

Coal, Gas and Steam

The essay, below, is an extract from the book *Different Times*, amended to suit this application.

The book can be viewed by way of this link:

http://www.amazon.co.uk/William-Kenneth-Jones/e/B0034OD1XW/ref=sr_tc_2_0?qid=1367511022&sr=1-2-ent

The coal, gas and steam of the Victorian age held its dominance well into the nineteen-thirties. Oil, natural gas and electricity were only just beginning to spread their influences, to finally bring in the age of energy and power that we now know.

In our environmentally conscious age, with its concern for clean and renewable energy, the idea that the previous period's coal, gas and steam could hold any attraction whatsoever might appear to many people as ludicrous. Yet, such is the enduring appeal of coal and steam, numerous Railway Preservation Societies dedicatedly keep it very much alive – irrespective of its noise, smoke and smell.

The increasing need for gas went alongside the growth of the Victorian conurbations and their rapidly expanding populations. Gasworks, and the arrival of their coal-supplying trains, represented a typical arrangement for virtually every industrial town and city of that time. Manchester's population increase from 70,000 in 1801 to over 300,000 in 1851. During the same period, England and Wales doubled its numbers from nine to eighteen million. This brought into existence social problems never previously experienced, and of a comparative magnitude that would stretch the coping capacity of even a modern, well resourced, society.

A similar phenomenon took place in Ireland. In 1800, it had a population between 4 and 5 million. However, what might be seen as a positive effect of the Industrial Revolution in the first half of that century expanded the Irish Linen industry almost explosively. This provided favourable economic and social conditions for the population to increase dramatically. By 1841, it had exceeded 8,000,000.

Manchester's immense expansion of industry fed on this growth. An aspect of this was its attraction for those displaced by agriculture's need for less workers, due to increasing mechanisation. It also absorbed large numbers of Irish immigrants impelled to move by the mentioned population pressures and its overspill. Many of them poured into areas such as Angel Meadow.

Another factor influencing Manchester's population increase was the rapidly expanding industries' need for more and more labour, with a concomitant forcing up of wages. Friedrich von Raumer (the German writer) visited Manchester in 1825, 1836 and 1841. On the basis of this, he made a collection of observations which he compiled in a book entitled *England in 1835*. In it (page 222) he commented: "English workers receive in proportion higher wages, and live better than those in Germany." This was obviously noted by and thereby attracted the large numbers of Irish immigrants, for instance. A present-day parallel is the movement of Eastern Europeans into East Anglia, driven by the same impulse.

Raumer based his wage-comparison on the German area of Barmen-Elderfeld – the birth-place of Friedrich Engels in 1820. This district also experienced rapid industrialisation and became known as "the Manchester of Germany", and suffered similar conditions: "the river became polluted by dyeworks and was bordered on both sides by textile factories and shabby housing for workers" (reference: page 57 *Manchester In The Victorian Age*, by Gary S. Messinger).

As in all times and places of rapid changes and movements, environmental and social conditions can become somewhat disordered – or even worse..

In England's Manchester, industry's forceful nature is indicated by the fact that no power looms existed in 1814, but by 1835 their presence had exceeded 30,000. Also at that time, Lancashire possessed more power-driven machinery than the rest of the world put together, and most of these concentrated in and immediately around Manchester. This pouring of people into the fast-growing towns and cities impelled row upon row and mile after mile of hastily built houses, crammed around mills and factories. It generated an imperative to find some form of readily available heating and lighting along with comparatively clean fuel for the fast-growing numbers of iron-foundries. This came in the form of coal-gas, which engendered the rapid construction of gasworks with their massive gasometers, primarily placed where their outputs of gas and coke had direct and immediate consumption.



As the photo indicates, their presence could substantially dominate the area in which they appeared.

In our current concern about environmental matters, the placing of enormously polluting and unsightly complexes, right in the centre of any habitation, would meet serious challenge. However, since such gigantic and dominating gasworks are no longer a usual feature of our towns and cities, it could be interesting to go back to the time when the one in Manchester's Gould Street had its beginning. By this, we

might gain some insight into how and why it was thought right and proper to build it there in the first place.

Maps of the latter part of the 1700s indicate that the existing Gould Street closely follows the line of what was once the northern demarcation of a pristine meadow, which gave rise to the name Angel Meadow – a name used for its area up to the present day.

As a point of reference to the emergence of Gould Street becoming part of the process that submerged the meadow beneath bricks and cobbles, we can use the visit of Alexis-Charles-Henri Clérel de Tocqueville (the French historian, 1805-1859) who, in 1835, was less than happy about what he saw in Manchester.

The road now known as Rochdale Road was then named Saint George's Road. Gould Street (already existing at the time of his visit, and possessing that name) had a position related to this roadway as it does to Rochdale Road in the present time. A nearby feature at the lower end of Angel Meadow (Saint Michael's Church – constructed in the years 1788 to 1789) was more than likely seen by Alexis de Tocqueville as he surveyed what was, to him, the alarmingly predatory nature of the industry he could see spreading all around. He saw an explosion of industry whose magnitude had never before been witnessed. What he did not know – but we in retrospect can know – is what he viewed could be described as the labour of the modern world's birth.

However, by the time of de Tocqueville visit, Saint Michael's church had declined into a fast fading remnant of its former glory. The increasing industrialisation of its once pleasant area impelled the "genteel" – who inhabited the Georgian houses in Angel Street, which ran along the edge of Angel Meadow – to move elsewhere.

As a matter of interest: Saint Michael's stood intact until the year 1935 when its district entered the last stages of decline. It finally became reduced to rubble by 1936. Only the nearby Charter Street Mission remained as a last witness to the buildings that once gave some "grace" to the area.

The humiliation of the church was again the result of what de Tocqueville perceived as a blight increasingly crowding around places like the church and constantly pushing outwards and beyond – its unremitting pressure soon destroying any semblance of an area that could claim any esteem. The church had become part of the scene that impelled the French visitor to describe thus:

An undulating plain, or rather a collection of little hills. Below the hills a narrow river – the Irwell – flows slowly to the Irish Sea. Two streams, the Medlock and the Irk, wind through the uneven ground and after a thousand bends, flow into the river... the fetid, muddy waters stained with a thousand colours by the factories they pass...

A sort of black smoke covers the city. The sun seen through it is a disc without rays... the crunching wheels of machinery, the shriek of steam from boilers, the regular beat of looms, the heavy rumble of carts, those are the noises from which you can never escape in the sombre half-light...

Earlier, in 1814, William Wordsworth in his poem *The Excursion* (Book VIII) gives an almost prophetic view of the expanding industrial towns:

*Meanwhile, at social Industry's command,
How quick, how vast an increase! From the germ
Of some poor hamlet, rapidly produced
Here a huge town, continuous and compact,
Hiding the face of earth for leagues - and there,
Where not a habitation stood before,
Abodes of men irregularly massed
Like trees in forests, - spread through spacious tracts,
O'er which the smoke of unremitting fires
Hangs permanent, and plentiful as wreaths
Of vapour glittering in the morning sun...*

*Hence is the wide sea peopled, hence the shores
Of Britain are resorted to by ships
Freighted from every climate of the world...*

Wordsworth gave no name to the "huge town" mentioned in his fourth line, but, in all probability, it was Manchester.

However – and returning to the gasworks: Just a few years before de Tocqueville penned his sombre view, supplying the expanding industrial areas with gas and coke emerged as a rapidly increasing possibility, causing the existing "City Fathers" to realise that "something must be done". This more so because – in addition to the fast growing need for furnace-coke to fuel the expanding factories and foundries – an increasing pressure arose to supply gas as a means of lighting the fitfully illuminated buildings, dark streets and alleyways of that time. The installation of street-lighting would, it was believed, reduce criminal opportunities. It soon became obvious that only a large and substantial gasworks could supply all the requirements.

Long before the need for gas was thrust upon the awareness of the City Fathers, a Scottish engineer named William Murdoch used coal-gas to light his house, in 1792. By the period of our main gaswork-building consideration, the possibility of applying the Murdoch technique to lighting the main streets of towns and cities seemed more than a possibility. This casting of light where once night-time darkness prevailed began to have widespread appeal. For instance, Manchester's Theatre Royal and the nearby Fountain Street became gas-lit in 1819.

It soon became apparent that the existing small and scattered sources of supply, arising haphazardly and restricted to individual demands, were becoming increasingly "not up to the job". The use of the conveniently piped and more illuminating alternative than the expensive candles or smelly oil-lamps, previously used in the domestic settings, had won the day (and night) so to speak. Thus, the growing and extensive demand for gas was one that had to be met.



At this stage, it seems appropriate to mention certain devices allowing the widespread success of interior and exterior gas lighting at that time, and therefore impelling the demand for gas.

The most important innovation, finally transforming the not very bright naked gas-flame into a satisfying level of illumination, came in the form of the delicate, fabric-like hood which eventually became known as the "gas-mantle" (see the illustration on the left). Before this ingenious and comparatively simple invention arrived on the scene, to brighten up peoples' lives, numerous attempts were made to increase the gas-flame's illumination.

The first viable effort came in the adaptation of the principle used in a device known as the Argand Burner. This had already been extensively employed in oil-lamps, therefore, its tried and tested arrangement became, in 1809, transferred to gas-lighting. The principle worked on the basis of a cup-shaped flame, achieved in the case of the oil-lamp by a circular shaped wick.

Its application to gaslight took the form of a circular gas-jet, allowing the maximum amount of air around the flame and thereby assisting more efficient burning, and, of course, greater illumination. The glass "chimney" found to be a necessary part of the Argand Burner principle when used for oil-lamps (see the oil-lamp illustration on the left) also added its induced airflow to improved combustion in the gas application.



This arrangement of circular flame and glass chimney became the standard method of indoor gas lighting up to the latter part of the Victorian period. However, its level of light, even with the mentioned improvements, still failed to satisfy, and numerous experiments were conducted to increase illumination.

The first effort approaching a satisfying practicality appeared in 1878, when the American inventor, Thomas Edison, coated a woven platinum wire-mantle with oxides of zirconium – this to place over the flame for the mantle to then glow brightly.

However, the final and more affordable effort (the gas-mantle, shown in the illustration above that of the oil-lamp) came by way of an invention produced in 1885 by a person named Carl Auer Von Welsbach. This took the form of a woven fabric (cotton or rayon) impregnated with a solution of thorium and cerium nitrates. Its advantage – besides being cheap – also lay in its flimsy construction immediately gaining strength by the chemical reaction created by the burning process.

This innovation continued to reliably produce what was then considered to be a highly satisfying level of light for homes and streets, until the arrival of brighter and cleaner electricity ensured its final "turning off".

But back to the production of gas: under the pressure to satisfy demand, those responsible for the city's gas supplies obtained – in 1824 – a vacant and positionally convenient nine-acre site in Gould

Street, no more than a mile or so away from the city centre. The plan proposed a complex capable of serving as a major gas producer for that area, with the possibility of eventually supplying areas beyond.



The illustration on the left is a section from the *Map of Manchester & Salford, 1836*. It shows the then Gould Street Gasworks with its first two gasometers. They are indicated just left of centre and above the green area of the proposed St Michael's Church burial ground.

This new site received the name of St. George's Station, employing eighteen men. By the time Alexis de Tocqueville arrived, to contemplate the scene and write his bleak view, it had reached a production of 50,000 cubic feet of gas per day. Such was the arduous nature of and dangers involved in this production that each employee received a quart of ale every day along with the offer of a free coffin – if needed.

The latter "benefit" may have been associated with the undoubtedly perilous process involved in heating coal to extremes of temperature; this being done in air-tight ovens – known as retorts – that allowed the coal to release its gas without it igniting. The main constituents of the gas consisted of highly poisonous and flammable combination of methane, hydrogen and carbon monoxide.

At Gould Street, the resulting gas had its storage in a cluster of two then three massive gasometer – the final one being erected by the time of 1850. These had the capability of allowing the storage and then the controlled discharging of their contents into the ever-expanding network of gas-mains and branching pipes, built according to demand.

In such complexities, explosions of escaping gas could easily occur, and, due to this, the construction's initial stages resulted in many accidents. In an early instance, a man suffered a fatality and thirteen received severe, disabling, burns.

These dangerous possibilities resided in the nature of the undertaking. The gasification process ended with each retort being emptied of the carbonised lumps, which we know as coke, necessitating the handling of material giving off extremely hot sulphurous gases. Therefore, it wasn't surprising that a coffin "if needed" was offered free of charge, as part of the job's "benefits", and the men concerned probably thought it a very generous offer, and not in any way unusual.

In addition to the inherent dangers, it seems these industrial units became targets for sabotage during periods of "unrest". For instance, in the Chartists disruptions of 1824, the Gould Street works – then in the early stage of construction – came under attack, resulting in its newly built sections being substantially damaged.

Further attempts at sabotage occurred in 1876, on the part of the Fenian Movement (an Irish-American Republican secret society, first emerging in 1858 as the forerunner to the IRA). After this incident, many of the Gould Street workers were granted the power of special constables "to act in any way necessary and according to the situation". No doubt the offer of a coffin also gave "consolation" in these circumstances?

Another condition exacerbating the arduous nature of the process in the early stages was the absence of trains. Their advantage had to await the extensive railway complexes built some decades after the gasworks' construction. Therefore, the coal required to feed the constantly increasing demand for gas had then to be laboriously transported by horse and cart, which became a severe limitation on output.



With the arrival of railway transportation, production leaped to the staggering figure of 7,000,000 cubic feet of gas per day, compared with the initial production of 50,000 cubic feet. This output became possible because of the enormous amount a train could readily deliver straight from the mines.

By 1860, this allowed a constant 400 tons (about fifty wagon-loads) of coal each day to generate the mentioned increased volume of gas and coke – requiring the employment of 700 men to maintain this output. The image shows a section of Gould Street Gasworks as seen from Roachdale Road, circa 1950. A coal supply wagon is just entering the gateway from the Thompson Street railway yard, opposite the Gasworks.

Thus came into being an everyday crossing of Rochdale Road from the railway sidings opposite, with the train entering the gasworks' fiery – smoke filled – labyrinth. All the coal, gas and steam the process represented is now gone; and, with it, a last witness of Victorian industrialisation.

A Comment From The Writer

For various reasons (some rational, some irrational) the present fashion is to give the Victorians and their period a “bad press”. However, they laid the foundations for wealth-creation exceeding even the wildest fantasies of their previous times – as intimated in the quoted William Wordsworth poem.

Moreover, and in our time, it is worth appreciating the fact that we still live on the basis of much that the Victorians did. How would we manage without the infrastructure including water supplies and sewerage systems that their time bequeathed? How would our towns and cities look without their magnificent, Victorian, buildings? How would the world be without their finalization of the industrial and technological age, with its possibility of vastly increased living standards?

Granted, industrialisation ruined the once “heavenly” Angel Meadow. However, the energetic, inventive, enterprising and artistic people of the Victorian era (1837 to 1901) began to understand what went wrong to cause the awfulness of the 1831 cholera epidemic in Angel Meadow. By this, they laid the foundations of medical science and the comparatively disease-free life we now enjoy.
