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Windsor Street Gasworks

...through the years



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This publication is adapted with permission from “A History of the Gas Industry in Birmingham” by Professor Russell Thomas. Russell Thomas has a keen interest in the gas industry. He has been working on former gasworks sites since 1997, a subject he has grown to find fascinating.

Russell works as a technical director for the International Engineering Consultancy WSP, advising on former industrial sites, with a special focus on former gasworks. “A History of the Gas Industry in Birmingham” can be downloaded from nationalgrid.com/windsorstreet



Introduction

For over 130 years, the Windsor Street gasholders have dominated the Aston skyline in Birmingham. They are steeped in industrial history, providing a link to the pioneering age of gas. However, times change, bringing new innovations to produce and store fuel.

After being unused for years, the three gasholders are now set to be dismantled. This will be the first step towards returning the unused land back to beneficial use.

The former gasworks at Windsor Street, which once spanned 26 acres, and the gasholders which stand today, have links to generations of Birmingham residents. This publication celebrates the role of the Windsor Street Gasworks and aims to bring to life some of the important personalities and events which helped shaped the gas industry in Birmingham over the past two centuries.

Birmingham led from the front in developing the manufacture and storage of gas. William Murdoch first developed the concept of commercial gas lighting at the Boulton and Watt works in Smethwick. Then, in about 1811, the first privately owned gas streetlamps started to appear in Birmingham. However, it wasn't until 1817 that Samuel Clegg built the first gasworks to light the streets of the city for the public at large.

Gasworks soon became a common feature in the heart of the city, with sites at Gas Street, Fazeley Street, Adderley Street and Swan Village. However, by the 1840s there was a growing call for them to be located out of the city along the River Rea.

Consequently, the Birmingham Gas Light and Coke Company constructed a gasworks at Windsor Street and the Birmingham and Staffordshire Gas Light Company built their works at nearby Saltley.

The fierce rivalry between the two companies continued until 1875 when the Birmingham Corporation acquired them both. Ultimately, four large gasworks were established to the North East of the city centre, in addition to the Swan Village gasworks located near West Bromwich, the Birmingham Corporation operated Windsor Street and the other gasworks until nationalisation of the industry in 1949.

The Windsor Street Gasworks ceased gas production in 1974, but the site was retained as a gasholder station, with the three column guided gasholders used to provide storage of natural gas when demand was high. These gasholders remained in use until 2012.



Panorama across the Saltley Gasworks c1928. Source: National Grid Gas Archive.



A view of the retorts and charging machine at Adderley Street Gasworks c1928. Source: National Grid Gas Archive.



Far right: Aerial view of the Windsor Street Gasworks c1950. Source: National Grid Gas Archive.



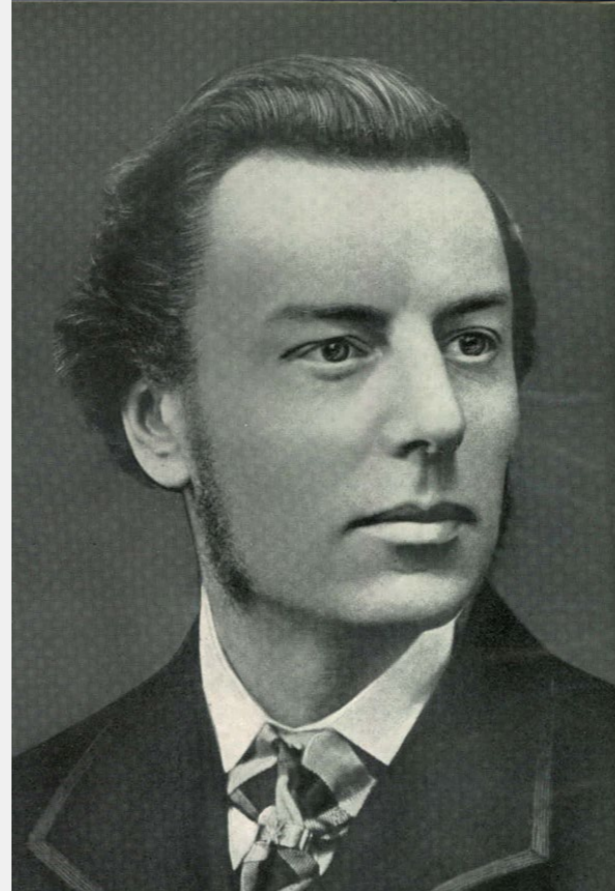
Early history

The Windsor Street Gasworks was built in 1846 by the Birmingham Gas Light and Coke Company. The site was chosen for its close connections to the Birmingham and Fazeley Canal, which enabled the coal used in gas production to be easily transported to the works and for the by-products of the process to be shipped away.

The early days of the gasworks were chequered, to say the least. The business was dogged by relentless competition from the rival Birmingham and Staffordshire Gas Company and by an embarrassing and costly scandal in which the company secretary embezzled a healthy share of the takings.

The subsequent recovery and extensive development of the gasworks owed much to the tireless efforts and expertise of Charles Hunt, one of the most respected gas engineers of his day. After joining the Birmingham Gas Light and Coke Company as chief engineer in 1872 at the tender age of 30, he moved quickly to improve efficiency.

He built new larger retorts, the ovens in which coal is baked to release coal gas, and reorganised and improved the gas distribution network, thereby significantly reducing leakages from the gas mains. In just three years he had turned the company's fortunes around.



Joseph Chamberlain. Source: National Grid Gas Archive.



A photograph of Charles Hunt from 1906 when elected President of the Institution of Gas Engineers. Source: National Grid Gas Archive.



The Windsor Street Gasworks was transferred to the Birmingham Corporation in 1875, heralding a new chapter in its history.



Early history

The Windsor Street Gasworks was transferred to the Birmingham Corporation in 1875, heralding a new chapter in its history.

At this time, the gasworks was no longer viewed as an ideal site as all the available land had been utilised and there was no rail connection. This was unfortunate, as it was apparent that the demand for gas was growing and the Corporation needed to find a way to meet this.

Luckily a saviour arrived in the form of a man called Joseph Chamberlain, who was in charge of the Birmingham City Gas Department. He arranged for the purchasing of a large tract of land between the existing gasworks and Rupert Street and struck a deal with the North West Railway Company.

The deal allowed the railway company to use part of this newly acquired land in return for extending its railway on the site, leaving the rest of the land in the hands of Charles Hunt who utilised it to fulfil his ambitious visions for expansion. These changes proved to be a gamechanger for the site and substantially strengthened the gasworks' position.

The canal with retort house behind at Windsor Street. The taller vertical retorts can be seen to the back of the retort house with the tall chimneys. Source: IGEM Archive.



Leading the world



The twin gasholders at Windsor Street

Charles Hunt oversaw an extensive, three-year development of the Windsor Street Gasworks. His proudest achievements were his gasholders and retort house but the most striking feature of the gasworks by far were the twin gasholders that were constructed to his own design.

Inspired by the huge gasholders built by South Metropolitan Gas Company, he successfully persuaded the gas committee that “bigger was better” and convinced them to support his plans for building larger structures.

Once constructed, each of the twin gasholders had an enormous capacity of 6.5 million cubic feet of gas, making them the joint largest in the world at the time. The twins were named Gasholder No.13 and Gasholder No.14.



Leading the world

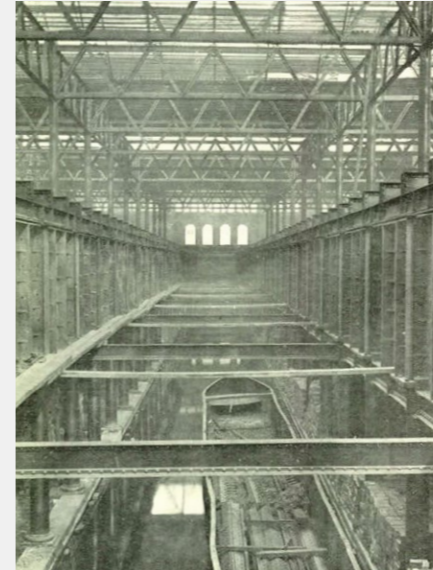
Despite initial opposition, Hunt's approach was ultimately adopted by the gas industry at large.

Hunt's desire for scale and efficiency extended to his retort house, which was the largest in existence when it was originally built. The structure measured 487 feet by 210 feet and contained 756 through retorts in 84 beds. Hunt ensured that he adopted the latest and most efficient method to heat the retorts, using continuous regenerative furnaces which he had first tried at the smaller Adderley Street Gasworks.

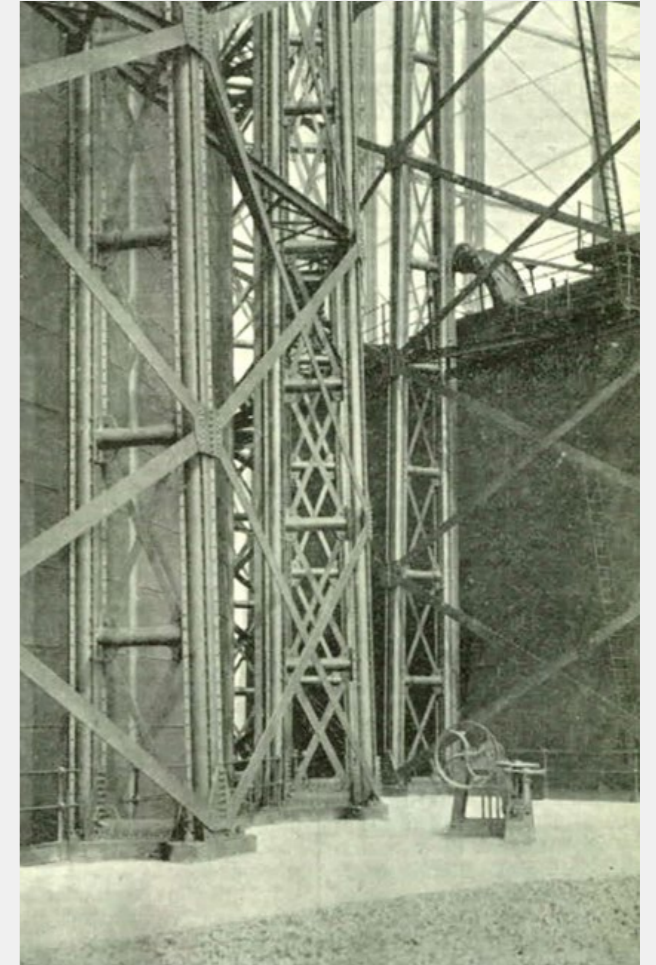
The retort house had the unusual feature of being connected by both rail and canal. It was constructed so that a side arm of the Birmingham and Fazeley Canal flowed underneath it, with an intricate rail network operating at two levels alongside. The high-level network moved coal from the heaps to the retorts where gas was made, while the lower rail network removed the coke residue left in the retorts after gas was produced.

The coke was a valuable product with a variety of useful applications. As well as being a source of heat for the retort furnaces, it was harnessed as a smokeless fuel in domestic and industrial settings and had further uses in metal production.

Despite Hunt's original vision for the gasworks to cover nine acres, it was transformed under his supervision into the largest gasworks in Birmingham and one of the biggest in the country. When Hunt left in 1902, the gasworks spanned 26 acres and only five of the original gasholders, the offices, a former meter house and two of the original retort houses survived the extensive expansion works.



The interior of the retort house during construction, showing the integrated connection between the canal basin and retort house, c1902. Source: National Grid Gas Archive



The point at which the twin gasholders meet at the Windsor Street Gasworks c1902. Source: National Grid Gas Archive





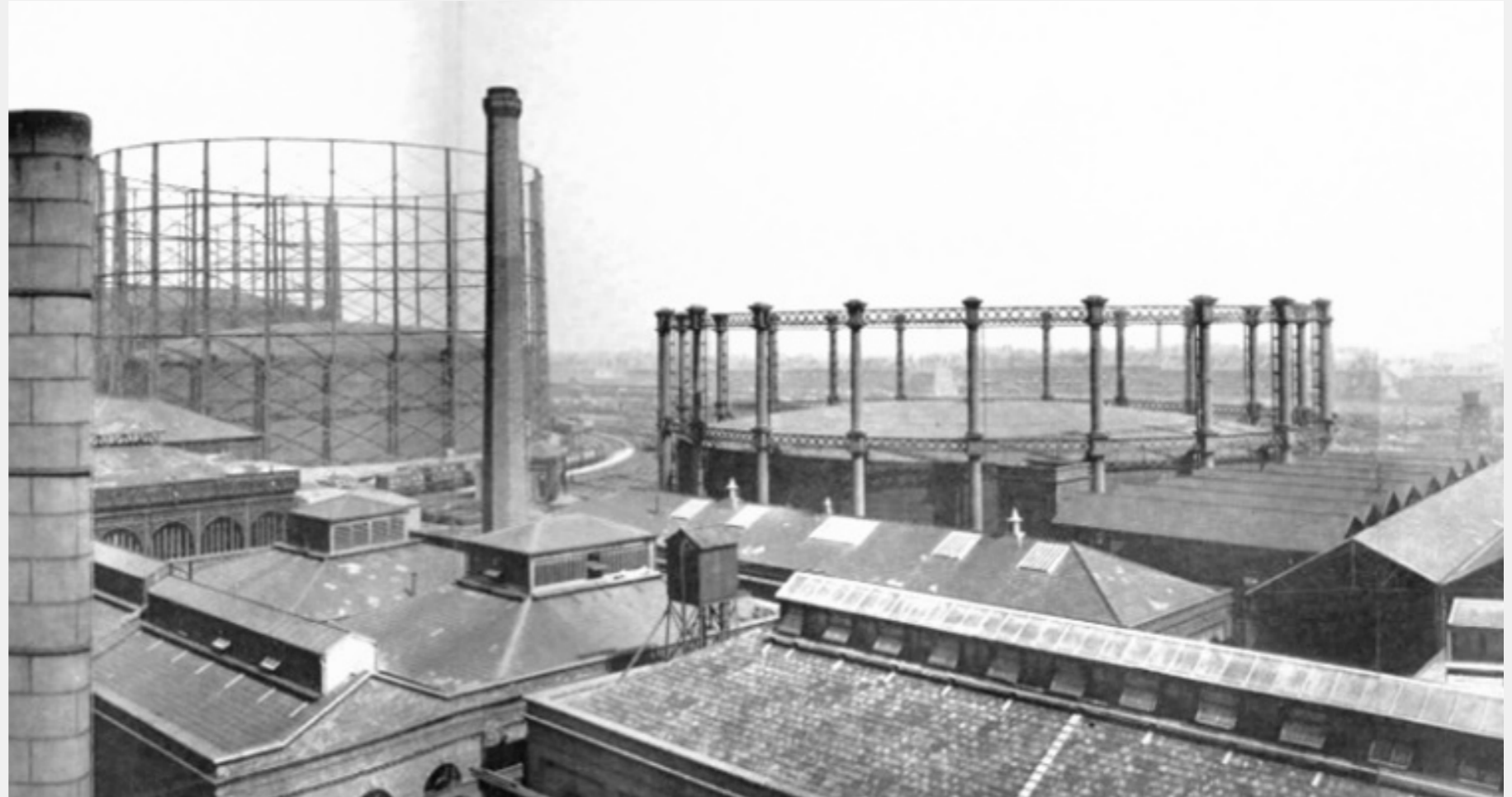
Further growth

Over the following years, the gasworks continued to develop thanks to the progressive approach of the City of Birmingham Gas Department, which was always willing to adopt new technologies to improve gas making.

One of the new developments was the adoption of continuous vertical retorts (CVR). These were built inside the existing retort house, which had originally been designed by Charles Hunt for horizontal retorts.

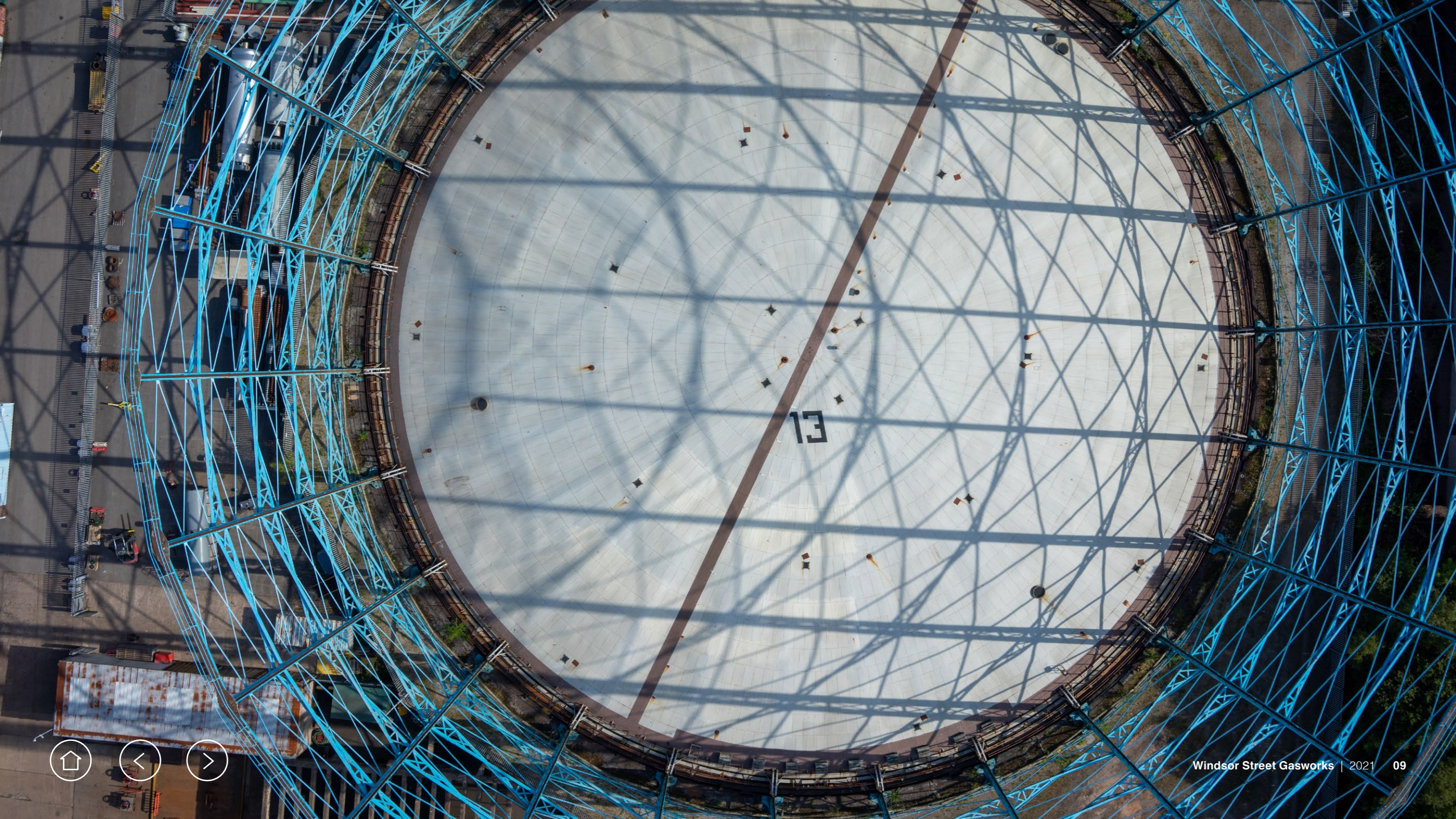
There were several benefits of the CVR over the traditional horizontal retorts. They could be operated continuously, with coal fed into the top of the retorts and coke continuously removed from the base. They also required much less floor space, which enabled more gas to be made in the same area of land.

The retorts were cleverly designed so that the excess heat generated from heating them was used to power boilers to make steam, the first CVRs to have used this system. The steam produced was used for a range of purposes across the gasworks. The CVRs continued in service until the gasworks' closure.



Panorama across the works 1928.
Source: National Grid Gas Archive.

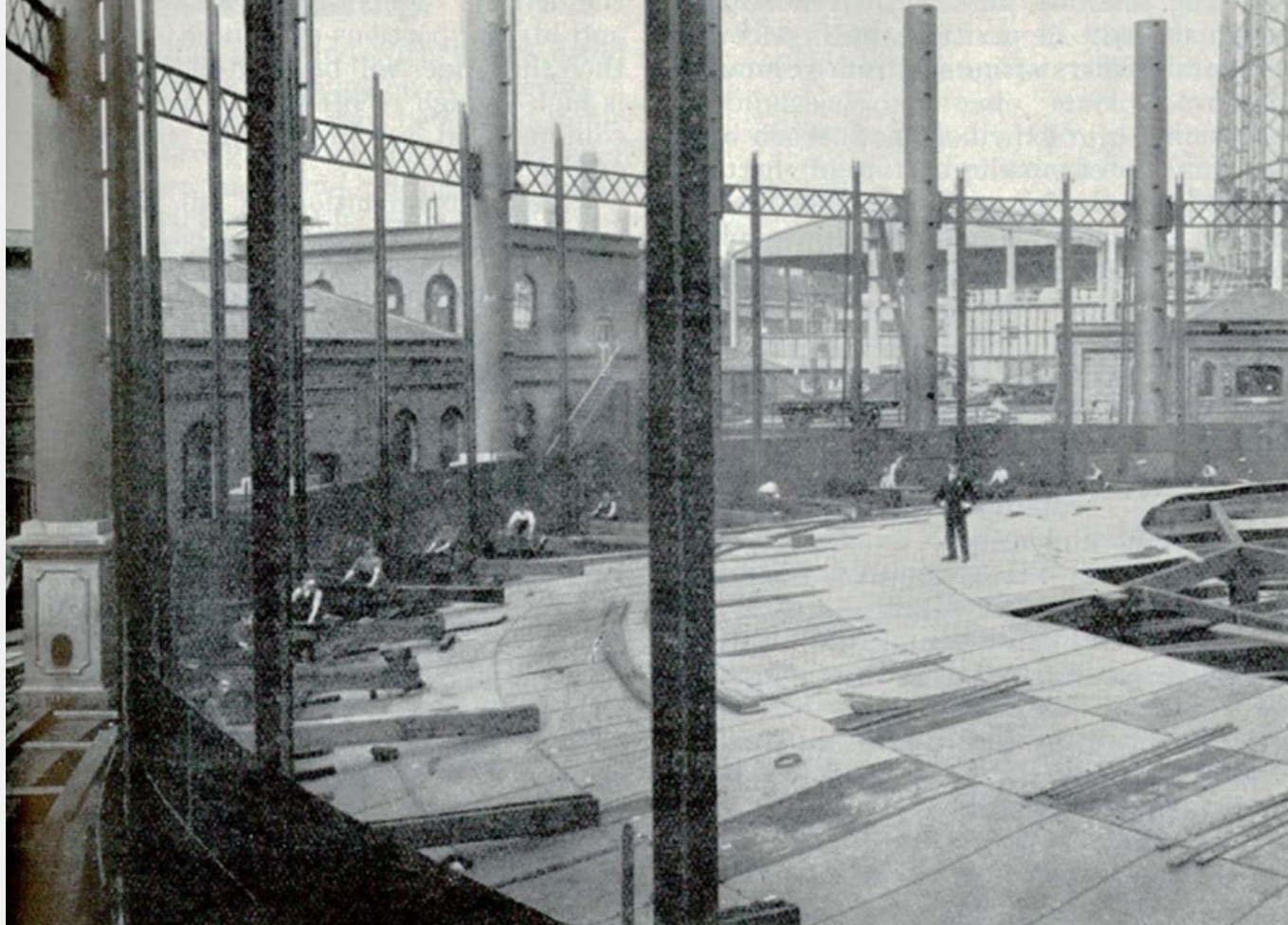




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Gasholder No.12



Gasholder No.12.

Reconstruction of Gasholder No.12, during the lowering of the 2nd lift.
Source: National Grid Gas Archive

The No.12 gasholder was originally designed by Charles Hunt and built by Messrs Thomas Piggott & Company Ltd in 1877. It included two lifts and could accommodate 2 million cubic feet of gas. The original gasholder had cast iron columns connected by wrought iron girders.

In 1934, a new gasholder was built in its place by Messrs Clayton Son and Company Ltd of Leeds. This was a major undertaking that took more than nine months to complete and involved pumping 5 million gallons of water out of the tank over a period of days so that alterations could be made to the tank structure before it was refilled.

The old brick tank was reused, but the frame was replaced and increased in height from 70 feet to 180 feet, with each of the four new lifts measuring 35 feet deep.

Construction was complex with a multitude of components, including 5,000 steel plates, 14,000 nuts and bolts, and more than 1 million rivets and accompanying rivet holes. Once erected, the gasholder was painted in aluminium, which not only provided protection from the elements but also gave it a striking silver appearance.



Social activities



These events were a real treat for workers as it was not commonplace at the time for employers to offer this.

Group photograph of the annual Christmas party for workers and their families at the Windsor Street Gasworks. Source: National Grid Gas Archive.

The City of Birmingham Gas Department was viewed as more than merely an employer. It was seen more as an extended family, responsible for the welfare of its employees, organising recreational and sports activities that brought them closer together as a community.

Annual family days out were common. A train would be chartered for the trip and refreshments provided for everyone during the long day.

Another popular event was the annual sports day where staff and their families battled it out for prizes. Leagues were also established so that staff could compete against each other at sports including football, cycling and fishing, taking advantage of the Department's dedicated sports ground at Hollyfields.



Diversification

Retorts had many advantages but a significant drawback was they couldn't be brought into operation at short notice as they required a few days to be prepared and get up to temperature. This posed a problem for the gas engineer if there was a sudden increase in demand triggered by a cold snap.

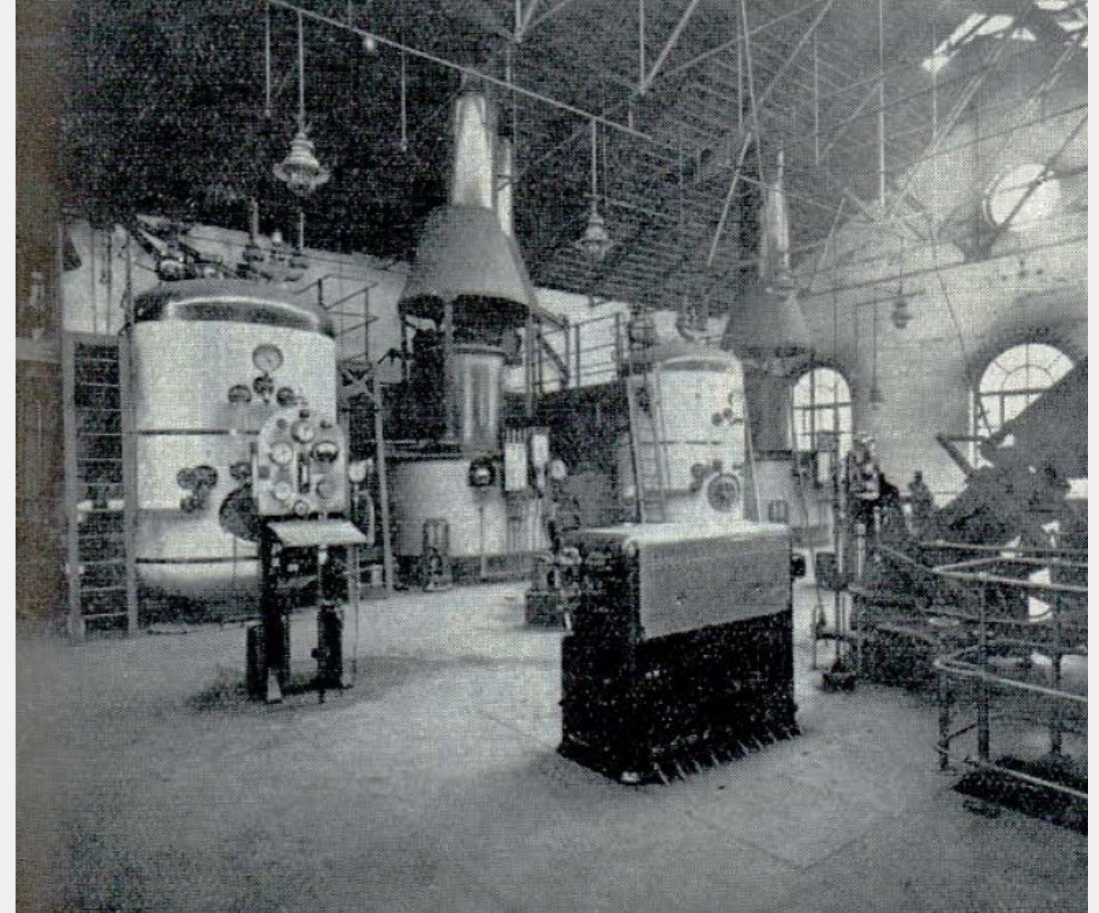
Although gasholders helped to alleviate potential shortages during sudden increases in demand by providing additional storage options, this was not enough to meet demand and gas production also needed to rise.

An American engineer called Thaddeus Lowe made significant improvements to a type of plant which could make gas quickly, known as a water gas plant. The process made a gas composed of hydrogen, carbon monoxide and carbon dioxide by injecting steam into a chamber containing red hot coke. Oil was then injected into the hot chamber to enrich this gas. This process was known as carburetted water gas (CWG). Four of these CWG plants were built at Windsor Street Gasworks.

As well as introducing innovative, new production methods, the Windsor Street Gasworks was becoming more and more adept at finding uses for the various by-products of the gas-making process.

For one, multiple applications were found for the steam raised in coal-fired boilers and waste heat boilers. Not only was it used in the CWG plant, steam also drove pumps and generators that produced electricity to power the gasworks' plant machinery.

One of the more unusual by-products produced at Windsor Street was cyanogen salt. This was created using the cyanide that formed in the gas during the production process by washing the gas with a solution of iron salts in the presence of ammonia. This allowed the cyanide to be extracted, with around 2 lb of Prussian Blue recovered for each tonne of coal carbonised. For a period, the cyanide salts were used by the local metal industry but this was deemed uneconomical by around 1922.



The upper floor of the automated carburetted water gas plant at Windsor Street. Source: National Grid Gas Archive.





The site also operated a tar drying plant that dehydrated coal tar to prepare it for constructing tarmac road surfaces. As the city council owned the gasworks, they had a ready use for the tar in building and repairing the city's roads.



The war years



World War I had a significant and heart-breaking impact on the gas industry. Mercifully, air raid attacks on the Birmingham area were limited to the German Zeppelin airships.

One attack wreaked damage on the Black Country towns of Tipton, Wednesbury and Walsall, but such incidents were rare. Uncommon though they were, they served to drive recruitment for military service locally.

A bigger issue for the gas industry was that many skilled staff were lost to the war effort. By 1916, 800 employees of the Gas Department were on active, military service and a further 650 were in the military reserve forces. Many joined the Royal Warwickshire Regiment. By the end of the war, 1,239 members of the Department had served in the armed forces and 156 of those had died in active service, 34 of them from the Windsor Street Gasworks.

The human loss to the Gas Department was deeply felt and a war memorial to the fallen was built in the Council House offices to remember those colleagues who had made the ultimate sacrifice.

The situation in World War II was even worse than that in World War I. During hostilities, the gas industry suffered a perfect storm; physical damage to the gasworks and gas mains, loss of staff to the war effort and underinvestment.

During the war years (1939–1945), gas manufacture had to increase by 22% to 20.5 billion cubic feet to meet spiralling demand, with around 46% of gas production going to industry. Such was the situation that carburetted water gas plants – normally only used in peak periods, were run continuously, using about 5 million gallons of oil per year.



The Gas Department head offices after the air raids on the 21–22 November 1940. Source: National Grid Gas Archive



Today

Today the Windsor Street gasholders, painted in the distinctive claret and blue colours of neighbouring Aston Villa Football Club, are being removed.

Gas is now stored in a number of alternative ways; in transmission and distribution pipelines, in below-ground storage facilities and in liquified natural gas (LNG) import terminals, meaning that gasholders are now redundant.

National Grid is undertaking a programme to dismantle the remaining gasholders across the UK and ultimately their unused land at Windsor Street site will be returned to beneficial use.

Whilst these towering structures will disappear from the local landscape in 2022, a few visible reminders of Birmingham's place in the history of gas production still remain. These include the old Gas Street Gasworks, the former retort houses at Adderley Street and Fazeley Street, and the former Gas Department offices in the Council House stand which are lasting monuments to the city's rich, industrial past.



An aerial photograph of the Windsor Street gasholders whilst still operational, with their characteristic claret and blue paintwork, the colours of the nearby Aston Villa Football Club. Source: IGEM archive.



If you want to learn more about the Windsor Street Gasworks or our work to dismantle the gasholders, then you can visit our dedicated webpage here: [**nationalgrid.com/windsorstreet**](https://nationalgrid.com/windsorstreet)



National Grid plc
National Grid House
Warwick Technology Park
Gallows Hill
Warwick CV34 6DA
United Kingdom

nationalgrid.com

