

Gas

Transport and Vehicles

Resources for teachers

nationalgrid

nationalgridgas.com/resources-teachers





Using the resource

National Grid owns, manages and operates the national gas 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

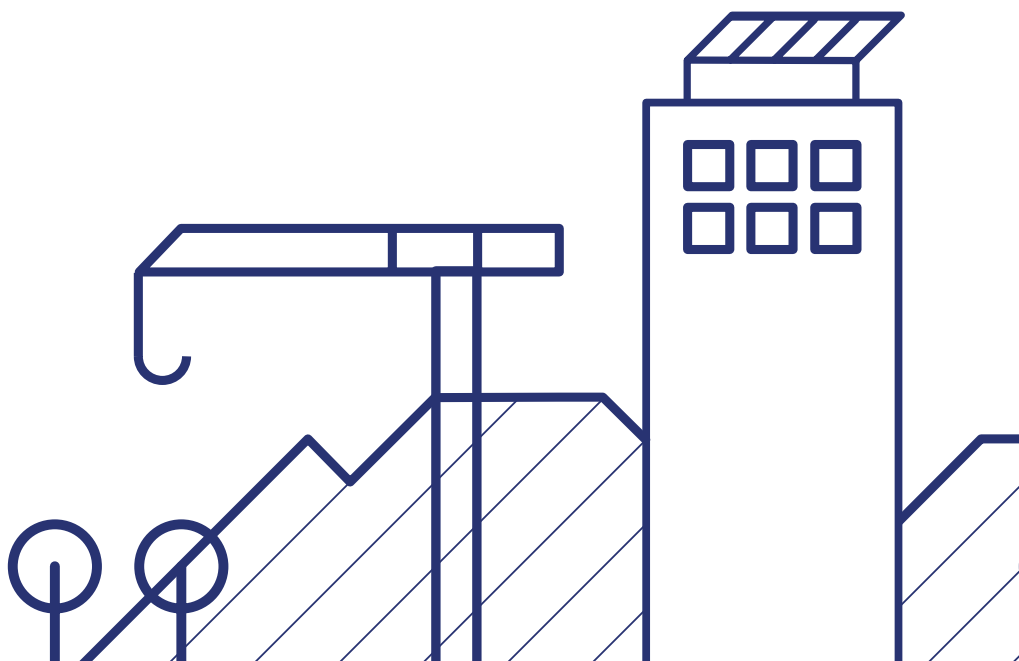
And used to support cross-curricular work in English, Technology, Science and Art & Design.

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 was it made?](#)
- [The changing role of women](#)
- [Transport and vehicles](#)
- [Classroom activities](#)
- [Your local gas heritage](#)



Information for teachers

The history of different vehicles used in the gas industry provides a useful window onto the development of transport, in general, over the last 150 years – and into the future.

Horse and steam-power

When the gas industry first emerged in the early 1800s, it depended on horse-drawn carts, boats and sailing ships to transport the coal used to make gas. Coal was transported from the mines by a combination of horse-drawn canal boats and wagons, pulled along 'wagon-ways' by horses. The coal was usually hauled to a port where it would then be transported along rivers or the coast by ship.

The first commercial steam-powered railway, the Stockton and Darlington Railway, opened in 1825. It transported coal from mines in County Durham to the port at Stockton-on-Tees. From there it was transported by ship along the east coast of Britain to cities such as London. From the mid 1800s, steam-powered locomotives started to become more important in the transportation of coal to gasworks. By the end of the 1800s, steam-powered canal boats were being used to supply coal to gasworks located on canals or navigable rivers (although some were still horse-drawn as late as the 1950s).

Steam wagons became a popular form of road transport (for commercial haulage rather than personal or domestic use) in the early 1900s – especially in Britain. But as the internal combustion engine developed and road vehicles became more sophisticated, steam-powered road vehicles were gradually replaced (they were also more expensive to tax) and very few remained in use beyond the Second World War.

People-power

From the early 1800s until well into the 20th century, the gas industry also relied on people-power. **Lamplighters** would simply walk from lamp-to-lamp in order to light the town's streetlamps in the evening and extinguish them at dawn. **Gas engineers** carried their heavy tools from job-to-job in barrows and, later, on bicycles and tricycles – some even managing to carry a ladder too! Engineers continued to use pedal-power well into the 1950s and '60s when they were replaced by vans. Today, there are five engineers who travel from place to place by motorbike to look after the 1500 gas lamps that are still operating in London.



1950s

Engineers continued to use pedal-power well into the 1950s and '60s when bicycles were replaced by vans.

Gas power

In the 1920s, German engineer Georges Imbert developed a gas generator that could be attached to a vehicle. Gas was made 'on the go' by burning materials such as wood chips, sawdust, charcoal or coal and fed into the vehicle's combustion engine – in a very similar way to petrol or diesel today. These were known as 'producer' gas vehicles. At the end of the 1930s, about 9,000 producer vehicles were in use, almost exclusively in mainland Europe¹.

During World Wars I and II, fuel was short and reserved mainly for military purposes. Many cars, buses and lorries were adapted to run on gas – especially during World War II. While wood gas vehicles were popular in other countries, in the UK this mainly involved storing the gas in a large 'bag' strapped to the top of the vehicle. The gas storage bags were made of silk or other fabrics soaked in rubber. They could be filled up at special fuelling stations.

Today, gas powered vehicles run on natural gas. The gas can be used in two different forms: as Compressed Natural Gas (CNG), which is stored at high pressure in large bottles, or as Liquefied Natural Gas (LNG) – gas which has been cooled until it reaches a liquid state and stored in specially insulated tanks to keep it at a low temperature.

Gas powered vehicles have an increasingly important role to play in combatting climate change. In the UK, for example, 26% of its greenhouse gas emissions are from cars, lorries and other forms of transport. Increasing the use of natural gas-fuelled vehicles (particularly lorries, which typically travel long distances and use diesel) could help reduce pollution from carbon dioxide by as much as 25%.

Some argue that, compared with electric cars, the latest natural gas cars are lighter, less expensive and aren't full of complex battery technology. Another advantage of using natural gas is that it tends to wear out the engine less rapidly than conventional fuels. It is also more efficient and less is wasted in the combustion process. However, alongside these advantages, factors such as cost and ease of distribution and availability must also be considered if natural gas is to genuinely succeed as a viable alternative to petrol and diesel.



Did you know?

- ◆ There are over 26 million vehicles worldwide running on natural gas. Over 6 million of these are in China².
- ◆ While today we are concerned about pollution from exhaust fumes, in the 1800s the main concern was pollution from horse dung - up to 1000 tonnes was deposited every day onto London's roads alone (that's about the same weight as six houses!)³.
- ◆ Hydrogen gas also has great potential as a vehicle fuel but is too expensive at the moment to be commercially viable.
- ◆ The longest canal in the UK is the Grand Union Canal, stretching 137 miles from London to Birmingham⁴.

¹www.lowtechmagazine.com/2010/01/wood-gas-cars.html

²www.oxfordenergy.org/wpcms/wp-content/uploads/2019/04/A-review-of-prospects-for-natural-gas-as-a-fuel-in-road-transport-Insight-50.pdf

³www.itmuseum.co.uk/collections/collections-online/information/item/2008-1998

⁴canalrivertrust.org.uk

1 Horse-drawn transport

Before the advent of steam and petrol-driven transport, all road vehicles used horse power. Wealthy passengers travelled in their own private horse-drawn carriages, while those who could afford it paid for seats aboard stagecoaches, omnibuses and trams, or may have owned a simple pony-and-trap. Horses also hauled industrial rail wagons, canal boats and farm machinery.

Horse drawn carts and wagons were some of the earliest vehicles used by the gas industry, to transport coal and heavy goods. These images show:

- i. Cooker delivery by the Maidstone Gas Company (c.1890)
- ii. Coke (which was left behind after coal was burned to produce gas) being sorted and transported at the Adderley Street Gasworks in Birmingham for use as fuel (c.1920).

Look closer

- ◆ Can you see how the horses are attached to the carts and wagons?
- ◆ What are they carrying?
- ◆ What kind of vehicles and fuel might be used to carry these sorts of loads today?
- ◆ Where do you think the horses would have been looked after?





2

Steam wagon delivering coke

(c.1910)

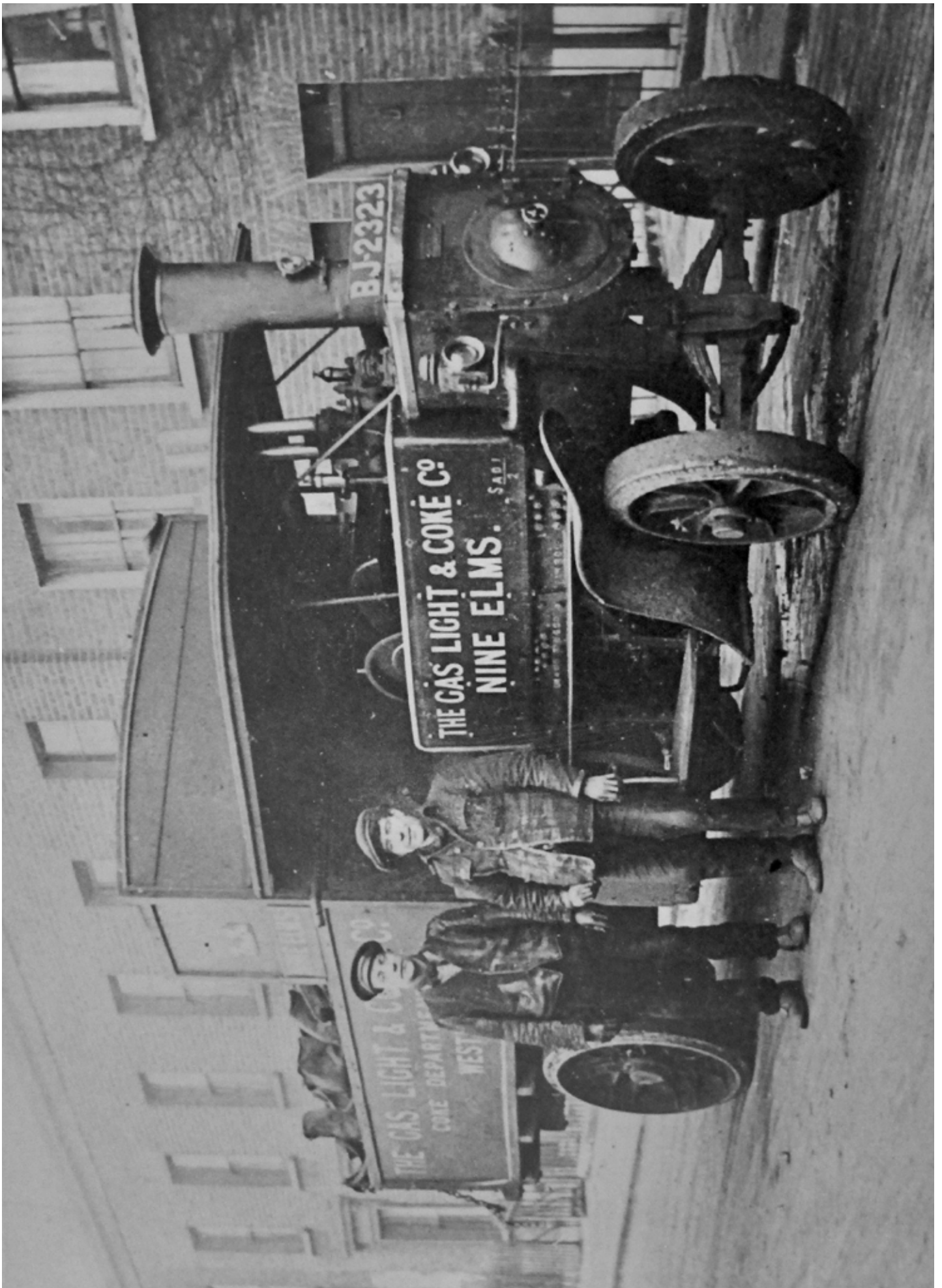
Steam wagons were the earliest form of lorry. They were designed to carry freight (goods and materials) by road and were widely used in Britain in the early 1900s.

This image shows a steam wagon used by The Gas Light & Coke Company to transport coke. Coke was left behind after the gas had been extracted from burning coal. It would sometimes be re-used as fuel to heat the retorts (coal ovens) or sold as fuel for houses, schools, factories and businesses. This wagon has solid tyres which would have made for an uncomfortable ride over the uneven and cobbled streets of the early 1900s.

Look closer

- ◆ What do you think the funnel on the front is for?
- ◆ What do you think the wagon is carrying?
- ◆ Do you think it would be comfortable to ride in? Why/why not?





From publication: The people who made gas, British Gas North Thames, 1993

3

Producer car

(1941)

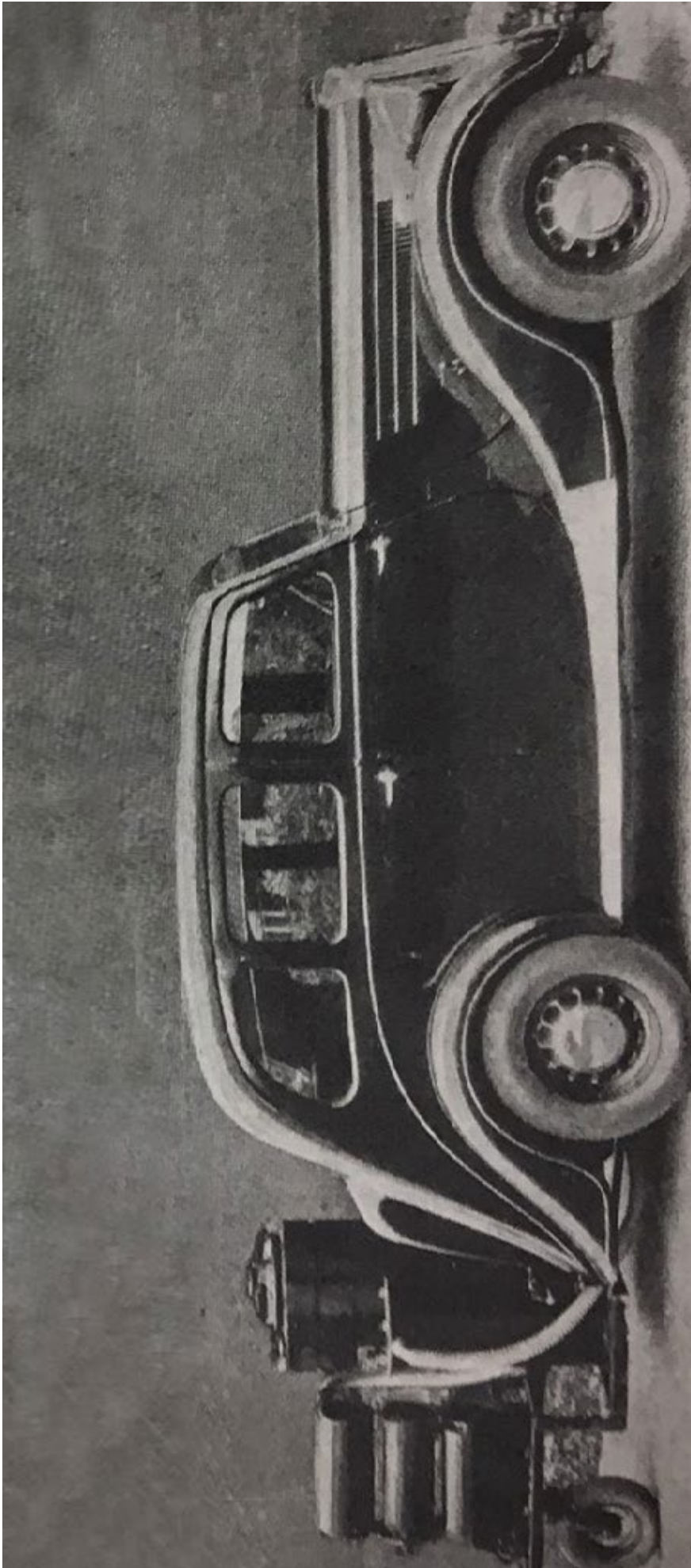
In the 1920s, German engineer Georges Imbert developed a gas generator that could be attached to a vehicle. Gas was made 'on the go' by burning materials such as wood chips, sawdust, charcoal or coal and fed into the vehicle's combustion engine – in a very similar way to petrol or diesel today. These were known as 'producer' gas vehicles. They became popular in mainland Europe and other countries and, by the end of World War II, half-a-million were in use in Germany alone. However, after World War II, petrol became more readily available again and the numbers of producer gas vehicles quickly declined.

Producer vehicles were surprisingly efficient, with relatively low and clean emissions, compared to petrol and diesel. Rising fuel prices and environmental concerns have led to a renewed interest in this technology and people around the world are once again attaching gas producers to their vehicles and converting their engines to run on gas.

Look closer

- ◆ Can you see where the fuel is burned and the gas is made?
- ◆ What do you think the advantages and disadvantages might be of cars that run on gas, compared to cars that run on petrol or diesel?





4

City of Coventry Gas Department car

(c.1930s)

The earliest cars were powered by steam, gas and electricity. They were open, offering little protection from the weather, had large, spoked wheels and looked more like horseless carriages than cars.

By the early 1900s, cars driven by the internal combustion engine began to dominate. In 1908, Henry Ford perfected mass-production, making cars quicker and easier to make and the company's now famous Model T became the first affordable car for middle-class families.

By the 1930s, cars had become safer, more affordable and much more luxurious. The main body was now completely enclosed, and some included heaters and even radios!

This van was used by the City of Coventry Gas Department. Such a van would have been rare for a gas company and Coventry would have probably used it for a variety of purposes. It would have been used in more rural areas where the use of a bike or public transport would not have been practical. It could have been used by meter readers, for collecting money from customers or prepayment meters. It may also have been used by a gasfitter to carry several small appliances such as fires, pipes and meters, and for the personal transport of senior managers.

The gas industry's mascot 'Mr Therm' can be seen painted on the side. Mr Therm was created by Eric Fraser in 1931 for the London based Gas Light and Coke Company. They used Mr Therm to promote their business and the popularity of gas. Mr Therm was so popular that he was later adopted by the whole gas industry in Britain, for many years.

Look closer

- ◆ How is this van different to modern-day vans?
- ◆ How many features can you see that are the same?
- ◆ How can you tell that this van is NOT a modern-day vehicle?
- ◆ What do you think Mr Therm is designed to look like?





5

Steam train: Fosehill gasworks, Coventry

(c.1930)

The first steam-powered locomotive was designed by Richard Trevithick in 1804. It was used to haul iron from Merthyr Tydfil to Abercynon. Over the next twenty years, the design was developed and refined until, in 1825, the first commercial steam-hauled passenger railway – the Stockton & Darlington Railway – opened, with a locomotive designed by George Stephenson.

A network of railways soon transformed Britain and stretched around the world, powered by steam. Goods could now be quickly and affordably transported across the country, and to coastal ports for shipping. People from all walks of life travelled to previously unreachable areas for work, business and pleasure.

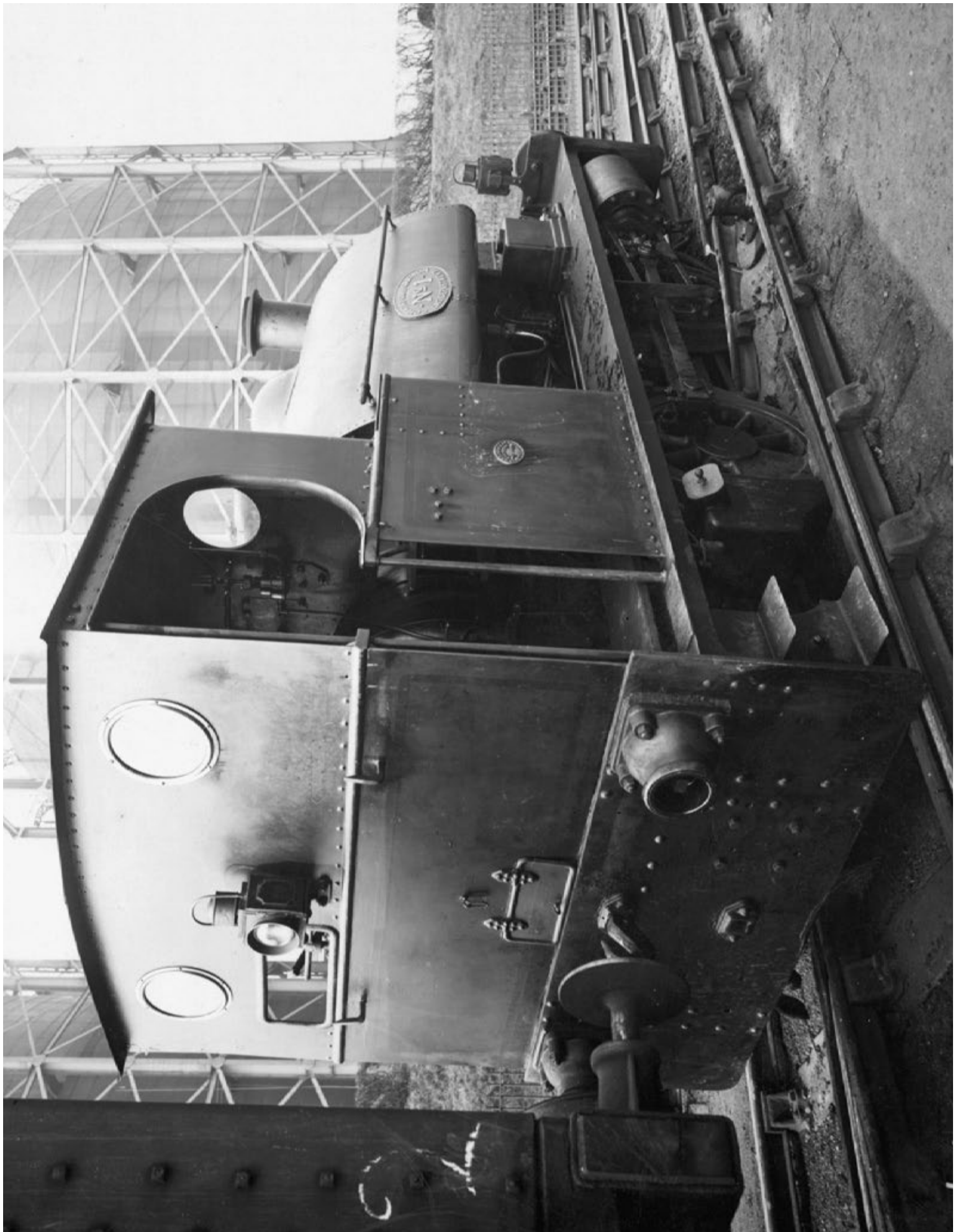
Before the discovery of natural gas in the North Sea, in 1965, Gas in Britain was made from heating coal. The coal had to be transported – often in large quantities - from coal mines around the country to the individual gasworks in every town and city. Early gasworks were usually located beside a river or canal so that the coal could be brought in by barge. It was later transported by rail with some gasworks being large enough to include their own internal railway systems.

This image shows a Peckett steam locomotive, being used to transport wagons around the large Fosehill gasworks, that was located near Coventry and supplied the city with gas. The gasworks was so big that it had its own railway for moving coal and coke.

Look closer

- ◆ What is the funnel at the front for?
- ◆ What do you think it might be carrying?
- ◆ How can you tell this train is near a gasworks?
- ◆ What do you think has happened to this train (look carefully at the wheels)?





6

Gas powered vehicles

(World War II)

During World War II, fuel was short and reserved mainly for military purposes. Many cars, buses and lorries were adapted to run on gas. While producer vehicles were popular in other countries, British vehicles were adapted so that they could use gas made at gasworks. The gas could be used in a petrol or diesel engine (with some changes), which made it easy to use.

Petrol is a liquid and has a lot of energy stored inside it, so it could be kept in a small tank inside the vehicle. But gas took up a lot of space so it had to be stored in a large bag. This bag would be strapped to the top of the vehicle, which then fed the gas to the engine.

These images show:

- i. A lorry from the North Middlesex Gas Company (1939)
- ii. A privately owned car being filled up with gas (1943)

Listen to [James Hatch's memories](#) of gas-fuelled vehicles.

Look closer

- ◆ Can you see the large bag on the top for carrying the gas?
- ◆ How can you tell these are NOT modern-day vehicles?
- ◆ Where might you go to fill up one of these gas-powered vehicles?
- ◆ What problems might occur with these designs?





7

Transporting coal – canals and colliers

(c.1948)

Britain's canals as we know them today came about as a direct result of the need to transport materials and goods as quickly and cheaply as possible around the country during the Industrial revolution, especially bulky materials like coal.

By the mid 1800s, a vast network of over 4,000 miles of canals had been built across the length and breadth of Britain. Pulled by just one horse, a canal boat could transport 30 tons, compared to just 1 ton that could be carried by a horse-and-cart on Britain's uneven roads.

Canals were essential to the gas industry, providing an efficient way of transporting the vast amounts of coal needed, from Britain's mines to gasworks all over the country. For this reason, most gasworks were built next to waterways.

Coal was also transported by sea, in large ships called Colliers. A particularly busy route opened up along the east coast of England, as coal from Durham and Northumberland in the North East was shipped to a rapidly expanding London.

At first, the coal was unloaded by hand. Over the years, the system was slowly mechanised, with cranes unloading the coal into wagons to be transported to the gasworks by rail, or carried using a conveyor system. It could then be stored ready for burning in the furnaces (retorts) to produce gas for local homes and industries.

These images show:

- i. Canal barge, Linacre Gasworks (1948)
- ii. Unloading Coal at Goole Gasworks (1926)
- iii. Collier – SS *Brixton*, Southern Eastern Gas Board (c. 1955)

Look closer

- ◆ What do you think you would hear and smell if you could step into these pictures?
- ◆ Do you think there is much wildlife in the canal?
- ◆ What might it have been like to unload the coal by hand? Would you have liked to do this job? Why/why not?

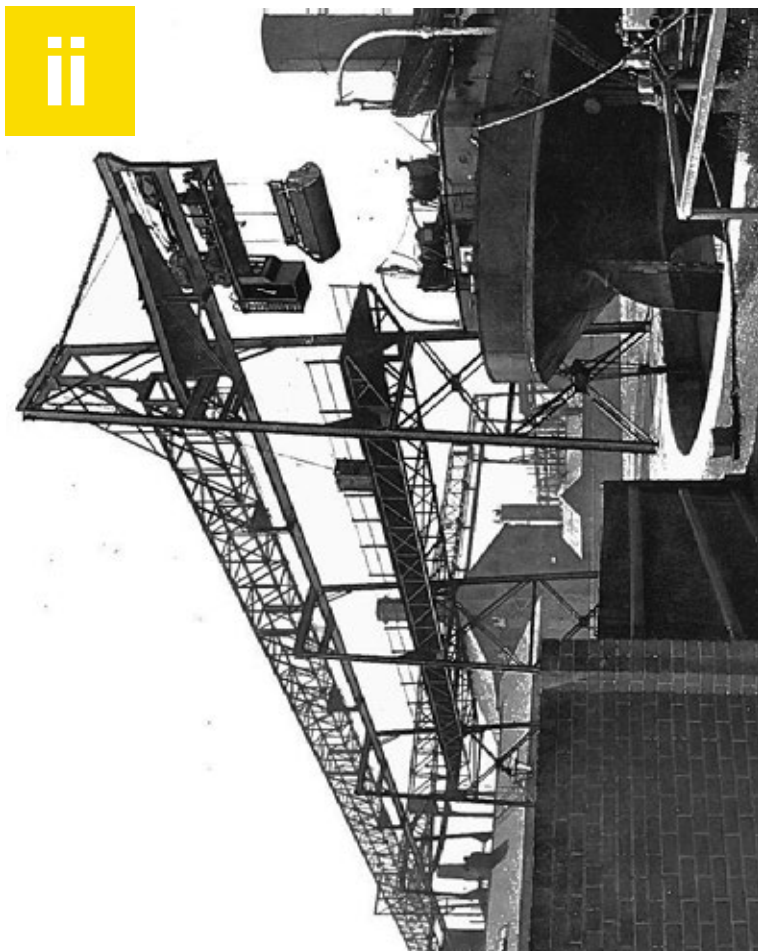


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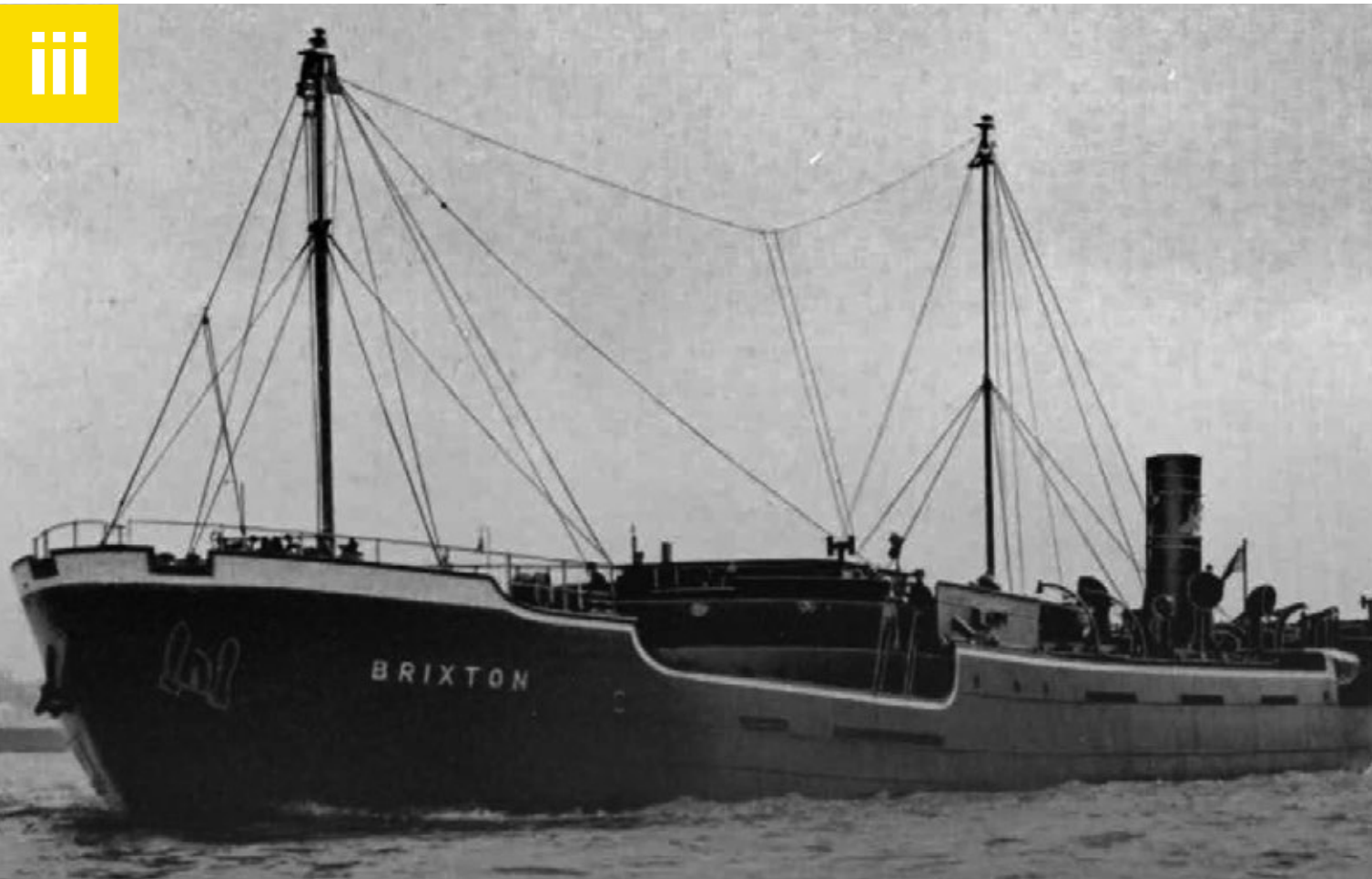
Warrington Gas Archive

ii



Gas Journal July 7 1926, Source IGEM Archive

iii



Warrington Gas Archive circa 1950

8

Engineer's Bike 'Yvonne'

(c.1950s)

The first useable 'bicycle' was invented in Germany 200 years ago and was made almost entirely of wood. It was ridden by sitting in the saddle and pushing yourself along with your feet. Bicycle design remained basically unchanged until the 1860s, when pedals were added to the front wheel.

The design continued to develop with the invention of the famous Penny-farthing, which was faster and easier to steer, but difficult to climb onto and balance. Then came the safety bicycle, the forerunner of today's bicycles. The seats were nearer the ground, the driving wheel was now at the back and turned by chains linked to pedals, and both wheels were the same size. Hollow rubber tyres, inflated by air, were fitted on a lighter, wire-spoked wheel. Later, the use of gears made pedalling easier to get up hills and metal frames became lighter.

Bicycles were popular with **gas engineers** and used right up to the 1960s. Although public gas lights were no longer lit by **lamplighters** after the invention of the clockwork controller in the 1930s, engineers were still needed to service and repair them (along with household appliances like cookers and water heaters). They would travel from one job to another by bicycle or a tricycle with a space to carry tools at the front. They would also carry their ladder! An engineer's equipment was very personal and they often gave their bikes names. This one was named Yvonne.

Look closer

- ◆ In what ways is this bicycle the same as a modern-day one?
- ◆ In what ways is it different?
- ◆ What do you think might be in the engineer's bag in the basket at the front? Do you think this would make the bag heavy or light to carry?





9

Gas powered vehicles

(modern day)

Today, gas powered vehicles run on natural gas. The gas can be used in two different forms: as Compressed Natural Gas (CNG), which is stored at high pressure in large cylinders inside the vehicle, or as Liquefied Natural Gas (LNG) – gas which has been cooled until it reaches a liquid state – which is stored inside the vehicle in specially insulated tanks to keep it at a low temperature.

Gas powered cars, lorries, buses – even ships - look almost exactly like conventionally powered vehicles, but may need more storage space for the fuel. They can be specially made to run on gas or converted from existing diesel or petrol vehicles. Burning a mixture of gas and air powers the engine instead of a mixture of petrol/diesel and air.

This image shows a Compressed Natural Gas (CNG) powered lorry at a refuelling station.

Look closer

- ◆ Does this vehicle look like a conventional lorry?
- ◆ How do you know this lorry is using gas?
- ◆ What do you think the lorry is being used for?
- ◆ Where do you think the gas has come from?





10

Liquid Natural Gas (LNG) tanker

(modern day)

When gas was first used to heat and light our homes, over 100 years ago, it was made by burning coal. Today, the gas we use is natural gas, found deep underground – often under the sea. Once the gas has been collected, it must be safely transported from where it is found, to where it is needed – such as in our cookers.

One of the best ways to transport gas – especially if it has to travel a long way - is to first change it into a liquid so that it can be placed into containers. This involves cooling it down to extremely cold temperatures - much lower than the temperatures in our freezers. The resulting liquid is known as Liquid Natural Gas, or LNG.

Huge, highly-specialised tankers (ocean-going ships) are used to transport LNG to countries around the world. It is held in large 'cryogenic' storage containers which keep the gas at a super-cooled temperature of -160°C . Most tankers are about 300 metres long and 43 metres wide – that's as wide as a football pitch and twice as long!

When the tanker reaches its destination, the Liquefied Gas is returned to its gaseous state at a special terminal, and then piped through natural gas pipelines to where it is needed.

Look closer

- ◆ Can you see the four huge tanks for storing the Liquid Gas?
- ◆ What do you think the steps next to the tank at the front might be for?
- ◆ What might it be like to work on one of these ships?



