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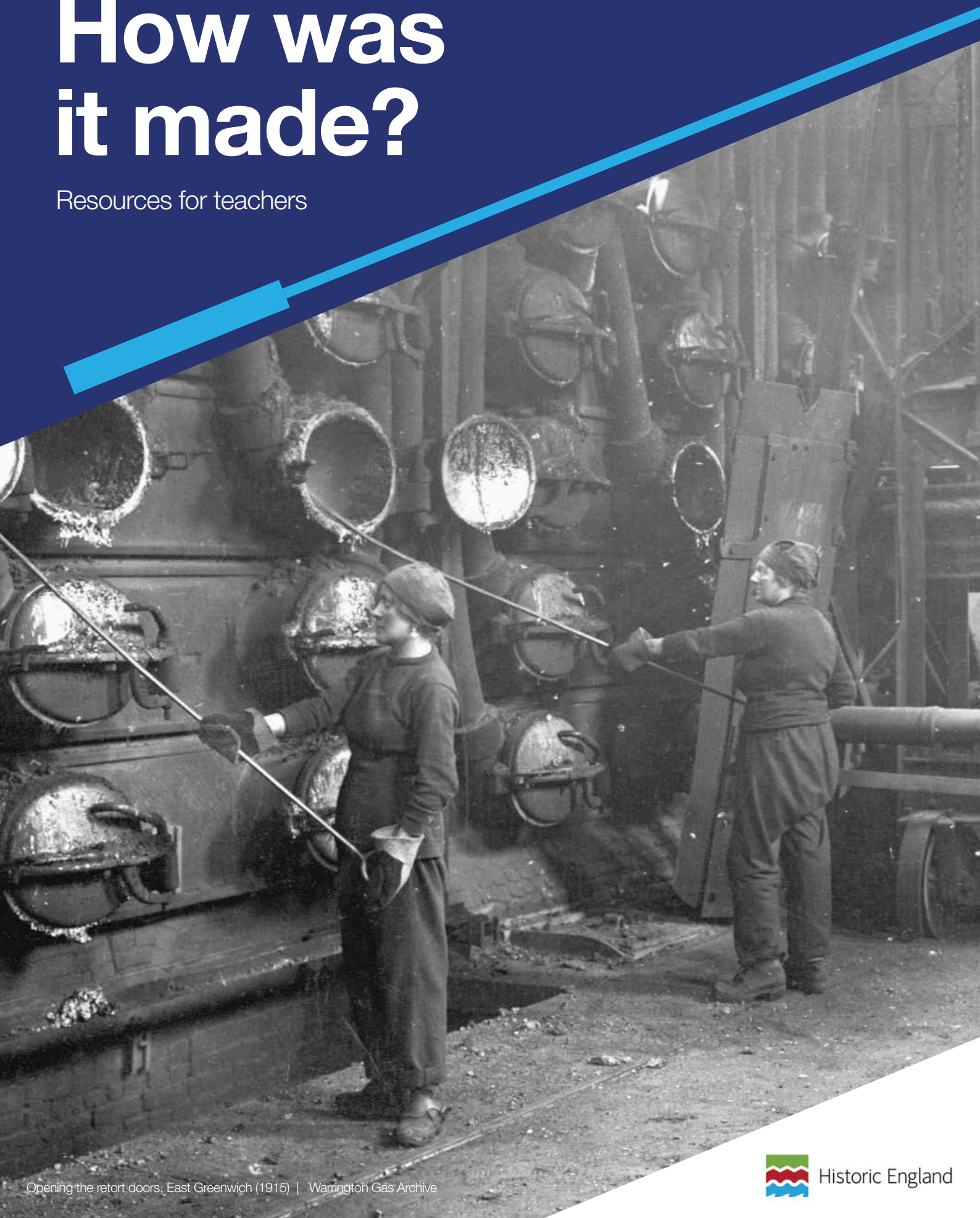
nationalgridgas.com/resources-teachers

Gas

How was it made?

Resources for teachers



Opening the retort doors, East Greenwich (1915) | Warrington Gas Archive

Historic England

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Using the resource

National Grid owns, manages and operates the national transmission network in Great Britain, making gas available when and where it's needed all over the country. This resource is part of our series for schools, highlighting and celebrating how gas has lit our homes and streets and kept us warm for over 200 years.

This resource primarily supports History at Key Stages 1 and 2 and the development of children's enquiry, creative and critical thinking skills. It includes:

- Information for teachers
- Fascinating Did you know..? facts
- A series of historical images to help children explore the theme, with additional information and questions to help them look closer.

It can be combined with other resources in the series to explore wider topics such as:

- Energy
- Homes
- Victorians
- Jobs and work
- The industrial revolution
- Technology

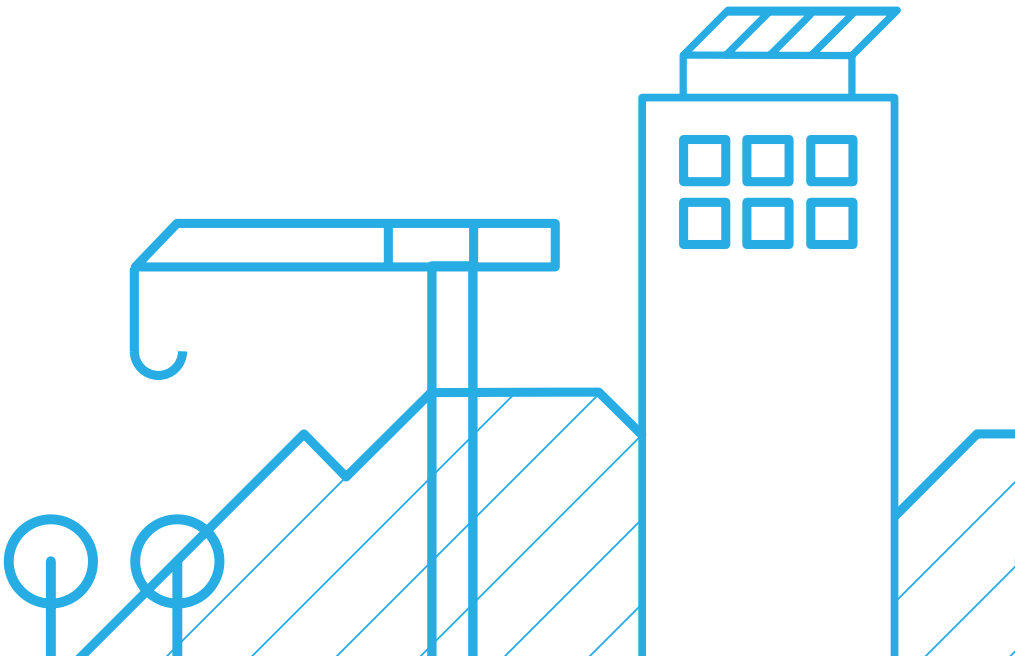
And used to support cross-curricular work in English, Technology, Science and Art & Design.

Project the images onto a whiteboard to look at them really closely, print them out, cut them up or add them to presentations, Word documents and other digital applications.

Our **Classroom activities** resource provides hints, tips and ideas for looking more closely and using the images for curriculum-linked learning.

Resources in the series

- Gas lighting
- Heating and cooking with gas
- Gas gadgets
- Gas - how does it work?
- The changing role of women
- Transport and vehicles
- Classroom activities
- Your local gas heritage



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Information for teachers

Today we can light and heat our homes, take a hot bath and cook our food all at the flick of a switch. But it wasn't always so easy. Before the 1800s, light came from candles or oil lamps, food was cooked on fires or ranges fuelled by wood and coal, and for those lucky enough to enjoy a hot bath, this was painstakingly filled by pots and kettles of water heated on the stove.

In 1792, the Scottish engineer and inventor William Murdoch made an extraordinary discovery which would transform not only lighting, heating and cooking, but all sorts of other activity and industry. Experimenting in his back garden in Cornwall, he found a way to produce gas, by heating coal in a closed container and collecting and cleaning the smoke. He stored the gas in a large container and piped it into his **house** to make the first gas lights.

Throughout the 1800s and into the 1900s gas became more and more widely used, lighting streets, factories and homes, fuelling cookers, gas fires, boilers, and more unusual items such as irons, fridges – even radios.

You can find out more in our **Gas lighting**, **Heating and Cooking** and **Gas gadgets** resources.

Where does gas come from?

At first, gas was made from coal. This was known as 'coal' gas, or 'town' gas. The diagram below shows how it was produced and used. **Gasworks** were built across the UK. They were usually built near a river, canal or railway line so that coal could easily be transported and delivered to them. They tended to be built on the edges of towns and cities as they could be noisy and smelly. Large country houses in remote parts of the country, in the 1800s, had their own private gasworks.

The coal was heated in the retort house and, after cleaning, stored in gas holders before being piped into streets, homes and businesses. Some gas holders were giant-sized and became landmarks. The by-products from the process had many different uses such as for making disinfectants, medicines, fertilizer, flavourings and paint. **Coke** left over from heating coal was used as smokeless fuel for home stoves and fireplaces, and by schools and factories.

In 1965, natural gas was discovered in the North Sea off Grimsby. A massive 'conversion' project followed. 400 million gas appliances across the UK were refitted in homes, schools and businesses across the UK. It took ten years to complete. After that, coal gas was no longer needed.

Gas, along with other energy sources like wind, solar and nuclear energy is still a vital source of power for the UK and provides essential back-up to renewable energies when the sun is not shining and it's not windy. Around a quarter of the country's electricity is generated by gas-fired power stations, and 80% of its 25 million homes use gas for heating and cooking. Today, the UK produces enough gas to meet almost half of its needs (44%) from the North Sea and the East Irish Sea. The rest is imported from other European countries. You can find out more **here**.

1792

In 1792, the Scottish engineer and inventor William Murdoch made an extraordinary discovery which would transform not only lighting, heating and cooking, but all sorts of other activity and industry.

Workforce

As the demand for gas increased, the gas industry became a key employer across the UK. From the stokers and chemists working in the gasworks, to the **lamp attendants** and engineers carrying tools and ladders from place to place on bikes (and later vans), sales people in the gas showrooms and office workers in maintenance and distribution centres. The first union for non-skilled workers - the Gas Workers' Union was founded in 1889. Its first major achievement was to reduce working hours to an eight-hour day.

The gas industry was one of the first to provide paid holidays, sick pay and pensions, from the 1870s. It was also one of the first industries to create co-partnerships, this allowed the workers to share in any profits the gas company made.

Some gas undertakings included homes built for their workers. For example, in 1879, the Aylestone Road Gasworks in Leicester, (now a British Gas centre and home to the **National Gas Museum**) built a terrace of houses for the workers and manager, along with access to five allotments. They also provided Leisure facilities with a mess room, baths and toilets. Lectures, readings and concerts were provided in the winter months .

During World War I and World War II, the gas industry employed thousands of women in jobs that had previously only been open to men. Find out more in our **Changing role of women** resource.

Find out more **here** about the people who work for National Grid today.

Did you know?

- By-products from producing coal gas were used to make textiles including artificial silk.
- Early gas-powered vehicles carried around large canvas bags of gas on their roof.
- Bakelite - the first plastic - was produced from coal tar, a by-product of gas manufacture.
- In the 1930s, gas was used to power a range of gadgets, from washing machines and irons, to hairdryers and waffle makers.
- Modern natural gas is not poisonous but gas leaks are still dangerous as they can cause explosions – because the gas is colourless and odourless, a harmless gas called mercaptan is added to make it smell so you know when you've left the gas on. Some people say it smells like rotten eggs!

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Did you know..?

By-products from the gas making processes were used to make all sorts of things such as disinfectants, medicines, paint, clothes – even flavourings!

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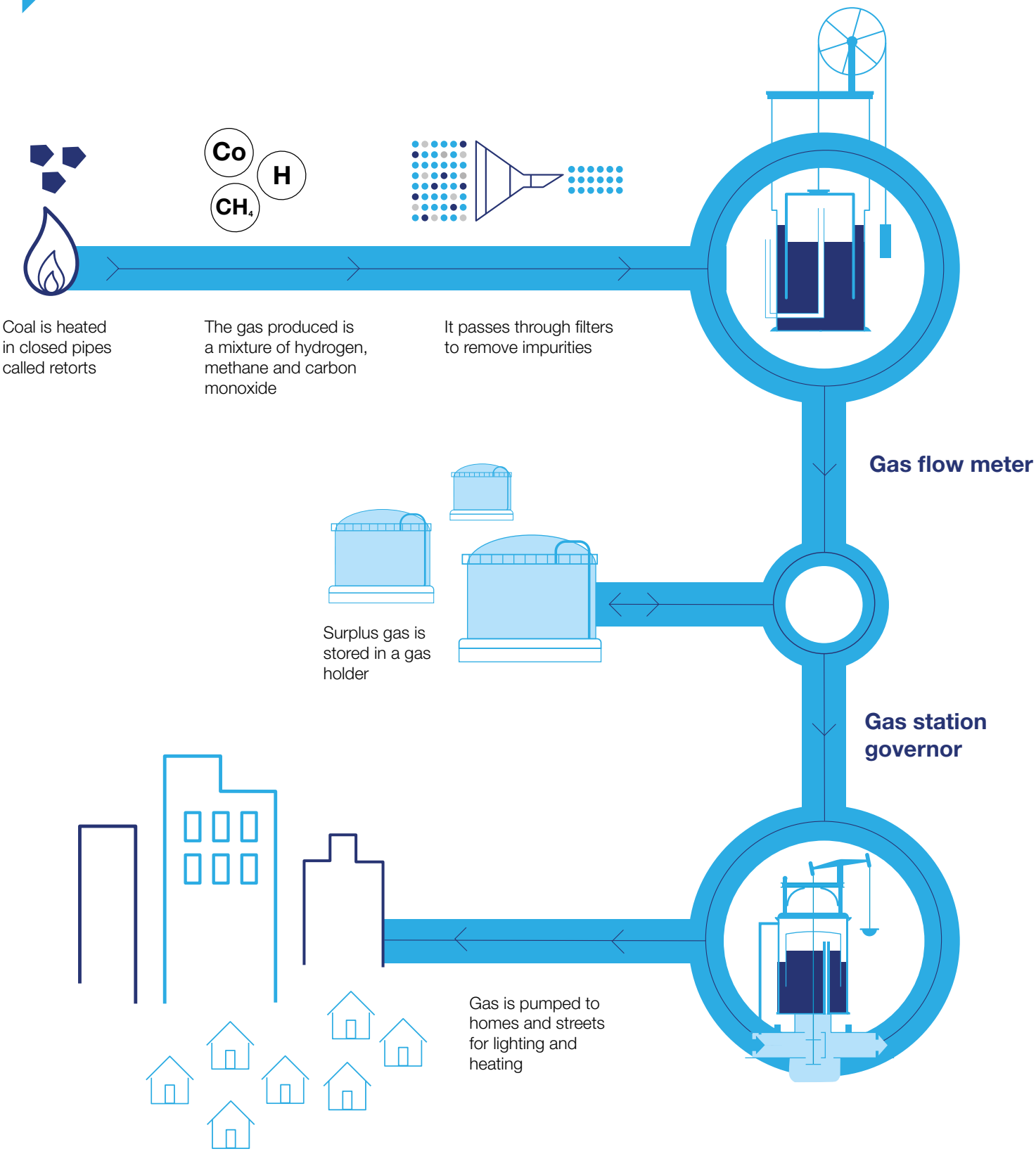
1 Gas from coal



This diagram shows how gas was made from coal. You can see a video of the process in action in the 1960s **here**.

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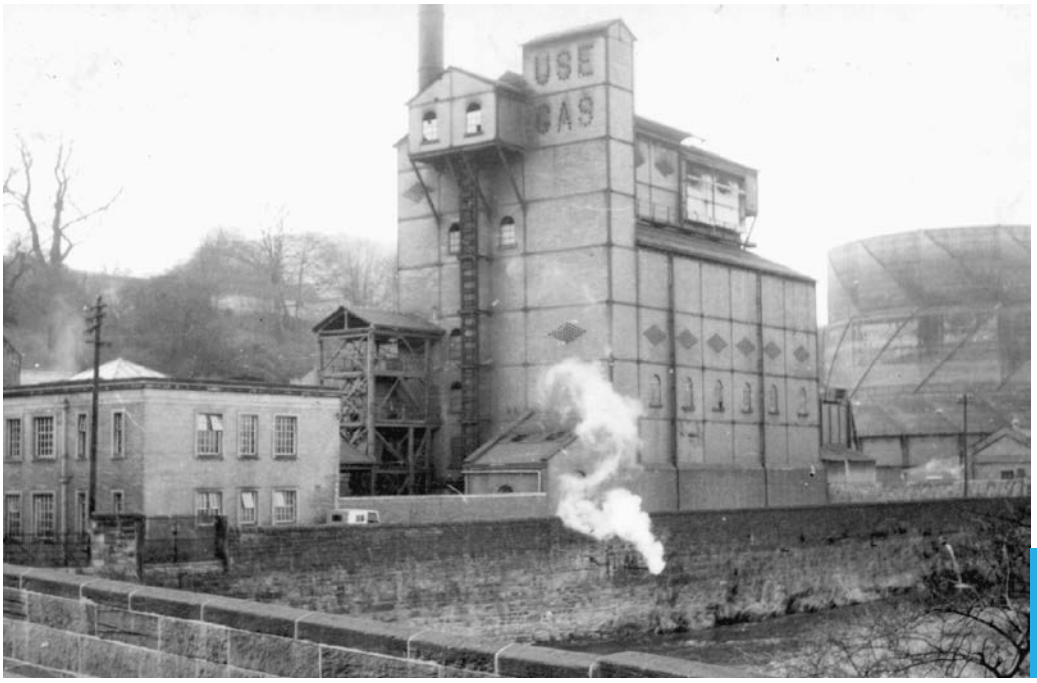
2 Gasworks

At the height of the coal gas industry, a gasworks would be found in or near every town and city in the UK. They included:

- A coal store
- A retort house, where the coal would be baked for around ten hours to produce the gas
- A condenser, where the gas was cooled and the tar removed
- A washer and scrubber for removing soluble impurities from the gas with water
- Purifiers for removing further impurities, such as sulphur
- A station meter for measuring the amount of gas made
- A gas holder for storing the gas

These images show:

1. The gasworks and vertical retort house at Bingley, Bradford
2. Workers standing outside the retort house
3. Gas holders at Linacre, Liverpool in 1949.



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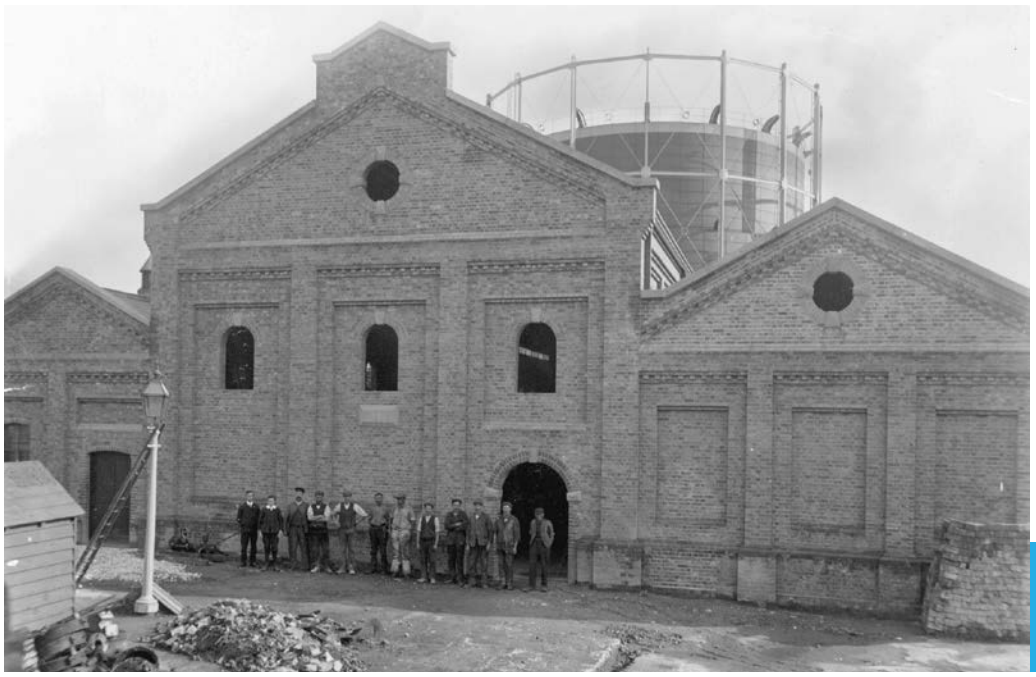

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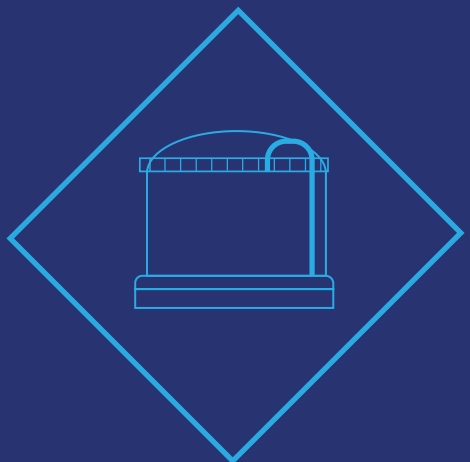
3 Gas holder: Kennington Oval

Behind the cricket ground (c. 1950)

Despite their often enormous size and imposing architecture, gasholders have become iconic landmarks and some are being preserved despite no longer being in use. This image shows one of the Kennington gasholders while it was still in use. Seen frequently on national and international TV cricket coverage from the nearby Oval cricket ground, it is possibly the most well-known gasholder in the country. It was awarded a Grade II listing by Heritage England in 2016, which recognises its historical and architectural significance and protects it for future generations.

Look closer

- How tall do you think this gasholder is (try comparing it to the five-storey building to its right)?
- What is happening in the picture?
- Why do you think people wanted to preserve this gasholder?



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Warrington Gas Archive

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4 Working in the retort house

These images show people working in the retort houses – these workers were known as ‘stokers’. The retorts were effectively ovens, used to bake the coal for about ten hours. The gas produced was collected through a series of pipes. Once the coal had been baked, a residue called ‘coke’ was left behind. These retorts had to be filled with coal (‘charged’) and emptied by hand, which was hot, dirty and back-breaking work, it also took a great deal of skill and accuracy. Later, mechanical charging and vertical or inclined retorts were introduced in the larger gasworks but hand-charging of horizontal retorts like these continued at small town gas works until they closed in the 1960s.

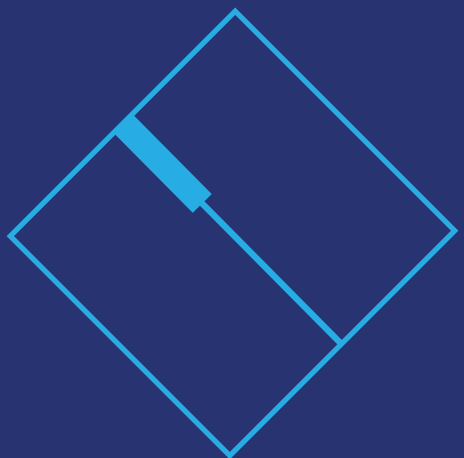
These images show:

1 Stokers at the Garstang gasworks in Lancashire, raking coke from the retorts as the bosses look on (1960)

2 Women workers, drafted in during World War I, opening the retorts for the automatic machine to empty them of coke and then load them with new charges of coal.

Look Closer

- Which of the people in these pictures do you think are the bosses, and which are the retort house workers?
- What do you think it would have been like to work in a retort house?
- Would you like to have done any of these jobs?



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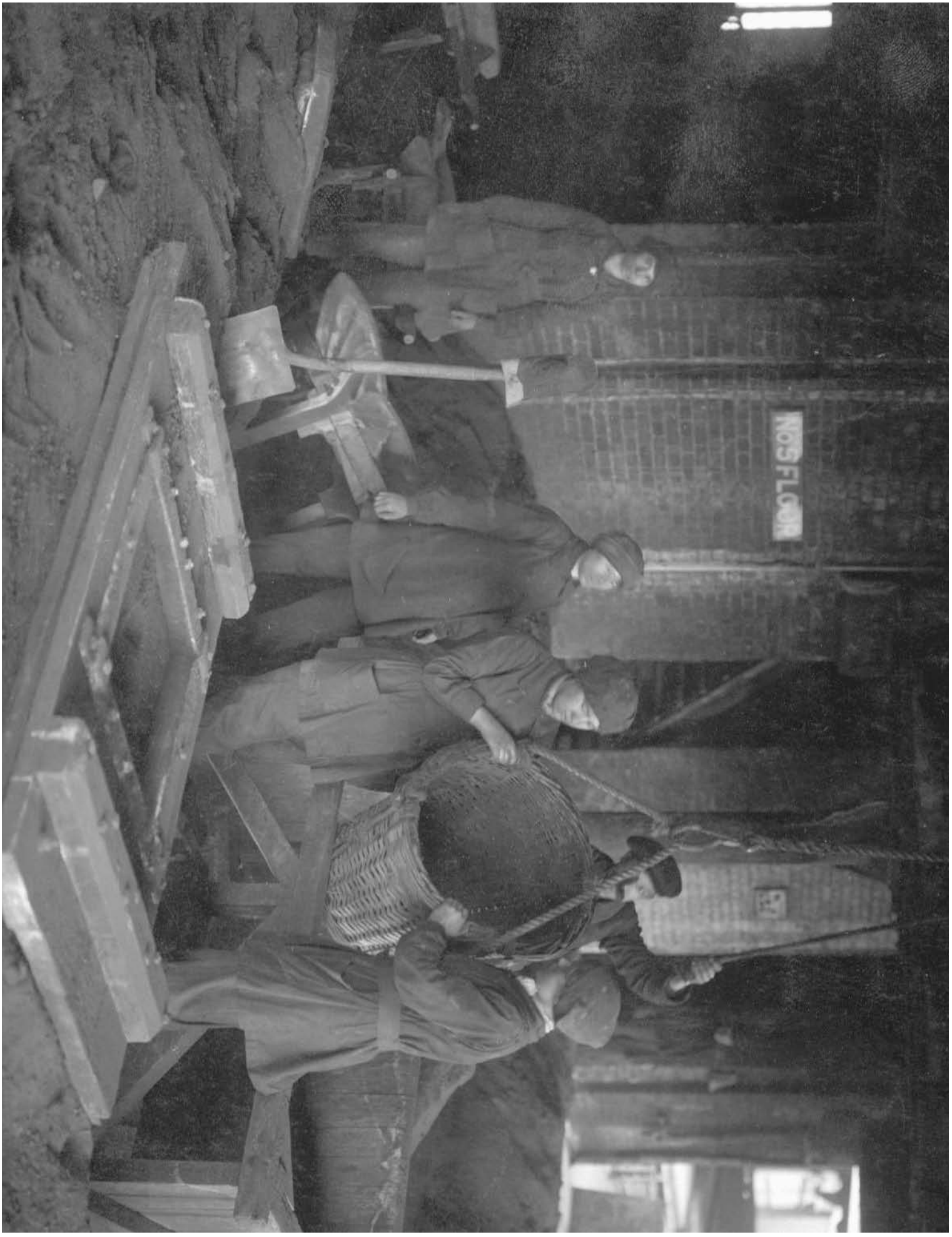
5 Purifying the gas

(1915)

This image shows workers at the East Greenwich gasworks during World War I - mainly women, drafted in to replace the men working at the front (see our **Changing role of women** resource for further information). They are filling a purifier with iron oxide, which removed hydrogen sulphide from the gas as part of the purifying process. This was a very dangerous job. The hydrogen sulphide was used to make dyes, acid and fertilizer.

Look Closer

- What are the people in the picture wearing? What might workers wear today to do a dangerous and dirty job like this?
- What equipment can you see? How might this be different today?
- What do you think the people in the picture might be saying to each other?


NO5 FLOOR

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6

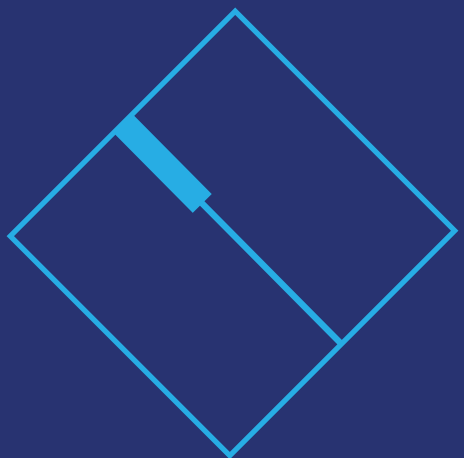
Drawing the retorts at the Great Gas Light Establishment

Brick Lane (1821)

This is an artist's impression of working in one of the early retort houses. It gives a clear impression of how hot, smoky and physically strenuous this work might have been.

Look Closer

- What is happening in the picture? Who can you see and what are they doing?
- How has the artist made it look like this is hot, difficult work?
- Can you see someone in the picture who looks like they might be in charge?



From The Monthly Magazine, 1821.PD

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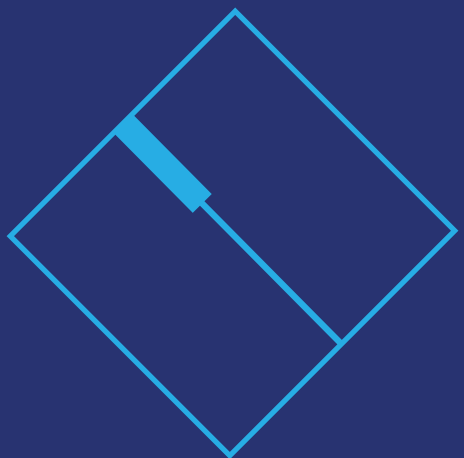
7 Gas flow meter

(1909)

The amount of gas produced in early gasworks was measured by a gasometer or gas flow meter. This meter was also used to check the accuracy of other meters – such as those installed in people's houses. The gas was fed inside a 'bell', floating in a tank of water. This caused the bell to rise. The volume of gas could be calculated by measuring the movement of the bell. By timing the movement, the rate of gas flow could also be calculated.

Look Closer

- Can you see the white 'bell' inside the gas flow meter?
- What do you think happens to the other parts of the machine as the bell goes up and down?
- What do you think the taps are for?



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8 Laying pipes

Southall to Brentford Gas Main (c.1900)

The Southall gasworks in London originally opened in 1869 and was built to meet the rapidly increasing demand for gas from Middlesex. This gas main connected Southall to Brentford - both large gasworks belonging to the Brentford Gas Company. Gas produced at these works was delivered to homes and businesses through pipes like these (although much smaller), which ran for miles underground. Underground pipes are still used to distribute gas today – you can sometimes see these being repaired or laid in the road.

Look Closer

- What tools are being used to dig the trenches for these pipes?
- How have they been transported to the site?
- What tools and equipment do you think might be used to do a job like this today?

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Warrington Gas Archive

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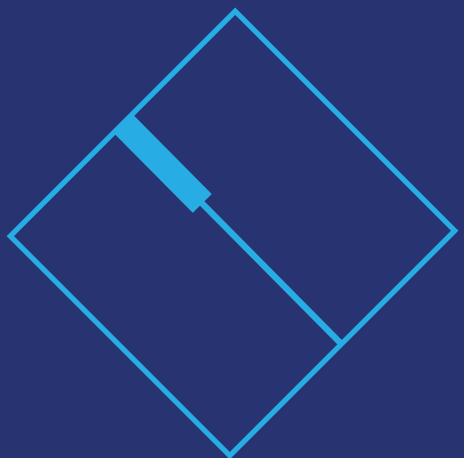
9 Treasures in coal poster

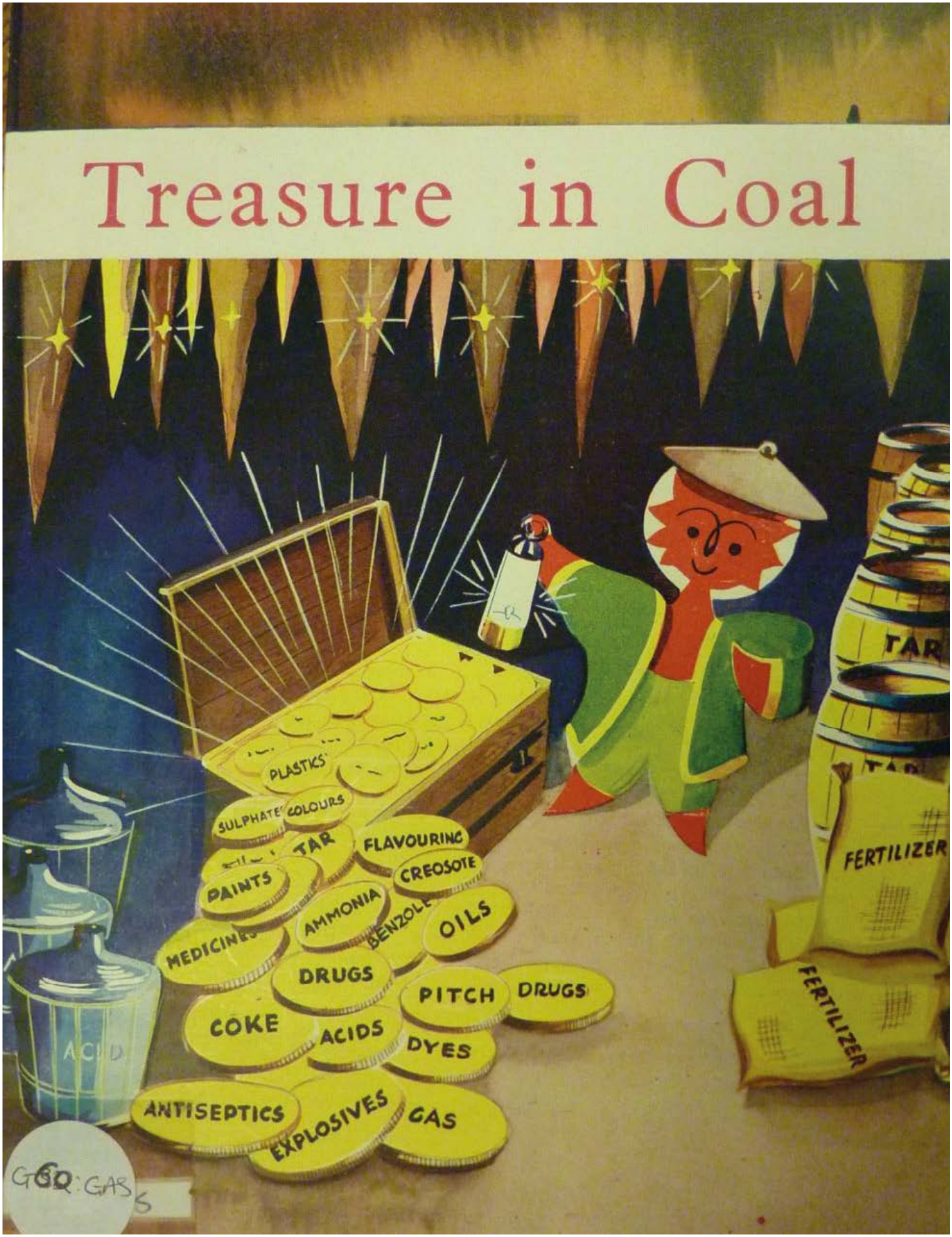
The by-products from the process of producing and purifying gas from coal had many different uses such as for making disinfectants, medicines, fertilizer, flavourings and paint. They were also used to make explosives during both World War I and World War II.

The picture includes a character called ‘Mr Therm’ who was a mascot created for the gas industry.

Look Closer

- How many different products can you see made from the ‘waste’ produced through making gas from coal?
- Who might have used these products? What for?
- Why do you think Mr Therm was designed like this? What does he look like?




Treasure in Coal
PLASTICS
SULPHATE
COLOURS
TAR
FLAVOURING
CREOSOTE
PAINTS
AMMONIA
BENZOLE
OILS
MEDICINES
DRUGS
PITCH
DRUGS
COKE
ACIDS
DYES
ANTISEPTICS
EXPLOSIVES
GAS
ACID
TAR
FERTILIZER
FERTILIZER

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10 Collecting coke

These images show families queuing to collect coke in Birmingham in 1930, and collecting coke at the Old Kent Road Works during the fuel crisis of 1947.

Coke, left over from heating the coal was collected, crushed and sorted into different sizes. The highest-grade coke was used to heat the retorts in the gasworks. The rest was used for industrial boilers and in fireplaces in homes and schools. Children often made pocket money from selling coke collected from their local gasworks. It was a particularly popular fuel during and after World War II as it was not rationed.

Look Closer

- Who has come to collect the coke?
- What are they collecting it in?
- Why do you think there is a police officer next to the line of people?

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11

Bagging sulphate of ammonia

(1930s)

Sulphate of ammonia was one of the many by-products produced as a result of making gas from coal. It was bagged up and sold to farmers for use as a fertiliser for growing crops.

Warrington Gas Archive