

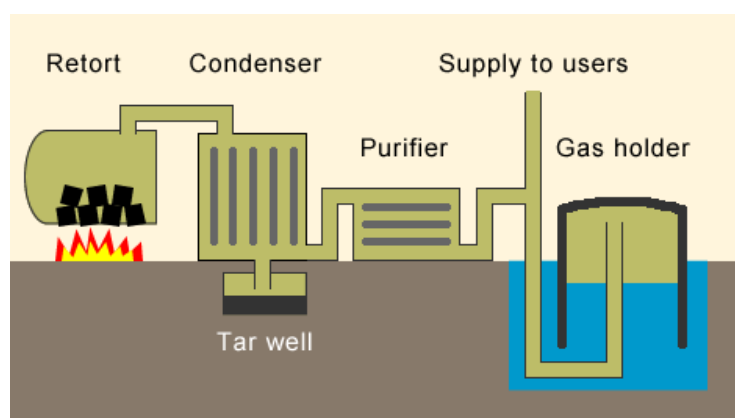
The Colwall Gas Company Limited – Andy Ball

In common with many other communities of any size, Colwall previously had its own local gas works. This produced gas made from coal that was used for several community, domestic and commercial purposes during the first half of the 20th century. Stephen Ballard III wrote a piece about the 'Colwall Gas Works' in his memoirs which forms the basis for much of the detail that follows. In addition, archive copies of 'The Journal of Gas Lighting, Water Supply and Sanitary Improvement' have yielded invaluable reference material.

The nineteenth century saw the development of a widespread national infrastructure providing gas derived from burning coal in sealed vessels called Retorts, in a process known as carbonization. By the mid-19th century gas works could be found in most towns of over 10,000 people; cities were served by municipal gasworks; large private country estates, and some factories and villages also had their own gasworks. In the first two decades of the 19th century the gas produced was primarily used for public, non-domestic lighting but by the mid-19th century gas was being employed for domestic lighting and cooking. The increase in demand accelerated the development of infrastructure including gas production at gas works, gas storage in the form of gasholders, and gas distribution networks in the form of underground mains.ⁱ

The method by which coal gas was produced is summarized by this description provided on the National Gas Museum website. *'The basic process for making gas from coal used in the 19th century remained essentially unchanged right through until the last coal gas works closed in the 1970s. Coal in a closed tube called a retort was heated in a furnace. The gases given off – mainly*

*hydrogen and carbon monoxide – passed through a water trap ("hydraulic main") and were then cooled in a condenser, where tar and some other liquids were removed. The gas then passed through a purifier to remove sulphur compounds and other impurities before being used or stored in a gas holder. Later in the 19th century, steam driven exhausters were introduced to pump the gas through the gas works and into the mains system. These retorts had to be filled with coal ("charged") and emptied by hand, which was hot, back-breaking work. Later in the 19th century mechanical charging and vertical or inclined retorts were introduced in the larger gas works but hand charging of horizontal retorts continued at small town gas works until they closed in the 1960s.'*ⁱⁱ



As the industry grew and developed successive Governments responded with new regulations. In 1870 The Gas and Water Works Facilities Act was 'An Act to facilitate in certain cases the obtaining of powers for the construction of Gas and Water Works and for the supply of Gas and Water'.ⁱⁱⁱ The 1875 Public Health Act gave local authorities the power to amalgamate local gas supply companies in order to create municipal gas undertakings.

As a local comparable, Ledbury had its own gas works and gas streetlighting in operation in the mid nineteenth century. The works were located adjoining the canal which was used to bring in coal. The streetlights were lit for the first time on the first Sunday in January 1847, as a contemporary account described - *'The town changed from heaviness and gloom to cheerfulness and light. The event was hailed by feelings of unanimous joy throughout the whole of the town, and notwithstanding the sacredness of the day, the bells commenced their gayest notes immediately on the completion of the illumination'*^{iv}

Malvern had at least two gas works by the end of the 19th century. The first was on the junction of Pickersleigh Road and Madresfield Road and was opened by the local authority in 1856. Another privately owned works (Malvern Link Gas Company) came into operation on a site adjoining the Worcester and Hereford railway line at Lower Howsell, Malvern Link in 1861.^v

The Colwall Gas Company Limited was established in 1897 with a nominal capital of £8,000. equivalent to around £1,225,000 in 2023. Of this sum £3,000 was for the cost of the works, the machinery and equipment together with construction of 'Gas House' - a dwelling that was used as the gas manager's house; £2,000 was for the gas mains that took the gas supply around the village; and the remainder was for meters, tools, and other miscellaneous items.

vi

The timing of the creation of the new Colwall company is intriguing. In the previous year (1896) Malvern Urban District Council appear to have been planning a takeover of the Malvern Link Gas Company, and expansion of operations to include supplying gas to Colwall as described in a short article in the 'Journal of Gas Lighting, Water Supply and Sanitary Improvement'.

'Malvern Urban District Gas. — The Malvern Urban District Council are desirous of purchasing, by compulsion or agreement, the undertaking of the Malvern Link Gas Company, carrying on, extending, and enlarging the works, and supplying gas in Great Malvern and several adjacent parishes and places in Worcestershire, as well as in Cradley and Colwall, in Herefordshire. The usual powers as to gas supply will be sought, and also authority to raise more money.'^{vii}

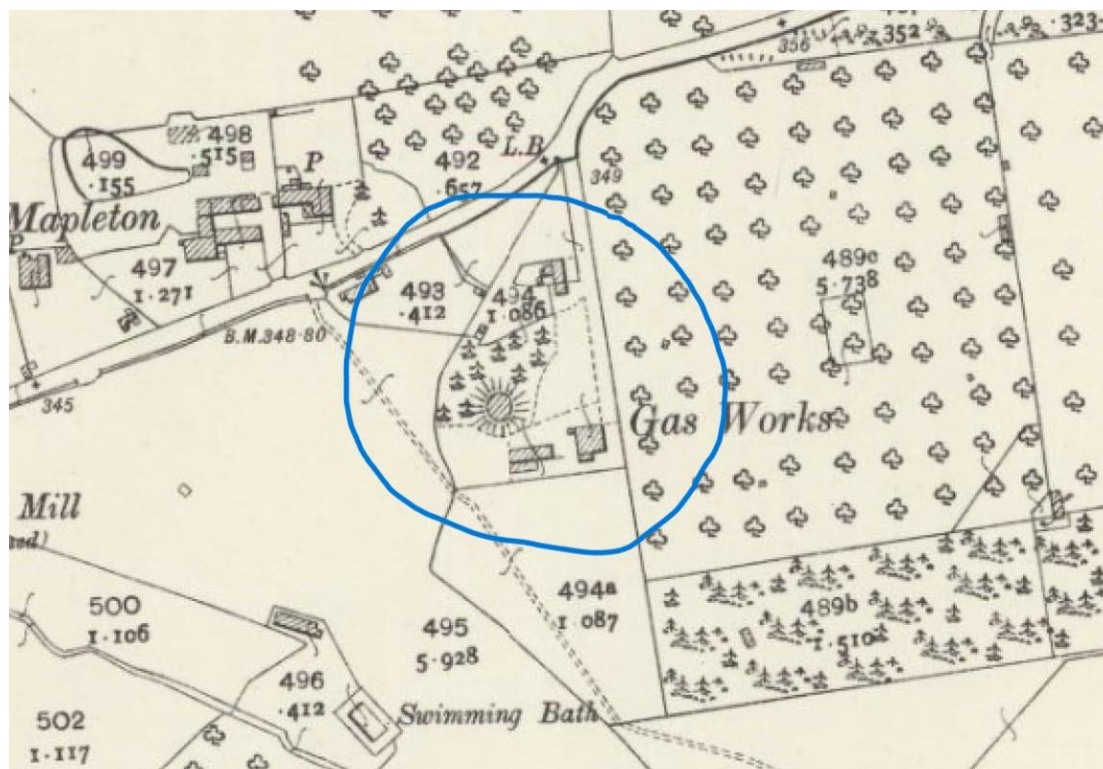
Therefore, the launch of the new, independent Colwall gas company may well have been triggered and spurred on by that situation.

The first group of directors of the Colwall Gas Company Limited comprised Reverend Black, Mr. F. Ballard, Mr. J.W. Broadhead, Mr. A. King, Mr. H. Meates, Mr. F.J. North, and Mr. T.A. Pedlingham.^{viii} The works manager listed in the 1901 National Census as living at 'Gas House' was a Yorkshireman - Mr. Harry S. Charlesworth (aged 29) resident there together with his wife, son, mother-in-law and sister-in-law.

Some of the directors were local dignitaries who also had Colwall parish council connections. For example, Mr. F. Ballard had been elected the first Chairman when the Colwall parish council was created in 1894.^{ix} The parish council agreed a new rate for street lighting in 1897 the same year that the Colwall Gas Company Limited was established.^x This

inevitably led to accusations of a conflict of interest as an article in 'The Journal of Gas Lighting, Water Supply and Sanitary Improvement' describes. *'Gas Shareholders as Parish Councillors—A singular complication is reported to have arisen at Colwall. It appears that a number of the members of the Parish Council are connected with the Gas Company; and, as a consequence, when matters affecting the Council and the Company have come to be dealt with, there has not been a quorum to vote. Application has therefore been made to the Herefordshire County Council on the subject; and the Parliamentary Committee have discussed the position. They reported at the last meeting of the County Council that they did not think it desirable that Colwall should be ruled by the Gas Company; but at the same time, it was not reasonable that the parish business should at certain junctures come to a deadlock. They therefore recommended that the voting disqualification should be dispensed with in the case of the two shareholders who, not being Directors, had the smallest interest in the Gas Company. The recommendation has been adopted; and so the deadlock has ended'.^{xi}*

The Colwall gas works were located on land to the south of the property now known as 'Kimberley House' (originally simply known as 'Gas House') off Old Church Road. This site was chosen as it was on low ground within the parish which meant that the gas supply pressure to the rest of the village would be better, and, as it was a noxious trade, it was well away from the majority of the houses. The land was previously owned by Stephen Ballard II who took shares in the new company in lieu of payment.^{xii}



Extract from Ordnance Survey 25 inches to 1 mile map published in 1905 showing the location of the Colwall gas works. Not to scale.

The Ordnance survey map of at 25 inches to a mile scale, published in 1905, shows the original layout of the Colwall gas works. The works were constructed by Messrs. Robert Dempster and Sons, of Rose Mount Iron Works, Elland, Yorkshire.^{xiii} They were a well-respected firm of specialists in this industrial sector.

There are currently few known photographs of the Colwall gas works, however, from a contemporary account of the opening of the gas works and from the Ordnance Survey mapping, it is possible to establish what was likely to be present in 1897.

The inverted 'L' shaped building at the north of the gas works site is 'Gas House'.

The broadly square building at the southeast corner of the site was the retort house. This was 30 feet square and 18 feet high and contained two arches each with five retorts. The vertical type condensers in this building were made of cast iron. The scrubber was of wrought iron plate, 20 feet high and 3 foot in diameter and was furnished with a water cistern and a distributor. There were two purifiers 6 foot square and 3 feet deep, arranged for working either singly or together. The station meter for measuring the gas produced was made by Parkinsons.^{xiv}

From Fred Ballard's book 'Concrete for House, Farm and Estate' there is an image of a 'Tar Tank at Colwall Gasworks' so that also formed part of the works infrastructure but may be a later addition, or replacement. The tank appears to be flanking the exterior of a brick-built building (most probably the retort house) and had a capacity of 2,000 gallons.^{xv}

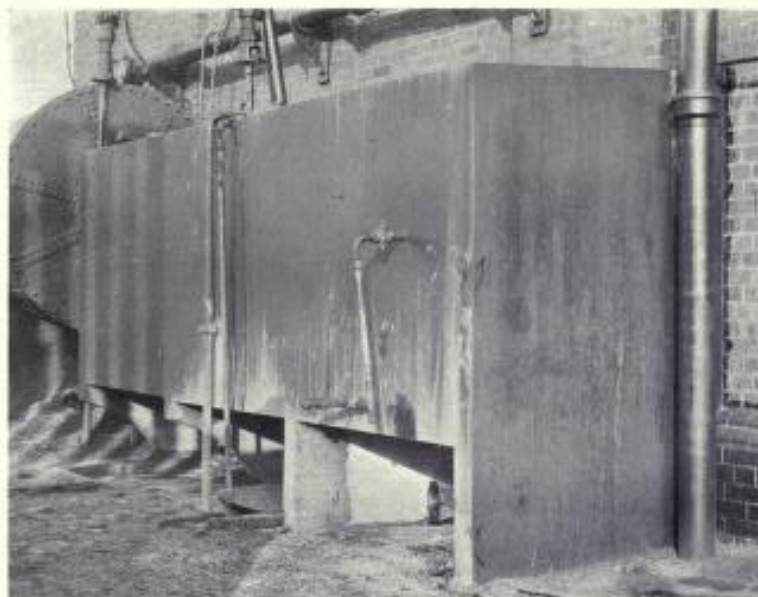
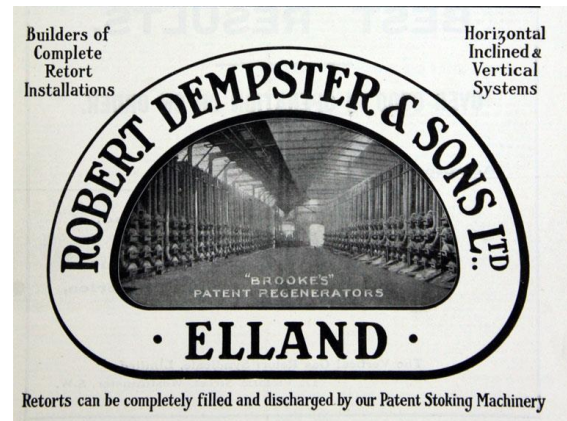


Fig. 39.—TAR TANK AT COLWALL GASWORKS.

This tank holds 2000 gallons. It is built above ground level for barrel-filling, one end supported on brackets owing to tar-well being underneath. Cost 180, including builder's profit.

The rectangular building at the southwest corner of the site is likely to be the coal store, or other storage building.

Regarding the gas holder infrastructure at the works photographic evidence seems to contradict the Ordnance Survey maps. An undated photograph, sourced from the National Gas Archive (<https://extranet.nationalgrid.com/GasArchive/>), shows this image of the Colwall gas works taken from the south.



In this photograph the original gas storage is the structure to the left of the image which is consistent with the Ordnance Survey mapping. With its vertical, finial topped standards (uprights) and horizontal lattice work struts this structure is known as a column guided gasholder. The vertical standards would typically be made of cast iron and the horizontal struts would be made of either cast or wrought iron bolted to the standards. The variable volume part of the structure containing the gas would have risen and fallen within these columns. Either totally or partially below ground there would have been a water tank. The pile of earth surrounding the structure is likely to be the spoil from such an excavation. The contemporary account of the gasholder present in 1897, at the time of the opening of the Colwall gas works, describes it as being 35 feet in diameter and 14 ft. 3 in. deep with a storage capacity of about 13,500 cubic feet.^{xvi}

The other gas holder, central to the photograph, is not shown on any of the 20th century Ordnance Survey maps of the site. It is a two-lift spiral guided holder in an above ground tank and was most probably not present in 1897 but was subsequently added at an unknown date. It is possible that this was added quite soon after the opening of the gas works as a piece from 1897 in the 'The Journal of Gas Lighting, Water Supply and Sanitary Improvement' suggests '*The Colwall Gas Company, Limited, will apply for power to maintain*

and continue their existing works, and to construct a new gasholder and make other additions, including plant for the treatment of residual products. Authority will be sought to supply gas generally in Colwall and Coddington, in Herefordshire, as well as in bulk; also to supply meters, fittings, stoves, &c. The capital is to be defined, and more will be required.'^{xvii}

The base third (the area below the gantry) of this spiral guided gas holder was of fixed height and contained water, while the upper two thirds was of variable height and contained the gas. This gas type of gas holder operated based on spiral guided rails affixed to the side of the vessel. The spiral rails engaged with rollers on the edge of the tank in such a manner that the bell moved up and down in a screw like fashion. The vessels could be all left-handed, all right-handed, or successive combinations of both.^{xviii}

The Colwall gas works relied upon coal brought to the village by rail which was then transported by horse and cart to the works which were over a mile away from the railway station. Stephen Ballard III estimated that there was around 600 tons of coal brought to the works in this way annually.^{xix} At one stage consideration was given to expanding the tramway that ran from the Ballard Malt Vinegar Works in Stone Drive to the Model Piggery which was onwards to the west. The proposal was to extend the existing tramway to the railway station at one end and to the gas works at the other thus providing a direct link between the gas works and the station. However, the scheme was turned down and never came to fruition.^{xx}

Stephen Ballard III described the gas main infrastructure that supplied gas through underground pipework to the village. This included gas mains

- From the Colwall gas works along Old Church Road, across Stone Drive and to the Wyche
- From the village [probably meaning the settlement surrounding Colwall Stone] to Colwall Green and on to Evendine
- A subsequent main from the gas works directly across fields to the Horse and Jockey public House and then onto Colwall Green
- From Old Church Road along Mathon Road towards Redland House^{xxi}

Not all of these gas mains would have existed together at the initial launch of the company in 1897 when most probably they only served the area of the village centred around Old Church Road and Colwall Stone. The article written in the 'Journal of Gas Supply, Water Supply & Sanitary Improvement' for the launch of the Colwall gas works in 1897 described that *'There are upwards of three miles of mains laid, varying from 6 to 3 inches in diameter'*.^{xxii} The gas mains would have been sited underground, made of cast iron pipework which traditionally would have had socket and spigot joints packed with hemp and sealed with lead.^{xxiii}

The gas mains network was extended significantly to Upper Colwall, Evendine Lane, along Mathon Road and to Barton Court in around 1932.^{xxiv}

Stephen Ballard III visited the Colwall gas works when he was child. A section in his memoirs of the Colwall Gas Works sub-headed '*A little boy's picture of Hell*' graphically describes the

process that he saw - 'As a small boy a visit to watch the retorts being charged was an entertainment, more spectacular towards evening when the flames could be seen across the fields. The procedure was as follows:- The coal for a retort was weighed into a steel wheelbarrow, the lid on the end of the retort, which was 5 or 6 feet above floor level, was unscrewed and the escaping gas was lit with a torch, the lid was removed and the coal was shovelled from the barrow into the red hot retort. This caused the flames to shoot out 8 to 10 feet up into the air. The lid was prepared for refixing by having fire clay smeared round the edge. A mobile hook lifted the lid, put it in place and it was quickly screwed up, extinguishing the escaping gas. The coke on the floor, which had been raked out prior to putting the coal in, was partly used to feed the furnace under the retorts. This was another cherry red cavern with quite a lot of blue flames in it. The remainder of the coke was cooled down by having buckets of water thrown over it causing a great whoosh and a huge cloud of steam to rise up into the darkness of the roof. The coke was stockpiled outside and sold as a bye product, its quality varied according to the type of coal being used and to how long it had been in the retort.'

^{xxv}



Illustrative picture of the inside of a retort house with horizontal gas retorts. Fakenham gas works. Source: Fakenham Gasworks Museum. Available at <https://fakenhamgasmuseum.com/>

In two separate articles written by Stephen Ballard III about the 'Colwall Brick and Tile Works' and 'Colwall Goods Yard and Passenger Station' there is also evidence that the original gas mains supplied both the Colwall Brick and Tile Works (located at the end of what is now Old Orchard Lane and in operation circa 1900), and Colwall Railway station.^{xxvi}

A series of streetlamps lit the roadside where the gas mains were laid.^{xxvii} These were present from 1899 onwards.^{xxviii} In addition, there was gas lighting at the Colwall Brick and Tile Works and at Colwall Railway station.^{xxix} The latter is also evidenced by a photograph from the early 20th century showing the newly built replacement Colwall railway station building and accompanying footbridge. Gas lamps were present on the approach road, by the station building and on the footbridge itself.



Stephen Ballard III described the scene *'When darkness fell, Colwall passenger station was to a small boy in 1910 a blaze of light. Although Colwall village was lit by gas lamps long before many other villages as it had its own private gas works, the lamp posts were often more than a hundred yards apart. But on Colwall station they were thirty feet apart.'*^{xxx}

Elsewhere, the postcard image below, understood to date from 1932, shows a gas lamp present at Colwall Green at the junction of Walwyn Road and Evendine Corner.

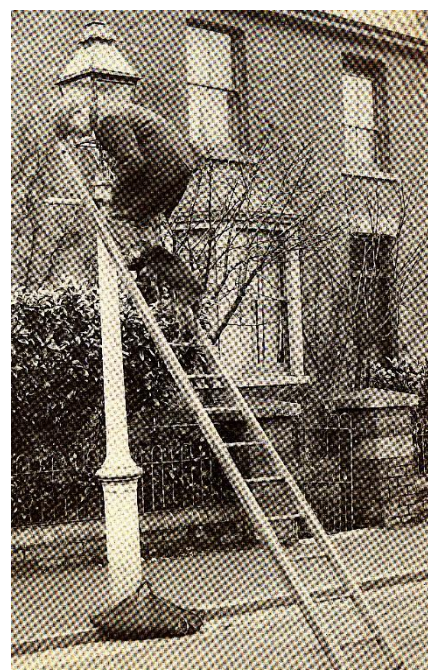


Initially the technology for street lighting was based upon fish-tail burners which provided very limited light, sufficient only to show the general position of the roadway. The technology improved during the early 20th century and Colwall streetlights had new incandescent fittings installed. ^{xxx}

This description from the National Gas Museum website describes the technological changes. *'Throughout most of the 19th century, gas lights were simply naked flames of varying shapes, depending on the type of burner; these had names like cockspur and fishtail. Whilst these were much brighter than candles or oil lamps they were poor by modern standards. In 1885 the Austrian scientist Carl Auer invented the gas mantle, which consisted of a fine ceramic gauze impregnated with rare earth metals. When heated to a high temperature by an aerated gas burner (invented 30 years earlier by Robert Bunsen), this produced a much brighter light than a naked flame.'* ^{xxxii}

The street lighting needed someone to light them. A 'lamplighter' had to cycle around the village to turn on the gas and light the lamp using a pole with a light on the end. ^{xxxiii}

This uncredited image from the Colwall Village Society archive shows a lamplighter using a ladder to light a gas lamp. It is not certain whether this is an image taken in Colwall. (The angle of the ladder and the presence of a



dog by the boy's feet probably wouldn't meet modern day health and safety requirements...).

Coal gas was used for a variety of purposes in houses during the first half of 20th century - for lighting, space and water heating, cooking and appliances. Whilst gas cookers had been showcased at the Great Exhibition in 1851 the uptake of this technology was slow and restricted to wealthier householders. Gas cooker technology had a considerable boost in the 1920s with the introduction of the oven thermostat in 1923. At around the same time, with increasing competition from electricity, the gas industry responded with the introduction of many other gas-powered appliances including refrigerators, fans and irons.^{xxxiv}

Wealthier Colwall households may well have utilised these at a time when most local dwellings would still not have had an electricity supply.

Stephen Ballard III recounts that Parkinsons, a major manufacturer of gas stoves from Birmingham, ran a three-day exhibition of gas appliances in the Workmans' Hall in Stone Drive, Colwall opened by the then Rector of Colwall, the Reverend Custance.^{xxxv} From an article in 'The Journal of Gas Lighting, Water Supply and Sanitary Improvement' this can be established as happening in 1898.^{xxxvi}

A small gas showroom existed in the village located near Crescent Road. This was a very simple shed-like structure with a sign that simply said 'Gas Service'. From a photograph dating back to 1935, at the time of King George V's jubilee celebrations, the building is clearly visible. Closer inspection of the image reveals the presence of gas cookers just discernible inside the front window.



Production of coal gas yields a series of useful waste by-products including coke, coal tar and sulphate of ammonia.

The best coke would have been retained for using to heat the retorts at the gas works but any excess would have been sold. Conveniently, one of the original directors of the Colwall Gas Company Limited was Mr. H. Meates who ran a series of coal yards at stations along the Worcester and Hereford railway. An advert from the 'Gloucester Journal' dated Saturday 8th October 1910 describes the setting up of a new company to be run by the Meates family.

'Local Company. JOHN MEATES AND SONS, LTD. This company has just been registered with capital of £7,500 in £1 shares (2,500 pref), to carry on the business of coal, coke, breeze,

lime, oil, fodder, timber, and builders' merchants, colliery proprietors, etc., to acquire the business formerly carried on at Ledbury, Colwall, Ashperton, Herefordshire, and Newent, Gloucs., as John Meates and Sons, and until recently by H. Meates. The subscribers are:— Shares. H. Meates, Ledbury, director ... 1 pref. A. G. T. Banks, Ledbury, agent ... 1 ord. Private company. The number of directors not to be less than two nor more than four. The first are H. Meates (chairman and permanent director, special qualification 1,000 shares) and R. Down (permanent, subject to holding any of the first issue of debentures). Qualification £5. Remuneration one guineas each per meeting attended. Registered by the Solicitors' Law Stationery Society, Ltd., 9, Chancery-lane, W.C.' ^{xxxvii}

Coal tar was sold on from the gas works to tar distillers at the price of £1 per 40 gallon barrel but Stephen Ballard III claimed this didn't provide much income. ^{xxxviii}

It is likely that sulphate of ammonia, resulting from the production process, would have been bagged up and used as a fertiliser on the extensive, local fruit farms run by the Ballard family in Colwall during the early to mid 20th century.

The Colwall Gas Company Limited had formally opened the new gas works on Monday 22nd November 1897 and 'The Journal of Gas Lighting, Water Supply and Sanitary Improvement' described how the occasion was marked.

'The opening ceremony was performed at the works by Mrs. Black, the wife of the Chairman (Rev. C. Black), in the presence of a numerous company. Subsequently a move was made to the retort-house, where the Manager (Mr. W. Mason) drew a retort, and Mrs. Ballard, the wife of the Vice Chairman (Mr. F. Ballard), lighted a jet over the doorway. Lamps at various places in the village were afterwards lighted by ladies. The occasion was a notable one—all the residents being on the alert. A public dinner took place at the Oddfellows' Hall; a free tea was served at the Temperance Hotel; and there was a display of fireworks.' ^{xxxix}

In the first year of trading there were fourteen customers but by the next year there were over one hundred.^{xl} This was a very auspicious start and the Colwall Gas Works annual meeting reported upon in 'The Worcestershire Chronicle' dated Saturday June 24th 1899 outlined the positive position in 1898/99. *'The directors reported that they had obtained a Provisional Order which placed the company on permanent foundation, and safeguards its interests in every possible way. The provision of an exhauster by additional capital being subscribed was recommended. The Chairman stated that they had got their works into thoroughly good condition. They had predicted that they made two million feet of gas there would be a profit; they had made 64,000 ft. over that amount, and the result was in accordance with the forecast. Their consumers were steadily increasing.'* ^{xli}

The Colwall Gas Company Limited continued to prosper. Stephen Ballard III describes how by 1908 Colwall was 'going over to gas in a big way' and 'accounts showed a turnover of 1,078 and a profit of £314.' ^{xlii}

A snapshot of the company in 1926 from the 'Gas Journal' magazine described a similar picture. *'Colwall Gas Company—The annual meeting of the Colwall Gas Company was held on June 15, when Mr. F. Ballard (Chairman) presided. The Directors reported a net profit of*

£362 on the year's working, as compared with £282 for the previous year. There was a substantial increase in the quantity of gas consumed. A dividend of 6 pct. (less income-tax) for the year was recommended, and it was decided to carry forward £58 to the profit and loss account. The Directors decided to reduce the price of gas to ordinary consumers to 1s. 5d. per therm.'^{xliii}

In 1938 the turnover was £5,459 and the profit £340.^{xliv}

Such healthy trading allowed the company to make various improvements. As previously detailed at some stage a second gasholder was provided.

In 1913 the company was profitable enough to build a stoker's cottage on land purchased from Messrs. E and S. Ballard.^{xlv} This was at about the same time that the business ran an advertisement in the 'Western Gazette'. *'STOKER (single) Wanted for a small village gasworks. Willing to make himself generally useful. Wages 21s per week. Apply MANAGER GASWORKS, Colwall Malvern.'*^{xlvi}

In 1930 the gas works manager, Mr Hogg, replaced the gas engine powering the works with a steam one allowing the exhaust steam to produce water gas. Adding this to the coal gas improved its calorific value.^{xlvii}

Stephen Ballard III recalls that *'The Colwall Gas Company served the village well through both World Wars and as far as I remember we were never short of gas.'*^{xlviii}

This account would appear to be slightly contradicted by an article from the 'Gas Journal' in 1917. It seems that due to staff shortages caused by the Great War the Colwall Gas Company Limited was forced to seek additional gas supplies from Malvern. *'Gas Supply of Colwall—Being placed in a difficulty through the joining-up of their employees, the Colwall Gas Company applied to the Malvern Urban District Council for a supply of gas in bulk. The Council have agreed to a recommendation by the Gas Committee that such a supply be given to the Company, at 3s. 0d. per 1000 c.ft., rising or falling 1d. for every 1s. variation in the price of coal, taking the Council's present average price of 27s. 3d. per ton as the basis. The daily maximum supply is not to exceed 12,000 c.ft.; and the Company are to authorize the transfer under their contracts of coal of approved quality equivalent to the amount of gas supplied.'*^{xlix}

The intriguing question arising from such an arrangement was how the gas arrived at Colwall from Malvern?

The 1930s saw the laying of electricity mains within Colwall by the Shropshire, Worcestershire and Staffordshire Electricity Company and this process continued into the 1940s when 87 electric streetlamps were also installed on principal roads within the parish.^l These two decades saw great competition for customers from the gas and electricity sectors. In Colwall there was considerable loyalty to the Colwall Gas Company Limited from some quarters. Elizabeth Lloyd (whose father had been involved with the gas company and who was a significant local landowner), in a tape-recorded set of communal recollections hosted at the Colwall Village Society AGM on 14th April 1998 recalled *"my father wouldn't*

allow any of his houses, or farms, or cottages, or anything, to have electricity, they had to have gas."

Further, more detailed information on the year-by-year performance of the Colwall Gas Company for several years of trading is available from Hereford Archive and Records Centre under their reference E77. This archive covers minutes of the company from 1922 until 1949.

Such overall success of the Colwall Gas Company Limited attracted interest from other quarters and in 1937 an approach was made by the Severn Valley Gas Corporation to negotiate a takeover, but the Colwall directors resisted this.^{li}

In 1948 all of the United Kingdom's gas making and supply industry was brought under state control under the 1948 Gas Act. The Colwall Gas Company Limited was one of 1,064 gas making undertakings vested under 12 different Area Gas Boards, each with its own autonomous structure, chairman and board of directors.^{lii} The directors of the Colwall Gas Company Limited were summarily dismissed at this time.^{liii}



Undated photograph towards Colwall Stone, from the Kettle Sings Café, Jubilee Drive with the Colwall gas works just visible.

The Colwall works was shut and subsequently a new natural gas supply was provided from the direction of Malvern.^{liv} The majority of the works buildings and structures were demolished although 'Gas House' remains as 'Kimberley House'. Hints of the past lingered on with the former orchard immediately to the east (now the site of Colwall Village Garden) being known locally as 'Gas Orchard' until recent times.

ⁱ Historic England (2020) *Gasworks and Gasholders: Introductions to Heritage Assets*. Swindon. Historic England.

ⁱⁱ National Gas Museum (2023) *History of Gas – Making Gas from Coal*. Available at <https://www.nationalgasmuseum.org.uk/discover/making-gas-from-coal/> (Accessed 25 November 2023)

ⁱⁱⁱ Wikipedia (2023) *Gas and Water Facilities Act 1870*. Available at https://en.wikipedia.org/wiki/Gas_and_Water_Works_Facilities_Act_1870 (Accessed 18 November 2023)

^{iv} Herefordshire Past (2015) *Ledbury News from the Past – 1847 Ledbury Gets Gas Lights*. Available at <https://herefordshirepast.co.uk/news-from-the-past/ledbury-news-from-the-past/> (Accessed 27 November 2023).

^v Angus and Rosemary's Miscellany of Malvern – Local History (2022) *Public utilities – then and now*. Available at http://www.the-malvern-hills.uk/other_history_utilities.htm (Accessed 27 November 2023)

^{vi} Ballard, S (?) Stephen Ballard III Memoirs

^{vii} Unknown (1896) 'Malvern Urban District Gas' *The Journal of Gas Lighting, Water Supply & Sanitary Improvement* 01 December, Volume 68 (Issue 1751) P. 1078

^{viii} Ballard, S (?) Stephen Ballard III Memoirs

^{ix} Bowen J P, and Craven A, with Comber J (2020) *The Victoria History of Herefordshire – Colwall*. London: University of London Press.

^x Bowen J P, and Craven A, with Comber J (2020) *The Victoria History of Herefordshire – Colwall*. London: University of London Press.

^{xi} Unknown (1899) 'Gas Shareholders as Parish Councillors' *The Journal of Gas Lighting, Water Supply & Sanitary Improvement* 31st January, Volume 73 (Issue 1864) P. 262

^{xii} Ballard, S (?) Stephen Ballard III Memoirs

^{xiii} Unknown (1897) 'Opening of Gas-works at Colwall' *The Journal of Gas Lighting, Water Supply & Sanitary Improvement* 30th November, Volume 70 (Issue 1803) P. 1179

^{xiv} Unknown (1897) 'Opening of Gas-works at Colwall' *The Journal of Gas Lighting, Water Supply & Sanitary Improvement* 30th November, Volume 70 (Issue 1803) P. 1179

^{xv} Ballard, F (1925) *Concrete for House, Farm and Estate*. 3rd edition. London: Crosby, Lockwood & Son.

^{xvi} Unknown (1897) 'Opening of Gas-works at Colwall' *The Journal of Gas Lighting, Water Supply & Sanitary Improvement* 30th November, Volume 70 (Issue 1803) P. 1179

^{xvii} Unknown (1897) 'Colwall Gas' *The Journal of Gas Lighting, Water Supply & Sanitary Improvement* 30th November, Volume 70 (Issue 1803) P. 1184

^{xviii} Parsons, Dr R (2010) 'Gasholders and their Tanks.' Available at https://www.researchgate.net/publication/268447774_Gasholders_and_their_Tanks (Accessed 19 November 2023)

^{xix} Ballard, S (?) Stephen Ballard III Memoirs

^{xx} Ballard, S (?) Stephen Ballard III Memoirs

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- ^{xxi} Ballard, S (?) Stephen Ballard III Memoirs
- ^{xxii} Unknown (1897) 'Opening of Gas-works at Colwall' *The Journal of Gas Lighting, Water Supply & Sanitary Improvement* 30th November, Volume 70 (Issue 1803) P. 1179
- ^{xxiii} National Gas Museum (2023) *History of Gas – Storing and Distributing Gas*. Available at <https://www.nationalgasmuseum.org.uk/discover/storing-and-distributing-gas/> (Accessed 14 November 2023)
- ^{xxiv} Bowen J P, and Craven A, with Comber J (2020) *The Victoria History of Herefordshire – Colwall*. London: University of London Press.
- ^{xxv} Ballard, S (?) Stephen Ballard III Memoirs
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