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29 August 1984

ELECTRICITY SUPPLY IN BALLARAT

For the first 20 years of its history, Ballarat relied upon tallow candles, slush lamps and naptha torches as a means of illumination. In 1858 came GAS, which was soon installed in many buildings.

In 1885 electricity was introduced with a small plant of 25 H.P. located in Dana Street where McRobertson's warehouse (for chocolates and lollies) later stood, for many years.

A Mr Tom Thursfield of Lyons Street North and his partner were the instigators of this plant, 25 H.P. called Ballarat Electric Supply Co. As electricity was not making much progress, a proposition was made to the City Council by the B.E.S. Co to illuminate the city's main streets. Agreeing to this, arc lights were installed at Sturt and Grenville Streets, Sturt and Lydiard Streets, Sturt and Armstrong and Sturt and Dawson Streets.

The then Mayor, in his annual report of 1895, congratulated the citizens of Ballarat in having their streets brilliantly illuminated with arc lights. Many shopkeepers later installed arc lights to illuminate their shop windows also with this light, thus, electricity got off the ground.

By amending the Act (Light and Power)of 17 October 1900, Orders in Council No 4 of 6 September 1897 and No 9 of 19 December 1898, assets were transferred from the Ballarat Electric Supply Co (Tom Thursfield and partner) to the British Insulated Wire Co Ltd (British Insulated & Helsby Cables Ltd.)

The plant in Dana Street was frequently added to in order to meet the growing demand for electricity, principally for lighting purposes, until 1904, the resources of this little power house of 100 H.P. were severely overtaxed. It was then that the Electric Supply Co of Victoria, financed with Pommies' capital (good folks these pommies?) bought the franchise, the British Insulated Wire Co retaining however a large interest in the company.

Mr Benjamin Deakin the B.I.W. Co representative in Victoria was appointed the Manager of the E.S. Co of Victoria. He took up residence in the house still [illegible] in Ballarat College Grounds, prior to the Ballarat College purchasing

the property for a College, the house is still used and is directly behind the Clock Tower. He had a liveried Coachman to drive him to and from work, whose name was Jimmy Cameron. As a hobby, above all things, he kept pigs and Jimmy Cameron attended to their squealing needs.

On the 23rd of August, 1904, the foundation stone of an up to date power station was laid on the site in Wendouree Parade, on the south west corner with Ripon Street, previously occupied by Fry's Flour Mill. Parts of this Mill's massive bluestone walls form a portion of the power station's structure and are still standing.

The chimney was 125' high and just to the east of the chimney was sunk a well 150' deep, it being thought that they would be able to use the lake as water for the condensers. But it was frowned upon by the City Fathers so the well was sunk 150' to entice lake water to supply the water and a 4 stage pump was installed, but it did not give enough water, so the town's supply was brought in to augment this water supply. The condenser waters would have heated up the lake, about 5°F, and in later years, the wisdom, if you could call it such, of not allowing it to be used, could have an effect on the increasing growth of algae, in warmer water this algae grows fairly quickly.

The plant comprised John Thompson boilers built at Castlemaine and Browett Lindley reciprocating compound engines, with Brush DC generators, giving a total capacity of 900 kW (1200 H.P.)

The ever increasing demand for electricity for lighting, motors and tramways necessitated the plant being enlarged to 1200 kW (1600 H.P.) and in 1913 and later an additional Brush Parsons turbine set was installed.

In 1924 the demand exceeded the plant capacity so alternating current was introduced with the installation in 1925 of two (2) Ljungstrom steam turbine sets, with a capacity of 2800 kVA, 3000 H.P. each and an additional boiler was introduced.

The reason for this change to AC came from the difficulty in supplying distant consumers such as Sebastopol and Ballarat East. Let me briefly illustrate the problem.

The loss in a power line is proportional to the square of the current in that line, e.g. 200 Volts at 1 ampere = 200 Watts, the loss is proportional to 1 x 1 = 1 on a 2 wire supply. By doubling the voltage to 400 on 3 wires, the current for 200 Watts = ½ an ampere ½ x ½ = ¼. So we can supply 4 times as far on 400 V as on 200 V. The new AC V was 6600 for transmission to areas and first was run to Eureka Tile Co and changeover to AC was commenced from DC to AC. A substation was erected in Latrobe Street to supply Sebastopol.

? Creswick switched on 24/11/37 see Advertiser 26/11/37

Prior to the war of 1939 a 6.6 kV line single phase was run to Buninyong, the first outlying township to be supplied from Ballarat. At the commencement of the war the Government erected an ordnance factory at the Railway Station site at Buninyong and all the plant was equipped with three phase motors, but it presented no problem as the Ferrais Arno System was introduced, which was Called Master Motor Control, also where a standard three phase motor of 25% capacity of the plant was run on single phase 460 Volts, thus generating a 3ϕ supply in its third phase winding and as long as the master motor was running a 3ϕ supply was available.

This system was also supplied to Mr Coxall's motor garage when he arrived in Buninyong to start a business and all his machinery was three phase ∴ three phase was made available under the Ferrais Arno control and the brains? in Melbourne said it couldn't be done, but the brains of Ballarat were a little more knowing and advanced.

In 1931 the State Electricity Commission (SEC) negotiated for a takeover of the generating plant and all its assets. The Supply Co of Victoria wanted another 30 years franchise but as no finality could be reached (due to lack of foresight, which I doubt, as in the boom period of 1925-28 the demand increased rapidly, and as the franchise was nearing the date of expiry the offer of the SEC was the best alternative, and finally in 1934 the SEC took over complete control. From 1932 to 1934 the ES Co of Victoria was their agent.

After the Bendigo plant was closed down on 31 December 1937, transmitted supply was then available, the arrangements were soon put in hand to transfer the two Brush-Ljungstrom turbo generators from Bendigo to Ballarat. There was beautiful workmanship in these unique generating plants and when they were finally installed in Ballarat alongside the two identical generators in existence at Ballarat,

the supply to Ballarat was assured for some time to come.

Direct current supply for the tramways was supplied through Rotary Converters as was the remaining DC to consumers, which was in the stage of changing over from DC to AC as the load continued to increase due to partly increased supply to country areas, which were demanding the use of electricity.

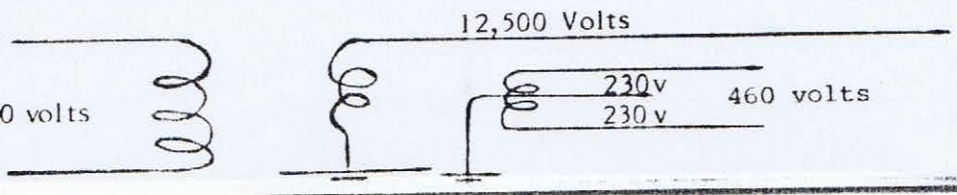
A very interesting point in supply to the Skipton Line, as our transmission voltage was 6600, it would be hard pressed to give a satisfactory supply due to voltage loss in the High Tension Line, so in Gillies Street near the cattleyards was erected a 6600 Volt substation and transforming to 415 - 240 and another transformer was added, 415 -240 - 22000 which allowed power without much loss to be conveyed to Skipton.

Eventually all 6600 Volts were replaced by 22000 making transmission much more economical.

Still the load increased and it became necessary to erect another Power Station, the site selected being in Creswick Road north of Norman Street. This was called B Station and was of a package style, being ready made and assembled on site. Later again transmitted supply was brought from Melbourne at 66000 transformed down to 22000 and 6600 to connect in to the Ballarat transmission. Later again a transmission line of 220,000 volts was brought into a new terminal station called Warrenheip Terminal Station and transformed down to 22,000 and taken to B Terminal Station.

When completed this 220,000 Volt line could now supply Ballarat and District and the Power Stations of A and B became redundant and closed down thus saving the cost of bringing raw fuel (briquettes) from Yallourn and Morwell to Ballarat by rail.

Farmers now had to be supplied in remote rural areas and a scheme called the S.W.E.R. system was introduced. S.W.E.R. meant Single Wire Earth Return which used an "isolating" transformer with a 12,500 Volt tertiary winding and a single line was then run to the farms, to a small 5 or 10 kVA transformer, which we called a Billy Can, thus enabling the benefits of electricity being brought to these isolated areas



Referring back to these early DC days it is interesting to note that the main feeder cables still lie underground, for Ballarat's first inner city supply WAS indeed pole-less supply - something which is much sought after, and is very costly in these "advanced" days.

This original DC system consisted of -

(a) A 0.5 sq inch cable, 3 core from the power station in Ripon Street to the north-western corner of Sturt and Drummond Streets.

(b) A 0.8 sq inch cable, 3 core from the power station to the north-eastern corner of Sturt and Doveton Streets.

(c) A 1 sq inch concentric cable from the power station to the north-eastern corner of Peel and Bridge Streets, later a tap was made at the north-eastern corner of Lydiard and Sturt Streets.

These feeder cables were each brought to a fused distribution pillar, where the distribution cables went along the streets underground and into the consumers' houses.

It is worthy to note that this 1 square inch concentric cable could only be supplied in 70 yard lengths and therefore it had to be jointed every 70 yards. A big task for a concentric cable and during its period of service it never failed, proving the efficient work of the cable jointers and the reliability of the manufactured cable.

Later the .5 sq inch cable was intercepted at the south-western corner of Drummond and Webster Streets cutoff from the Drummond Street distribution pillar and joined into the overhead Rly Workshops line so that the line down Webster Street could be dismantled. It comprised 2-½ square inch + positive feeders, 2-½ square inc (negative) feeders and a bootlace size neutral.

On the installation of a Rectifier and an AC supply being run to the Workshops these heavy cable and poles were eventually dismantled from south-west Corner of Drummond and Webster Streets to the Rly Workshops.

ILLUMINATION

The main streets were illuminated by carbon arc lights and had to receive daily attention for renewal of the carbon rods and several were in series to form a group.

They were let down from the pole arms by a small windlass attached to the pole. The arc lights had a most ingenious device or motor for maintaining the arc, as the carbons burnt away the pressure coil of the motor remained constant and as the carbon rod burnt away the current in the current coil got weaker, causing the pressure coil to dominate and the motor commenced to rotate forcing the negative carbon to feed down to the positive carbon and if it went too far, the excess current caused the motor to reverse, withdrawing the carbon until a balance or state of equilibrium was reached and the light burnt steadily. But if a fault occurred, the motor would run until a shorting switch closed and cut the light out of circuit. Then came the carbon filament lamp, costly to run, but had a long life, the vacuum lamp was more efficient (when these vacuum lamps burnt out it was a practice to gently file off the sealing point underwater and when the point was off, water would then fill up the vacuum, a string would be placed around its neck and the globe hung up forming an excellent weather glass, the lower air pressure allowed the water to form a drop, like on the end of your nose to indicate wet weather).

Then followed the gas filled lamp, often called a ½ Watt lamp as it normally consumed a ½ Watt per candle power. Then the neon, high voltage lamp used mostly in signs, then again followed the fluorescent lamp, sodium and mercury vapour lights.

During the early 1930s we changed over all the gaslamps in the city outskirts to electricity and the electric lamps in use prior to this complete changeover, were cut off during moonlight periods, other times they went off at midnight.

The street lighting was controlled manually as were lights under shop verandahs rented by the shopowners, being switched on and off by two boys in the area on cycles. Then came the spring wound vennere time switch, which had to be wound up every 8 days. Then the electric wound or motor time switch and they only had to be set about every month as the hours of daylight varied with the seasons. Then came the lumitrol which is now universally in use and is entirely automatic in its operation.

Before we go on to the next section, one or two points on the humourous side.

The first lumitrol was placed UNDER a public light and when darkness approached it dutifully switched on the light, but the light being directly OVER the lumitrol,

of course caused the lumitrol to extinguish the light, then on it came again and then off again.

During the early days of radio, batteries or accumulators were used for the radio valve filaments and ordinary dry batteries for the B and C power.

The charging of A batteries was a remunerative occupation and many forms of battery chargers were in use, from motor generator sets, resistance banks made from lamps in parallel or iron wire constructed on bedstead frames to engine driven low voltage generators, and even one small hydro-electric plant. But the most ingenious and costing nothing for power to the user, was using the fall of potential along our DC neutral cable, as this neutral was earthed only at the power station through a circuit breaker and limiting resistor at the end of the circuits, or any way along the system a connection was made,to the neutral at his house workshop, through a reverse energy release amp meter to the battery charging bus bar, through the batteries to the bus bar and to the water pipes, thus, on loading of the system, cause a potential difference, which closed the reverse energy release, the batteries were duly charged, when the load on the system declined, the battery current flowed back immediately opening the circuit and disconnecting the system from the neutral conductor.

In those days we used the Trams for our means of transport, putting our ladders and tools on the back of the trams as only the front entrance was used for entry and exit from the tram and we were sometimes referred to as dead heads.

Once when I was on a tram going up Sturt Street West an enterprising high school student asked me would I please explain to him how the tram on which we were on worked. So I explained how the power was picked up from the overhead trolley wire at 500 Volts by the trolley pole and to the circuit breaker for protection, then through the motor controller, handled by the "Motorman" as they were then called, to the motors, two of 30 H.P. each,small trams and two of 50 H.P. each on the larger trams, thus turning the wheels, to give motion to the tram, then through the wheels to the track and back along the track to the Power House, thus completing the circuit.

Oh! he said, and does our power, we use in the house go back also, to the power house? I said, Yes, if it didn't it would cause trouble somewhere. The reply,

a bit startling: THANKS, but I always thought you blokes were a tricky lot.

THE TRAMWAYS

In 1885 the Ballarat City Council applied for an Order in Council for the construction of tramways in its area and this was granted in 1886.

A cable tramway was considered but when this was found too expensive, the Council granted the concession to Mr Edward Thompson of Adelaide who formed the Ballarat Tramway Co in Melbourne with a nominal capital of 32,000£4 shares.

The Company constructed six miles of track along the following routes:- Sturt Street from Grenville Street to the Gardens via Sturt Street West. Ripon Street to Wendouree Parade and the Gardens, Lydiard and McArthur Streets, Armstrong and Skipton Streets to the City Boundary, Drummond Street South from Sturt Street to Skipton Street as occasion necessitated.

The first rail was laid on 18th October 1887 and six weeks later on 21st December 1887 the official opening took place. Six tramcars ran from the City to the Gardens.

The Company purchased five acres of land on the north side of the lake where it built a depot and stables for the horses, and this area remained the depot until the trams ceased operations in 1971. It is now a residential area.

In 1888 the Ballarat East Town Council approached Booth Ellison & Co concerning a battery operated tram service for Ballarat East. Although the conditions were favourable, the proposal was not proceeded with and it was not until 1905 that the electric tramways were extended to East Ballarat. This shows the lack of co-operation between the Councils where the interest of the public should have been paramount to all concerned. An example is the stupidity of the States and their various railway gauges, 'nuff said.

The Electric Supply Co of Victoria Ltd which purchased the electricity undertaking at Ballarat and Bendigo also purchased the horse tramways in 1903. Twelve of the horse tramcars were converted to electric tramcars, eight became trailers to the electric trams. Six were transferred to Bendigo and one ex horse tram was used for many years for the tramway employees to have their cycles transported to and from Grenville Street , i.e. 13 Sturt Street where the office was .

The official opening of the Electric tramways took place on 18th August 1905. The routes electrified were Victoria Street to Stawell Street terminus, Mt Pleasant route to Corner of Barkly Street at Main Road. There was a horse tram shuttle to the terminus at Gladstone Street for several weeks pending completion of the overhead wires. This line was later extended to Cobden Street terminus, later from Sturt Street and the circuit around the lake from Drummond Street North and McArthur Street, Lydiard Street North to Gregory Street. Drummond Street South was converted to electric trams in 1907. Sebastopol Council did not agree to the replacement of horse trams by electric trams until 14 April 1913.

On 28th August 1937 an extension of 45.5 chains was opened to the cemetery gates on the Lydiard Street North route. This was the only major change made in the system after the Sebastopol electrification in 1913.

Second-hand trams were purchased from Melbourne and Adelaide with single and double bogie trucks and prior to being put into service, were overhauled and beautifully reconditioned by the tramway maintenance personnel.

In 1950 there were 17 single truck trams and 9 bogie truck trams.

In one case a bogie car entered service with the Hawthorn Tramway Trust in 1916, sold to the M & MTB in 1919, sold to the SEC in 1948 for Geelong. When this system closed in 1956 it went to Bendigo and then came to Ballarat and numbered No 1, the only bogie car in Australia to carry this No.

In 1963 Ballarat had 15 single truck cars, 10 bogie cars and 1 track cleaner.

It is interesting to note, in spite of the early introduction of electric power to the tramways the safety of the public was of paramount importance. For normal service stops a handbrake controlled by a swan neck handle with a ratchet and panel on the floor. For emergency the old cars known as "Pringles Spring Drays" were fitted with the Newall Westinghouse Magnetic Track and Wheel brake, the most powerful of brakes ever known. It used the momentum of the car by turning the motors into generators, the power thus generated was supplied to an electro-magnet slung between the wheels on each side riding above the track by 1'/2" held by a spring, when power from the generators electrified the magnet, it gripped the rail and in so doing due to the forward movement of the car pulled on levers, that applied the brake shoes to the wheels. Its effect was instantaneous. This was later changed to rheostatic braking which was more gentle as the energy was dissipated in resistance banks. This type of

braking of course had to be independent of the trolley wire.

Then along came the air brake. This made driving a tramcar a pleasant occupation as no strong arm practice was required and they were very effective and could be controlled so as little discomfort as possible was experienced by the passengers when they were being applied. The tramways ceased operations on the 23rd of September 1971.

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16/10/1984