

1940.
—
WESTERN AUSTRALIA.

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REPORT
of the
Royal Commissioners
on the
SOUTH-WEST NATIONAL
POWER SCHEME.

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*Presented to both Houses of Parliament by His Excellency's Command.*  
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[SECOND SESSION OF THE SEVENTEENTH PARLIAMENT.]

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ROYAL COMMISSION

WESTERN AUSTRALIA, } By His Excellency Sir James Mitchell,
TO WIT. } K.C.M.G., Lieutenant-Governor in and
JAMES MITCHELL, } over the State of Western Australia
Lieutenant-Governor. } and its Dependencies in the Common-
[L.S.] } wealth of Australia.

To FRANK SHAW, WILLIAM HENRY TAYLOR,
and FRANCIS CHARLES EDMONDSON, all of
Perth, Western Australia, Chairman and Members
of the Electricity Advisory Committee as estab-
lished and constituted under and for the purposes
of the Electricity Act, 1937.

WHEREAS the Minister of the Crown charged with
the administration of the Electricity Act, 1937, acting
in accordance with the provisions of that Act has
referred to you Frank Shaw, William Henry Taylor,
and Francis Charles Edmondson, Chairman and Mem-
bers of the Electricity Advisory Committee as estab-
lished and constituted under and for the purposes of
the said Act as such Committee the matter of examin-
ing and reporting upon the establishment of a national
power scheme at Collie in this State to serve the South-
West portion of the State, with particular reference to
the practicability, the demand, the estimated cost, and
any other relative financial, commercial, and economic
factors: And whereas it is deemed expedient that in
relation to and for the purposes of the examination and
report aforesaid you should have and be able to exercise
the powers of a Royal Commission: Now, therefore I,
the said Lieutenant-Governor, acting with the advice
and consent of the Executive Council, do hereby appoint
you, the said Frank Shaw, William Henry Taylor, and
Francis Charles Edmondson, being the Chairman and
Members of the Electricity Advisory Committee afore-
said and acting in such capacity, to be a Royal Com-
mission without payment of remuneration other than
the remuneration payable to you respectively under the
Electricity Act, 1937, as the Chairman and Members of
the Electricity Advisory Committee aforesaid, to do the
following things, namely:—

1. Inquire into, examine, consider, and report—
 - (a) generally upon the matter of the establish-
ment of a national power scheme at Collie
in this State to serve the South-West portion
of this State; and
 - (b) particularly upon the practicability of, the
demand for, the estimated cost of, and any
other financial, commercial, and economic
factors relative and material to the estab-
lishment of a national power scheme as
aforesaid.

2. To consider and make any recommendations
which in the opinion of the Commission are justified or
warranted by the inquiries and investigations made
under paragraph 1 hereof:

And I appoint you the said Frank Shaw to be Chair-
man of the said Commission: And I declare that you
shall by virtue of this Commission be a Royal Com-
mission within the Royal Commissioners' Powers Act,
1902, as reprinted in the Appendix to the Sessional
Volume of the Statutes for the year 1928, and that you
shall have the powers of a Royal Commission or the
Chairman thereof under that Act: And I hereby request
you, as soon as reasonably may be, to report to me in
writing the result of this your Commission.

Given under my hand and the Public Seal of the
said State, at Perth, this 3rd day of November,
1938.

By His Excellency's Command,

J. WILLCOCK,
Premier.

GOD SAVE THE KING !!!

SOUTH-WEST NATIONAL POWER SCHEME.

REPORT

Public Works Department,
Perth, 2nd August, 1940.

*His Excellency Sir James Mitchell, K.C.M.G.,
Lieutenant-Governor,
Perth.*

Your Excellency,—

Subsequent to your Commissioners closing their investigations in regard to a National Power Scheme the representatives from the Collie National Power Committee made a request that there should be embodied in the Report some reference to the bauxite deposits in and around Collie, with a view to their utilisation for the production of aluminium and by-products.

Your Commissioners could not reopen the inquiry, but promised to submit a covering memo. advising you of the Committee's request and that it should be considered when the Report is being read.

FRANK E. SHAW,
Chairman.

To His Excellency Sir James Mitchell, Knight Commander of the Most Distinguished Order of St. Michael and St. George, Lieutenant-Governor in and over the State of Western Australia and its Dependencies in the Commonwealth of Australia.

May it please Your Excellency by your Commission bearing date the Third day of November, One thousand nine hundred and thirty-eight, the following were appointed Royal Commissioners:—Frank Shaw, Chairman; Francis Charles Edmondson, Member; William Henry Taylor, Member, to inquire into and report upon:—

- (a) The matter of the establishment of a national power scheme at Collie in this State to serve the South-West portion of this State; and
- (b) Particularly upon the practicability of, the demand for, the estimated cost of, and any other financial, commercial, and economic factors relative and material to, the establishment of a national power scheme as aforesaid.
- (c) To consider and make any recommendations which in the opinion of the Commission are justified or warranted by the inquiries and investigations made under paragraphs (a) and (b) hereof.

In order to closely study the problem, a large scale map was prepared containing the South-Western portion of Western Australia. Concentric circles of 10, 20, 30, 40, etc., miles radius from Collie were drawn.

Statistics and statistical data of the areas were obtained from the controlling or other appropriate authorities. The map is attached as Appendices 1 and 2 of this Report (in reduced scale).

The terms of our Commission render necessary the presentation of the various phases in a specific manner. Therefore we have sectionalised our Report broadly as follows:—

1. General.
2. Practicability.
3. Demand for.
4. Operation.
5. Commercial and Economic Aspect.
6. Generation of Electrical Energy.
7. Transmission and Distribution.
8. Financial Consideration.
9. Recommendations.

GENERAL.

Your Commissioners were aware that there existed at Collie an organisation known as the "National Coal and Power Scheme Committee" created in July, 1936. It was also common knowledge that the Committee had been active in the direction of soliciting governmental interest, which culminated in our present inquiry.

Your Commissioners felt that the Collie organisation should represent a fair cross section of public opinion in Collie and surrounding districts. They therefore decided that, before embarking upon their general investigations, to issue an invitation to the Collie Committee to informally meet the Commission in Perth for the purpose of ascertaining generally the Committee's views. The invitation was accepted and the following members met the Commission:—His Worship J. A. Rowland (Mayor); Messrs. H. D. Stapleton, Jas. Morrison, S. Simpson (Town Clerk), and the secretary, Mr. Thos. Lowry.

The Collie Committee presented a prepared report and a brief informal discussion followed. A verbatim report of the proceedings is attached hereto as Appendix 6.

At this stage your Commissioners consider it would be advantageous to quote part of the Committee's statement—prefaced with remarks:—

"Mr. LOWRY: This is our Executive Committee. We have appointed Mr. Stapleton to express our views.

"The CHAIRMAN: This Commission was set up for a specific purpose; the ramifications and inquiries will be fairly wide. We thought it wise, first of all, to have an informal chat. We are not taking any evidence; when that is taken it will be on oath. To-day we propose to hear exactly what your views are.

"Mr. STAPLETON: That is exactly what we anticipated. I may state that we have condensed what we have to say to a minimum and although we came as a deputation of five it was realised that one could do as well as five. We brought five as an earnest of our goodwill in the matter and to show by the representativeness of this deputation that as far as this project is concerned, every interest in Collie is behind it.

"The National Coal and Power Scheme Committee, which we represent, has neither political nor parochial bias. It came into being in July, 1936, because the people of Collie realised that two matters of paramount importance to the State were in need of investigation. The people of Collie were the only section of the general public in this State sufficiently cognisant of the position to know that this step was necessary. One of those matters was the establishing of a national power scheme for the South-West, which is now the subject of investigation by this Commission. We take this opportunity of very respectfully expressing our appreciation of the fact that the personnel of this Commission is so admirably qualified in every way to deal with the matter now submitted to it. We also take the opportunity of assuring the Commission of our wholehearted co-operation in any way in which we can be of service. We understand that shortly the Commission will be sitting in Collie and we would welcome any indication from the Commission as to the nature of the evidence it will require and as to any investigations we could make or figures and exhibits we could obtain to assist it in its task.

"We submit that an adequate and economical supply of electrical power is necessary for the development of the South-West. It is required for domestic purposes, for small private power units, and for industrial purposes. The benefits which would be derived are so numerous and so far-reaching as far as the whole State is concerned that it is neither practicable nor, we feel, the wish of the Commission to deal with them at this the initial investigation. We assume that at this stage it is the wish of the Commission to investigate generally the ground to be covered and the avenues to be explored, and to make inquiry as to the various sources of information and evidence which are most likely to assist the Commission in framing its report. As we see it, the position at the moment is briefly as follows:—

"In the main centres of the South-West, efforts are being made to provide facilities through small local generating plants. We submit that these efforts are abortive, for the following reasons:—

1. The cost to the consumer is excessive. We understand it approximates 1s. per unit. Of course, when I refer to these local centres, I exclude Collie and Bunbury.
2. In a big majority of centres, the supply is limited to practically the evening hours.
3. This means that the supply can only be used for domestic lighting requirements, and those sparingly.
4. For even the smallest of private power units it is impracticable, for industrial purposes it is unthinkable.
5. There has been no standardisation. Therefore, the longer a linking up with a big central source of supply is delayed, the more expensive the changeover will be.
6. It is realised that the powers of the Electricity Advisory Committee under the 1937 Act will of course arrest the present drift from standardisation. We like to think that the initial efforts of our Committee contributed in a small way to some of these provisions being included in the new Act.
7. Practically all these local plants rely on imported crude oil for the generation of power, while an abundance of suitable local coal is available. It is felt, for numerous obvious reasons, that coal should be used instead of crude oil. We appreciate that the charge might be levelled at us that we are concerned in this matter because Collie happens to supply the coal. I think that you will appreciate the fact, where the general public probably would not, that the additional coal required to supply a few more million units round the South-West would not appreciably affect the position. Therefore, you can take it that the efforts of this Committee over the last two years, and the work they are still prepared to do, is work that they feel themselves bound to carry out because of their knowledge acquired through living in the Collie district and because they realise better than people in other districts the possibilities and advantages to be gained as far as the State generally and the South-West is concerned."

Subsequently by Press notices the Commission invited evidence, held 13 public sittings and examined 55 witnesses. Sittings were held in Perth, Bunbury, Collie, Harvey, Bridgetown, Manjimup and Pemberton. Evidence tendered was mostly of a lay character. Few witnesses claimed any knowledge of electrical theory or practice and the general trend of evidence was of a parochial character.

Most witnesses claimed that the South-West portion of this State would benefit from a national power scheme, but evidence tendered did not indicate any serious retardation of any existing industry and it was not shown that the lack of such a scheme had militated against the establishment of any industry. Further, your Commissioners, in their investigations, obtained no definite evidence of any important industry that was likely to be established even if a power scheme were brought into being. On the contrary, at least one large industry has been established at Pieton Junction for the manufacture of fertilisers and generates its own power at a figure probably for less than a national power scheme could supply.

The importance of dairying was particularly stressed by witnesses. It was claimed that electrical energy would assist in its development and make for less laborious effort on the part of the operatives. It would also make for improvement in the amenities of the peoples and thereby create a brighter outlook and greater contentment.

It was also claimed that electrical energy would enable the initiation and development of private water supplies and irrigation schemes. The Commission called as an expert witness the Hydraulic Engineer of the Public Works Department. He stated that he could not envisage any large State irrigation or water supply schemes that would call for any considerable supply of electrical energy.

Your Commissioners agree that electrical energy would assist private schemes if the current could be supplied at a very cheap rate, but they are not sanguine that a central power plant could supply current at competitive prices with current generated by efficient internal combustion plants located near the points to be served with electricity.

Most witnesses were very optimistic regarding the future of the country and proud of their accomplishments.

When they were questioned there were differences of opinion as to the nature of the future developments of the South-West. It was agreed that dairying was the principal industry capable of great expansion. There was, however, no unanimity concerning such industries as fruit canning, fat lambs, refrigeration and cold storage, etc.

The suggestion of utilising electrical energy for sawmilling purposes was not wholly supported by witnesses. Evidence tendered by persons directly interested was, in the main, to the effect that purchased electrical energy would not be able to compete with steam power raised from mill waste.

During the tendering of evidence the term "cheap power" was frequently used and when witnesses were asked their opinions as to what would constitute cheap power there was a considerable diversity of opinion, which varied from 1d. per unit to 9d. per unit.

At date of this report a number of towns are served with electricity by local authorities, private persons or companies. The latter two operate under concession agreements with local authorities, for periods not exceeding twenty-one years. There are also many small generating plants installed on private properties.

The power or prime movers in most of the installed plants are Diesel type engines and electricity can be generated and distributed over short distances at a cost which any central generating station, with long transmission and comparatively small output, would have difficulty in competing with.

It is not suggested that a modern power house using high pressure steam and pulverised fuel could not successfully compete with Diesel plants in actual cost of generation, other things being equal. In any comprehensive electricity scheme for the South-West of this State, transmission is the paramount factor. The central station would deliver high tension current for transmission over great distances for ultimate distribution at a lower voltage to sparsely populated areas. Such high tension transmission involves heavy capital expenditure, not only in the creation of the transmission lines, but also in the provision of transformers with the subsidiary apparatus and sub-stations. There is also the actual losses in transmission and transformation, which must be reflected in the price to consumers. Localised plants are of course not met in such heavy capital expenditure, with the consequent heavy overhead charges to meet interest on capital, depreciation, etc.

Your Commissioners are not alone in the belief that in sparsely populated areas localised plants have advantages over a general scheme distributing over large areas and in support of this belief we quote an extract from the Federal Power Survey of U.S.A. of 8th February, 1938:—

"Rural Distribution.—There are approximately 6,300,000 farms in the United States. About 800,000 or 12.5 per cent. now receive electric service, and 5,500,000 are without service. It has been estimated that an additional 2,400,000 families living in rural areas and towns of 2,500 population or less are also without service. This means that about 7,900,000 families, or roughly one-fourth of the total in the country, are not yet served.

"Two sections of the country, comprised of 16 States east of the Mississippi and north of the Ohio rivers, and seven States in the far west, embrace about 29 per cent. of the farms, of which about 30 per cent. are now served. The other 25 States, located in the south and central sections of the country, embrace about 71 per cent. of the farms, of which only five per cent. are served. These 25 States contain 62 per cent. of the land area of the United States and 42 per cent. of the population.

"It is difficult at best to render self-supporting rural service at a cost which prospective customers are willing or able to pay for it. The relatively low development is due in large part to the economic resistance represented by the preliminary investment in interior wiring, lighting fixtures, lamps and appliances.

Another factor retarding development has been the commercial risk in building long rural lines into thinly populated districts. On the other hand, the economic benefits of rural service are constantly attracting new customers and at present this class of development is growing quite rapidly.

"Much work has been done in the past two or three years in developing low-cost rural distribution lines employing high-tensile conductors and moderately long spans. All details of construction have also been carefully studied to eliminate non-essentials and reduce investment costs to the minimum consistent with safety and reasonable reliability. These developments have already demonstrated their benefits in extending rural lines into districts heretofore considered too lean for self-supporting service.

"The utopian ideal of electric service lines to every farm and home in the land is undoubtedly impossible of realisation, except on the basis of a heavy Government subsidy at the expense of the taxpayers nationally. Moreover, it would be uneconomic in any event. *Those farms and homes located so far apart on the average that rural lines are too costly, could all be served with small individual generating plants.* Reliable farm lighting sets, driven by small internal combustion engines, with full automatic control, have been on the market for many years. These plants are adequate for all individual needs and can be installed at reasonable cost. For still less it is possible to purchase a windmill generating plant which will operate a few lamps, radio set, and the like. These self-contained sources of individual supply constitute the economic alternative when the territory is too thinly populated to support rural lines.

"In the event that Congress should appropriate one billion dollars for rural electrification, as recently proposed, it would be more economical in many cases to subsidise the purchase of individual farm generating plants than to build rural supply lines."

Your Commissioners were very concerned in their visits to the South-West by the dependence on imported fuel for practically all plants, whether owned by local authorities, concessionaires or privately, and they feel that the question of producer gas in relation to these installations should be immediately investigated.

Witnesses were invited to express opinions regarding the disposal or absorption of any plant or apparatus rendered useless by the innovation of a national power scheme. The question was:—"Should the replacement of such plant and apparatus be a matter solely or partly for the owners thereof, or should the scheme undertake the replacement free of cost to the owners of the plant and apparatus rendered unusable by the national scheme?"

Views of witnesses varied. Some contended if cheaper current could be supplied the consumers should be prepared to make their own arrangements for the disposal of discarded and the acquisition of new suitable outfits. Others, however, were adamant that if the innovation of a national scheme rendered useless any plant or apparatus it was to be a function of the national scheme to make same good.

Representative witnesses of local authorities who have community-owned plants were questioned as to the likely attitude of their members regarding the taking of a supply of electricity from a national scheme. Whilst they were mostly non-committal, they suggested if a national scheme could supply current at a price not above their own generation costs, it might be attractive, but this view was qualified by their stating that satisfactory arrangements would have to be made to relieve them of their existing plants.

PRACTICABILITY.

From an engineering viewpoint, an electricity supply for the South-West of this State, with a generating station suitably located, high tension transmission and low tension distribution is a practical proposition and presents no insuperable difficulties. Any modern power house calls for an ample supply of water, in addition to fuel. At Collie we have an assured supply of the latter, but regarding water the position is not so secure. However, if Minninup Pool (see Appendix 3a, b, c, for sections of Minninup Pool) could be made available with suitable safeguards for conservation, any difficulty in connection with water would be greatly eliminated. If the pool is not available and it is desired to locate a power house at Collie, it will be necessary to obtain sub-artesian water, which would probably call for extensive pre-cooling arrangements. To the casual observer it might appear that Collie is the appropriate site because of its coal deposits, but there are other factors that might outweigh such an undoubted advantage.

Collie, practically speaking, is on the easternmost fringe of the more closely settled South-West agricultural lands and there is not likely to be the intense development and closer settlement immediately around and to the eastward of Collie that might be expected toward the west coast and in a southerly direction. The Commission envisaged very great development in the southerly and south-westerly districts, particularly through the Margaret and adjoining country.

It is probable that Collie will always be somewhat isolated from the centre of distribution of any electricity scheme created in the South-West, therefore it is important to consider a generating plant in close proximity to fuel supplies as against a plant generating near the centre of distribution. If the advantages of the latter outweigh the former, then a site near Bunbury should be carefully explored. Such a location would have a great advantage in the matter of cooling water supplies for condensing purposes, whilst the cost of fuel transported from Collie should not affect the cost of electricity to the consumer as central distribution would be a compensating balance. This aspect, however, does not call for further space at the moment, as no doubt the question of site would be carefully explored by the designers of any contemplated scheme.

DEMAND FOR.

From your Commissioners' specific and general investigations and from the claims of witnesses examined they do not consider a very strong case has been made for a comprehensive scheme of electricity supply for the South-West portion of this State, particularly in view of the very heavy capital expenditure involved. As already stated many towns are provided with electricity either by community-owned plants, or by persons or companies operating under concessions, and it is by no means certain that present consumers would benefit, particularly monetarily, from a change to a national scheme. As a matter of fact they may be disadvantaged as it has been suggested that a flat rate should be struck for all consumers. If such were done, it would mean that many consumers would contribute toward the cost of supplying electricity to other consumers, and we are of opinion that such a system would not generally be acceptable. Nevertheless the evidence received indicated a keen desire for the establishment of a national scheme.

OPERATION.

It is very obvious any national power scheme must be supported by statutory enactment not only as regards the generation and transmission, but also over the low tension distribution in the various townsites and districts where distribution from the power scheme is introduced for the purpose of supplying electrical energy to consumers at the cheapest possible rate. In the opinion of your Commissioners a national scheme to be operated successfully should be controlled by a central authority to handle the scheme as a whole, despite the fact that witnesses opined that local authorities would be able to control the distribution in their areas more advantageously than a central authority.

COMMERCIAL AND ECONOMIC ASPECT.

Your Commissioners studied the commercial and economic aspects thoroughly. From their observations and inspections during visits to the South-West and from the evidence received and studied your Commissioners formed the opinion that industries and commerce represented by butter factories, saw mills, South-West port facilities, packing sheds, etc., did not appear to be handicapped commercially in any way whatsoever from the lack of a national power scheme.

GENERATION.

Opinions expressed by witnesses as to a power station at Collie were made on the assumption that to produce electric power at a low rate it must be situated adjacent to the coal mines. This would at first appear to be a very sound argument, but the only feature favouring the coal mines site is the saving in rail freights, against which must be set the capital cost of clearing for transmission lines, losses in transmission, and the maintenance of long lines.

At this stage it is appropriate to refer to a generally popular belief that electricity can be distributed in a manner akin to a water supply reticulation. Such belief, of course, is entirely erroneous. In a South-West electricity scheme the main transmission line may deliver energy at a pressure of 66,000 volts. The stepping down of high voltage for distribution to consumers represents heavy expenditure, consequently step down transformer stations would only be placed at carefully considered points. Also further step down transformers would be required at the distributing points. The capital expenditure involved would not be warranted in sparsely populated areas, consequently the high transmission line may run past many would-be consumers whom the scheme could not economically supply.

An examination of the plan (Appendix 4) will show that two positions present themselves—Collie and Bunbury. The relative merits of each expressed by witnesses can be suitably assessed.

It is necessary to consider what may reasonably be expected as to the ultimate installed capacity of generating plant and what the site conditions limit the capacity to.

The investigations disclose that for the requirements of the South-West, assuming the existing independent generation stations were closed down (excepting Collie Power Company) and all services given from one central generating station, the estimated consumption of electric power for some considerable time would not exceed 4,000,000 kilowatt hours per annum generated, and this figure has been arrived at after giving liberal interpretation to all views of witnesses as to increases which may follow. But there is no reason to believe this would be greatly exceeded during the first five years of a scheme's inauguration.

Estimated Outputs.

Total kilowatt hours generated	4,000,000 kilowatt hours.
Maximum Load	1,500 kilowatts
Load factor	30%

Estimated Capital Cost.

Power Station	£236,000
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Power Station.

Capacity—total installed	6,000 kilowatts.
Plant—steam, using pulverised coal and turbo-generators.	

The technical features of the proposed power station cover using Collie coal in powdered form, or what is generally known as pulverised, and turbo-generators with self-contained auxiliary units.

The general features would permit of extending within limits.

The cost of generation would be as follows:—

Capital charges	£18,063	=	1.084	pence	per	kilowatt	hour.
Operating costs	£12,166	=	.73	do.	do.		
Combined costs	£30,229	=	1.81	do.	do.		

The foregoing figures were computed from the formulae set down in the Electricity Act, 1937, section II., clause 2. The costs of production in consequence of the heavy capital cost of the power station are high. The nature of the proposal for supply over an area covered by this report emphasises the costly nature of such, brought about by a very small consumption.

The existing power house at Collie generates alternating current in contra-distinction to other generating stations in the South-West. Taking this fact into account, as well as other factors such as extra capital cost of extending the station, and the cooling water problem, as well as existing agreements and concessions, it was decided that costs would be best arrived at, for the purpose of this investigation, by considering a new station capable of expansion.

TRANSMISSION AND DISTRIBUTION.

For investigation purposes, your Commissioners firstly put a liberal interpretation on the words "the South-western portion of the State" and included an area bounded on the south by Albany to the Leeuwin; on the west, the Leeuwin to Mandurah; on the north, Mandurah to Brookton; and on the east, Brookton, Wickepin, Dumbleyung, Gnowangerup, to Albany.

The question of supplying the area was then gone into. It was realised at the outset that, with the sparse population and large territory to be covered, the most economical construction would have to be used in order to keep the capital cost down.

Firstly, consideration was given to supplying all centres of population, including 37 towns as follows, and the area en route and surrounding the towns:—

Brunswick	Narrogin
Harvey	Wilga
Yarloop	Boyup Brook
Waroona	Kojonup
Pinjarra	Katanning
Mandurah	Tambellup
Boyanup	Cranbrook
Capel	Mount Barker
Busselton	Albany
West Busselton	Bunbury
Yallingup	Nannup
Margaret River	Williams
Donnybrook	Wickepin
Balingup	Pingelly
Greenbushes	Brookton
Bridgetown	Gnowangerup
Manjimup	Dumbleyung
Pemberton	Denmark
Wagin	

After consideration of a number of alternatives and keeping costs to a minimum, it was found necessary to supply at 66,000 volts. (See Map Appendix 4, where 66,000 volt transmission line is delineated green; with 33,000 volt spur lines delineated brown.)

The capital cost of transmission to supply all towns was	..	..	..	£512,000
Distribution was	..	..	..	£412,000
Replacing D.C. apparatus was	..	..	..	£104,000
Total	..	..	..	£1,028,000

The population in the towns to be served was 33,000.

(The population of whole area—approximately 100,000.)

The estimated number of consumers 7,500.

The estimated annual consumption in units was 3,000,000.

Charges on capital cost per unit due to above figures alone approximately 8d.

Owing to the high cost, your Commissioners then considered the question of supplying a more limited area of the south-western portion of the State—from Pemberton and Margaret River in the south, to Mandurah in the north, and Boyup Brook in the east.

It was decided that the whole of the transmission was to be 33,000 volts, but in order to make provision for extensions, the portions shown green in Appendix (5) would still be erected for 66,000 volts, but only 33,000 volts would be transmitted for the time being until stepping up to 66,000 volts was warranted. By this method, also, in the initial stages of the scheme the charging current would be kept down.

The 22 towns to be supplied are as follows:—

Brunswick	Margaret River
Harvey	Donnybrook
Yarloop	Balingup
Waroona	Greenbushes
Pinjarra	Bridgetown
Mandurah	Manjimup
Boyanup	Pemberton
Capel	Wilga
Busselton	Boyup Brook
West Busselton	Bunbury
Yallingup	Nannup.

At each of the towns the 33,000 volts transmission would be stepped down to suitable limits. The area which could be supplied by high tension reticulation in 16 of the towns is shown by the black circles in Appendix (4) and Appendix (5).

Transformation points at suitable load centres in the area covered by the black circles would step down the current to low tension, three-phase, four-wire, for local distribution purposes.

The capital cost is as follows:—

	£
Transmission	248,000
Distribution	226,500
Conversion of D.C. apparatus	65,500
	<hr/>
Total	£540,000
	<hr/>

Population in the area served in towns supplied, 16,000 (total population approximately 50,000).

Estimated number of consumers	4,000
Estimated units sold per annum	1,800,000
Charges on capital cost per unit due to above figures alone—approx. 7d.	

The figures for capital cost do not include the cost of high tension and low tension reticulation to limits of black circles (see Appendix (4) and Appendix (5)) but only to supply existing consumers in towns.

As an indication of the huge cost involved in providing an electric supply to the whole area, the capital cost of reticulating each black circle would be £150,000 approximately, for 16 circles £2,400,000.

The diameter of each circle represents 20 miles, practically the distance from Fremantle to Guildford, and the area in square miles is 312, or 199,680 acres.

Further, the figures for capital cost do not include the taking over of loans of local authorities, or buying out existing power authorities and concessionaires.

Note.—None of the figures include Collie local transmission or distribution.

FINANCIAL CONSIDERATION.

We feel that a study of the figures previously quoted regarding capital cost involved will be sufficient indication of the financial obligations that would be created by such a national power scheme.

RECOMMENDATION.

Your Commissioners come to the final stage of their report, probably the most important, that is the "Recommendation."

To appreciate fully the recommendation, one must be seized with all the facts, and we place those facts in the following order:—

1. Area to be covered.
2. Population of districts in such area.
3. Population and number of townsites in area.
4. Anticipated electrical demand.

5. Cost of Generation.
6. Cost of Transmission and Distribution.
7. Capital Cost.
8. Cost per unit to consumer sufficient to meet interest, depreciation, and sinking fund payments and operating costs.

The area covered by this recommendation takes into consideration that part of the South-West roughly bounded by Pemberton and Margaret River in the South, to Mandurah in the North, and Boyup Brook in the East, which represents the most thickly populated part of the South-West. The area to be supplied in these limits is 4,500 square miles.

The total population of this district is 50,000, with a total number of townsites of 22, and a combined population of 16,000. The average distance between townsites is 16 miles.

Taking these figures into consideration, we have a density of population of only 11 per square mile.

The anticipated electrical demand in the area covered by this recommendation, but excluding Collie, in the opinion of your Commissioners, will not bring about a sale of electricity exceeding 1,800,000 units in the first year.

The cost of generating with the foregoing loading will be in the vicinity of 2d. per unit, whilst the high tension transmission lines, distribution, and changing direct current apparatus will cost 7d. per unit; making a total of 9d. per unit.

The total capital expenditure required would be £776,000 made up with £236,000 for power station cost, and £540,000 for transmission distribution and direct current apparatus replacement cost, but is exclusive of any allowance for the Loan indebtedness of Local Authorities or the cost of taking over any private concessions.

The cost per unit to the consumer would need to be set at a figure higher than 9d., to cover the balance of annual charges not included in the given cost figures.

We do not consider it necessary or desirable to expound further detail on the technical and statistical phases involved. We feel that a study of this report and the appendices attached will clearly indicate that no relevant avenue has been left unexplored in our endeavour to advise you fully regarding the establishment or otherwise of a National Power Scheme in the South-West.

Your Commissioners respectfully desire to digress from the terms of their Commission in order to emphasise the need of uniform practice in the matter of the distribution of electricity.

The Electricity Act, 1937, provides, inter alia, "that any additions to existing plants or creation of new plants must have the approval of the honourable minister administering the Act."

If the powers conferred are rigidly applied and uniformity insisted upon then we can visualise that in the comparatively early future a great improvement in electrical distribution will be effected.

Your Commissioners recommend that the Minister should request his Advisory Committee to consider the matter of electricity supply given in towns at present served with electricity. During the course of our investigations we verified the complaints of some consumers regarding the indifferent service rendered by some Supply Authorities.

Your Commissioners further recommend that the Advisory Committee as such should give special attention to the length of the terms of any concession that may be proposed for the distribution of electricity in any townsite in the South-West portion of the State.

A careful consideration of the capital involved to put a national power scheme into being, even in a preliminary way, appears to your Commissioners to be not justified. There could be no hope of a reasonable return on the money expended and therefore the financial drain on the State as a whole would be heavy.

We are of the opinion that the population of the South-West portion of this State will have to be considerably augmented before we can recommend your Government to undertake the financial obligations necessary to inaugurate a National Power Scheme.

In arriving at the conclusion that a national power scheme is not warranted at the present time your Commissioners have been influenced by the very heavy capital cost involved and the economic impossibility of the proposal and also the fact that if consumers were called upon to pay rates for electricity commensurate with the cost of supply, they would certainly not reap the advantages anticipated.

FRANK E. SHAW,
Chairman.

W. ORR,
Secretary.

WILLIAM H. TAYLOR,
Member.

F. C. EDMONDSON,
Member.