW each which can be set up at a moderate cost. Small hydro-units upto 100 kW capacity are now being manufactured in the country. It is stated that these will be more economical than diesel alternating sets as they are relatively easy to maintain and would not involve any foreign exchange for their procurement and installation. As this aspect of power development is of special significance for hilly areas, a Cell has been functioning in the Central Water and Power Commission for initiating and assisting in field surveys and in installation of such plants. The Committee were informed that 103 sites had been surveyed in this connection and that recommendations had been made for installation of small hydro-electric sets at 35 of these sites. The representative of the Ministry stated that the response of the State Governments had been poor to these proposals for installation of micro hydro-electric sets and only 12 sets had actually been installed.

The Committee suggest that the reasons for poor progress in installation of micro-hydel sets may be investigated with a view to extend their use.

IV

ADMINISTRATIVE DELAYS AND BOTTLENECKS

34. The present procedure of sanctioning projects for effective implementation consists of many stages. The first stage is the preparation of the project for administrative sanction in a State. The second stage is to get it included in the Plan. The third stage is to establish a priority among projects for allocation of resources and the fourth stage is actual implementation and phasing that may be necessitated for various reasons. So far as power projects are concerned, the first and fourth stages are the responsibility of the State Governments. So far as the middle stages are concerned, the Central Water and Power Commission is required to ensure that all necessary investigations have been carried out, the estimates of expenditure are reasonably correct and the estimates of revenue are based on adequate data, before the schemes are finally scrutinised by 'Technical Advisory Committee, constituted by the Planning Commission to examine the projects proposed by the State Governments and to advise the Planning Commission on the technical and financial soundness of the various proposals'.

**Procedure
for Pro-
cessing
Plan
Schemes.**

A. *Incomplete investigation of projects*

35. Unsatisfactory position regarding the investigation and finalisation of the projects has been commented upon both in the Second and Third Five Year Plans. It is observed in the Second Plan that in the case of a number of schemes, for which project reports were received and examined by the Technical Advisory Committee, it was found that the investigations were not complete and the reports lacked details essential for technical and financial scrutiny. However, a number of such projects had been provisionally included in the Plan for 'regional and other considerations', in anticipation of further investigation and detailed revision of the scope and estimate of the projects.

**Incom-
plete inves-
tigations—
a chronic
Feature.**

The Third Five Year Plan also contains a pointed reference to lack of availability of information about public sector projects included in the Plan in the following words :—

"In the course of the preparation of the Third Plan, although to a smaller extent than in the Second, it was observed that many of the projects proposed for inclusion were not worked out fully, nor were they presented adequately. For a considerable number of projects included in the Third Plan, the information available even at this stage leaves much to be desired".

A statement showing the major power schemes (hydel, thermal and nuclear) included under the Third Plan together with particulars relating to installed capacity, construction schedules etc is given at Appendix VIII. The Committee were informed that the necessary investigations in respect of all the schemes in the Third Plan had not been completed as yet and that complete information regarding schemes under investigation was not readily available. They were, however, furnished with a list of schemes in respect of which project reports had not been received but were 'still under investigation'. The list of such schemes, is given at Appendix IX.

The Committee are surprised to note that out of the total plan provision of Rs. 1039 crores in the public sector, an amount of Rs. 100 crores i.e. 9.6 per cent of the total provision, has been provided on account of 58 schemes in respect of which reports have not been received by the Central Government.*

It is obvious that project schemes would have to be prepared and sanctioned before any start can be made in the implementation of the projects. Since two years of plan period are nearly over without the submission of power development schemes envisaged in the Plan, there is bound to be delay in their execution.

The Estimates Committee recommend that work relating to investigation of schemes included in the Third Five Year Plan may be completed without delay.

They would also urge that project studies relating to the Fourth Five Year Plan may be taken in hand forthwith. These should be completed sufficiently early so that as far as possible, fully investigated schemes may be included in the Fourth Five Year Plan.

B. Delays in sanctioning of projects

Administrative Delays.

36. As regards delay involved in scrutiny of projects, Gokhale Committee (1959) had made the following observations in their Report:—

“...considerable time is taken by each Directorate to offer its comments even on small projects. This lends weight to the complaint made by the States that the consideration of the projects gets delayed while they are under scrutiny by the Central Water & Power Commission. The position in the power-side is that the projects have to undergo scrutiny by the Central Electricity Authority in addition to the Central Water and Power Commission and the Advisory Committee.”

*Out of Rs. 100 crores, power development schemes aggregating to estimated expenditure of Rs. 13.65 crores had been received by the Central Water and Power Commission.

A State Electricity Board brought to the notice of the Committee some concrete instances where several months had been taken by the Central Water and Power Commission in according sanction to their scheme reports. The Committee asked for specific details regarding the date of receipt of the scheme reports and the date of communication of sanction by the Central Water and Power Commission. They find from the information furnished by the Ministry that the time taken by the Central Water and Power Commission in according sanction ranges between 4 to 8 months.

In this connection, the Committee would like to draw attention to Section 31 of the Electricity (Supply) Act, 1948 which lays down that the Central Electricity Authority should forward its recommendation to the State Electricity Board within a period of six months from the date of receipt.

The Committee consider that now that the Central Water and Power Commission have a fund of experience of more than a decade, it should be possible for them to conduct technical examination of proposals received from the State Electricity Boards in a more expeditious manner. They recommend that the Central Water and Power Commission may carefully review the procedure for processing such schemes so as to reduce the time to the minimum.

C. Difficulties in execution of Projects

37. The Committee were informed that a Reviewing Team consisting of the Joint Secretary, Ministry of Irrigation and Power, Member (Hydro-electric), Central Water and Power Commission and Adviser, Planning Commission, had visited various States in 1961 for assessing the main difficulties and bottlenecks experienced by the project authorities. Some of these difficulties related to target dates, coordinated action, delays in foreign exchange, procurement of steel, cement, explosives, supplies from Heavy Electricals and other organisational defects. A note showing the action taken by Government to resolve the difficulties pointed out by the Team, is reproduced in Appendix X.

**Need for
timely
Removal
of Diffi-
culties
Experi-
enced by
Project
Authorities**

38. It was brought to the notice of the Study Group of the Estimates Committee that visited the Sharavathy Hydro-electric Project* in September, 1962 that a number of difficulties like shortage of steel, non-availability of foreign exchange and cumbersome procedure for import of

**Delay in
Execution
of S hara-
vathy
Hydro-
Electric
Project.**

*The Sharavathy Valley Hydro-electric Project is one of the biggest power projects in Asia contemplating generation of electric power of nearly one million kW in the final stage at a cost of Rs. 68.43 crores. Power from this project is expected to be generated at a low cost of Rs. 720 per kW.

machinery and equipment had been experienced by the authorities in the execution of the project. The Study Group were given to understand that detailed investigations had not been made before the project was sanctioned. The result was that the design for foundations of some portion of the dam and tunnel had to be modified in the light of subsequent detailed investigations. The Study Group also observed that as a result of heavy rains during the last monsoon, huge quantities of soft soil and debris from the hill slopes had been washed down into the power channel which had been dug and was being lined with cement concrete. Soft soil and debris had also been washed down during the last rains into the concrete base erected for the installation of the power house.

The Committee were informed by the Ministry that the scheme report on the Sharavathy Hydro-electric Scheme Stage I was received by the Central Water and Power Commission from the Government of Mysore in January, 1955. The sanction of the Planning Commission to Stage I of the Scheme estimated to cost Rs. 22.97 crores was accorded on the 7th June, 1956. The reason for the intervening period of one year and six months to process the scheme was stated to be due to the fact that the Advisory Committee at its first meeting held on the 11th February, 1955 had desired to have certain additional details on its hydrology etc. which led to changes in the scope of the project, cost estimates etc. necessitating re-examination of the report *de novo*. The original and revised target dates for the commencement of construction and commissioning of various units of the power house were stated to be as follows:—

Unit	Date of commencement		Date of commissioning	
	Original	Revised	Original	Revised
I	Aug. 61	Dec. 62	Dec. 62	June 64
II.	Oct. 61	Jan. 63	To follow after 3 to 4 months	Dec. 64
III.	Not yet started		...	Dec. 64
IV	Do		...	April 65
V	Do		...	Aug. 65
VI	Do		...	Dec. 65
VII	Do		...	April 66
VIII	Do		...	Aug. 66

The representative of the Central Water and Power Commission stated during evidence that delays in the execution of the project were due partly to the time taken in

the construction of the dam and partly to landslide during the monsoon.

It is unfortunate that the erection of the first two units of the Sharavathy Hydro-electric project would be delayed by about 18 months.. In view of the acute shortage of power being experienced in Mysore State particularly by Defence industries, the Committee have no doubt that Government would make every endeavour to speed up the execution of Sharavathy Power Project.

D. Watching Progress of Schemes

39. The instance cited above highlights the need for maintaining a continuous watch on the execution of major power projects. The Committee were informed that the Central Water and Power Commission had set up an Implementation Cell (Power projects) in August, 1962 to undertake the following functions:—

Need for ensuring strict compliance with Time Schedule.

- (1) continuous review of the stage of execution of each power project included in the Plan;
- (2) assessment of the needs of each power project for ensuring its timely implementation;
- (3) removal of difficulties and bottlenecks experienced by the project authorities in regard to the timely implementation of the power projects;
- (4) liaison work between State Governments, Ministries of Irrigation and Power and Finance, Development Wing of the Ministry of Commerce and Industry and Licensing authorities.

The representative of the Ministry stated during evidence that a senior officer had been appointed in the Ministry to see that the bottlenecks relating to foreign exchange or raw materials were promptly removed.

As regards progress reports of power generation projects costing more than Rs. 1 crore, the Committee were informed that there were a number of projects in respect of which the State authorities had not sent reports in spite of repeated requests. The *pro forma* for submission of progress reports had been recently revised and simplified in consultation with the Planning Commission to make it easier for the authorities to send in time the quarterly progress report. The result of the revision of form for submission of progress reports would be known only after April, 1963, when the first Progress Report on it would be received.

The Committee stress the need for timely receipt of periodical progress reports on major projects from State authorities. Such progress reports should be analysed immediately on receipt in the Central Water and Power Commission in order that immediate action could be taken to resolve the bottlenecks.

They are firmly of the view that once the Government have sanctioned a particular project, all impediments coming in the way of its smooth progress should be removed expeditiously to ensure adherence to plan targets.

E. Problem of Co-ordination

40. The principal bottlenecks in the implementation of construction schedules arise mainly due to delays in:—

- (i) release of foreign exchange and grant of import licences;
- (ii) timely availability of equipment and spare parts; and
- (iii) shortage of scarce material such as steel, cement, explosives, electrical accessories etc.

Foreign Exchange.

The Committee have received general complaints from almost all the State Electricity Boards and representative organisations regarding abnormal delays in the release of foreign exchange. One of the State Electricity Boards has represented:

“Even when the source from which the foreign currency expenditure for any particular project is to be met is known, detailed investigations are made to determine whether the equipment even if it forms a small part of the project as a whole, can be procured from indigenous sources. Considerable amount of time has to elapse before the Development Wing decides the extent to which foreign exchange could be released for any proposals made for such releases.

* * * *

Once a clearance from the Development Wing is obtained, the time involved in actually effecting release of foreign exchange by the Irrigation and Power Ministry is at present excessive.

* * * *

Similarly, once the foreign exchange release by the Irrigation and Power Ministry is sanctioned, the present procedure of issuing the necessary import licence also takes excessive time.”

A Chairman of one of the State Boards had advanced a number of measures for rationalising the procedure for release of foreign exchange and issue of import licences. Two of these measures are mentioned below:—

- (i) The Ministry of Finance may make an *ad hoc* allocation of foreign exchange to the Ministry of Irrigation and Power say for every quarter, and on the basis of this allocation, the Ministry of Irrigation and Power may release foreign exchange.

- (ii) The Development Wing* may every six months draw up comprehensive list of items required for power projects which may be imported during a specific period. On the basis of this list, the project authorities may be permitted to import equipment and for such items it may not be necessary for the Central Water and Power Commission to consult the Development Wing*.

The representative of the Ministry stated during evidence that the question of rationalising the procedure for the release of foreign exchange had already been taken up in conjunction with the Ministry of Economic and Defence Coordination. He stated that the two measures mentioned above were under consideration.

41. The Committee note that the Eighth Seminar on Irrigation and Power held at Ootacamund in September, 1962 had also gone into the question of removal of bottlenecks. The Seminar had recommended: Ooty Seminar.

- (1) streamlining of procedure for the release of foreign exchange and grant of import licences and suitable enhancement of the direct powers of the Ministry of Irrigation and Power in respect of foreign exchange;
- (2) the requirements of machinery and foreign exchange should be planned well in advance of the commencement of the project and the applications for release of foreign exchange should be sent by the project authorities, as far in advance as possible, of the actual needs;
- (3) surplus equipment in each State should be operated in a pool for optimum utilisation, controlled by a properly organised State Mechanical Unit. The surplus spare parts should be physically pooled in each State and the rest should be controlled by a Central inventory so as to reduce the sickness of equipment and burden of carrying stocks of spares in each State;
- (4) it will be the responsibility of the State to furnish up-to-date inventories to the Central Water and Power Commission of the surplus machinery and spare parts. Utilisation of machinery and spares, once declared surplus, should be with the prior concurrence of the Central Water and Power Commission. For discharging this function, the Central Water and Power Commission should be suitably equipped;

*Now Department of Technical Development under the Ministry of Economic and Defence Coordination.

- (5) streamlining of procedure for allocation of all material in scarce supply and requirement of all such material to be planned well in advance to ensure timely supply;
- (6) progressive study of requirement of technical personnel should be taken up.

Since a number of Ministries are intimately connected in finding a solution to these problems, the Committee suggest that the question of setting up a Committee composed of representatives of the Ministries of Irrigation and Power (including Central Water and Power Commission), Finance, Commerce and Industry, Steel and Heavy Industries, and Economic and Defence Coordination for removing the bottlenecks encountered by the project authorities in the procurement of foreign exchange, machinery, equipment, steel, cement, explosives, etc. may be examined. They also suggest that early action should be taken to rationalise the procedure for release of foreign exchange and issue of import licences so as to cut out all delays.

F. Manufacture of Electrical Equipment.

Need for Expanding Manufacture of Heavy Electrical Equipment.

42. The Third Plan provides for an increase in the generating capacity from 5.6 million kW in 1961 to 13.45 million kW in 1966. In consonance with this increase in the generating capacity, the electrical engineering industries will have to be given more attention and resources to cope with the requirements.

The Committee would urge that the manufacture of generators, transformers, high tension switch gears and heavy industrial motors etc. may be geared up to meet the plan requirements.

43. The representative of the Ministry stated during evidence that the Central Water and Power Commission and the State Electricity Boards were not represented on the Board of Directors of the Heavy Electricals Ltd., Bhopal*.

The Committee consider that there should be close liaison between the Heavy Electricals Ltd., Bhopal on the one hand and the Central Water and Power Commission and the State Electricity Boards on the other.

Standardisation of Power Equipment.

44. Experience has shown that economy in cost and speed in installation can be achieved by standardisation of equipment.

During evidence the representative of the Ministry stated that Government had already taken some steps towards standardisation. For example, 14 generating sets of 50,000 kW each of standard design had been ordered in

*At the stage of factual verification of the Report, the Ministry pointed out that the Ministry of Heavy Industries had agreed to appoint two more Directors on the Board of Directors of Heavy Electricals Limited.

bulk for various power projects in the country like Talcher, Ramagundam, Delhi, Satpura, Paras, etc. It was hoped to effect thereby a saving of Rs. 3 crores in foreign exchange (approximately 25 per cent).

Heavy Electricals had also been requested to manufacture only six designs of transformers which would cover nearly 25 different existing designs. Heavy Electricals had also been requested to standardise the generating plants to 3 designs.

The Committee are glad to note that the Ministry have initiated action to standardise power equipment. The Committee feel that with the setting up of the Power Research Institute and the Specialised Engineering Organisation, it should be possible to extend standardisation to other important items of electrical equipment.

V

ASSESSMENT OF DEMAND

Load Planning related to Industrial and Economic planning.

45. Assessment of demand for power is the *sine qua non* of all planning for power development. This was recognised in the First Five Year Plan in the following words.—

“The pattern of power utilisation has to be laid down in advance and the load development has to be carefully planned for every generating unit. The development of power generating capacity should be coordinated with the development of load. If the lag between power generation and load buildings is long, interest charges on capital mount up and make the undertaking uneconomic. Load planning for any large power system is integrally related to the industrial and economic planning of the regions within a reasonable distance of the generating station. Carefully worked out schemes for building up the load must be planned and executed along with schemes of generation.”

A. All India Load Survey Scheme

Load Surveys being made on ad hoc basis.

46. The Government of India decided in 1954 that a systematic power load survey of different regions and the country as a whole might be undertaken by the Power Wing of the Central Water and Power Commission as a National Project. To carry out this assignment four regional load survey offices at Meerut, Calcutta, Bombay and Bangalore were set up in 1955 to function under the overall control of the Director, Load Survey and Load Development. The preliminary load survey reports for all the States (prior to their reorganisation under the States Reorganisation Act, 1956) were completed and issued by the middle of 1957. A revised report was published in the form of a compendium under the name 'Forecast of Power Demand in India—1955-56 to 1970-71 in September, 1958. This quick appraisal was made to facilitate finalisation of power programme for the Second Five Year Plan.

For formulating proposals for the Third Plan, detailed Load Survey Reports were prepared to cover a period of 25 years from 1955-56 to 1980-81. While the detailed load survey of various States in the country was under progress, the Planning Commission desired in 1960 to have a

quick appraisal of load estimates for all the States so as to enable them to discuss the Third Plan projects with the States concerned. The particulars were compiled with the help of data already collected during the detailed load surveys and furnished to the Planning Commission. The progress made in completing detailed load survey till July 1962 is indicated below:---

- | | |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (i) Reports completed and issued: | Andhra Pradesh, Madhya Pradesh, Rajasthan, Orissa, Uttar Pradesh, Delhi, Gujarat, Madras, Assam, Maharashtra, Goa, Himachal Pradesh, Pondicherry and Punjab. |
| (ii) Reports under scrutiny and finalisation : | Jammu and Kashmir, West Bengal. |
| (iii) Reports under preparation: | Bihar, Kerala. |
| (iv) Field Survey in progress: | Mysore. |

The Committee were informed that it was expected to complete detailed load surveys by about March, 1963.

The representative of the Federation of Electricity Undertakings in India stated during evidence that "the load surveys get out of date by the time they are published and made available. If it could be processed quickly and made available to the industrialists, perhaps, they would know what exactly is the latest picture of the load surveys".

A Chairman of a State Electricity Board in his evidence before the Committee also stated that the load surveys conducted so far had proved inadequate.

The representative of the Ministry admitted during evidence that the Ministry had not for sometime past been satisfied with the progress of load surveys.

The need for accurate load forecasting as a pre-requisite condition for systematic planning for power development requires hardly any stress. Unless power load surveys are carried out and results made known early, they lose their value as basis for power planning and economic development. It is, therefore, a matter of regret that the work of power load survey of different regions and the country as a whole which was taken up in 1954 and has already cost the Government about Rs. 20 lakhs has not been completed so far.

B. Decentralisation of Load Survey Work

**Need for
laying down
guiding
principles
for Load
Surveys.**

47. Gokhale Committee had made the following observations regarding the decentralisation of work relating to load surveys:

“.... The State Electricity Boards should make their own arrangements for load survey. This is their function and the expenditure is legitimately chargeable to their estimates. The Central Water and Power Commission has taken over this work on the assumption that the States inflate their figures and thus vitiate the data on which decisions are taken regarding the relative priorities of the projects. We do not fully share the apprehensions of Central Water and Power Commission, nor has any tangible evidence been produced before us indicating that this is the general practice.”

The Committee were informed that the Government had decided that “the State Electricity Boards should themselves undertake detailed load surveys of the area within their jurisdiction. The first load surveys in hand may, however, be completed by the Central Water and Power Commission in accordance with the existing arrangement”.

In pursuance of the above decision, Chairmen of State Electricity Boards|Chief Engineers were advised in May, 1961 to undertake load survey of the areas under their jurisdiction after the first detailed load survey of the country had been completed by the Central Water and Power Commission. It was also indicated that the Commission would draw up instructions for the conduct of the load surveys by the Boards etc. and prescribe procedures, standards and norms, wherever possible in the light of the experience gained from the first detailed load survey of the country which was expected to be completed by March, 1963.

The Committee note that an official of the Central Water and Power Commission has been deputed to the United States to study power forecasting in that country. They also note that work relating to power forecasting has already been taken in hand by Government and that assistance of American experts would also be taken, wherever necessary.

The Committee would in this connection like to refer to the periodical publications brought out by the Edison Electric Institute of the United States which present in a succinct manner relevant statistics regarding electric power supply and manufacture of electric power equipment. It was understood that semi-annual electric power

surveys were published by this Institute which gave the forecast of demands and the capacity to meet it. The representative of the Ministry stated during evidence that these forecasts by the Edison Electric Institute were found to be very accurate and were relied upon by everybody in the United States including the industry and the Government. The Committee note that Mr. Walker Cisler who is connected with the Edison Electric Institute is represented on the Electric Survey Committee which has been recently appointed by the Government to go into the whole field of planning and development of power. (The terms of reference and composition of the Electric Survey Committee are reproduced in Appendix XI.)

The Committee hope that load surveys would be completed shortly and that work relating to power forecasting would be completed speedily. They would urge that broad principles for undertaking load surveys and power forecasting may be laid down by the Central Water and Power Commission at an early date for the guidance of the State Electricity Boards so that there is uniformity of approach in the detailed load surveys to be carried out by the State Electricity Boards. They would also urge that as in the United States, arrangements may be made to bring out periodically, at least once every year, a publication containing vital statistics about load surveys and power development programmes for the different States, Union Territories and the country as a whole.

VI

POWER FOR RAILWAY ELECTRIFICATION SCHEMES

Advantages of Electric Traction.

48. Indian Railways have in recent years been switching over from steam traction to diesel and electric traction to meet the growing volume of traffic. Though electric traction involves high capital cost it has three distinct advantages:

- (i) it makes for high acceleration and operating speed;
- (ii) its cost of operation and maintenance is low; and
- (iii) using thermal power source the efficiency of an electric locomotive is about 14%* as compared to overall thermal efficiency of 4.5% (approx.) of a steam locomotive.

Electric traction would also reduce the requirements of high grade coal for Railways as thermal power can be generated with low grade coals.

49. In view of the above considerations the Expert Committee on Coal Consumption on Railways (1958) recommended that "endeavours should be made to reach a target of at least 30% electric traction..... by 1975".

50. Electric traction programme was initiated by Indian Railways in a big way in 1954 and so far 1218 route kilometres have been electrified. Another significant development which needs to be mentioned in connection with Railway electrification is that since 1957 Railways have adopted 25 KV single phase AC at the industrial frequency of 50 cycles per second as the standard for all new electric traction as the experience of foreign countries, particularly France, had indicated that it was the most economical system for electric traction.

*At the time of factual verification the Ministry of Railways stated that 'Using thermal power source from a modern generating station, the overall efficiency of an electric locomotive is about 21 to 23%

The following table indicates the power requirements for electrification programme on the Indian Railways for the Third Five Year Plan:

Railway	Section	Ultimate Power requirements in MW (allowing for diversity)	Source of Supply	Target date for Power Supply
Eastern Railway	(a) Durgapur-Gaya	36.0	D.V.C.	Energised.
	(b) Durgapur-Howrah Docks <i>via</i> Chord	14.0	D.V.C.	Oct. 1964.
	(c) Howrah—Burdwan Mainline A.C.	14.0	D.V.C.	Dec. 1965.
	(d) Sealdah South and North	30.0	D.V.C. through West Bengal S.E.B.*	April, 1963/ Jan. 1965.
	(e) Gaya—Moghalsarai	14.4	Rihand** and D.V.C.	Energised.
South Eastern Railway	(a) Kharagpur—Tatanagar	10.0	D.V.C.	Nov. 1962.
	(b) Howrah---Kharagpur	11.7	D.V.C.	Oct. 1965.
	(c) Asansol—Tatanagar—Rourkela	46.4	D.V.C. and Hirakud	Energised.
	(d) Additional Branch lines of South--Eastern Railway.	5.4	Do.	End 1962 to Jan. 1964.
	Additional load due to anticipated increase in traffic.	8.4		
Northern Railway	(a) Moghalsarai—Allahabad.	22.0	Uttar Pradesh S.E.B.*	July, 1964.
	(b) Allahabad—Kanpur	20.0	Do.	July, 1965.
Central Railway	(a) Igatpuri-Nandgaon	16.0	Maharashtra S.E.B.	April, 1965.
	(b) Nandgaon—Bhusaval	15.0	Do.	Jan. 1966.
Southern Railway	(a) Tambaram-Villupuram	9.6	Madras* S.E.B.	Dec. 1963.
	(b) Madras Suburban	4.0 (including 3 D.C.).	Do.	March, 1965.

*S.E.B. stands for State Electricity Board.

**25 MW firm power and 15 MW temporarily, until DVC's Chandrapura Power House is Commissioned, has been allotted for Rihand for Railway electrification in the Eastern Zone.

Eastern and South Eastern Railways

**Sachdev
Committee's Pro-
posals.**

51. The requirements of power for Eastern and South Eastern Railways had been reviewed in detail in 1961 by Sachdev Committee, appointed by Government, "to enquire into the causes of Recent Failure of Power supply in West Bengal and Bihar". The proposals made by the Sachdev Committee for supply of power for electric traction as compared to the original proposals of 1958 are indicated in the table below:

Power Supply authorities	Original Proposals (in M W)	Sachdev Committee's Proposal (in M W)
D.V.C.	125 + 20 DC	120 + 20 DC
West Bengal S.E B.	...	43.75
Bihar S.E. B.		22
Rihand	25	...
Hirakud	25	...
	175 + 20DC	185.75 + 20DC

It would be observed that in the original proposals for supply of power to the Railways, the State Electricity Boards of West Bengal and Bihar were not to supply any power but according to the proposals of the Sachdev Committee these Boards are required to supply 43.75 and 22 M W of power for railway traction.

**Apprehensions of
Power
shortage.**

52. The Ministry of Railways have stated in their memorandum that power supply originally envisaged for electric traction was altered as above without inviting their views in the matter. The revised allocation arrangements were dependent upon the West Bengal and Bihar State Electricity Boards being able to develop adequate generating capacity, transmission lines etc. to make available the requisite power. It was added that no clear indication had yet been given by the Ministry of Irrigation and Power about the extent to which the Sachdev Committee's recommendation in the above behalf would be given effect to.

In particular it was apprehended that there would be a shortage of 15 MW from June 1963 to March, 1964 and 20 MW from March, 1964 to September, 1964. This shortage could be overcome if power was made available from other sources including Gouripur Electric Supply Company's station near Naihati.

A shortage of 29MW is expected between September, 1964 to December, 1964 and this could be overcome by advancing the date of commissioning of Chandrapura Power House from December, 1964 to September, 1964.

The Committee hope that the Ministry of Irrigation and Power would take necessary action to ensure that the power requirements of Railways which constitute the nation's life line are fully met. The West Bengal and Bihar State Electricity Boards should supply power as envisaged by the Sachdev Committee or in the alternative Rihand and Hirakud Power should continue to be made available. They would also like to emphasise that the generation of power in Chandrapura should be advanced to as early a date as possible, but not later than September, 1964 so as to meet fully the railway requirements.

Northern, Central and Southern Railways

53. The Committee also hope that the Ministry of Irrigation and Power would similarly ensure that the requisite power for the Third Five Year Plan is made available for electrification on Northern Railway by U.P. State Electricity Board, on Central Railway by the Maharashtra State Electricity Board and on the Southern Railway by the Madras State Electricity Board.

54. The Committee would also urge that a close watch may be kept on the installation of transmission lines so that there is no delay on this account in making the power available at the points needed for railway electrification. In this connection they would, particularly, like to draw attention to the need for completing the transmission lines to carry power, for electrification of Sealdah-Ranaghat and Dum Dum—Bongoan Section of Sealdah Division of Eastern Railway.

55. The Committee understand that Railways are experiencing difficulties to secure additional power supplies for some Railway Workshops. The Committee urge that high priority may be accorded for meeting the urgent requirements of Railway Workshops so that the Railways' maintenance and production programmes do not suffer.

56. It was stated by the representative of Railways that as it took several years to establish a Power House there was need for perspective Planning for power requirements. He added that a tentative plan of railway electrification for Fourth and Fifth Five Year Plans had been prepared. Certain routes for electrification had been tentatively decided, but the actual traffic which would have to be carried on those routes had yet to be precisely ascertained. A tentative picture of the Fourth-Five Year Plan had been sent to the Planning Commission, but no discussion had yet been held with them. One of the factors was the lack of certainty about the availability of diesel oil for diesel traction. It was hoped that in about six months time* a clearer picture of electric traction requirements would emerge.

*The representative of Ministry of Railways appeared before the Committee on 17.11.1962.

The Committee would like to draw attention in this connection to the recommendation made by the Sachdev Committee that new power plants for installation during the Fourth Five Year Plan should be sanctioned by the end of 1962. The Committee cannot too strongly emphasise the need for undertaking perspective planning for electric traction in greater detail and with greater expedition so that the Railway requirements can be fully taken into account while sanctioning the power projects for the first two years of the Fourth Five Year Plan.

Where hydel power is available at reasonable rates the advantage of it should be taken for electrification of railways in the areas especially when they are far removed from coal bearing areas. The Committee would suggest a comprehensive examination of the possibilities of electrification in the different Zonal Railways.

The Committee would further suggest that to end uncertainty about the supply of power for railway traction, the Central Electricity Authority may at the time of sanctioning new projects of State Electricity Boards and other generating authorities earmark the power which they have to make available for railway traction.

Closer Co-ordination between Generation and Supply Authorities necessary.

57. The Committee would also like to emphasise the need for closer co-ordination between the generation and supply authorities so that the work progresses according to schedule in a most economical manner. In this connection, the Ministry of Railways had pointed out that in the earlier stages there was lack of co-ordination between Bihar State Electricity Board, D.V.C. and Rihand in the commissioning of Pipri—Sonenagar Transmission Line in the matter of metering and synochronising equipment, arrangement for parallel operation, settlement of energy charges etc. with the result that the scheduled date of June, 1961 had to be put off by one year. Similar lack of co-ordination between Bihar State Electricity Board, Damodar Valley Corporation and Hirakud authorities was alleged to be responsible for delay in utilisation of Goilkera—Rourkela Transmission Line which was required to feed reliable supply for the vital railway lines to steel mills to carry raw materials*.

It was also pointed out by the Ministry of Railways that there was duplication of substations at Purulia and Sonenagar between Damodar Valley Corporation and West Bengal State Electricity Board which resulted in needless over-capitalisation and duplication of operating personnel. The Committee would urge the Central Water and Power Commission to use its good offices to ensure close co-ordination between the diverse generation and supply authorities who are catering for Railway traction.

*Closer Co-ordination, however, has since achieved according to the Ministry of Railways in both the above Cases.

58. The Ministry of Railways have furnished to the Committee a comparative statement (Appendix XII) showing the rates charged or proposed to be charged for electrical energy by various supply authorities for railway traction. **Tariff Rates for Railway Electrification.** The Committee are surprised to note that there are wide variations in the overall charges, for example, from 7.53 nP for D.V.C. Power to 13.78 nP for Hirakud Power at 40% load factor.

The Railways have represented in a memorandum of July, 1962 to the Planning Commission and the Ministry of Irrigation and Power that Electricity Undertakings were taking undue advantage of their autonomous position to quote excessive tariffs for railway traction and therefore it was necessary to lay down guiding principles for drawing up equitable tariffs for railway electrification schemes. It is understood that in Britain the National Grid Supply Authority is taken as one supplier and the British Railways drawing the power from the Grid are treated as one consumer. The Ministry of Railways have urged in their memorandum to the Planning Commission that "supplies to the Railway electrification loads from the same source of power generation (i.e. belonging to one particular agency) should have a unified tariff so far M.D. and energy charges are concerned, and the Railway drawing power at various substations should be treated as one consumer, even though the supplies may be made through several agencies transmission lines, and substations". They have also urged that "the tariff should be evolved with due consideration to the actual cost of generation, the cost of power at the point of supply and the fact that supply is taken in bulk. To this a reasonable margin of profit may be added and the tariff so evolved should have the approval of the Central Water and Power Commission".

"...Speaking broadly, electricity rates for electric traction should not be appreciably higher than what it would cost the Railways had they generated their own power".

"The period of integration of the maximum demand for railways should be 30 minutes as in the case of other bulk consumers and not 15 minutes".

The Railways have also pointed out that power supply authorities were adopting very liberal designs for substations which were uneconomic and resulted in over-capitalisation. In this connection, it has been pointed out that "so far as Railways are concerned, experience has revealed that average cost of a 132/25 KV single phase traction substation being set up by different supply authorities is about Rs. 20 lakhs while it would not cost the Railways anything more than about Rs. 10 lakhs". The Railways have expressed a feeling that "they are in effect being used for subsidising the development programme" of the Electricity Boards and other supply authorities.

Scope for Eliminating over-capitalisation by Supply Authorities.

The Committee understand that the proposals made by the Railways for rationalisation of tariffs for Railway elec-

trification had been examined by the Ministry of Irrigation and Power who had furnished their comments to the Planning Commission.

The Committee hope that Government would go into the matter at an early date and in the larger interest of the country would lay down general principles as far as possible for determining equitable tariff rates for supply of power for railway electrification.

VII

ADMINISTRATION OF ELECTRICITY ACTS AND RULES

A. Central Electricity Board.

59. The Central Electricity Board was constituted in 1937 under the provisions of Section 36-A of the Indian Electricity Act, 1910. The functions of the Board are to make rules to regulate the generation, transmission, supply and use of energy, and, generally to carry out the purposes and objects of the Act.

60. The Board consists of a Chairman and nine members nominated by the Central Government to represent Defence Ministry, the C.P.W.D., Indian Posts and Telegraphs Department, All India Radio and the Atomic Energy Establishment at Bombay, each of the Union Territories of Delhi and Himachal Pradesh, the Union Territories of Manipur, Tripura and the Andaman and Nicobar Islands and the Federation of Electricity Undertakings of India, members nominated by the State Governments and the State Electricity Boards, and one member each nominated by the Railway Board, the Chief Inspector of Mines, Dhanbad and the Indian Standards Institution, New Delhi.

Composition of the Board.

The Indian Electricity Rules were last revised by the Central Electricity Board in 1956. Since the revision of Rules, the Board has met only once in November, 1957.

Meetings of the Board.

The Board is stated to have received since its last meeting in November, 1957, 138 proposals for amending the Rules. Out of them, only 4 have so far been disposed of by circulation. *The Committee are constrained to note that even though 134 proposals for amending the Rules have been pending, the Central Electricity Board has not met even once during the last 5 years. They cannot too strongly emphasise the need for prompt processing of all proposals which are received for amending the Rules so that the shortcomings brought to notice in the application of Rules are rectified without delay.*

The Committee hope that the meeting of the Central Electricity Board will be held at an early date and that in future also such meetings will be held as often as necessary, at least once a year, so that the pros and cons of important proposals received for amendment of Electricity Rules are discussed before decisions are reached.

It would also be useful to review periodically the Rules as a whole once in five years so as to take full cognisance of advances made in power transmission, electrical appliances and other allied matters which have a bearing on the working of Rules.

B. State Electricity Boards

Functions.

61. State Electricity Boards have been set up by all the State Governments under Section 5 of the Electricity (Supply) Act, 1948. The State Electricity Boards are charged with the responsibility of promoting co-ordinated development of generation, supply and distribution of electricity within their States in the most efficient and economical manner.

Composition.

62. The State Electricity Boards are to consist of not less than three and not more than seven members *vide* Section 5(2) of the Act. The Act also lays down qualifications for appointment of members to the Boards by the State Governments.

Need for uniformity in State Boards' set up and Functions.

The Estimates Committee note that a Committee of the Government of India (consisting of Sarvashri B. S. Nag, K. P. S. Nair and P. P. Agarwal) which reviewed the power development programme in 1961 pointed out that members of some of the Boards had been appointed on full-time basis while others were working with part-time members. Another matter about which uniform procedure had not been followed was with regard to transfer of electricity systems to the State Electricity Boards. Some States had transferred all the power projects and systems to the Boards on their constitution. In others, only the distribution system and projects under construction had been handed over to the Boards while the execution of new projects had been retained by the State Governments. It was also noted that procedure for staffing the Boards differed from State to State. While in some States, the entire staff of the Electricity Department which existed before the constitution of the Boards was transferred to the Boards on permanent basis, in others, the staff had been sent to the Boards on deputation and the State Governments continued to exercise disciplinary control over it.

The Committee note that Ministry of Irrigation and Power had addressed a questionnaire in January, 1962 to State Governments to gather detailed information about composition, functioning and financial structure of the Electricity Boards, with a view to bringing about some uniformity in the set-up and working of the Boards. The Committee feel that the Union Government should have kept a watch on the composition and working of the Electricity Boards from their very inception so as to ensure uniform development. They would urge the Government to complete their proposed study at an early date and use their good offices to bring about uniformity as far as possible, in the set up and functioning of the State Electricity Boards.

C. Inspection Machinery

63. Section 36 of the Indian Electricity Act, 1910 authorises the State Governments to appoint duly qualified Electrical Inspectors. Rule 5 of the Indian Electricity Rules, 1956 lays down the scope of inspections to be done by the Electrical Inspectors in order to ensure that the provisions of the Electricity Act are being fully observed. One of the leading Associations of Electrical Contractors has stated in a memorandum to the Study Group of the Committee that "from experience it has been found that the system of the Electrical Inspectorates consisting of officers lent by the State Electricity Boards has not been conducive to the effective functioning of the Inspectorates inasmuch as these officers lent to the Inspectorate find it irksome to discharge their obligations strictly and fearlessly when the provisions of the Indian Electricity Act and Rules are not complied with by the Electricity Board officers who very often happen to be their seniors in their parent organisation".

Inspection Machinery in the States.

The representative of the Ministry stated during evidence that electrical inspectors constituted a very small cadre and if they were separated from the Electricity Board they would not have adequate opportunity of promotion. It was added that the subject had also been considered at one of the Conferences of the State Electricity Boards and the consensus of opinion was that the existing arrangement should continue.

It was also stated that the Electrical Inspectors submitted their reports to the State Governments. Under the Rules, the State Electrical Inspectors were not required to send any report to the Union Government.

The Committee consider that as the Electrical Inspectors are intimately connected with the working of the Indian Electricity Rules, which are framed by the Central Electricity Board, it is but appropriate that an annual report may be called for from the State Electrical Inspectors. The Report may prove of use to the Central Electricity Board to review annually the working of the Indian Electricity Rules. The Ministry may also examine how best the Electrical Inspectors can be enabled to discharge their statutory responsibility in an independent manner.

64. With the growing development of electric power and the increasing use of domestic electrical appliances in India, a need was felt for prescribing minimum safety and performance requirements for these appliances. The Indian Standards Institution has published a number of specifications on domestic electrical appliances, since 1951. It was expected that publication of the Indian Standards Institution standards would go a long way towards improving the quality of Indian manufactured appliances, but the Electrical Accessories Sectional Committee of the Indian

Compulsory Testing of Electrical Appliances.

●

Standards Institution, after a careful review, were forced to the conclusion that the quality of electrical products had not improved. They recommended at their meeting held on the 6th July, 1958 that:

“The Electrical Accessories Sectional Committee of this Institution views with considerable disappointment that Indian Standards for electrical accessories which were published a number of years back have not found any substantial application in the manufacture of such accessories as is evident from the availability in the market of unsafe and poor quality goods. It is understood that the Indian Electricity Rules are being modified to include reference to the Indian standards. The Committee strongly recommends that the Government of India should, in the interests of safety of the users, take early steps to review the position and take necessary steps to encourage manufacture of electrical accessories to specifications and prevent actively the manufacture of non-standard domestic electrical appliances.”

The above recommendation of Electrical Accessories Sectional Committee was brought to the notice of the Development Wing*, who advised the manufacturers of domestic appliances and wiring accessories borne on their list to adopt the Indian standard specifications. The Indian Standards Institution also approached the Small Industries Service Institute, Delhi as a number of small scale units were manufacturing electrical appliances. It is understood that the Small Industries Service Institute, after making a study of the problem had felt that it was necessary to have compulsory quality control on the manufacture of domestic electrical appliances.

The Indian Standards Institution had accordingly approached the Ministry of Commerce and Industry in 1958 to make the quality control on electrical domestic appliances compulsory.

65. The Development Council for the Heavy Electrical Industries also recommended at their Eighth meeting held in 1958 that legislation should be brought forward for prohibiting the manufacture and sale of electrical equipment not conforming to the requisite standards, particularly in the case of wires and cables, domestic appliances etc. used on voltages upto 660 volts. The Development Council also recommended that “until the legislation is

* Zow Department of Technical Development under the Ministry of Economic and Defence Co-ordination.

passed, the Government of India should pass executive orders to ensure that all electrical equipment commonly used up to 660 volts bearing Indian Standards Institution Certification Mark should only be sold and this should be made obligatory”.

It is understood that the Ministry of Commerce and Industry had issued in October, 1959 directions to the Directors of Industries of all State Governments and Union territories to issue suitable executive instructions ‘to ensure that only such electrical equipment commonly used on voltage upto 660 volts should be permitted to be sold as bear the Indian Standards Institution Certification Mark’.

The Committee understand that the question of introducing compulsory quality control for domestic electrical appliances is still under the consideration of Government. They also understand that in several foreign countries such as Sweden, Australia, Germany, Denmark, Norway, Finland and Canada, compulsory testing of electrical equipment is in force. A brief note furnished by the Indian Standards Institution on the procedure obtaining in the aforementioned foreign countries for compulsory testing of domestic electric appliances is reproduced in Appendix XIII.

66. The representative of the Ministry of Irrigation and Power when asked about the extent to which the Indian Electricity Rules, 1956 could be evoked for ensuring safety of electrical appliances, stated that in terms of Rule 29 of the Electricity Rules the Electrical Inspector was concerned with ensuring that “construction of electric supply line and apparatus shall be sufficient in power and of sufficient mechanical strength for the work they may be required to do and, so far as is practicable, shall be constructed, installed, protected, worked and maintained in accordance with the standards of the Indian Standards Institution so as to prevent danger”. He stated that the use of words ‘so far as is practicable’ diluted the power given to the Electrical Inspectors to prevent the use of apparatus which was not in accordance with the standards of the Indian Standards Institution. He added “probably, this can be enforced indirectly. If the State Governments put in a condition that no licences will be issued to the manufacturers unless they conform to the standards of Indian Standards Institution, it is possible to ensure safety in the use of electrical goods.”

The Committee feel that the Government should take appropriate legislative and administrative measures for ensuring the manufacture and supply of intrinsically safe domestic electrical equipment, accessories and wiring materials for use in homes and other non-industrial premises.

'Code for Safe operations and Maintenance of Transmission and Distribution system.'

67. It was represented to the Committee by the Federation of Electricity Undertakings of India that greater co-ordination could be achieved in the administration of Electricity Rules if the 'Code for Safe Operations and Maintenance of Transmission and Distribution System' is finalised and implemented. The Committee were informed during evidence that work on the Code was taken up four years ago and that the comments of the Electricity Boards, Electrical Inspectors etc. had been invited and it was hoped to place the Code before the next meeting of the Central Electricity Board, which was expected to be convened in a few months time.

The Committee recommend that in view of the importance of the Code for ensuring safety in operation and maintenance of transmission and distribution systems it should be finalised and implemented at an early date.

VIII

POWER RESEARCH INSTITUTE AND STATE RESEARCH UNITS

A. Power Research Institute, Bangalore.

68. The establishment of a Power Research Institute was intended to fulfil the long felt need for a Central organisation for undertaking applied research on problems connected with generation, transmission and utilisation of electric energy. The Ministry of Irrigation and Power appointed a Planning Committee in 1955 with Prof. M. S. Thacker as Chairman. This Committee recommended in September 1956 the setting up of a Power Research Institute with a Unit at Bangalore and another Unit at Bhopal. The Bangalore Unit was intended to work in close collaboration with the Indian Institute of Science and to deal with research problems on all phases of power engineering while the Unit at Bhopal was to devote its attention to switch-gear testing and development and high current phenomena working in association with the Heavy Electrical Ltd.—a Government of India public undertaking. Historical
Back-
ground.

The scheme as recommended by the Planning Committee was estimated to cost Rs. 420 lakhs extending over a period of 7 years and was included in the Second Five Year Plan with a provision of Rs. 300 lakhs. However, due to lack of personnel for detailed planning work and due to foreign exchange shortage, little progress was made on the scheme during the first three years of the Second Plan. Early in 1958, a Planning Officer (of the rank of Director) was appointed in the Power Wing of the Central Water and Power Commission and the detailed planning of the scheme was taken in hand. It was also decided that the scheme should be sponsored for assistance from the U.N. Special Fund and that pending the outcome, a short-term scheme termed "First Stage" should be initiated at Bangalore in co-operation with the Indian Institute of Science with such facilities as might be available by adding a minimum of essential extra equipment. The "First Stage" scheme, which was estimated at Rs. 36.42 lakhs and was spread over a period of three years was sanctioned by the Government in January, 1960.

In the meantime the U. N. Special Fund examined the main scheme in all its aspects through their experts and eventually decided to give a grant in foreign exchange equivalent to Rs. 91.85 lakhs. Rs. 18.53 lakhs out of this are for the Bangalore Unit and the balance of Rs. 73.32

lakhs for the Bhopal Unit. The scope of the scheme accepted by the U. N. Special Fund was incorporated and finalised in the 'Plan of Operations' in January, 1960.

The Committee understand that there are only 12 such Power Research Institutes in the World. They are happy that the Government have decided to set up the Power Research Institute in the country. They hope that the Institute will fulfil the long felt need of a Central organisation for applied research in power.

Bangalore Unit.

69. Nearly 140 acres of land are needed for setting up the buildings, laboratories and staff colony for the Institute. Out of this, 10 acres have already been obtained and 30 acres are shortly to be allotted by the Mysore Government. The balance of 100 acres belong to private parties and are expected to be acquired by 1963-64.

The Unit at Bangalore would work in close collaboration with the Indian Institute of Science and would deal with research problems on all phases of power engineering. It would have four fully equipped laboratories for dealing with problems concerning the electric power supply industry and to some extent the electrical equipment manufacturing industry.

Research Problems.

The technical work of the Power Research Institute would be classified into the following 10 sections:—

1. Insulating materials.
2. Power System Planning.
3. Generating Plant testing.
4. Thermal Power Plant techniques.
5. Design of electrical power equipment.
6. Transmission and Distribution Structures.
7. High Voltage Transmission (Electrical)
8. Instrumentation.
9. Engineering Physics.
10. Engineering Chemistry.

Pending establishment of its laboratories the Institute had taken up following items for investigation with the assistance afforded to it at the Indian Institute of Science:—

- (1) sub-station grounding and earthing resistivity;
- (2) economical construction of pre-stressed concrete poles;
- (3) application of Digital computers to power system studies;
- (4) lightning currents on transmission towers; and
- (5) humidity correction for Bushings and Insulators.

70. Twenty acres of land for the Testing Laboratory at Bhopal Bhopal have been taken in the factory area of the Heavy Electricals Ltd. and 40 acres of land for construction of staff colony have also been obtained from the Madhya Pradesh Government. Broad details of the scheme and equipment required have been finalised and orders for supply of equipment placed. **Bhopal Unit**

The Bhopal Unit would work in close collaboration with the Heavy Electricals Ltd., Bhopal and devote itself to switchgear testing and development and research on high current phenomena.

The Committee suggest that a phased programme for development of the two units of Power Research Institute at Bangalore and Bhopal may be drawn up. They feel that as foreign exchange required for the equipment of the Institute has been assured by the United Nations Special Fund, there should be no difficulty in adhering to the schedule.

71. The Committee have referred earlier in Chapter II to the development of regional grids. The Committee learn that the establishment of these grids involves a great deal of study of the power systems on the net-work analyser. The Committee understand that digital computers are being utilised in Western countries for getting accurate and quick solution to many power problems and designs. The Committee learn that one of the officers of the Power Research Institute has been deputed for special training in this subject in the United States. **Study of Power Problems : (i) Digital Computers.**

Studies of power systems are at present being made by the Power Research Institute with the help of a small computer installed in the Hindustan Aircraft Ltd.

72. A Study Group of the Estimates Committee which visited the Power Research Institute at Bangalore were informed that a detailed study made of the optimum voltage for transmission of power over Southern Zone grid had indicated that it should be pitched at 400 kV. It was stated that the Indian Institute of Science was setting up a 400 kV transmission line. The Power Research Institute would undertake detailed research and investigation with the help of this line for ascertaining the suitability of 400 kV instead of 220 kV which is in use at present. **(ii) Optimum Voltage Transmission**

The Committee understand that the Central Electricity Generating Board of the United Kingdom had taken a decision to adopt 400 kV as future voltage for main transmission instead of the existing 275 kV.

The Committee are glad that a practical beginning in undertaking studies for optimum voltage for regional power grids is being made in the Power Research Institute. They

recommend that these studies should be expedited so that concrete suggestions for adoption of optimum voltage for transmission on the regional grids are forthcoming early.

Another important matter which the Committee would like the Power Research Institute to examine expeditiously is the development of most economical and practical methods for making supports for power lines particularly in the rural areas. The Committee are glad to note that the Power Research Institute is conducting some studies on the subject. They would like these to be expedited so that their suggestions can be put to practical use.

B. Research Units in States

73. Government have allocated Rs. 30 lakhs as grant-in-aid during the Third Five Year Plan for research on fundamental and basic problems on power by the testing laboratories attached to the State Electricity Boards. The Committee were informed during evidence that only five State Electricity Boards had so far established research units. The Committee would urge the Government to stress on the remaining State Boards the necessity of setting up research units at an early date.

Inadequate Assistance to State Boards.

It has been represented to the Committee that financial assistance given by the Central Board of Irrigation and Power to the State Electricity Boards is not sufficient for obtaining the necessary equipment for research. It has also been represented that the procedure for import of research equipment is cumbersome and needs to be simplified.

The Committee would like the Government to look into these and other related difficulties being experienced by the State Electricity Boards so that the State research units do not feel handicapped in the matter of equipment.

IX

TECHNICAL SPECIALISTS FOR POWER PROJECTS

74. Government have assessed their requirements of technical specialists for Power Projects in the country during the Third and Fourth Five Year Plans as under:—

	<i>Electrical Graduates</i>	<i>Electrical Diploma Holders</i>
Third Plan	3273	5112
Fourth Plan	4600	7600

Requirements of Technical Specialists for power Projects.

The Committee have been informed that Government have taken the following steps to train technical specialists for power projects.

Arrange
ments for
Training
in CWPC.

Facilities have been afforded in the Central Water and Power Commission for training in:

- (a) Design, layout and specification relating to—
 - (i) Hydro Electric Power Projects (including Civil Engineering Works);
 - (ii) Thermal Power Stations;
 - (iii) High voltage transmission systems (including transmission layouts based upon net work analyser studies);
 - (iv) Distribution systems (including sub-stations);
- (b) Load survey, commercial engineering (*e.g.*, statistics, tariffs, electricity legislation, etc.).

The above facilities have been made available to (i) serving engineers in the various States; and (ii) Post-graduate students. In the case of the former, engineers come either for a specified period of training or on deputation. The graduate students generally come for a period of six months.

Where necessary the Central Water and Power Commission arrange for training of serving engineers in the method of design and construction of large power plants, transmission systems, etc. in the country with the assistance of the State and Project authorities.

75. Facilities have been developed in recent years with the help of T.C.M. Engineers for imparting training in the method of Hot Line maintenance of high voltage transmission lines. It was stated that training in the hot line technique would help to increase the reliability of supply as its adoption would enable the Electricity Undertakings to carry out maintenance jobs on overhead power lines without switching off power. The Committee understand that so far 190 trainees drawn from the State Electricity Boards

Training in Hot Line Maintenance.

and major private undertakings had been trained in the Hot Line Training Centres.

The Committee are glad to learn of the progress made and hope that the training would enable the Electricity Undertakings to increase the reliability of supply.

Training in Foreign countries.

76. Suitable candidates are also being sponsored annually by the Central Water and Power Commission and the State Governments for getting training abroad under the various aid programmes such as T.C.M., Colombo Plan, Indo-French Technical Co-operation, United Nations Special Fund, United Nations Expanded Programme of Technical Assistance, etc.

Shortage of Technical Personnel.

77. It has been represented to the Committee by one of the State Electricity Boards that it is 'finding extremely difficult to recruit a sufficient number of trained personnel particularly in lower categories'. Another State Electricity Board has pointed out that 'facilities available in the country for practical training of electrical technicians and engineers are very meagre'. The Committee have been informed by the Ministry that one of the main reasons for delay in the execution and commissioning of power projects by the target dates laid down in the Third Five Year Plan is shortage of trained personnel.

The Committee consider that as power targets are likely to be perceptibly increased in the Fourth and succeeding Plans, there is bound to be steep increase in the requirements of technical personnel. They are glad to note that one of the terms of reference of the Power and Energy Survey Committee is to go into 'the requirement of skilled manpower for construction, operation and maintenance of power systems'. The Committee hope that suitable action would be taken by Government to augment training facilities to meet the requirements of technical personnel in the light of findings of the Power and Energy Survey Committee.*

Foreign Consultants for Power Projects.

78. The Committee desired to know the amounts paid to foreign consultants for hydel and thermal power projects during the Second Five Year Plan and the estimated amount to be paid during the Third Five Year Plan. The Committee have been informed by the Ministry that the amounts paid to foreign consultants for power projects for the Second Five Year Plan are not available with them. As regards the Third Five Year Plan, the Ministry have furnished the following information in respect of payments made/to be made during the Third Five Year Plan in connection with the services of foreign consultants already engaged for hydro and thermal power projects:

Hydro Projects

Foreign currency

Rs. 105.58 lakhs

Local currency

Rs. 9.39 lakhs

*See Appendix XI

Thermal Projects

Foreign currency	Rs. 394.39 lakhs
Local currency	Rs. 213.31 lakhs

Asked as to why foreign consultants were required for hydel projects for which country had the requisite experience the representative of Central Water and Power Commission stated that for projects financed by the World Bank or Agency for International Development, foreign consultants had to be appointed. For example, they had to appoint foreign consultants for the Koyna Power Project. *The Committee feel that as India has enough of experience in the designing and construction of hydel works, it should be possible to persuade the International agencies and countries giving foreign aid not to insist on employment of foreign consultants.*

79. The Committee are glad to learn that a Specialised Engineering Organisation for rendering consulting engineering services had been sanctioned by the Government in the Power Wing of the Central Water and Power Commission in March, 1961. Its function is to undertake complete engineering design, procurement and installation of large thermal and hydro power stations in the country.

**Specialised
Engineering
Organisation.**

80. For the first phase of the Organisation, the following posts have been sanctioned:

Chief Engineer	..	2
Dy. Chief Engineer	..	1
Director	..	4
Dy. Director	..	15
Asst. Director	..	30
Extra Asst. Director	..	24

**Training of
Personnel
for the
Specialised
Organisation.**

In order to equip the Organisation for the specialised task ahead, advantage is being taken to dovetail the training of officers under the various technical assistance programmes, such as Colombo Plan, T.C.M., etc. In the meanwhile, majority of the officers are being given the necessary training and experience while employed on certain projects in hand. Officers earmarked for the Specialised Organisation are also to be deputed to thermal and hydro projects under construction in the country for periods upto 60 days at a stretch for on-the-spot study of various problems connected with the field of their assignment.

It is stated that by suitably coordinating the three-pronged action, viz., (i) foreign training, (ii) on the job training, and (iii) training on projects under execution in the country, it would be possible to render specialised services to the State Government, State Electricity Boards and project authorities.

81. The Committee have been informed that the Planning Cell in Madras, which was set up in 1956, is being treated as part of the Specialised Engineering Organisation.

**Planning
Cell.**

The Study Group of the Estimates Committee which visited the Planning Cell at Madras in September, 1962 were informed that the Cell had been able to effect a substantial saving to the tune of several lakhs, which would have otherwise been paid to the Russians by way of consultation fees for designing, installation, etc. of the Neyveli Thermal Power Station.

The Committee are glad to learn of the saving. The Study Group were also glad to learn that the Planning Cell was confident of preparing detailed designs for power equipment and supervise its installation and operation thus discharging all the functions of the technical consultants.

**Shortage
of Techni-
cal Officers.**

82. Certain shortages in the category of Technical Officers in the Planning Cell were brought to the notice of the Study Group during its visit to Madras in September, 1962. The representative of the Ministry stated during evidence that so far as planning work was concerned technical personnel had been provided to the Planning Cell. However, for advancing the programme of construction of the Neyveli Power Station it had not been possible to provide the Cell with technical persons. It was added that two things stood in the way of recruiting the requisite number of persons. First, there was shortage of personnel and secondly the people who were recruited did not remain for long, as there were attractive avenues elsewhere. The Committee were informed that steps had been taken to attract and retain technical persons by giving them extra increments and by discouraging them from applying for outside jobs.

The Committee hope that the shortage of technical staff in the Planning Cell would be made good at an early date.

The Committee would like the Government to so organise the Specialised Engineering Organisation that it is able to discharge fully the responsibilities of technical consultants.

The Committee are also glad to note that Tatas have set up a consultant organisation (Tata Ebasco Services Ltd.) in collaboration with a foreign firm which would be largely manned by Indian engineers.

The Committee hope that no effort would be spared in developing the Specialised Engineering Organisation and other consultancy services within the country without further loss of time. They feel confident that if a proficient technical consultant service is built up within the country it should not be too difficult to persuade even the countries giving aid for power schemes not to insist on employment of foreign consultants so that as much of foreign exchange as possible is saved.

H. C. DASAPPA,
Chairman,
Estimates Committee.

NEW DELHI;
The 19th March, 1963
Phalguna 28, 1884 (Saka)

APPENDIX II

(Vide para 2)

Functions of the Power Wing of the Central Water and Power Commission

The functions of the Power Wing of the Central Water and Power Commission as contained in the Ministry of Natural Resources & Scientific Research Resolution No. EL-I-201 (5), dated the 21st April, 1951, are as follows:—

The Power Wing will be charged with the general responsibility of initiating, co-ordinating and furthering, in consultation with the State Governments concerned, schemes for the utilisation of water resources throughout the country for the purpose of water-power generation, as well as schemes of thermal power development and also schemes of transmission and utilisation of electric energy throughout the country. The Power Wing will, if so required, also undertake the construction and execution of any such schemes. In exercise of the above responsibilities it will be the function of the Power Wing—

- (a) to make all necessary investigations and surveys and when so required, to prepare schemes and designs:
 - (i) for the development of water resources in respect of power generation; and
 - (ii) for thermal electric power development;
- (b) to undertake construction work on any electric power development schemes on behalf of the Government of India or State Governments concerned;
- (c) to advise and assist, when so required, the State Governments (Commissions, Corporations or Boards that may be set up) in the investigation, surveys and preparation of power development schemes for particular areas and regions and in the surveying of potential sources of load, the forecasting of revenue from electricity supply and the formulation of electricity tariffs;
- (d) to advise the Central and State Governments on the administration of electricity legislation and control of electric utilities;

- (e) to advise the Government of India in regard to all matters relating to electric power development, Public electric utilities both private and State-owned;
- (f) to advise the Government of India in regard to the settlement of priorities for plant, materials and foreign exchange as between various river valley development and power projects;
- (g) to collect, maintain and publish statistical data relating to the generation, distribution and utilisation of electricity throughout India and to act as the Central Bureau of Information on all matters relating to the public electricity supply;
- (h) to initiate schemes and arrange for the training of Indian Engineers in India and abroad in all aspects of electricity supply industry.
- (i) to review and lay down for the whole of India standard voltages and practices for generation, transmission and distribution of electrical energy;
- (j) to conduct and co-ordinate research on the various aspects of power development etc. and the connected structural and design features; and
- (k) to conduct experiments, research, propaganda and generally to carry out such other activities as will promote the spread and use of electricity throughout the country, in particular in the semi-urban and rural areas.

2. Since the above functions were laid down in 1951, the following additional functions have been assigned to the Power Wing:—

- (i) to provide secretariat assistance to the Central Electricity Authority;
- (ii) to carry out Power Load Survey of the country on an all-India basis as a national project;
- (iii) to render Consulting Engineering Services covering engineering design, procurement and installation of large thermal and Hydro Power Stations in the country.
- (iv) to carry out investigations and research on various problems connected with development and utilisation of energy resources and to conduct studies for promotion of technical efficiency and economy in various aspects of power supply industry;

- (v) to impart training in the repairs and maintenance of overhead lines in an energized state (technically known as Hot Line Training);
- (vi) to carry out inspections of Electrical Installations in the Union Territories (excluding Delhi) and similar installations under the All India Radio, Civil Aviation and the C.P.W.D.; and
- (vii) to plan and establish an All India Super Grid.

APPENDIX III

(Vide para 23)

A note on additional funds required for stepping up the Power Programme in the Third Plan

A review of the progress on the implementation of the third Plan power projects has shown that the generating capacities that will be brought into Commission during each year of the third Plan will be as follows:—

	MW
1961-62	580
1962-63	758
1963-64	937
1964-65	1992
1965-66	3160

By the end of 1965-66, it is expected that with the above additions the total installed capacity in the country will be 12.97 mil. kW. It will be seen that in the early years of the third Plan there is considerable deficit in power and this has been mainly due to the postponing or slowing down of some of the second Plan projects due to foreign exchange difficulties. In order to have adequate power availability, so that industrial progress may not suffer a setback, it is necessary to increase the generating capacity each year progressively and not on a pattern obtained during the second Plan period.

2. This subject was discussed by the Member (NR) in the Planning Commission during the preliminary discussions on the approach to the fourth Plan. It was considered desirable that by the second year of the fourth Plan the generating capacity in the country should be brought up to a level of about 17 million kW. and for this purpose, it was suggested that the action to be taken should be indicated. It is seen that the benefits from the power schemes which are being implemented during the third Plan and which will spillover to the first two years of the fourth Plan, will be about 1.97 million kW. bringing the total to about 15.0 million kW. If a target of 17 million kW has to be achieved, then additional schemes totalling about 2 million kW will have to be taken up during the third Plan so as to have the power stations commissioned not later than 1957-58. Considering that even if an authorization is given during the course of 1962-63, there will be only five years time left, such new schemes with the

exception of one or two extensions to hydro power stations currently being executed, will have to be thermal. A list of the schemes already included in the III Plan and from which benefits could be obtained during the fourth Plan is attached herewith.* It will be seen from this statement that some of the schemes could be commissioned during the first two years of the IV Plan bringing an additional benefit of about 2 million kW installed capacity. Similarly, a suggested list of schemes which may have to be taken up preferably not later than the end of 1962-63 for completion before the end of 1967-68, that is, second year of the fourth Plan, is also attached.* It may be mentioned that most of these schemes have been already proposed in the draft fourth Five Year Plan prepared by the Central Water and Power Commission.

3. For bringing into effect all this programme of achieving generating capacity of 17 million kW by the second year of the fourth Plan, additional allocation of funds will have to be provided for some of the schemes in the third Plan and fresh allocation made for the new schemes which will have to be taken up not later than the end of 1962-63. The additional funds to be provided in the third Plan for the schemes already included has been estimated to be about Rs. 62 crores with a foreign exchange component of Rs. 24 crores. With regard to new schemes to be taken up in the third Plan so as to give a benefit of 2 million kW in the first two years of the fourth Plan, the funds to be provided in the third Plan have been estimated to be Rs. 67 crores with a foreign exchange component of Rs. 16 crores. In addition a sum of Rs. 3 crores may be required for transmission and distribution schemes. Thus, the total funds to be provided in the third Plan to achieve an installed capacity of 17 million kW by end of the second year of the fourth Plan will be $\text{Rs. } 62+67+3=\text{Rs. } 132$ crores—say Rs. 160 crores—with a foreign exchange component of $\text{Rs. } 24+16+3=\text{Rs. } 43$ crores.

*Not printed.

APPENDIX IV

(Vide para 25)

Efforts made by the Ministry of Irrigation and Power to get all the major power schemes included in the core of the Second Five Year Plan

The power development programme under the Second Five Year Plan was intended to fulfil the following three objectives:—

1. To meet the normal load growth in the existing systems.
2. To provide the requisite capacity for reasonable expansion of the areas of supply.
3. To meet the needs of industries which were proposed to be established in the second Plan.

It was then estimated that about 1·4 million kW of additional power demand would arise on account of the normal development of medium and small industries and of commercial and domestic consumption. In addition to this, a further demand of 1·3 million kW was expected on account of new programme of industrial development included in the second Plan. Making allowance for requisite standby capacity and other causes of variation etc., it was estimated that an addition of 3·5 million kW would be required during the second Plan period. In other words, it was programmed to increase the total installed capacity in the country from 3·4 million kW in March, 1956 to 6·9 million kW by March, 1961. Accordingly, to meet the above objectives certain major power schemes were selected to form the core of the Plan. Apparently every major power scheme could not be included in this core, as otherwise the very objective of forming the core would have been defeated.

At its meeting on the 3rd and 4th May, 1958, the National Development Council considered the question of the total outlay to be undertaken in the public sector during the balance period of the second Plan, keeping in view the progress made during the first two years. In this meeting it was decided by the National Development Council that the total outlay for the second Plan should be maintained at Rs. 4,800 crores, but this allocation should be divided into two parts: Part (A) core projects involving a total outlay of Rs. 4,500 crores. Part (B) remaining schemes with

a total outlay of Rs. 300 crores. The core projects comprised such of the national projects as were in the interest of increasing agricultural production, or were in an advanced stage of construction or were otherwise inescapable projects having a direct bearing upon the needs of industries which were proposed to be established in the second Plan. Out of this total plan allocation the outlay for irrigation and power sector was Rs. 860 crores, out of which projects worth Rs. 820 crores were core projects under Part (A) and the balance of Rs. 40 crores were placed under Part (B). These provisions were considered on 13th May 1958, in a meeting in the room of Secretary, I. & P., where Planning Commission were also represented. It was decided that our suggestions in regard to the revised allocations for the Irrigation and Power Sector might be framed and sent to the Planning Commission. The Chairman, Central Water & Power Commission compiled information in respect of the power projects. Out of Rs. 860 crores for Irrigation & Power Sector, provision for the Second Five Year Plan for Power Projects was Rs. 412 crores. In the note prepared by the Chairman, C.W. & P.C. it was stated that the actual provision for the Second Five Year Plan after considering the excess spill-over from first plan schemes and adding for the additional generating capacity in the D.V.C. would be Rs. 476 crores. As against this suggestion of increasing the plan allocation for power projects, the Planning Commission had suggested a reduction of about 56 crores. On reviewing the suggestion, it was estimated that a minimum of Rs. 435 crores for power sector of the Second Five Year Plan should be made available. In support of this proposal statements showing the minimum revised requirements of power projects were prepared. It was mentioned that even with the provision of Rs. 435 crores the power programme would have a serious set-back.

As a result of the reappraisal of the second plan provisions for Irrigation and Power Sector, which took into consideration the resources of all the States, the Planning Commission allocated a sum of Rs. 833 crores instead of Rs. 860 crores decided by the National Development Council. But in this reappraisal the allocation for power scheme was increased from Rs. 412 crores to 425 crores.

APPENDIX V

(Vide para 26)

Statement of Installed Capacity, Firm Capacity, Demand, Shortage/Surplus during Third Plan

Year commencing April	Installed capacity	Firm Capacity + Bulk Supply (MW)	Estimated Demand (MW)	Estimated Shortage(—) or Surplus(+) (MW)
1	2	3	4	5
<i>Andhra Pradesh</i>				
1961 . .	228.2	146.0	185.4	(—) 40.4
1962 . .	228.2	145.0	205.0	(—) 60.0
1963 . .	228.2	145.0	245.7	(—) 99.7
1964 . .	257.0	151.0	366.9	(—) 215.9
1965 . .	347.0	227.0	391.9	(—) 164.9
1966 . .	587.0	367.0	478.3	(—) 111.3
<i>Assam</i>				
1961 . .	19.4	11.6	10.1	(+) 1.5
1962 . .	25.45	17.0	20.4	(—) 3.4
1963 . .	25.4	17.0	23.9	(—) 6.9
1964 . .	34.4	29.4	62.8	(—) 33.4
1965 . .	91.0	74.5	78.6	(—) 4.1
1966 . .	148.6	103.3	119.3	(—) 16.0
<i>Bihar—DVC—West Bengal</i>				
1961 . .	1104.5	755.0	875.2	(—) 120.2
1962 . .	1104.5	755.0	1051.8	(—) 296.8
1963 . .	1134.5	777.0	1190.8	(—) 413.8
1964 . .	1308.5	935.0	1399.3	(—) 464.3
1965 . .	1821.5	1361.0	1627.2	(—) 266.2
1966 . .	2546.5	1822.0	2024.5	(—) 202.5

1	2	3	4	5
<i>Gujarat</i>				
1961	. .	333.3	228.0	251.5 (—) 23.5
1962	. .	367.3	246.0	304.8 (—) 58.8
1963	. .	411.3	287.0	340.8 (—) 53.8
1964	. .	539.3	407.0	383.4 (+) 23.6
1965	. .	669.3	471.0	415.3 (+) 55.7
1966	. .	669.3	471.0	499.5 (—) 28.5
<i>Jammu & Kashmir</i>				
1961	. .	13.0	4.5 +4.5	12.0 (—) 3.0
1962	. .	22.0	12.0 +9.5	20.0 (+) 1.5
1963	. .	31.0	21.0 +9.5	25.0 (+) 5.5
1964	. .	31.0	21.0 +9.5	30.0 (+) 0.5
1965	. .	41.0	30.0 +9.5	38.0 (+) 1.5
1966	. .	61.0	45.01 +19.5	48.0 (+) 16.5
<i>Kerala</i>				
1961	. . .	137.5	119.5	131.0 (—) 11.6
1962	. .	167.3	119.5	141.0 (—) 21.5
1963	. .	182.9	134.5	164.0 (—) 29.5
1964	. .	215.9	178.5	229.0 (—) 50.5
1965	. .	351.3	296.5 —50	246.0 (+) 0.5
1966	. .	551.3	446.5 —50	325.0 (+) 71.5
<i>Madhya Pradesh</i>				
1961	. .	299.0	139 +15.0	147.7 (+) 6.3
1962	. .	244.5	150.5 +15.0	228.4 (—) 62.9
1963	. .	254.5	160.5 +15.0	289.5 (—) 114.0
1964	. .	914.5	216.5 +25.0	378.8 (—) 137.3
1965	. .	502.0	388.0 +25.0	456.0 (—) 43.0
1966	. .	754.0	510.0 +10.0	550.0 (—) 30.0
<i>Madras</i>				
1961	. .	517.5	391.0	453.6 (—) 62.6
1962	. .	552.5	426.0 + 50.0	540.0 (—) 64.0
1963	. .	552.5	426.0 +150.0	662.0 (—) 86.0
1964	. .	552.5	426.0 +200.0	740.0 (—) 114.0
1965	. .	747.5	504.0 +218.0	838.0 (—) 56.0
1966	. .	917.5	709.0 +278.0	1012.0 (—) 26.0

	1	2	3	4	5
<i>Maharashtra</i>					
1961	.	759.5	611.5 — 15.0	619.0	(—) 22.5
1962	.	759.5	611.5 — 15.0	671.2	(—) 74.7
1963	.	939.5	789.5 — 15.0	758.9	(+) 15.6
1964	.	1029.5	877.0 — 15.0	998.2	(—) 136.2
1965	.	1149.5	920.5 — 15.0	1120.0	(—) 214.5
1966	.	1544.5	1249.5	1312.4	(—) 62.9
<i>Mysore</i>					
1961	.	198.3	151.4	184.3	(—) 32.9
1962	.	316.3	169.4	244.0	(—) 74.6
1963	.	249.5	194.4	311.0	(—) 116.6
1964	.	443.9	392.0	362.0	(+) 30.0
1965	.	632.1	566.0	466.0	(+) 100.0
1966	.	800.3	654.6	660.0	(—) 5.4
<i>Orissa</i>					
1961	.	170.7	119.0 +50.0	133.5	(+) 35.5
1962	.	170.7	119.0 +50.0	187.8	(—) 18.8
1963	.	317.7	246.0 +50.0	250.5	(+) 45.5
1964	.	317.7	246.0 +50.0	319.8	(—) 23.8
1965	.	377.7	302.0 +50.0	374.7	(—) 22.7
1966	.	557.7	418.4 +50.0	475.3	(—) 6.9
<i>Punjab</i>					
1961	.	246.4	185.0 —27.0	245.9	(—) 87.9
1962	.	430.4	391.0 —73.5	409.7	(—) 92.2
1963	.	432.4	392.0 —73.5	475.0	(—) 156.5
1964	.	455.4	407.0 —74.5	512.0	(—) 179.5
1965	.	455.4	407.0 —74.5	573.0	(—) 240.5
1966	.	649.1	607.0 —89.5	616.0	(—) 98.5
<i>Rajasthan</i>					
1961	.	135.8	63.0	25.9	(+) 37.1
1962	.	180.3	85.5	57.7	(+) 27.8
1963	.	183.3	87.5	95.1	(—) 7.6
1964	.	193.3	95.5	117.7	(—) 22.2
1965	.	280.8	173.0	151.7	(+) 21.3
1966	.	394.1	299.0	281.3	(+) 17.7

1	2	3	4	5
<i>Uttar Pradesh</i>				
1961	397.4	244.5	267.3	(—) 22.8
1962	651.4	388.5	325.8	(+) 63.2
1963	736.4	469.0	448.9	(+) 20.1
1964	776.4	492.0 —10.0	507.6	(—) 25.6
1965	922.9	563.0 —10.0	643.5	(—) 90.5
1966	1089.9	772.0 —10.0	805.0	(—) 43.0
<i>Delhi</i>				
1961	76.3	60.0 +20.0	86.1	(—) 6.1
1962	76.3	60.0 +60.0	122.2	(—) 2.2
1963	76.3	60.0 +60.0	142.4	(—) 22.4
1964	121.3	88.0 +60.0	170.3	(—) 22.3
1965	131.3	144.0 +60.0	193.0	(+) 11.0
1966	241.3	200.0 +80.0	210.0	(+) 70.0

APPENDIX

(Vide para 11)

Statement showing Rural and Urban Consumption

(in million kWh)

Sl. No.	State	Domestic light and small power		Commercial light and small power		Industrial power		Public lighting	
		Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
1	Andhra Pradesh	33.4	37.4	14.3	17.0	186.0	207.3	7.0	7.8
2	Assam	0.8	9.1	0.3	3.9	1.0	10.8	0.2	2.7
3	Bihar	6.3	38.0	4.3	25.5	110.0	666.4	0.5	3.1
4	Gujarat	12.3	63.2	5.5	26.1	139.0	666.5	2.6	12.6
5	J & K	5.3	17.2	0.2	0.8	5.1	16.9	0.3	1.0
6	Kerala	8.6	42.4	0.6	3.2	68.0	335.7	1.4	7.0
7	M.P.	20.6	24.7	9.3	11.5	136.0	165.3	4.1	5.0
8	Madras	90.0	62.9	92.0	64.7	560.0	393.0	20.0	14.0
9	Maharashtra	22.4	238.6	17.2	181.0	160.0	1692.6	1.7	18.1
10	Mysore	18.2	57.2	5.1	16.2	168.0	525.0	4.6	14.2
11	Orissa	0.2	18.1	0.1	7.7	6.0	461.1	..	1.5
12	Punjab	21.0	48.9	18.5	42.8	111.0	258.0	2.7	6.3
13	Rajasthan	2.0	18.7	1.5	14.3	2.8	25.8	0.5	4.7
14	U.P.	32.6	90.1	19.7	55.0	132.0	371.9	3.7	10.1
15	West Bengal	29.8	323.7	10.0	105.8	156.0	1704.1	1.9	21.4
Total		303.5	1,090.4	198.6	575.5	1,940.9	7,500.4	51.2	129.5

Note.—Irrigation is shown mainly as rural consumption and traction mainly as urban.

V1

32)

of Electricity for the year 1960-61

(in million kWh)

Traction		Irrigation		Public water works and sewage pumping		Total	
Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
..	..	58.8	..	3.4	3.9	302.9	273.4
..	..	..	..	0.1	0.4	2.4	26.9
..	..	18.2	..	1.7	10.5	141.0	743.5
..	..	19.6	..	6.8	32.7	185.8	801.1
..	..	0.7	..	0.8	2.7	12.4	38.6
..	..	18.2	..	1.3	6.5	98.1	394.8
..	..	3.9	..	11.4	14.8	185.3	221.3
..	15.0	382.4	..	8.5	5.9	1152.9	555.5
..	338.0	14.7	..	3.0	32.1	219.0	2500.4
..	..	28.7	..	14.1	45.8	238.7	658.4
..	..	0.7	..	..	2.3	7.0	490.7
..	..	74.8	..	2.7	6.4	230.7	362.4
..	..	3.6	..	1.9	17.6	12.3	81.3
..	..	200.0	..	16.0	44.6	404.0	571.7
..	95.0	0.6	..	8.0	88.0	206.3	2338.0
..	448.0	824.9	..	79.7	314.2	3398.8	10,058.0

consumption.

APPENDIX VII

(vide para 32)

Statements showing Anticipated Rural Consumption of Electricity in 1965-66

Sl. No.	Name of the State	Category of Rural Consumption				Total Rural Consumption million kWh	Quantum of generating capacity needed to meet the Rural Demand (kW)
		Domestic & Commercial Lighting & Small Power	Public Lighting	Small Medium Industries	Irrigation Dewatering		
1	2	3	4	5	6	7	8
1	Andhra Pradesh	33.0	14.0	64.0	192.0	303.0	99,557
2	Assam .	7.5	0.9	12.0	..	20.4	6,703
3	Bihar .	13.0	0.5	20.2	126.0	159.7	52,475
4	Gujarat .	31.0	5.0	45.0	134.0	215.0	70,643
5	Jammu & Kashmir .	4.0	0.5	5.0	4.5	14.0	4,600
6	Kerala .	20.2	5.2	12.6	66.0	104.0	34,171
7	Madhya Pradesh	27.0	4.5	51.0	71.0	153.5	50,436
8	Madras .	75.0	17.0	123.0	724.0	939.0	308,528
9	Maharashtra	33.0	6.8	62.0	223.0	324.8	106,720
10	Mysore .	31.5	6.8	36.8	198.9	273.1	89,733
11	Orissa .	5.0	2.4	7.4	11.0	25.8	8,477
12	Punjab .	58.0	4.0	93.0	455.0	590.0	193,857
13	Rajasthan .	18.0	3.0	30.5	25.0	76.5	25,136
14	Uttar Pradesh	21.0	3.6	63.0	372.0	459.6	151,011
15	West Bengal	18.0	1.3	25.0	9.2	53.5	17,578
16	Delhi .	7.5	0.9	0.7	2.5	11.6	3,811
TOTAL .		402.7	76.4	651.2	2,593.2	3,723.5	1,233,434

Notes.—(1) The generating capacities given in the last column are only approximate as they are arrived at on the basis of 3,500 kWh per kW installed and allowing 15% for the losses in transmission and distribution and auxiliaries.

(a) The consumption figures are based on the estimates of L. S. & L. D. Directorate.

APPENDIX VIII

(Vide para 35)

Statement of Major Power Schemes included in the Third Five Year Plan and their Target Dates for Completion.

Name of Scheme	Capacity in MW	Target dates for completion	Remarks
1	2	3	4

ANDHRA PRADESH

(a) *Hydel Schemes*

- | | | |
|--------------------------------------------------|-----|---------|
| 1. Tungabhadra H.E. Scheme
Stage I | 9 | 1963-64 |
| 2. Tungabhadra H.E. Scheme
Stage II | 27 | 1963-64 |
| 3. Upper Sileru H.E. Scheme
Stage I | 120 | 1965-66 |

(b) *Thermal Schemes*

- | | | |
|------------------------------------------------------|-----|---------|
| 1. Nellore Thermal Station | 30 | 1964-65 |
| 2. Ramagundam Thermal
Station Extension | 60 | 1965-66 |
| 3. Kothagudam Thermal Scheme | 120 | 1965-66 |

ASSAM

(a) *Hydel Schemes*

- | | | |
|-----------------------------------------------------|------|---------|
| 1. Uiam (Barapani) H.E.
Scheme Stage I | 36 | 1965-66 |
| 2. Uiam H.E. Scheme Stage II | 17.8 | 1965-66 |

(b) *Thermal Schemes*

- | | | |
|-----------------------------------------------|----|---------|
| 1. Nahorkatiya Thermal Station | 69 | 1965-66 |
| 2. Nangwal Bibra Thermal
Station | 60 | 1965-66 |

BIHAR
(a) ^{Hy}Hydel Schemes

1. Kosi H.E. Scheme 20 1965-66

(b) Thermal Schemes

1. Barauni Thermal Station 30 1963-64

2. Barauni Thermal Station Extension. 115 65 MW will be commissioned by 1965-66. Benefit of 50 MW will accrue in 4th Plan.

3. Pathratu Thermal Station 100 1964-65

4. Pathratu Thermal Station Extension 300 200 MW will be commissioned by 1965-66. Benefit of 100 MW will accrue in 4th Plan.

GUJARAT

(a) *Hydel Schemes* Nil

(b) Thermal Schemes

1. Shapur Thermal Extension 10 1963-64

2. Ahmedabad Thermal Station (Private sector) 60 1962-63

3. Cambay (Dhuvaran) Thermal Station 240 1963-64

4. Kandla Thermal Station Extension 10 1964-65

JAMMU & KASHMIR
(a) *Hydel Scheme*

1. Ganderbal. Power House Extension 9 1961-62

2. Mohora Power Stn. 9 1962-63

3. Chenani H.E. Project 15 10 MW will be commissioned by 1965-66. Benefit of 5 MW will accrue in 4th Plan.

	1	2	3	4
--	---	---	---	---

(b) *Thermal Schemes*

- | | | | | |
|---------------------------------------------|----|---------|--|--|
| 1. Kalakote Thermal Station | 20 | 1964-65 | | |
| 2. Nichahom Thermal Power Station | 15 | 1965-66 | | |

KERALA

(a) *Hydel Schemes*

- | | | | | |
|------------------------------------|-----|----------------------------------------|--|-----------------------------------------------|
| 1. Nariamangalam H.E. Scheme | 30 | 1962-63 | | |
| 2. Panniar H.E. Scheme | 30 | 1963-64 | | |
| 3. Sholayar H.E. Scheme | 54 | 1964-65 | | |
| 4. Sabragiri H.E. Scheme | 300 | 1965-66 | | |
| 5. Kuttiadi H.E. Scheme | 75 | 50 MW will be commissioned in 1965-66. | | Benefit of 25 MW will accrue in the 4th Plan. |

- | | | | | |
|--------------------------------------|--|--|-----|--|
| (b) <i>Thermal Schemes</i> | | | NIL | |
|--------------------------------------|--|--|-----|--|

MADHYA PRADESH

(a) *Hydel Schemes*

- | | | | | |
|------------------------------------------------------|-----|--------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------|
| 1. Chambal H.E. Project Stage I (4th unit) | 23 | 1963-64 | | MP's share is 11.5 MW. |
| 2. Ranapratapsagar H.E. Scheme | 172 | 86 MW will be commissioned by 1965-66, out of which 43 MW is the share of M.P. | | Benefit of 86 MW will accrue in 4th Plan, out of which 43 MW is MP's share. |
| 3. Kotah Power House | 100 | During 4th Plan. | | Out of this the share of M.P. is 50 MW. |
| 4. Chambal (Gandhisagar) 5th unit | 23 | 1965-66 | | M.P.'s share is 11.5 MW. |
| 5. Tawa H.E. Project | 42 | During 4th Plan. | | |

1	2	3	4
(b) Thermal Schemes			
1. Chandni (Korba) Thermal Station Extension . . .	10	1963-64	
2. Amarkantak Thermal Station	60	1964-65	
3. Korba Thermal Station Extn.	200	1965-66	
4. Satpura Thermal Station . . .	300	1965-66	M.P.'s share out of this is 180 MW.

MADRAS

Hydel Schemes

1. Kaudah Stage III . . .	245	1964-65	
2. Mettur Tunnel H.E. Scheme	200	1965-66	
3. Periyar 4th unit I & II (Stage II)	35	1963-64	
4. Parambikulam H.E. Project	180	100 MW will be commissioned in 1965-66.	Benefit of 80 MW will accrue in 4th Plan.
5. Neyveli Lignite Thermal Station	400	1965-66	

MAHARASHTRA

(a) Hydel Schemes

1. Koyna H.E. Stage I . . .	240	1962-63	
2. Koyna H.E. Stage II . . .	340	225 MW will be commissioned in 1965-66.	Benefit of 115 MW will accrue in 4th Plan.

(b) Thermal Schemes

1. Khaperkheda Thermal Station Extn.	60	1963-64	
2. Bhusawal Thermal Station	60	1965-66	
3. Paras Thermal Station	60	1965-66	
4. Trombay Thermal Station Extension (Private sector)	125	1965-66	

MYSORE
Hydel Schemes

1	2	3	4
1. Sharavathi Stage I . . .	178.2	1964-65	
2. Badra H.E. Project . . .	33.2	1953-64	
3. Tungabhadra left bank Power House	27	1953-64	
4. Sharavathi Stage II . . .	534.6	356.4 MW will be commissioned by 1965-66.	Benefits of balance 178.2 MW will accrue in 4th plan.
5. Tungabhadra Right Bank Stages I & II	36	1963-64	Mysor.'s share out of this is 7.2 MW only.

ORISSA(a) *Hydel Schemes*

1. Hirakud H.E. Project Stage II	147	1963-64
--------------------------------------------	-----	---------

(b) *Thermal Schemes*

Talcher Thermal Station	240	1965-66
-----------------------------------	-----	---------

PUNJAB(a) *Hydel Schemes*

1. Bakra right bank Power House	280	210 MW will be commissioned by 1965-66, out of which Punjab's share is 178 MW.	Benefit of balance 70 M Plan
2. Uhl River Extension	45	15 MW will be commissioned in 3rd Plan.	Benefit of 50 MW will accrue in 4th Plan.

Thermal Schemes

1. Thermal Plant at Delhi	60	1965-66
2. Faridabad Thermal Station	15	1964-65

RAJASTHAN
(a) Hydel Schemes

1	2	3	4
1. Chambal Stage I	23	1963-64	Share of Rajasthan is 11.5 MW.
2. Ranapratapsagar Power Station	172	86 MW will be commissioned by 1965-66, out of which 43 MW is the share of Rajasthan.	
3. Right Bank Power House at Bhakra.	280	210 MW by 1965-66 Rajasthan's share is 32 MW.	70 MW in 4th Plan Rajasthan's share is 10.6 MW.
4. Chambal (Gandhisagar) 5th unit.	23	1965-66	Share of Rajasthan is 11.5 MW.
5. Kota Dam—Power House	100	During 4th Plan.	Share of Rajasthan is 50 MW.
(b) Thermal Schemes			
Satpura	300	1965-66	Rajasthan's share is 120 MW.

UTTAR PRADESH**(a) Hydel Schemes**

1. Rihand Project	250	1961-62	
2. Yamuna Stage I	56.5	1965-66	
3. Matatila Project	30	10 MW will be commissioned by 1965-66.	Benefits of balance 20 MW will accrue in 4th Plan.
4. Obra H.E. Project	100	67 MW will be commissioned by 1965-66.	Benefits of balance 33 MW will accrue in 4th Plan.

	1	2	3	4
(b) Thermal Schemes				
1. Harduaganj Stage I, Thermal Extn.	60	During 1962-63		
2. Singarauli Thermal Project	250	150 MW will be commissioned by 1965-66.	Benefit balance 100 MW will accrue in 4th Plan.	of 100 4th
3. Kanpur Thermal Station Extn.	60	1964-65		
4. Harduaganj Extension Stage II	30	1964-65		
5. Martin Burn Extn. (Private Sector)	20	1963-64		
WEST BENGAL				
(a) Hydrel Schemes				
1. Jaljhaka Stage I	18	1964-65		
(b) Thermal Schemes				
1. Durgapur Cokcoven Plant Thermal Extension	150	1963-64		
2. Bandel Thermal Extension	300	1964-65		
3. Durgapur Coke Oven Plant Extension Stage II	75	1965-66		
4. Calcutta Electric Supply Co. (Private Sector)	50	1963-64		
DAMODAR VALLEY CORPORATION				
Thermal Schemes				
1. Chandrapura and Durgapur Thermal Plant	560	420 MW will be commissioned by 1965-66.	Benefits balance 140 MW will accrue in 4th Plan.	of 140 4th
DELHI				
Thermal Schemes				
1. Delhi 'C' Stn.	30	1963-64		
2. Delhi Thermal Station Extn.	120	1965-66		
3. 15 MW Thermal Station	15	1964-65		

APPENDIX IX

(Vide para 35)

Statement in respect of power development schemes for which scheme reports have not yet been received.

Sl. No.	Name of Scheme/State	Plan Provision (Rs. lakhs.)	Remarks
1	2	3	4
A. Hydro Schemes			
1	Vaitarna	100·0	
2	Sahasrakunda	50·0	
3	Tail race Sharavathi	50·0	
4	Kalinadi	50·0	
5	Balimela—ORISSA	1150·00	Provision inclusive of Andhra's share.
6	Baspā—HIMACHAL PRADESH	5·0	
7	Improvement to Leimakhong	7·20	
8	Yairok	18·0	
B. Thermal Schemes			
1	Pathratu—Bihar	2974·0	
2	Kalakote—Jammu & Kashmir	100·0	
3	Obra Thermal—Uttar Pradesh	1600·0	
4	Package units—West Bengal	..	
5	Diesel Power Stations—NEFA	11·0	
C. Transmission, Distribution and Rural Electrification Schemes.			
1	Rural Electrification—Bihar	300·00	Part schemes costing a total of Rs. 169·86 lakhs approved.
2	Extension of lines in Jammu & Kashmir area—J.&K.	..	Schemes costing more than the Plan provisions have already been received.

1	2	3	4
3	Other Transmission and Distribution—Mysore	975.0	
4	Rly. Track Electrification—Orissa.	..	
5	Rural Electrification in Ajmer including 33 kV line from Ajmer to Beawar. } Rajasthan.	16.92	
6	Chambal Transmission Stages II and III. }	948.5	State II works costing Rs. 911.79 lakhs approved already.
7	Distribution works } NDMC } Delhi	150.0	
8	Inter State Link. . }	200.00	Includes provision for 15 MW set a/o. Scheme report for Rs. 178 lakhs received.
9	Rural Electrification works in Hill Area } Manipur	40.0	Scheme costing Rs. 33.10 lakhs approved.
10	Transmission.Distribution—NEFA	32.00	
D. Other Schemes			
1	Midget Station—Andhra	20.0	
2	Small Hydels. }	5.0	
3	Investigations. } Assam	35.0	
4	Workshop and Testing Laboratory. }	8.0	
5	Investigation and Small Hydel-Bihar	40.0	
6	Acquisition of Private supply undertaking—Bihar	10.0	
7	Extension of Testing Laboratory-DVC.	25.0	
8	Small Hydel and Investigation - Gujarat	30.0	
9	Salal (Investigation) }	25.0	
10	Small Hydels. }	30.0	
11	Survey Investigations }	12.0	
12	Other Micro Hydel Schemes. } Madhya Pradesh	20.0	Scheme costing Rs. 3.91 lakhs already approved.
13	Investigation	100.00	

1	2	3	4
14	Loans to licensees —Madras .	200.0	
15	Investigation:—Mysore .	50.0	
16	Low Head Hydro Schemes. } Orissa	10.0	
17	Investigation. }	70.0	
18	Small Hydrl—Punjab . .	100.00	Diesel Schemes for Rs. 60.0 lakhs approved already.
19	Acquisition of and loans to licensees. }	50.00	
20	Testing Laboratory } Rajasthan	5.0	
21	Investigations. }	15.0	
22	Small Hydels }	40.0	
23	Investigation } U.P.	120.0	
24	Uttarkhand Schemes }	75.0	Schemes costing Rs. 26.87 lakhs approved. Plan provision for these schemes is Rs. 12.47 lakhs.
25	Street lighting works—Delhi .	70.0	
26	Micro Hydels. } Himachal Pra-	10.00	
27	Investigations. } desh	3.0	
28	Micro Hydels } Manipur	5.0	
29	Investigations }	5.0	
30	Investigation schemes—Tripura .	3.57	Provision inclusive of continuing schemes also.
31	Normal Capital Works Extension. }	10.0	
32	Investigations. } NEFA	2.0	
33	Diesel Stations }	19.3	
34	Investigations. }		
35	Improvement to Electric Supply in Nicobar-Andaman Nicobar.	1.5	

APPENDIX X

(Vide para 37)

Note showing action taken by Government to resolve the difficulties pointed out by the Reviewing Team

(i) Target dates for various Stages and Components.

In many of the States there was no systematic attempt to prepare a realistic schedule of works and to adhere to the same to the maximum extent.

The visits of the Reviewing Team made it incumbent upon the Project Authorities to draw up realistic schedules of works to be undertaken each year for each Project. The schedule of civil works, date of issue of specifications, date of receipt of tenders, date of placing orders, delivery schedule, date of completion, have now been obtained for each project. Besides, a revised set of pro forma for submitting progress reports of each project was prepared by the Ministry and forwarded to all the Project Authorities. The information to be received on the revised pro forma will enable the C.W. & P. C. to get a correct picture of the progress being made on each item of work of the Project.

(ii) Lack of co-ordinated action in proceeding with various components of projects.

Although work on major items of a Project was taken up, a number of items which might be of relatively small cost as compared with the main work but which, if not arranged for in time, might hold up the progress of the main project, were not receiving adequate attention. Action for procurement of certain items such as power house cranes, gates, valves, cables, etc., had not been taken in time, in some cases, thus delaying completion of the projects. In certain other projects, although action had been taken for ordering the main generating plant, sufficiently speedy attention was not paid for the procurement of ancillary items, like water treatment plant piping, coal, and ash handling plant, etc.

The Team impressed upon the Project Authorities the need for taking co-ordinated action in the construction of civil works, procurement of power plant and equipment required for the completion of the project.

(iii) Delays in getting foreign exchange.

There were general complaints regarding delays in the release of foreign exchange. The Project Authorities had, however, not appreciated the difficulties in securing foreign

exchange and the necessity to scrutinise each proposal with a view to ensure optimum utilisation of indigenous manufacturing capacity.

The question of simplifying the procedure for release of foreign exchange is being actively pursued by the Ministry of Irrigation and Power with the Development Wing. The Development Wing have been requested to dispose of cases referred to them promptly. The Project Authorities were also advised that they should take sufficiently early action to apply for release of foreign exchange and issue of import licence.

(iv) Delay in procurement of steel.

Many of the Project Authorities were slow in estimating the categorywise requirements of steel for the power projects and placing their indents with the Iron & Steel Controller sufficiently in advance.

The questions arising out of steel supply were also taken up with the Iron & Steel Controller by the Ministry of Irrigation & Power. It was brought home to the Iron & Steel Controller that high priority should be given for meeting the steel requirements of power projects and where it was not possible to supply the steel from indigenous sources, permission should be given to import certain quantities of steel urgently required, which has been agreed to. All the high tensile steel plates required for the penstocks will be more or less covered by these imports.

(v) Shortage in supply of explosives and cement.

Some of the projects, particularly in Kerala and Madras, experienced inadequate supplies of explosives and cement.

The question of adequate supplies of explosives was discussed by the Ministry of I. & P. with the Ministry of Commerce and Industry and it was agreed that certain quantities of explosives should be imported by Imperial Chemical Industries, till such time as there is adequate indigenous capacity for meeting the demands for explosives. As regards cement, while the quarterly allocations by the Regional Cement Controller appeared satisfactory, the actual deliveries fell far short of these figures. The position was brought to the notice of the State Trading Corporation who control the production and distribution of cement.

(vi) Supplies from Heavy Electricals Ltd.

Many of the Project Authorities who had placed orders with Heavy Electricals for certain items like transformers, switchgear, etc., had not been informed of the delivery schedule and the prices for such equipment.

Discussions have been held with Heavy Electricals and a programme of manufacture of important items for the next three to four years has been ascertained. As a result of these discussions, it was found necessary to import cer-

tain equipment, such as step-up transformers and switch-gear for the Cambay Power Station to suit the targets date (July, 1963) for commissioning the plant.

(vii) Organisational Defects.

In some of the States like Andhra Pradesh, Maharashtra, Mysore and U.P., the responsibility for power generation, transmission and distribution is not vested with any single authority. For instance, in Maharashtra two separate Departments of the Government, namely Irrigation and Power and Industries & Labour are involved—the former being in charge of the Koyna Project and some transmission lines, while the latter looks after the work of the State Electricity Board.

The State Governments have been advised to see that single department is made responsible for handling all matters connected with power development.

(viii) Investigations.

One of the causes which affected speedy implementation of the projects was the lack of thorough and detailed investigations before deciding to go ahead with the scheme and preparing the project report.

The project authorities have been advised to complete detailed investigations of projects to be taken up in the fourth Plan. The Project Authorities have also been requested to intimate to the Ministry the progress of investigations on a regular pro forma.

The Team's review has highlighted the need for high level co-ordination at the Centre for speedy implementation of Plan Projects. Having regard to the size of the Power Plan to be implemented and also to the dependence of Project Authorities on the Centre for co-ordination regarding steel, cement, foreign exchange and import licences, a high level officer has been appointed in the Ministry of Irrigation and Power for giving undivided attention towards the implementation of power projects. Similarly a new Directorate has been set up in the C.W. & P.C. for watching the progress of projects, finding out the difficulties of project authorities in the implementation of projects and rendering as much assistance as possible. It has also been decided to undertake a similar review of power projects regularly each year. The second review is currently in progress.

(ix) Land acquisition for power house, sub-stations etc., should be pursued more vigorously.

(x) Decision on tenders should be taken more expeditiously.

(xi) Coal requirements of new thermal stations should be brought to the notice of the Coal Controller and the Railway Board well in advance.

APPENDIX XI

(Vide para 47)

Terms of Reference & Composition of the power and Electrical Survey Committee.

(a) The Government have appointed a top Advisory Group and a Power and Energy Survey Committee. In the light of the prospective demands for power by the various States and Regions and the category of consumers to be expected by March, 1971, the Committee will consider appropriate measures required to meet the same. In particular, the Committee will consider for the said period:—

(a) *Development of power resources.*

(i) hydro-electric.

(ii) thermal (this includes coal, lignite, oil and gas) and

(iii) atomic energy.

The Committee will make recommendations as to the phasing in which these should be brought into use progressively.

(b) Fuel for thermal power stations: availability of fuel, best location and sizes of plants. The fuel to be considered would be coal, oil, gas and atomic energy.

(c) The outline plan for regional and All-India grids and dovetailing (both in respect of timing and in respect of potential) of hydro-electric, thermal, and atomic energy stations into grids with recommendations for appropriate voltage levels.

(d) Survey of local production of generation, transmission and distribution equipment, consideration being given *inter-alia*, to capacities of equipment and possibilities of standardisation. In this connection the Committee will make a review of facilities available for transport of equipment and make appropriate recommendations.

(e) Investments necessary in generation, transmission and distribution, split up, to the extent possible, on an annual basis.

(f) Importation necessary giving due allowance to existing and recommended local production. The extent of standardisation might also be indicated so as to permit bulk purchase.

- (g) Requirements of skilled manpower for construction, operation and maintenance of power systems.

N.B. 1. *The work relating to power forecasting is already in hand and it is necessary that this should be completed as speedily as possible. This work will be completed by the Indian power experts, who recently visited the U.S.A. to study power forecasting in that country and they will be assisted by experts from U.S.A.*

2. *The Committee will also give consideration to organisational pattern for power surveys in future.*

The Committee may review and make recommendations in respect of important organisational and financial matters bearing on power development in the country, with particular reference to

- (i) adequacy of existing electricity supply legislation in the light of past experience and future development—improvement at State, regional or Central level in the organisation for development;

(ii) Electricity tariff and financial policies.

(b) The members of the Committee are: Shri M. R. Sachdev, Secretary, Ministry of Irrigation and Power, Mr. Walker Cisler, USA., Prof. Austin Robinson, U.K., Mr. De Heem, Belgium, Mr. Jacques Desrousseaux, France, Shri S. S. Kumar, Shri H. R. Bhatia, Shri K. P. S. Nair, Shri V. P. Appadurai, Shri S. Bose, Shri B. S. Nig, Shri Pitamber Pant, and Shri M. S. Ram (Member-Secretary).

The Committee will have powers to co-opt other experts from time to time.

The Advisory Group consists of: Shri C. M. Trivedi, Member, Planning Commission, Dr. H. J. Bhabha, Chairman, Atomic Energy Commission, Shri M. S. Thacker, Secretary, S.R. & C.A., and Shri M. R. Sachdev, Secretary, I. & P.

(c) The Power Survey Committee is expected to submit its report by July, 1963 and the Energy Survey Committee is expected to submit its report by December, 1963.

APPEN

(vide para

Comparative Statement of Tariffs for Railway Electrification

Sl. No.	Description	B. S.			
		D.V.C	W.B.S.E.B.	D.V.C. Power	Rihand Power
1	Nature of Generation	Hydro & Thermal	Hydro & Thermal ^(a)	Hydro & Thermal	Hydro
2	Maximum demand charge per month (15 Minutes)	Rs. 7.7 per kVA	Rs. 10.0 per kVA	Rs. 7.7 per kVA (30 min)	Rs. 10.0 per kVA (30 min)
3	Energy charge per kWh | . . . .	nP 2.14	nP 2.35	nP 2.14	nP 2.90
4	Ceiling cost per unit (after paying cost of maximum demand)	nP 6.25*	..	nP 6.25	..
5	Coal adjustment charge per kWh per cent rise in the basic cost of coal of nP 40/million BThU.	nP 0.006/nP 1.26/ kWh as on date).	nP 0.0065 (nP 1.365/ kWh).	nP 0.006 (1.26)	..
6	Annual charges on capital cost of s/s & transmission lines required for effecting supply at 25 kV. . . .	10%	10%	11%	11%
7	Annual charge referred in item 6 above, per substation per month	Rs. 6170	Rs. 15278	Rs. 23833	Rs. 23833
8	Overall cost per unit assuming 10 MVA maximum demand at .7 power factor and				
	(a) 40% load factor]				
	(i) Demand Charge	3.82	4.96	3.82	4.96
	(ii) Capital Charge	0.31	0.76	1.18	1.18
	(iii) Energy Charge	2.14	2.35	2.14	2.90
	(iv) Fuel Surcharge	1.26	1.37	1.26	..
		<u>7.53&</u>	<u>9.44</u>	<u>8.40&</u>	<u>9.04</u>
	(b) 60% load factor				
	(i) Demand Charge	2.55	3.31	2.55	3.31
	(ii) Capital Charge	0.21	0.50	0.79	0.79
	(iii) Energy Charge	2.14	2.35	2.14	2.90
	(iv) Fuel Surcharge	1.26	1.37	1.26	..
		<u>6.16</u>	<u>7.53</u>	<u>6.74&</u>	<u>7.00</u>

DIX XII

59)

Schemes offered by different power supply Generating Authorities

E.B.		ORISSA		Madras State Electricity Board	Tariffs as per Power Interchange agreement between Tatas & C. Rly.	Remarks
Hirakud Power		Final	Provisional	Thermal	Thermal	
Final	Provisional					
Rs. 365/- 1 W per year (30 min)	Rs. 4.95 per kVA	Rs. 365 kW per ci (30 min)	Rs. 4.9 per kVA	Rs. 6.0 3 nP	For interchange of Power. For supply by Rlys. to Tatas 4.61 nP in addition to fixed annual charge for peaking assistance. The rate for supply from Tatas to Railways is 3 nP per unit.	Power is being purchased from DVC at the standard rate i.e. Max Demand charges per month (30 minutes) Rs. 7.7 per kVA & energy charge per kWh nP 2.14.
..	nP 7.2	..	nP 7.2	10 pias		
..	nP 8.1	..	nP 8.1	..		*It is understood that DVC are considering reduction of this figure to 6 nP.
..		
..		
Rs. 65,389	Rs. 65,389	..	..	..
10.56	..	10.56	..	..
3.21	3.22	..	..	..
..	8.10	..	8.10	..		
..		
13.78	11.32&	10.56	8.10&	..		
7.04	..	7.04	..	..
2.15	2.15	..	..	..
..	8.10	..	8.10	..		
..		
9.19	10.21	7.04	8.10&	..		

& In these cases for the overall cost per Unit excluding capital charge, the capital cost given in item 4 above will operate.

APPENDIX XIII

(Vide para 65)

Note furnished by the Indian Standards Institution on the procedure obtaining in various countries with respect to compulsory testing of domestic electrical appliances.

Sweden

Compulsory testing of electrical equipment in Sweden is stipulated by orders of the Royal Board of Trade. According to this, equipment listed below must be approved by Svenska Elektriska Material Kontrollanstalten (SEMKO) before it may be sold, delivered or used in the country.

Electrical Accessories. Electrical Wires and Cables, Conduit for Electrical Wiring, Lighting Fittings, Hand Lamps, Electrical Domestic Appliances, Radio and Television Receivers, Fluorescent Lamp Auxiliaries, Bell and Toy Transformers.

The licence to use the S mark of approval, is granted by the SEMKO which is a non-profit making society recognized by Government in 1935. The specifications used as a basis for granting the mark are the SEMKO testing specifications. The specifications are drawn up by technical committees appointed by the SEMKO Board and relate mainly to the safety requirements.

Members of laboratory staff travel through different parts of Sweden, visiting contractors, wholesalers, retailers and selecting samples for testing at the laboratory. Penalties are prescribed, in case of an ascertained failure, which include fines and revocation of licence.

The technical activities of the Swedish Bureau of Testing Electrical Equipment of SEMKO Ltd. are directed by a Technical Board consisting of 9 members appointed by the Government and 6 members appointed by the three associations constituting the SEMKO Ltd. The Government-nominated members represent State Authorities, small manufacturers, electrical contractors, importers and users; the other six members are representatives of Electricity Supply Undertakings, large manufacturers and fire protection interests.

The Technical Board appoints the Testing Committee for analysing the results of testing done by the Swedish Bureau of Testing Electrical Equipment with a view to

granting the approval of marking to the individual manufacturer; and required number of Testing Standard Committees for the preparation of necessary standards against which products shall be tested. The Board also determines the fees to be charged for the tests made by the Bureau and passes resolutions on all other activities relating to testing activities.

Australia

In Australia, control of electricity in all its aspects is a function of the State Governments, as distinct from Federal Government. In each State in Australia, there is now a statutory Electricity Body, bearing responsibility under an Act of Parliament, for safety of electrical equipment. The details of approval schemes are incorporated in regulations. According to the approval schemes, for certain classes of electrical equipment proclaimed from time to time in Government Gazette, there is a complete prohibition on the sale or marketing in any way of such equipment, unless it has been submitted to and approved by the statutory authority concerned.

A form of marking to indicate such approval is laid down in the regulation. This is not, however, regarded as Certification Mark in the normal sense of the term, as it is not registered in the Trade Marks Act of Commonwealth of Australia. It is a statutory device for indicating that the manufacturer claims that the article complies with the relevant requirements, after submission of a sample for type approval.

In all States the criteria for approval are the approval and test specifications laid down by the Standards Association of Australia.

The equipment at present covered under the statutory order includes electric bread toasters, electric radiators, portable immersion heaters, electric kettle, electric jug, electric iron, earth leakage, circuit breakers, plugs and plug sockets, wall switches, electric soldering iron, electric hand lamp and electric room heater.

For industrial electrical equipment, the scheme of marking is voluntary.

Germany

In Germany, there exists a legislation by which power energy plants and appliances consuming power energy, are to be installed and maintained according to the approved rules of the electrotechnical industry. Such Rules are given in VDE-Book of Regulations (Regulations of the Association of German Electrical Engineers). This book includes regulations for wires and cables for power system; and consumer appliances besides for power plants and such other machinery.

In order to prove the conformity of products with the *VDE-Regulations*, the VDE grants the mark "VDE". In order to ensure the observation of these regulations, the workshops of the licensees are inspected by the officials of VDE-test service, the first time before granting the licence to use the VDE-mark and afterwards from time to time. The records are checked and the products marked with the VDE-stamp are taken at random and examined in the VDE-test laboratory. The licence to use the VDE mark is withdrawn in case the provisions for the grant of the licence have not been met. The marking of electrical appliances with the VDE-stamp is intended to certify the fulfilment of SAFETY requirements up to now, no regulations are in existence with respect to the control of other quality characteristics of domestic electrical appliances. DIN, however, proposes to include quality specifications for domestic electrical appliances in the DIN standards and to ensure the observation of these specifications by the controlled marking with the DIN stamp.

Up to now the VDE-mark has been granted for the following domestic electrical appliances:

"Room heating devices, flat iron, electrical ranges, cooking and baking appliances, boiling plates, stationary hot water supply boiler, water boiler and similar appliances, immersion heaters and similar appliances, feed stewar, toaster, grill soldering irons and other electrical tools, refrigeration machines (absorber and compressor type), heating pads, vacuum cleaner, floor polishing machines. combined domestic appliances with motor drive, machines for treatment of spoiled linen, sewing machines, coffee grinders, combined kitchen appliances with motor drive, hair drying appliance (air flow type), hair clipping and animal shearing machines, ventilators and electrical tools with motor drive."

Denmark

In Denmark, according to the Heavy Current Act, electrical equipment, etc., as detailed below which are used in or supplied from low voltage utilization system shall be approved by Danmarks Elektriske Materialkontrol (DEMKO) before it may be sold, delivered or used in the country. The term low voltage utilization systems denotes system with rated RMS voltages over 24 volt and up to and including 250 volts.

The following is the list of equipment for which DEMKO's approval is necessary before sale, delivery or use in the country:

Electrical accessories, electrical wires and cables, conduit for electrical wiring auxiliaries for

fluorescent lighting, hand lamps, electrical domestic appliances, radio and television receivers, electric fence controllers, measuring instruments and isolating transformers.

DEMKO is a Board appointed by the Ministry of Public Works for granting approval to the manufacturers in respect of the equipment listed above. The only aim of DEMKO is to protect the public against the risk which may result from the use of equipment of poor quality with particular regard to the danger to life or of fire. All approvals from DEMKO cover only the equipment as specified in DEMKO's certificate of approval and it is exactly the same as the samples covered by the certificate. It is the duty of the holder of the approval only to sell or deliver equipment in complete accordance with the approval. It is forbidden to sell, deliver or use equipment in the country until the applicant has received written approval. Other authorities in the country have other regulations and restrictions concerning the sale and use of equipment and the holders of the approvals are responsible to these authorities and must themselves make inquiries as to special requirements of these authorities. When sold, delivered or used in the country, approved equipment is provided with the registered mark of approval D.

Norway

In Norway, there exists a legislation according to which all electrical household equipment have to be tested and approved by a particular governmental institution called Norges Elektriske Materialkontrol (NEMKO). The equipment is to be sold with the legally protected certification mark N of that station before it may be used in the country. The use of this certification mark is thus made compulsory. The main object of the testing is to test the electrical safety but the station may also refuse to approve appliances and apparatus in cases where they fail to meet the requirements as regards other kinds of safety when used or fail to meet reasonable requirements as to function, economy and durability.

The equipment covered under this legislation includes refrigerators, washing machines, water heaters, etc.

Finland

In Finland, there exists a legislation by which all portable appliances to be connected to heavy current circuit by means of a flexible cord and plug shall be tested and approved by Electrical Inspectorate before marketing. Even electrical installation material for low voltage installations is subject to obligatory testing and approval.

At present, there is no national certification marking system for approved electrical equipment in Finland.

Canada

In Canada enforcement of safety requirements for electrical installations and granting of approval and policing of sales of electrical equipment are the responsibility of provincial authorities.

The Canadian Standards Association is responsible for preparation of the standards and the standards prepared by CSA, become mandatory only after they are adopted by the provincial authorities.

There are two avenues open for the manufacturers to get the approval for the products manufactured by them; (1) to directly approach each of the inspection authorities and convince them that their products meet with the requirements of the standard and thereby obtain their approval, (2) to submit their products to the CSA Testing Laboratories for certification. In such a case, the CSA Laboratory will, after testing the equipment and making sure that the product complies with the Canadian Standard, circulate copies of the test report together with all other details to the various inspecting authorities and get their approval by postal ballot.

There is also an Approval Council in existence whose primary function is to maintain contact with the provincial electrical inspection authorities and provide the necessary co-ordination between them and the CSA Testing Laboratories. This Council is an advisory body to the Testing Laboratories to assist in promoting uniformity in interpretation and enforcement of the standards.

APPENDIX XIV

Statement showing the summary of recommendations/conclusions

Sl.No.	Reference to para No. of the Report	Summary of recommendations/ conclusions
1	2	3
1	7	The Committee note that though the Damodar Valley Corporation had initiated the proposal for installing the fourth power generating unit at Bokaro as early as April, 1953, the project was cleared for execution by the Government of India only in May, 1956. This period of more than three years was passed in correspondence and conferences between the Ministry of Irrigation and Power, Damodar Valley Corporation, Central Water and Power Commission, the participating Governments and the Planning Commission. This is but one of the instances which goes to show how multiplicity of organisations for vetting power schemes result in delay. The multiplicity of organisations also make it difficult to pinpoint the responsibility for such delays. The Committee cannot therefore too strongly stress the need for streamlining the procedure so that power schemes are vetted and sanctioned more expeditiously.
2	8	The Committee suggest that the proposed review of the Electricity (supply) Act, 1948 may be made at an early date.
3	9	The Committee feel that there is need to establish closer contact with the Chairmen of the State Electricity Boards in the matter of planning for power. They recommend that meetings may be held by the Ministry with the Chairmen of the State Electricity Boards periodically, which may not be less than once a year.

1	2	3
4	12	<p>The Committee feel that time has come when the power plan should not merely be related to the resources and requirements of an individual State but should be related also to the interests of a region. It may well be that power resources in one State may have to be developed at an accelerated pace to enable utilisation of power in the neighbouring States. Similarly, the pattern of hydro-electric development in a State may have to be shaped in the light of requirements for co-ordinated operation of nuclear or thermal stations in adjacent States.</p>
5	19	<p>The Committee note that the studies indicate that large scale economics could be achieved by integrated operation of power systems in the country.</p> <p>The Committee feel that the establishment of regional grids and regional power agencies seem to be developments in the right direction. They note that a Committee composed of representatives of the State Electricity Boards and Centre will examine the scope of the regional agencies and the central agencies and their powers and ancillary matters. The proposal is of sufficient importance for a Committee to go into the question in detail and bring out all the implications after ascertaining the reactions in the places which would be affected by the proposal for it is necessary to have the fullest cooperation of the States concerned in such a development.</p>
6	20	<p>As "kWh generated per capita" is a sure index of country's industrial growth, the Committee feel that if India is to advance along the path of industrialisation, planning for power should receive high priority.</p>
7	22	<p>Since the cost of installing 1 kW of electric power is but a fraction of the capital investment required to utilise it, it is obvious that if in any eventuality power generating capacity was underutilised it would entail less overall loss to national economy than would be the case if productive machinery was to be rendered idle on account of power deficit. Past experience, in India and other countries, clearly shows that in a developing economy the demand for power nearly always outruns the available supply. Planning for surplus power is, therefore, essential for achieving an optimum rate of growth in the country. The Committee strongly recommend that power being a primary source of energy should be one step ahead of industrial and other requirements.</p>

1	2	3
8	23	The Committee hope that Government would not allow the phenomenon of shortage of power, which has handicapped the industrial and developmental plans in the first two years of the Third Plan to recur in the next Plan period. They would like to emphasise that Government should sanction in time the power projects required to meet the additional requirements in 1966-67 and 1967-68.
		The Committee are glad to note that perspective plans of power requirements till 1981 have been drafted. Planning for power is in fact a continuous process and the perspective plans have to be reviewed in the light of requirements revealed by power surveys. The Committee would like the Government to pay close and continuous attention to perspective planning so that the targets fixed are fully in consonance with the requirements.
9	24	As it is an established fact that hydel is the cheapest source of power in India, the Committee would urge the Government to investigate and prepare blue prints of all the remaining hydro-electric schemes so that they can be readily available for being taken up to meet the increasing demands. This is all the more desirable as India has all the requisite experience for undertaking investigation and preparation of project reports as also the implementation of hydel schemes.
10	:	The Committee consider it unfortunate that there was shortfall of 120 million kW in the installed generating capacity during the Second Five Year Plan due firstly to a number of power schemes being relegated into the non-core group of the Plan on the ground of foreign exchange difficulties and secondly on account of delays in the execution of some of the important projects such as Bhakra Nangal, Koyna, Rihand and Hirakud.
11	26	It is a matter of concern that the firm generating capacity in the country would continue to lag behind the anticipated demand throughout the Third Five Year Plan. The position is likely to improve somewhat during the last year of the Third Plan but the Committee note that the overall shortage would in fact increase from 353.1 MW in 1961 to 455.7 MW in 1966. Power supply at the end of the Plan is expected to be short in all the States, except Jammu and Kashmir, Kerala, Rajasthan and Delhi. The shortage is expected to be the heaviest (202.5 MW) in Bihar-DVC-West Bengal region. The additional requirements of power for the defence-based industries may further aggravate the shortage.

1	2	3
12	27	<p>The Committee are glad to note that Government have taken some measures in 1962 to augment power generation. It is yet to be seen as to how far in actual practice these measures are able to relieve the acute shortage of power which is already being experienced in several States in the current year and which is likely to become even more acute in 1964. The Committee hope that Government would ensure that the additional capacity sanctioned by them is brought into commission as early as possible to relieve shortage. In particular they would like to suggest that package units, for which orders have already been placed, be imported at an early date. These could be installed with expedition in areas which are experiencing the most acute shortage of power for industrial and defence needs. The Committee would also suggest that the position may be kept constantly under review so that necessary steps can be taken without avoidable delay to relieve power shortage as much as possible.</p>
13	28	<p>The Committee understand that Government have only sanctioned upto 25,000 kW for the present and that the proposal for the remaining 75,000 kW had been kept in suspense.</p> <p>In view of the need for meeting power requirements on emergent basis, the Committee recommend that urgent action may be taken to procure the standby units to the entire capacity of 100,000 kW.</p>
14	29	<p>The Committee have given careful thought to the question of smooth and effective functioning of the Damodar Valley Corporation in so far as it relates to generation and transmission of power in Bihar-West Bengal region. They cannot but agree with the following views expressed by the Public Accounts Committee in their Fifth Report (Third Lok Sabha) on the Audit Report on the Accounts of the Corporation for the year 1960-61:—</p> <p>“ . . . They feel that time has come to make an overall assessment of the working of the Corporation and also to examine what amendments, if any, in the D.V.C. Act are called for to achieve the objectives for which the Corporation was set up.”</p>
15	30	<p>The generating units which were either not in use or required repairs as revealed in the census carried out by the Ministry should serve not only</p>

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- as additional standby capacity but also to augment the present short supply in the country. The Committee would, therefore, urge the Government to devise suitable measures whereby the existing power resources could be exploited to the best advantage of the country by (i) pressing into service all small units which may have been closed down on grounds of economy; (ii) ensuring full availability of power supply by careful operation and maintenance of both new and old plants; and (iii) taking good and timely care to see that all essential spare parts are kept in stock for carrying out immediate repairs in case of breakdowns.
- 16 32 The Committee would urge that high priority should be given to power for irrigation pumping as this is one of the most practical ways of stepping up the agricultural production.
- 17 32 The Committee hope that decision on the recommendation of the Eighth Irrigation and Power Seminar (1962) that (i) the deficit in return from the rural areas may be made good by other Development Departments of Government; or alternatively (ii) Government may give loans to the State Electricity Boards at no interest for a period of at least five years to cover the capital cost of rural electrification, would be taken soon so that the important schemes of rural electrification make rapid headway.
- 18 33 The Committee suggest that the reasons for poor progress in installation of micro-hydel sets may be investigated with a view to extend their use.
- 19 35 The Committee are surprised to note that out of the total plan provision of Rs. 1039 crores in the public sector, an amount of Rs. 100 crores *i.e.* 9.6 per cent of the total provision, has been provided on account of 58 schemes in respect of which reports have not been received by the Central Government.

It is obvious that project schemes would have to be prepared and sanctioned before any start can be made in the implementation of the projects. Since two years of the Plan period are nearly over without the submission of power development schemes envisaged in the Plan, there is bound to be delay in their execution.

The Estimates Committee recommend that work relating to investigation of schemes included in the Third Five Year Plan may be completed without delay.

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They would also urge that project studies relating to the Fourth Five Year Plan may be taken in hand forthwith. These should be completed sufficiently early so that as far as possible fully investigated schemes may be included in the Fourth Five Year Plan.

20 36 The Committee consider that now that the Central Water and Power Commission have a fund of experience of more than a decade, it should be possible for them to conduct technical examination of proposals received from the State Electricity Boards in a more expeditious manner. They recommend that the Central Water and Power Commission may carefully review the procedure for processing such schemes so as to reduce the time to the minimum.

21 38 It is unfortunate that the erection of the first two units of the Sharavathy Hydro-electric project would be delayed by about 18 months. In view of the acute shortage of power being experienced in Mysore State particularly by Defence industries, the Committee have no doubt that Government would make every endeavour to speed up the execution of the Sharavathy Power Project.

22 39 The Committee stress the need for timely receipt of periodical progress reports on major projects from State authorities. Such progress reports should be analysed immediately on receipt in the Central Water and Power Commission in order that immediate action could be taken to resolve the bottlenecks.

They are firmly of the view that once the Government have sanctioned a particular project, all impediments coming in the way of its smooth progress should be removed expeditiously to ensure adherence to plan targets.

23 41 Since a number of Ministries are intimately connected in finding a solution to these problems, the Committee suggest that the question of setting up a Committee composed of representatives of the Ministries of Irrigation and Power (including Central Water and Power Commission), Finance, Commerce and Industry, Steel and Heavy Industries and Economic and Defence Coordination for removing the bottlenecks encountered by the project authorities in the

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		procurement of foreign exchange, machinery, equipment, steel, cement, explosives, etc. may be examined. They also suggest that early action should be taken to rationalise the procedure for release of foreign exchange and issue of import licences so as to cut out all delays.
24	42	The Committee would urge that the manufacture of generators, transformers, high tension switch gears and heavy industrial motors etc. may be geared up to meet the plan requirements.
25	43	The Committee consider that there should be close liaison between Heavy Electricals Ltd., Bhopal on the one hand and the Central Water and Power Commission and the State Electricity Boards on the other.
26	44	The Committee are glad to note that the Ministry have initiated action to standardise power equipment. The Committee feel that with the setting up of the Power Research Institute and the Specialised Engineering Organisation, it should be possible to extend standardisation to other important items of electrical equipment.
27	46	The need for accurate load forecasting as a pre-requisite condition for systematic planning for power development requires hardly any stress. Unless power load surveys are carried out and results made known early, they lose their value as basis for power planning and economic development. It is, therefore, a matter of regret that the work of power load survey of different regions and the country as a whole which was taken up in 1954 and has already cost the Government about Rs. 20 lakhs has not been completed so far.
28	47	The Committee hope that load surveys would be completed shortly and that work relating to power forecasting would be completed speedily. They would urge that broad principles for undertaking load surveys and power forecasting may be laid down by the Central Water and Power Commission at an early date for the guidance of the State Electricity Boards so that there is uniformity of approach in the detailed load surveys to be carried out by the State Electricity Boards.

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29	47	The Committee would also urge that as in the United States, arrangements may be made to bring out periodically, at least once every year, a publication containing vital statistics about load surveys and power development programmes for the different States and Union Territories and the country as a whole.
30	52	The Committee hope that the Ministry of Irrigation and Power would take necessary action to ensure that the power requirements of Railways which constitute the nation's life-line are fully met. The West Bengal and Bihar State Electricity Boards should supply power as envisaged by the Sachdev Committee or in the alternative Rihand and Hirakud Power should continue to be made available. They would also like to emphasise that the generation of power in Chandrapura should be advanced to as early a date as possible, but not later than September, 1964 so as to meet fully the railway requirements.
31	53	The Committee also hope that the Ministry of Irrigation and Power would similarly ensure that the requisite power for the Third Five Year Plan is made available for electrification on Northern Railway by U.P. State Electricity Board, on Central Railway by the Maharashtra State Electricity Board and on the Southern Railway by the Madras State Electricity Board.
32	54	The Committee would also urge that a close watch may be kept on the installation of transmission lines so that there is no delay on this account in making the power available at the points needed for railway electrification. In this connection they would, particularly, like to draw attention to the need for completing the transmission lines to carry power for electrification of Sealdah-Ranaghat and Dum Dum-Bongoan Section of Sealdah Division of Eastern Railway.
33	55	The Committee urge that high priority may be accorded for meeting the urgent requirements of Railway Workshops so that the Railways maintenance and production programmes do not suffer.
34	56	The Committee cannot too strongly emphasise the need for undertaking perspective planning for electric traction in greater detail and with greater expedition so that the railway requirements can be fully taken into account while sanctioning the power projects for the first two years of the Fourth Five Year Plan.

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		Where hydel power is available at reasonable rates the advantage of it should be taken for electrification of railways in the areas especially when they are far removed from coal bearing areas. The Committee would suggest a comprehensive examination of the possibilities of electrification in the different zonal Railways.
35	56	The Committee would further suggest that to end uncertainty about the supply of power for railway traction, the Central Electricity Authority may at the time of sanctioning new projects of State Electricity Boards and other generating authorities earmark the power which they have to make available for railway traction.
36	57	The Committee would also like to emphasise the need for closer coordination between the generation and supply authorities so that the work progresses according to schedule in a most economical manner. In this connection the Ministry of Railways had pointed out in the earlier stages that there was lack of coordination between the Bihar State Electricity Board, D. V. C. and Rihand in the commissioning of Pipri—Sonenagar Transmission Line in the matter of metering and synchronising equipment, arrangement for parallel operation, settlement of energy charges etc. with the result that the scheduled date of June, 1961 had to be put off by one year. Similar lack of coordination between Bihar State Electricity Board, D. V. C. and Hirakud authorities was alleged to be responsible for the delay in utilisation of Goilkera—Rourkela Transmission Line which was required to feed reliable supply for the vital railway lines to steel mills to carry raw materials.
		It was also pointed out by the Ministry of Railways that there was duplication of sub-stations at Purulia and Sonenagar between D. V. C. and West Bengal State Electricity Board which resulted in needless over-capitalisation and duplication of operating personnel. The Committee would urge the Central Water and Power Commission to use its good offices to ensure close coordination between the diverse generation and supply authorities who are catering for Railway traction.
37	58	The Committee are surprised to note that there are wide variations in the overall charges, for example, from 7.53 nP. for D. V. C. power to 13.78 nP for Hirakud power for Railway electrification at 40% load factor.

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		<p>The Committee understand that the proposals made by the Railways for rationalisation of tariffs for Railway electrification had been examined by the Ministry of Irrigation and Power who had furnished their comments to the Planning Commission.</p>
		<p>The Committee hope that Government would go into the matter at an early date and in the larger interest of the country would lay down general principles as far as possible, for determining equitable tariff rates for supply of power for railway electrification.</p>
38	60	<p>The Committee are constrained to note that even though 134 proposals for amending the Rules have been pending, the Central Electricity Board has not met even once during the last 5 years. They cannot too strongly emphasise the need for prompt processing of all proposals which are received for amending the Rules so that the shortcomings brought to notice in the application of Rules are rectified without delay.</p>
		<p>The Committee hope that the meeting of the Central Electricity Board will be held at an early date and that in future also such meetings will be held as often as necessary, at least once a year, so that the <i>pros and cons</i> of important proposals received for amendment of Electricity Rules are discussed before decisions are reached.</p>
39	60	<p>It would also be useful to review periodically the Electricity Rules as a whole once in five years so as to take full cognisance of advances made in power transmission, electrical appliances and other allied matters which have a bearing on the working of Rules.</p>
40	62	<p>The Committee feel that the Union Government should have kept a watch on the composition and working of the Electricity Boards from their very inception so as to ensure uniform development. They would urge the Government to complete their proposed study of composition, functioning and financial structure of the State Electricity Boards at an early date and use their good offices to bring about uniformity as far as possible.</p>
41	63	<p>The Committee consider that as the Electrical Inspectors are intimately connected with the working of the Indian Electricity Rules, which are framed by the</p>

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		Central Electricity Board, it is but appropriate that an annual report may be called for from the State Electrical Inspectors. The Report may prove of use to the Central Electricity Board to review annually the working of the Indian Electricity Rules. The Ministry may examine how best the Electrical Inspectors can be enabled to discharge their statutory responsibility in an independent manner.
42	65-66	The Committee understand that the question of introducing compulsory quality control for domestic electrical appliances is still under the consideration of Government. They also understand that in several foreign countries such as Sweden, Australia, Germany, Denmark, Norway, Finland and Canada compulsory testing of electrical equipment is in force. They feel that the Government should take appropriate legislative and administrative and other requisite measures for ensuring the manufacture and supply of intrinsically safe domestic electrical equipment, accessories and wiring materials for use in homes and other non-industrial premises.
43	67	The Committee recommend that in view of its importance the Code for safe operation and maintenance of transmission and distribution systems should be finalised and implemented at an early date.
44	68	The Committee understand that there are only 12 Power Research Institutes in the World. They are happy that the Government have decided to set up the Power Research Institute in the country. They hope that the Institute will fulfil the long-felt need of a Central organisation for applied research in power.
45	70	The Committee suggest that a phased programme for development of the two units of Power Research Institute at Bangalore and Bhopal may be drawn up. They feel that as foreign exchange required for the equipment of the Institute has been assured by the United Nations Special Fund there should be no difficulty in adhering to the schedule.
46	72	The Committee are glad that a practical beginning in undertaking studies for optimum voltage for regional power grids is being made in the Power Research Institute. They recommend that these studies should be expedited so that concrete suggestions for adoption of optimum voltage for transmission on the regional grids are forthcoming early.

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47	72	Another important matter which the Committee would like the Power Research Institute to examine expeditiously is the development of most economical and practical methods for making supports for power lines particularly in the rural areas. The Committee are glad to note that the Power Research Institute is conducting some studies on the subject. They would like these to be expedited so that their suggestions can be put to practical use.
48	73	The Committee were informed during evidence that only five State Electricity Boards had so far established research units for undertaking research on fundamental and basic problems on power. The Committee would urge the Government to stress on the remaining State Boards the necessity of setting up research units at an early date.
49	73	It has been represented to the Committee that financial assistance given by the Central Board of Irrigation and Power to the State Electricity Boards is not sufficient for obtaining the necessary equipment for research. It has also been represented that the procedure for import of research equipment is cumbersome and needs to be simplified. The Committee would like the Government to look into these and other related difficulties being experienced by the State Electricity Boards so that the State research units do not feel handicapped in the matter of equipment.
50	75	The Committee are glad to learn of the progress made in imparting training in the method of hot line maintenance of high voltage transmission lines. They hope that the training would enable the electricity undertakings to increase the reliability of supply.
51	77	The Committee consider that as power targets are likely to be perceptibly increased in the Fourth and succeeding Plans, there is bound to be steep increase in the requirements of technical personnel. They are glad to note that one of the terms of reference of the Power and Energy Survey Committee is to go into 'the requirement of skilled manpower for construction, operation and maintenance of power systems'. The Committee hope that suitable action would be taken by Government to augment training facilities to meet the requirements of technical personnel in the light of findings of the Power and Energy Survey Committee.

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52	78	The Committee feel that as India has enough of experience in the designing and construction of hydel works, it should be possible to persuade the International agencies and countries giving foreign aid not to insist on employment of foreign consultants.
53	81-82	<p>(i) The Committee are glad to learn that the Planning Cell at Madras had been able to effect a substantial saving to the tune of several lakhs, which would have otherwise been paid to the Russians by way of consultation fees for designing, installation etc. of the Neyveli Thermal Power Station. The Study Group were also glad to learn that the Planning Cell was confident of preparing detailed designs for power equipment and supervise its installation and operation thus discharging all the functions of the technical consultants.</p> <p>(ii) Certain shortages in the category of Technical Officers in the Planning Cell were brought to the notice of the Study Group during its visit to Madras in September, 1962. The Committee hope that the shortage of technical staff in the Planning Cell would be made good at an early date.</p> <p>(iii) The Committee would like the Government to so organise the Specialised Engineering Organisation that it is able to discharge fully the responsibilities of technical consultants.</p> <p>(iv) The Committee are also glad to note that Tatas have set up a consultant organisation (Tata Ebasco Services Ltd.) in collaboration with a foreign firm which would be largely manned by Indian engineers.</p> <p>(v) The Committee hope that no effort would be spared in developing the Specialised Engineering Organisation and other consultancy services within the country without further loss of time. They feel confident that if a proficient technical consultant service is built up within the country it should not be too difficult to persuade even the countries giving aid for power schemes not to insist on employment of foreign consultants so that as much of foreign exchange as possible is saved.</p>

APPENDIX XV

Analysis of recommendations contained in the Report

I. Classification of recommendations :

A. Recommendations for improving the organisation and working:

S.No. 1 to 4, 6 to 23, 25, 28 to 31, 34, 35, 38, 39 to 41 and 45.

B. Recommendations for effecting economy:

S.No. 5, 26, 36, 37, 47, 52 and 53.

C. Miscellaneous:

S. Nos. 24, 27, 32, 33, 42, 43, 44, 46, 48, 49, 50 and 51.

II. Analysis of the more important recommendations directed towards economy:

S.No.	No. as per summary of recommendations	Particulars
1	2	3
1	5	Effecting large scale economies by integrated operation of power systems in the country.
2	26	Effecting economy in cost and speed in installation by standardisation of power equipment.
3	36	Need for closer co-ordination between the generation and supply authorities catering for Railway traction to avoid over-capitalisation and duplication of operating personnel.
4	37	Laying down general principles for determining tariff rates for supply of power for railway electrification.

1	2	3
5	47	(i) Optimum voltage for transmission of power on regional grids should be determined. (ii) Development of most economical and practical methods for making supports for power lines particularly in the rural areas.
6	52	Persuading the International agencies and countries giving foreign aid not to insist on employment of foreign consultants for hydro-power stations.
7	53	Organising the Specialised Engineering Organisation to discharge fully the responsibilities of technical consultants.