HEALESVILLE'S LIGHTING SERVICE.

GROWTH OF ELECTRIC UNDERTAKING.

COMPREHENSIVE REPORTS.

At last meeting of the Healesville Shire Council comprehensive reports on the electric lighting service of the town were furnished by the consulting engineers (Messrs. Lincolne, MacDougall and Demaine) and the engineer-in-charge (Mr. E. J. Kent). As both reports contain valuable information, and will prove of interest to ratepayers, they are published in full.

Messrs. Linclone, MacDougall and Demaine report:—

As requested by your council, we have carefully considered the present position of your electricity supply scheme, and the steps which may be necessary in the relatively near future in order that the consumers may continue to obtain the excellent service which they receive at present, while extending the services to others not now within the reticulated area. Before dealing with the future, we would like to congratulate your council and staff upon the extremely satisfactory state of the undertaking, and the undoubtedly splendid service which is maintained, and this at a cost per unit lower than that charged by many undertakings larger than your own, and in circumstances more favorable to economic distribution of electricity. Healesville, though having a relatively small permanent population, has a great floating population which very seriously influences the demand for electricity. In addition to this, the tourist population prefers to get away from the center of the township, with the result that relatively large boarding houses and other consumers are situated at a considerable distance from the power house, necessitating lengthy supply mains which are frequently practically useless for a large portions of their extent. Such a condition, naturally, makes a supply relatively costly and introduces the necessity for special treatment.

Fortunately, the supply system is alternating current and is suitable for such conditions, but, even so, the service is relatively costly. In a previous report upon this subject we stated that with a further growth of the demand it would be necessary to increase the number of high tension sub-stations in order that the supply to outlying areas might be increased, and also to relieve the low tension mains of some of their load and thus improve the supply to consumers served therefrom. Two such substations are at present in use at the Badger Creek and the other on Fernshawe road, and if a supply is to be given beyond St. Leonard's road, to wards Meyer's Falls, a third will be required. The transformer at the power house was designed for this purpose, and no further cost will be incurred at that spot. Subsequently additional transformer stations will be required at Chum and Lilydale roads, and possibly elsewhere. It will thus be seen that the system will ultimately consist of a number of areas each supplied from its own sub-station and the whole forming a ring round the central area supplied from the power house. This is, of course, as it should be, and there is no particular limit to the distance you can serve on this principle. The only restrictive influence is that of finance, and in this respect you have much to congratulate yourselves upon. From last year's balance sheet it appears that, after paying interest on capital and approximately 5 per cent. depreciation and sinking fund, the undertaking made a net profit of £477 odd. It is therefore apparent that although you have found it necessary to spend extra money on additions to plant and mains, the extra service which was made possible by these mains more than justified the expenditure. It is in this light that the extensions to plant and mains must also be regarded, and if an extension gives promise of returning a fair income it is justified on financial grounds and is due to ratepayers who may be thus benefited. We will deal later upon certain extensions to your mains, but before doing so will comment on the generating plant.

It will be remembered that when the Premier engine was purchased from the Electricity Commission its gas producer was obtained also. The cost of this was practically negligible. It was considered at the time that it was worth installing, in order to carry the load until the revenue warranted a new producer. The producer is now worn out, and should be replaced if the present plant is to be continued in full operation. A new producer would cost almost £700 by the time it was installed, and of a size large enough to carry both engines; but the installation of such a plant would not only improve the service, but economise in the fuel bill. It is, of course, difficult to accurately estimate this saving in pounds sterling, but it may be pointed out that such a plant would not only work far more economically than the Premier producer, but would obviate the necessity of lighting the Hornsby producer except on occasions, thus saving the stand by losses of a second producer. It is not over estimating to set the saving at £50 per annum, which would more than pay interest on the expenditure.

Before recommending this, however, we wish to discuss the future policy of the council as concerns the generating of power. In our original scheme we provided for a hydro-electric scheme operating with water from the Graceburn aqueduct. Owing to the failure of negotiations this scheme fell through, and it may now be impossible to obtain the concession; but it is a matter very well worth considering, and before making any appreciable expenditure on generating plant we would strongly recommend that the proposal be investigated. If you so instruct us, we will approach the Metropolitan Board, and if the proposal would be entertained we can then prepare estimates of cost. This question is of special interest, as it will soon be necessary to run a larger engine during the day, and even during the winter, in the early morning, as the load is growing beyond the small gas set. If the hydro-electric scheme be not feasible, it will still be necessary to consider the next best method of extending the plant, and as the question of parallel running must be taken into account, careful thought must be given to the whole matter.

Mr. Kent has shown us the report dated 24th inst., which he is submitting, and he is to be commended upon the full information he has so clearly put forward. This information is of very real interest, and the returns quoted show the growth of the undertaking to be consistent and sound. As mentioned earlier in this report, the growth has had the effect not only of increasing the revenue, but also of increasing the load on the mains, and a stage has now been reached when additions must be made. Dealing first with the inner area, that is to say, the area directly served from the power house at low tension, there are three localities where extensions should be made.

(a) Lilydale Road.—At the present time Lilydale road is served by a single phase, two phases extending only as far as the end of Ryrie street and the third phase terminating in Symons street. The supply along Lilydale road is, therefore, not as good as it should be since the line has become more fully loaded, and we would suggest that an additional phase be extended from the corner of Blanche and Symons streets along Symons and Ryrie streets and Lilydale road to the corner of Steele street. This would give a three-phase supply to the extreme end of Ryrie street, and bring two phases into Steele street, thus materially improving the supply to consumers throughout the entire route. The cost of this extension would be approximately £70, and it must be regarded not as a means of obtaining new revenue, because it will not in itself extend the mains to any new customers, but it is the natural result of a growth in the demand along this route, and will enable more consumers to be connected along these roads than would be possible with present mains. In this respect it is actually a developmental expenditure, in that it will enable new consumers to be connected, but such consumers will be situated along the present run of mains.

(b) Fernshawe Road.—Since the mains were installed along this road a considerable development has taken place on the old road. In the original layout the load was almost entirely along the deviation, and the provision made for any material supply along the old road. At a later date it was found necessary to extend mains to serve consumers throughout the old road, and now the demand in this locality has so increased that it is necessary to still further augment this supply. As in the case of the Lilydale road, no new poles will be required, the only material being cable and insulators to be erected on the existing poles. It is suggested that an extra phase be erected for the full length of the old road, at a cost of approximately £25.

(c) St. Leonard's Road.—Here, again, when the supply was first commenced there was practically no demand along Leonard's road, and light cable connected to one phase of the system was erected part of the way along the route. Considerable extensions to the demand have since taken place in this area, and the supply has been extended over the full length of St. Leonard's road and part of the way towards Meyer's Creek. A subdivisional road extending from St. Leonard's towards the Fernshawe road has also been reticulated, and several consumers are situated at the extreme end. It is now suggested that the existing 7/18 wire be taken down and replaced by three 7/14 cables extending from Fernshawe to the subdivisional road. One of these would be extended along the subdivisional road, and the other two would stop at this point, the existing lead hence to the end of the present pole line being connected to one of the phases. In order to supply a new consumer situated some 34 chains beyond the present supply, it would be necessary to erect about 14 poles, together with cable, insulators, etc. The cost of the major alterations would be approximately £710, and the cost of supplying this new consumer about £60. If, however, it were decided to run mains still further on to supply a number of consumers along Meyer's Creek, it would be necessary to erect high tension leads along this road, so that no poles would then be debited against this particular consumer, and that cost of serving him would then be reduced to approximately £30.

In addition to the three alterations dealt with in (a), (b) and (c), together with this last extension, applications have been received from a number of residents on the Meyer's Creek, and we have estimated the cost of making a supply available in this area. To do so it would be necessary to erect a high tension sub-station similar to those at Badger Creek and Fernshawe road. The distance from the power house to the position of this sub-station would be approximately 2½ miles, and it would be necessary to run one extra high tension line from the power house to the corner of St. Leonard's road and Fernshawe road, and two high tension lines for the rest of the distance. The cost of this high tension line, transformer, switchgear, etc., would be about £400, and the low tension mains to serve local consumers would be approximately £60. We understand that there are about ten or more consumers in this area, and in order to make the proposal financially sound there should be a guarantee of at least £60 to £70 per annum from the consumers. There should, of course, be no difficulty whatever in obtaining considerably more revenue than this, but the council would be well advised to obtain definite guarantees to cover a return on their capital expenditure. A still further proposal has been submitted, viz., to continue these mains a further distance of approximately four miles, to supply electricity to a number of consumers. This would entail an additional sub-station and high tension mains. Whereas no serious technical difficulties present themselves, the cost of such a run would be approximately £800, and unless the residents would guarantee at least £120 per annum revenue, the scheme could hardly be regarded as sound. This is a further example of the fact to which we referred to earlier in this report, viz., the long distance which frequently has to be run in order to supply some consumers, the major portion of the line running through country where there are no consumers at all.

We consider that if you can erect the lines referred to under (a), (b) and (c) you will materially improve the service to your consumers, and at least one of the high tension extensions should be warranted. This still leaves the Chum Creek road on the low tension, together with the Lilydale road, and the day is probably not far distant when sub-stations will be required in both of these localities. This, however, need not worry you for some little time to come.

There is only one other matter we would like to refer to while dealing with the mains. Some little time ago we understand that a water heater was installed in a main street, requiring something in the vicinity of 3 k.w., and arranged for connecting to one phase only. We cannot too strongly deprecate the principle of allowing such apparatus to be connected to the mains. You have definite regulations in force forbidding this practice and insisting that where a lighting consumer has more than a certain number of points he shall be connected across more than one phase, and that where a consumer wishes to instal a motor larger than 1 h.p. it shall also be across three phases. These regulations are drawn up, not for the purpose of harassing consumers, but solely with the object of protecting them. In even a large undertaking, if relatively big loads can be thrown on and off a single phase, adjoining consumers will necessarily be subject to an annoying disturbance in their lights, and we would strongly recommend that the regulations you have adopted, and which are in force in other matters, should be rigidly adhered to in connection with such equipment. If you are going to depart from such regulations it will be necessary to spend a very great deal of money in extra mains in order to endeavor to counteract the evil effects of such equipment.

In conclusion we would again congratulate your council on its undertaking, and also on its engineer-in-charge. We have frequently been impressed with the diligence and interest shown by Mr. Kent in his duties, and we think the council is singularly fortunate in having an officer who has the interests of the undertaking so very much at heart. Mr. Kent has had a great deal of work to do, and has to keep himself available at all hours to attend to faults. He has not only given his services, but uses his car in the course of his duties, and if no allowance is at present being made on this account, we would take the liberty of suggesting that a reasonable allowance be made. Regarding the extensions to plant, we would be pleased to discuss this matter with you, and, if you so desire, to submit estimates and recommendations to a later meeting of the council.

Mr. Kent's report:—

1.—Gas Supply.—Three gas generators are installed. These are connected to their respective engines, and also cross-connected between one another. Of these, the No. 1 generator primarily serves No. 1 engine 74-84 h.p., and can also be used to serve No. 2 engine if necessary, but will not serve both at once, as it is not large enough for that purpose. No. 2 generator is not used at all. Its capacity is only suitable for the small engine (16 h.p.) and as one, or both, of the larger gas generators is always in use, the small engine draws its gas from them. No. 3 generator is primarily connected to No. 3 engine (86 h.p.). As reported last month, this generator has outlived its usefulness, and is becoming a potential source of stoppage at times when both large engines are drawing gas. It is at present causing fluctuation in light values in the area east of McAulay road.

2.—Prime Movers.—No. 1 is a Hornsby twin-cylinder engine of 74-84 h.p. It is in good order, and capable of driving a 50 k.w. load. It is belt connected to a 60 k.w. alternator. Its working hours average approximately eight per day, allowing for odd working during day time. No. 2 is also a Hornsby engine, rated at 16-18 h.p. It is in fair order, inasmuch as much more wear is apparent than in No. 1 set. This is due to the longer hours of work which it has performed. Its running hours in the past have been most of the day time, and after 12 night, with 16 hours at least in each 24. It is belt connected to a 16 k.w. alternator, but is only capable of driving a load of approximately 10 k.w. alternator. Both of these engines were new when purchased, and have been working for about 5½ years. No. 3 is a Premier single-cylinder engine of approximately 86 h.p. It was purchased from the Electricity Commission at a purely nominal figure, is about 14 years old, and from present appearances has a good, useful life before it.

3.—Belting.—No. 1 belt, after five years' running, is still in very good order, as is No. 3 belt. No. 2 belt, which is much smaller than the other two, has hard service due to the day and night operation, and will probably require replacement within the next twelve months. Taking the running of the engine at 16 hours per day, the belt has actually seen the equivalent of eleven years service of eight-hour working days.

4.—Alternators.—No. 1 is a Westinghouse unit of 60 k.w. output. It is in good order. No. 2 is also by Westinghouse, of 16 k.w. out put. It is in good order. Both these are new when purchased over five years ago. No. 3 is a duplicate of No. 1. It was through the fire at Colac power house, and was purchased by us after being re-wound. It has carried 50 k.w., and while not quite as good as No. 1, is efficient and in good order.

5.—Fuel.—Our prime movers, being suction gas engines, draw their gas from the generators already mentioned. The gas is obtained by passing a draught of steam saturated air through a compact fire of carbonaceous material. We use a mixture of charcoal and coke, this having been found to give the most economical results. Owing to the defects in No. 3 gas generator, which I have already mentioned, much clinker is formed in this fire when using the coke-charcoal mixture, and it is impossible to remove it during operations without causing engine stoppage. In an effort to improve its performance by lessening the amount of clinker formed on the grate during the night's operation, we are now using charcoal only. This change was carried out on Sunday last, following a troublesome performance on Saturday night, 22nd inst., when the east side of the town was subjected to a partial stoppage of supply.

6.—Stores.—We keep little in the way of stores, and the account is a small one. Stores in hand include cable, insulators and pole fittings. A few poles, meters and accessories, cotton waste, oil, and a few spare parts.

7.—Oil.—Our present rate of oil consumption reaches approximately £84 per annum. This is made up of cylinder oil, £80, and bearing oil, £4. The bulk of this oil, after having lubricated the various parts of the engines, falls into a sump, and the reluctant mixture of cylinder and bearing oil is collected and passed through a filter, when it becomes useful again as bearing oil. It is not used for the cylinders. The bearing oil so obtained is used and filtered twice after the first filtration, after which it is taken out of service. We have at present about 80 or 100 gallons of such oil which we have just finished filtering, and canning, and this is now ready for disposal to buyers. As I have just stated, the cylinder oil, as such, does not re-appear after its first use, and as it is slightly more expensive, and because we use more of it than bearing oil, I would suggest that the practicability of using cylinder oil for both sylinders and bearings be gone into. This should result in a considerable saving, because the waste oil from the cump would be cylinder oil grade, and as such could be used again after filtration. Allowing for two filterings after first use, we would show a saving on our cylinder oil bill of, if not two-thirds, at least one half the cost. This, then reduces the first item of £80 to £40, and using new cylinder oil four times per year for main bearing replenishments we have the item of £4 again, giving a total at our present rate of consumption, of £44. In order to accomplish this we would need an oil filter with a minimum capacity of two gallons per day. Our present one deals with about half a gallon per day only.

8.—Switchboard and Instruments.—The switchboard consists of three supply panels connected to the alternators, two distributing panels connected to the low tension feeders, and one distributing panel connected to the transformer system. Meters and switchgear connected thereto are in good order. Some distribution ammeters are fully loaded at times of peak load, and will require recalibration or replacement. As the board is designed, it may be connected wholly to any one of the three generating sets, or may be split between any two of them. This brings us to the matter of loading.

9.—Loading.—The main load of the day comes on at the time of the evening meal, or rather earlier in dull weather. This load is carried for the first hour or so by one of the two large sets. By this time—the load having considerably increased—it is necessary to bring into operation the second large set, and so, from about 6 p.m. to 10 p.m., the two large sets are in operation. These times vary, of course, with the seasons. After the peak period has passed the load is carried by one of the two large sets, the other being shut down. At about midnight, the load having dropped off considerably, the small generator set (No. 2) is started up, and shortly after connected to the mains in place of the large set, which is also shut down. This small set carries a varying load during the night, which increases considerably before the departure of the early morning train at 7.15 a.m., and remains at this higher figure until about 9 a.m., when it again fails. This is caused by electric cookers and kettles being used in the preparation of breakfast, and at the present time this load between 8 and 9 a.m. varies round about the full load capacity of the engine. On two or three days of the week it is necessary to run one of the larger units during the morning or afternoon, or both. This is caused mainly by the ironing demand, and is largely influenced by the weather and holidays. On occasions when it is not necessary to operate the larger units in the day time, the small set continues in operation until the evening load calls for greater power. An exception to this, however, is that by a recent arrangement we now operate on of the larger sets from 10.30 a.m. to 12.30 p.m. in each day, to provide power for Miss Muzzell.

10.—Disposition of Load.—As I have already stated, the whole load may be carried by any one generating set, and at times of peak load this may be split between any two engines. The major portion of the load, owing to the disposition of the district, is carried by the No. 1 set, No. 3 carrying the balance, the ratio being approximately 7 to 5. The No. 2 set, of course, is too small to be of any assistance at these times. The load received at Easter just (the greatest load of the year), was the heaviest yet recorded, the total reaching approximately 84 k.v.a. A comparison with other years is as follows:—1922, 39 k.v.a.; 1923, 46 k.v.a.; 1924, 49 k.v.a.; 1925, 67 k.v.a.; 1926, 84 k.v.a. This shows that the full load of our No. 1 set was reached in 1924, and was, in fact, carried wholly by that set, the erection of No. 3 set not being completed until about a month later than the above period. We are now well on the way to full loading of the No. 3 set. Christmas, Easter and other holiday times represent our heaviest loads, Easter predominating. The winter loading is also fairly heavy, and consistent, as the attached graph shows.

11.—Reticulation.—The reticulated area has, of course, expanded considerably since inception, and unwired portions inside the original area have also been connected. Our original mains, while adequate, have not been augmented. The high tension scheme which was completed last year relieved them to a certain extent by removing from them consumers situated in Fernshawe road, above "The Marlborough," and at Badger Creek, at the junction of Baker and Albert roads. In other parts of the district, however, there is congestion at times of heavy load. As far as Lilydale road consumers are concerned, the suggestion in the last report, i.e., to run an additional phase to the coner of Lilydale road, would make a great improvement. St. Leonard's road group, on the other hand, will be improved by the additional wires which will be provided in carrying out the Meyer's Creek scheme to Christman's. Old Fernshawe road should have an additional phase between "The Bungalow" and "Yambacoomba," a distance of approximately 400 yards. The remaining long distance route, Chum Creek, is already served with three phases to the "Golf House," and then two phases to Ryan's road, the remaining one terminating at the aqueduct. This should be sifficient for the present, but should any considerable development take place it will be necessary to run high tension mains in that direction. As regards power, it is only natural that in a go-ahead, expanding district like this, a demand for power must come. I am not referring so much to the small domestic appliances, but to power appliances of an industrial nature, which, when connected to the lighting mains, have a serious effect on the quality of light if lamps connected to these mains. It will certainly be necessary in the near future to erect heavier mains for the purpose of serving consumers in the business center at least.

12.—Extensions. — The original scheme as laid out in 1920 served approximately 6¾ miles of streets for private lighting. Extensions carried out since then are an additional 12¼ miles, making a total of 19 miles of streets served. Public lighting mains (street lighting) commenced with 74 miles, and have now increased in length to 10¾ miles. The original number of lamps connected was 57, of varying candle powers. These have been increased to 82.

13.—Consumers.—The estimate of probable number of consumers at the inception of the undertaking was 150. It is interesting to note the growth since the end of the first financial year of supply (September, 1921).

Number of consumers using energy for:—

	Light	Other Purposes
September, 1921 . .	107	—
September, 1923 . .	225	49
September, 1923 . .	315	75
September, 1924 . .	337	105
September, 1925, to May, 1926 . . .	392	147

A total of 539 consumers at the present time.

14.—Service.—The service given by your undertaking to the consumers is, I believe, second to none in the State. Speaking from personal eservation, I may say that both sectional and total cut-offs are much less frequent than in Melbourne and suburbs, and of shorter duration. I am continually traversing the district on inspection, and many potential sources of trouble are removed before they develop. Complaints are few, and when received are attended to with the utmost expedition. Windy weather is our greatest bug-bear, on account of the numerous trees along the route of the mains. These trees are being continually cut back as they grow into the wires, and fluctuation from this cause is kept as low as possible. The trees in the main street, however, are very bad offenders, as I have pointed out before. These being ornamental trees, we do not touch them. I strongly advise that they be cut back well below our mains.

15.—Financial.—The capital value of your plant at September, 1921, was £7,977. The value at September, 1925, stood at £14,057. Depreciation allowed to that date was £1245. Four loans to the value of £13,000 have been obtained. Of these Loan No. 2 (£8000) terminates at September 1, 1950, and is being repaid in half-yearly instalments of principal and interest, rate of interest being 6 per cent. Loan No. 3 (£2,000) also terminates on the same date, and is being repaid similarly, interest being 6* per cent. Loan No. 4 (£1,500) at 6* per cent., is terminable on July 1, 1937, and Loan No. 7 (£1,500) at 6½ per cent. on July 1, 1934; interest only is being paid on these two, the principal being due in one payment at the end of their term. No sinking fund has yet been established for Loans Nos. 4 and 7. In view of the raising of interest from 3 to 5 per cent. on Victorian Government stock, the auditor-general has been asked for further information with a view to establishing proper sinking funds.

16.—Revenue.—In his report on the undertaking (then proposed) in 1919, Mr. Lincolne estimated the revenue to be derived in the first year at £1200 to £1300. Our returns are as follow:—1921 (nine months), £972; 1922, £1965; 1923, £2583; 1924, £2896; 1925, £2488.

17.—Overdraft. — At April 30th, 1926, the electric light account with the National Bank of Australasia Ltd. was overdrawn to the extent of £1496.

From the foregoing the following matters may be deducted:—1.—A new gas producer is necessary if we are to continue with our present method of generating energy. 2.—Our small engine will soon be unable to supply the demand at certain times when it is running unattended. 3.—Several feeder ampmeters will require recalibration or replacement to cope with the growing demand on their sections. 4.—Given an increased demand in the forthcoming year similar to that of the past 12 months, our machinery will again be fully loaded. This, however, depends largely on what extensions are undertaken. 5.—Increase to capacity of mains are required in portion of the area. 6.—Owing to the distances to be covered in keeping the scheme at a maximum efficiency, travelling facilities for your engineer-in-charge should be reviewed. 7.—Increases in various aspects of the undertaking have taken place as follows:—Reticulation mileage (private mains) approximately 185 per cent.; public lighting (number of lamps), 44 per cent.; revenue, 175 per cent.

In conclusion I wish to state that in preparing this report I have endeavored to approach the matter from your own viewpoint, and to keep the facts and issues as clear of technical data as possible, while presenting fully the details connected with the undertaking.

At the recommendation of the electric lighting committee it was decided that the president (Cr. E. F. G. Hodges), Cr. Kay and Mr. Lincolne be authorised to interview the Metropolitan Board of Works on the question of a supply of water for a hydro scheme, and ascertain the Board's view before anything further is done.

The king unto his jester spake—
"I counsel seek from thee, wise clown.
Pray tell me, what's the best to take
When cough and cold shall get me down?"
The jester answered with a grin—
"O, sire, the best of all, be sure,
For coughs and colds awaits within,
A bottle of Woods' Great Peppermint Cure."