

THE PUBLIC UTILITIES OF MELBOURNE, AUSTRALIA.

In order to fully understand the operation of public utilities in Melbourne, Australia, one must know the organization of the city administration. The Council of the city of Melbourne consists of thirty-two members, eight of whom are aldermen representing the eight wards of the city. The Council is presided over by a Lord Mayor who is elected annually by members of the Council. The permanent committees of the Council are: Public Works, Health, Finance, Markets, General Purposes and Legislative, Hackney Carriage, Electric Supply, Abattoirs and Cattle Market, Town Hall and Baths, Parks and Gardens, Alexandra Park, Insurance Special.

The metropolitan area of Melbourne, with an acreage of 163,366, has a population of approximately 724,000 and a valuation of nearly \$45,000,000. The functions of the city include control of the traffic, the control of licensed vehicles for hire, roads and footways, storm-water drains, bridges, parks, gardens and playgrounds. The operation of wholesale and retail markets for fruit and vegetables, produce and general merchandise, public weigh-bridges, public abattoirs and markets for cattle, sheep and pigs, horse bazaars, electricity for light and power, health functions, infectious diseases and hospitals, inspection of food premises, owners of real estate, etc. Water and sewage, tramways and fire brigades are controlled by three separate boards. The control of the police for the entire state is under the state department.

Within the city proper the total area of parks, lands and reserves is 1,834 acres. Of this, 49 acres are vested solely in the City Council, and the council as a committee of management has under its control 13 parks, gardens, reserves and squares with a total area of 525 acres. In addition to the foregoing, 53 acres of parks and gardens are controlled jointly by the Board of Land and Works and the city corporation, and an area of 1,210 acres, which consist of Crown lands and lands vested in special trustees, is also within the boundaries of the municipal corporation.

Electric Supply Department.

The city of Melbourne has been lighted by electricity from its own power house for 26 years, and the growth of the electric supply department during this period is of interest. The original plant for lighting the city electrically was obtained in 1892. Altogether, 650 arc lamps and 1,200 incandescent lamps were installed on what was known as the Thomson-Houston series, then in universal use for such purposes in the United States. At the power house four 300-horse-power engines for local manufacture were installed with 24 arc dynamos each capable of supplying 50 arc lamps. The total capacity of this plant was 1,200 horse-power, whereas to-day the plant capacity installed and on order amounts to approximately 35,000 horse-power. This system of street lighting was in use until the year 1906, when it was replaced by one of a more modern nature.

In 1897 the Council extended the plant so as to make available a supply to private customers. This supply was in the form of single-phase, alternating current, generated at 2,000 volts and transformed to 100 volts at the consumers' premises. Until 1901 the distribution of current was effected solely by overhead wires carried on poles, but in that year a system of underground mains was substituted in the central portion of the city, to give a supply of direct current at 230 and 460 volts. At the same time the Council completed arrangements for taking over the interests of the three private companies which were then engaged in supplying electricity to consumers in the city. The cost of this transfer amounted to about \$250,000, exclusive of a sum of about \$150,000 which was spent in re-wiring consumers' premises to enable them to be connected to the Council's supply system. Five small direct-current generating plants aggregating about 2,000 horse-power, which were installed at the power house in connection with this development, have since been sold to make room for the latest extensions.

Further extensions to the plant at the power-house and at the Heffernan Lane substation have taken place at various times. These are listed in the following table:

1905-6—Two 1,000-horse-power Allen Crompton direct-current generators.

1907—One 1,000-horse-power Allen-General Electric direct-current generator.
 1907—Two 1,000-horse-power British Westinghouse single-phase turbo generators.
 1910—One 2,000-horse-power Allen-General Electric direct-current generator.
 1912—Four 2,000-horse-power British Westinghouse rotary converters.
 1912—One 2,000-horse-power Tudor battery.
 1913—One 1,300-horse-power British Westinghouse rotary converter.
 1913—One 3,300-horse-power Belliss Siemens three-phase turbo generator.
 1914—Two 5,500-horse-power Willans Siemens three-phase turbo generators.
 1914—One 2,000-horse-power British Westinghouse rotary converter.
 1913—One 7,300-horse-power British Westinghouse three-phase turbo generator.
 1919—One 2,600-horse-power General Electric Company U.S.A. rotary converter.

Provision has also been made for the necessary boilers and auxiliary plant to supply the steam necessary for this additional generating plant. To meet the expected demand of the winter of 1920-1921, one 6,600-horse-power General Electric Company, U.S.A., frequency changer was ordered. This machine will deliver 6,600 volts at 50 cycles at the power-house bus bars from a 20,000-volt, 25-cycle supply transformed down to 6,600 volts at 25 cycles. The energy is supplied by the Victorian Railways Newport power-house.

As an ample supply of cooling water is necessary in order to obtain the highest economy from turbo generators, a new system of supplying water from the River Yarra is in operation. A tunnel of reinforced concrete has been constructed from the river to the power-house, where four large centrifugal pumps have had to be erected to raise the water and circulate it through the condensers. Each of these pumps is driven by a 125-horse-power motor and is capable of dealing with 500,000 Imperial gallons per hour. To give an idea of the amount of cooling water required for a modern turbine, it may be pointed out that the 7,000-horse-power turbo generator on order will at full load require 350,000 Imperial gallons of water per hour to be continuously flowing through its condenser. The maximum capacity of the tunnel will suffice for about 30,000 horse-power of generating plant.

Although the primary object in installing these three generators is to supply, through the medium of the converters, direct current to the central portion of the city, three-phase current is also being supplied to the municipalities of Brunswick, Coburg, Port Melbourne, and Williamstown, also the city abattoirs, the Melbourne-Brunswick and Coburg Trams and the State Cool Stores.

The City Council has discontinued the generation of single-phase current, which is used at present in the outlying portions of the city and in the Footscray municipality. These supplies are taken through suitable transformers connected to the three-phase system. By the substitution of a rotary converting plant, the gradual displacement of the remaining direct-current generators will be effected at no distant date, and the whole of the generation will then be performed by large-capacity, three-phase turbo generators, which in comparison with the smaller plant originally installed are very much cheaper to install and to operate.

The Annual Statement of Accounts for the year ending December 31, 1919, shows an operating expense of £134,854, shillings and pence omitted, against an operating income of £240,081. This makes a net operating revenue for the year of £105,227 in round numbers, which compares with a figure of £108,782 in 1918. Both the operating income and the operating expense increased in 1919 over the figures for 1918, but it will be noted that the net operating revenue for 1919 is some £3,500 less. When interest, depreciation and other charges have been written off against the account, it leaves a net profit for 1919 of £30,491 15s, as compared with the 1918 figure of £35,227 17s 11d. As wages and other general expenses showed very little change between 1918 and 1919, the biggest single factor in the increased costs was the item for coal, which advanced from £55,000 to £63,000.

(Continued on Page 343.)