The gas industry in Victoria to 1900
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EARLY GAS

In various parts of the world flammable gas issues from beneath the surface of the earth. For centuries past man has utilised that gas. In China, naturally occurring gas was used for lighting and for evaporating brine. Near Baku, on the shore of the Caspian Sea, fire worshippers erected temples in honor of the flames. In England in the 17th century, Dr. John Clayton investigated a certain ditch 'wherein the water would seemingly burn like brandy, the flame of which was so fierce that several strangers have boiled eggs over it'. Clayton concluded that the source of the fire was the underlying coal deposits. He therefore sealed some coal in a retort, heated it over an open fire and observed that 'a spirit arose' which 'caught fire at the flame of the candle, and continued burning with violence as it issued out in a stream'.

Essentially, this process was the destructive distillation of coal, more commonly termed the carbonisation of coal, upon which was later founded an important and worldwide industry. The production of coal gas, however, remained little more than a scientific curiosity until the end of the eighteenth century when in 1792 a Scot, Robert Murdoch, began to produce coal gas to illuminate his house in Redruth, Cornwall. In France, Philippe Lebon was pursuing a similar course at the same period. The work of both men was seized upon by one Friedrich Albrecht Winzler who, in 1807, demonstrated gas street lighting in Pall Mall, London. In 1812, with Winzler's involvement, the world's first gas company was established: the Gas Light and Coke Company. By 1850 some 700 gas undertakings existed in Britain, more than 300 in the United States and gaslighting was being adopted in the furthest corners of Europe.

FIRST STEPS IN AUSTRALIA

The first recorded user of gas in Australia was a shopkeeper in Sydney in 1826. In 1827 the Australian Gas Light Company was formed and in 1841 the first gas flowed in the mains beneath the streets of Sydney. In the wilds of the Port Phillip District the use of gas began in 1844, when a Fitzroy blacksmith, George South, began to market containers of compressed gas which were fabricated and filled at his smithy. This innovation had been pioneered some years earlier in England by the London Portable Gas Company. The enterprise did not prove successful in London or in Paris, where it was also adopted; and in Melbourne, South and his portable gas were 'chaffed out of the public mind and soon forgotten'.

The next recorded instance of gas being used in Melbourne was in 1845 when William Paterson, a watchmaker of Collins Street, displayed a five-burner revolving gaslight in the window of his shop. Paterson's 'revolver' was used for only three weeks or so, after which problems with leaking gas caused it to be abandoned.

The first person in Melbourne to consistently use coal gas for practical purposes was a baker and confectioner, William Overton. He was the entrepreneur but the technical accomplishment was that of George South who built the retort and gasholder. Overton's two shops in Swanston Street were first illuminated by gas on the evening of Monday 23 July 1849. The improvement in lighting quality was dramatic, and by week's end plans were afoot to float a gas company and supply the town with the modern illuminant. The gasworks was to be established in Swanston Street and gas was expected to be available in Collins Street and Elizabeth Street within two months.
In fact it was October 1850 before the City of Melbourne Gas and Coke Company was established, and more than five years after that when the gas supply at last began operation. The throes of Separation and the exodus to the newly discovered goldfields contributed in no small measure to the long delay. (9)

THE FIRST GASWORKS IN VICTORIA

A site for the Company’s gasworks was acquired in Collins Street, but this was found to be too small and an area alongside the Yarra, to the west of Batman’s Hill, was then leased from the Crown. One requirement of the lease was the excavation of a canal from the river to the Works site for the delivery of coal and other cargo. The Gas Company was also required to erect a bridge over the canal ‘sufficiently wide for drays to pass each other’. The canal was constructed by a contractor, Mr D Pritchard, and when completed it was 77 metres long, 16 metres wide at the top and three metres deep. This provided access to the largest craft then allowed up the Yarra. (10)

The foundation stone of the Works was laid on 1 December 1854 amid great celebration. The retort house, the heart of any gasworks, was 40 metres long with walls of dressed blue basalt, nearly one metre thick, founded on concrete and red gum to a depth of two and a half metres below normal ground level. The purifying house was of similar scale and the chimney stack was 60 metres high and seven metres square at the base. When the stack was topped out in October 1855, a champagne breakfast was held for directors and their friends at the top of the shaft. (11)

Inside the retort house were 120 retorts set in 24 benches. The fires were first lit under those retorts by Sir Charles Hotham on 17 December 1855. This was one of Sir Charles’ last official functions for he caught cold while at the Works and declined, through choleraic diarrhoea and irritation of the brain, to epileptic fits and final expiry at 1.15 pm on the last day of the year. (12)

As the fires slowly dried out the brickwork, the temperature was raised to the point where gasmaking could begin. The retorts were charged with coal imported from England and Scotland and the gasholder gradually filled. On 1 January 1856, with little publicity, gas was supplied to those few Melburnians whose premises had been fitted up to use the new fuel (Figures 1, 2).

THE SPREAD OF THE INDUSTRY

There was soon a strong demand for gas, however, and by mid-1856 gas mains were being laid in the streets of Fitzroy and Collingwood. The ‘township of Flemington’ enjoyed the boon of gaslighting from 1859 and by 1860 gas was available in parts of Richmond, Prahran, St. Kilda and South Melbourne.

The only other gasworks built in Victoria in the 1850s were at Kyneton, Ballarat, Castlemaine and Talbot. During the 1860s six more were commissioned, including plants at Collingwood and Williamstown. Eight works were established in the 1870s, but the real era of industry expansion occurred in the boom decade of the 1880s when no less than 28 gasworks were constructed (Figure 3). Apart from the Brighton Gas Company’s Highbett Works, built in the 1930s, the gasworks at Box Hill, Brunswick and Warracknabeal, commissioned in 1890, 1891 and 1892 respectively, were the last black coal gas plants constructed in Victoria. (13)

In all, 50 gasworks were built in the colony last century and all but two were designed to utilise black coal.

The first exception to this acceptance of coal as the gas-making medium was at Kyneton, where the second gasworks in the colony was constructed. The Kyneton Gas Company first supplied gas to the town on the evening of 30 April 1858. Instead of coal the retorts were charged with gum leaves. While the gas was reported to be ‘of first rate quality’ the use of eucalypt leaves for gas production was not adopted elsewhere in Victoria on a commercial basis. The Kyneton Works was later modified to accept black coal. (14)

The only other gas company to adopt an
Figure 1: The Melbourne Gasworks 1856.

Figure 2: The Melbourne Gasworks c1870. The canal and dock, lower right, has been filled in within the confines of the Works but remains, complete with bridge, outside the boundary wall. It was soon to be dispensed with and a wharf built.
alternative to coal was at Beechworth, where oil was the chosen fuel. The plant installed at Beechworth had been on display at the Melbourne International Exhibition of 1880 and was there inspected by a party from the bush. McLean Bros. and Rigg installed the 'machine for manufacturing as from crude oil' in Beechworth in 1881. Gas was first supplied to the town on 21 December.

The main variations between the Beechworth gasworks and a conventional coal gas plant were the oil storage tanks, in place of the traditional coal store, and the special retorts 'shaped like flattened bottles' into which, when they were red hot, the oil was allowed to flow in a steady stream. An annual report of 1894 indicated that oil was still the source of gas supply at that time but it appears that the Works was remodelled in 1897 and converted to a conventional coal gas plant.

THE SMALL GASWORKS

A typical Victorian country gasworks of the 1880s consisted of a retort house, condenser(s), scrubber, purifier(s), station meter, gasholder and main governor. Generally a workshop, a coal store, stables and a manager's cottage completed the Works.

The physical dimensions of the gasworks varied depending on the population of the town to be supplied but generally the retort house, the main structure, was about 15 metres long by 10 metres wide and five metres high, built of brick and roofed with iron. Within the building one or two benches or settings of retorts provided a gas-making capacity of between 285 and 570 cubic metres per day (approx. 10 000 to 20 000 cubic feet per day). Coates and Co., gas engineers, offered the following description of operations in the retort house:

The settings are built in the shape of arches, and the retorts, eight feet six inches long, made of fireclay, are laid upon a series of flues in such a position that the heat from the coke furnace has a free play all round, and raises the temperature to a bright orange heat of over 1300 degrees F. The coal is placed in these retorts and carbonised at this high temperature. Gas immediately begins to evolve from the coal, but to thoroughly extract all volatile matter of use, the coal is kept in for six to 12 hours. Most of the gas, however, comes off during the first three hours (Figure 4).

The gas produced then passed through a vertical ascension pipe which rose from the mouthpiece of each retort to the overhead hydraulic main. At the junction point a water trap was formed to ensure no air was drawn into the retort for, if this should occur, the coal within would simply burn and not carbonise. From the hydraulic main a 150 mm inch diameter pipe called the foul main transmitted the gas to the condenser which was usually a series of horizontal pipes some 60 metres long. Here, the gas was cooled and the 'tarry matters' given up.

The gas then passed through the scrubber which was, typically, an upright cylinder some six metres high and 1.2 metres in diameter, filled with layer upon layer of wooden battens over which water constantly trickled. The ascending gas scrubbed against the wet boards 'resulting in the nitrogen of the gas being absorbed by the hydrogen of the water and forming liquid ammonia'.

From the scrubber, the gas was conducted to the purified boxes containing slaked lime where the sulphuretted hydrogen and carbonic acid in the gas was removed. The cooled, scrubbed, purified gas was then measured by the station meter before passing to the gasholder for storage prior to passing from the Works to the distribution system.

The holder tank in a small Works was usually some 12 metres in diameter, three to four metres deep, lined with brick and filled with water. The holder bell was constructed of wrought iron plate with its roof 'supported by principals of tee iron strengthened by angle iron purlin and brackets'. The weight of the holder bell, counter balanced to a degree, provided the pressure to force the gas along the mains. Adjustment of the gas pressure in the distribution system was achieved by a weight loaded governor at the Works (Figure 5).
Figure 3: The Bendigo Gasworks 1861 (La Trobe collection, State Library of Victoria)

Figure 4: Retort being charged (Photograph Rick Altman)
Little now exists as tangible evidence of those 50 Victorian gasworks. The most
important monument to that century of black coal gas production is the Bendigo gasworks,
owned by the Bendigo City Council and administered by the Bendigo Trust. Parts of
the Bendigo retort house evidently date from the original Works, built more than 125
years ago. The Bendigo gasworks today is largely complete, with all the main elements
remaining much as they were when gas production ceased in 1973. The long-term
goal of the Bendigo Trust is to open the Works to public inspection but, as with most
such projects, cash is the determining factor (Figure 6).(20)

The ideal use for such an important and, in Victoria, unique example of industrial
archaeology would be as a working museum with perhaps one bench of retorts operating on
black coal, producing enough coal gas to illuminate the site and to supply various of
the old gas appliances stored nearby.

Elsewhere in Victoria, the Gas and Fuel Corporation retains a number of the old
Works sites but few signs exist of the retort houses and gasholders of bygone days. At Clunes a depression in the ground
alongside the creek marks the site of the long defunct Clunes Gas Company's old Works. In Talbot some brickwork remaining from the
town gasworks hides among the thistles near the bowling green (Figure 7).

In Melbourne there exist only a few buildings from the gas industry of last century.

At 198 Flinders Street the old Head Office building of the Metropolitan Gas Company
still stands. In 1984 the Gas and Fuel Corporation bought the historic building, and is preparing plans to refurbish it. Figure shows architectural sketch and
description of the building, from 1892.

A valve house dating from the 1880s survives in St. Kilda Road. Surrounding buildings of
the same period have recently been demolished but the valve house remains by virtue of its registration by the Historic
Buildings Council. At North Melbourne the

much larger Hotham valve house of similar vintage stands in good condition, the
property of the Gas and Fuel Corporation. A diminutive example exists in
Richmond.(21)

Gasholder tanks remain at North Melbourne and at Footscray; after many years, the
water lying in them still reeks powerfully with the familiar sulphurous gasworks smell
(Figure 8). Parts of the Highett gasworks, commissioned in 1939, were retained during a
recent site development, the main feature preserved being the grand brick chimney.

However, it is the Bendigo gasworks which offers future generations the best
opportunity to observe at first hand the industry of bygone years; the industry which
for over a century provided Victorians with gas for lighting, for cooking and for
heating.
Figure 5: A very large gasholder for a country works. The usual holder had a capacity of only 10-20 per cent of the one shown.

Figure 6: The retort house of the Bendigo Gasworks, March 1986. 'Let Gas help you' is picked out in the brickwork.
Figure 7: The apparent remains of the gasholder tank, Talbot, March 1986

Figure 8: Gasholder tank, 200 metres in circumference, and valve house, North Melbourne, March 1986.
REFERENCES


4. Newbigging, p.35.


6. Argus, 2 August 1849. Letter from 'Fides' explaining that W M Paterson's 'revolver' was the first gas lamp seen in Melbourne.


9. At the Second Annual General Meeting of the City of Melbourne Gas and Coke Company, Mr Trenchard, a director said that 'on the discovery of the gold fields the public excitement had risen to such a pitch that it was impossible for the Company to adopt any course at all...' *Argus*, 15 July 1852.

10. Report of the Company Engineer, Alexander Kennedy Smith, presented to the Fourth Annual General Meeting of the City of Melbourne Gas and Coke Company. *Argus*, 11 July 1854. The canal and dock were filled in during 1870 by which time it was an obstruction 'to the growing requirements of commerce'.

11. Argus, 26 October 1855.

12. Age, 1 January 1856.

13. The Lurgi plant at Morwell, opened in 1956, used brown coal briquettes.


16. It is likely, though not certain, that the Works was converted to use black coal in 1897. *The Beechworth Gasworks* closed in 1949, at which time it was a conventional coal gas plant.

17. Coates and Co. built 14 gasworks in Victoria between 1887 and 1892. The Company made a practice of supplying the local journal with a description of the Works. The quotation appeared in the *Ararat Advertiser*, 10 January 1888.

18. Lime for purification was later replaced by iron oxide.

19. The Works description is drawn generally from the Coates and Co. information supplied to the *Ararat Advertiser* but is typical of a small country gasworks of the period.

20. Access to the Bendigo gasworks site was kindly provided by Mrs Potter, Executive Officer of the Bendigo Trust and Mr Edgar Harrison, a director of the Trust.

21. The valve houses accommodated the valvework and pressure control gear for the gas distribution system in the area concerned. At North Melbourne, large gasholders stored gas from the West Melbourne Works. The gas from the holders was then distributed to a wide area through various systems of mains, by way of the valve house. The Metropolitan Gas Company operated 10 valve or governor houses. They were located at West Melbourne, South Melbourne, Fitzroy, North Melbourne, Essendon, Richmond, St. Kilda, Elsternwick and Tooronga.