

Electric Lamps

There are three basic types of electric lamp, all of which are represented in the Museum's collections:

- Incandescent lamps emit light from an electrically heated filament enclosed in a partially evacuated glass bulb, which prevents the filament burning away. They are more commonly called light bulbs.
- Gas discharge lamps contain a vapour that is made luminous by an electric current passing through the gas between two electrodes. Fluorescent tubes are the most common type of gas discharge lamp.
- Carbon arc lamps create an electric discharge in the air between the two carbon rods, producing an intense light. They have mechanisms to adjust the distance between the rods as they burn away.

The Museum has examples of most types of lamps, particularly from the period 1880 to 1940.

Carbon arc lamps

The first electric lamps were of the carbon arc type and were commercially produced from the 1830s. Early carbon arc lamps were operated by hand. It was not until the 1850s that a system was devised to regulate the arc automatically. Carbon arc lamps were used for street lighting by the 1870s, but they were unsuitable for domestic use because of the brilliance of the light.

Incandescent filament lamps



In 1880 domestic electric lighting became available with the introduction of the carbon filament lamp. This type of lamp was developed in Britain by the chemist Joseph Swan and in the United States by the prolific inventor Thomas Alva Edison. By 1885 light bulbs began to be fitted with the now standard screw and bayonet caps. By 1900, leading British manufacturers included the General Electric Company (GEC), British Thomson-Houston and the Edison & Swan United Light Company.

Lighting was the first aspect of home life to benefit from the application of electricity. However, while the light bulb was widely available by 1900, only a tiny percentage of homes had been wired for electricity. Most homes were still lit by gas, paraffin or candles, which produced smoke and residues. Domestic electric lighting only became commonplace during the 1920s and 1930s.

Carbon filament lamps produced about the same amount of light as gas burners fitted with incandescent mantles. New filaments developed at the beginning of the twentieth century

changed that. The best material for filaments proved to be tungsten, which produced at least twice as much light as carbon. Further improvements were made by tightly coiling filaments and by filling bulbs with gases such as argon, nitrogen and halogen at very low pressure.

Gas discharge lamps

Even the most efficient light bulbs release 90% of their energy as heat and only 10% as light. A more energy-efficient form of electric lamp is the gas discharge lamp. Gas discharge lamps rely on the natural luminosity and particular colour properties of certain gases. In 1900, an American electrical engineer, Peter Cooper-Hewitt, produced the first practical gas discharge lamp using mercury vapour in a glass tube. It produced a greenish-white light and was more efficient than a carbon filament lamp.

George Claude, a French industrial chemist, developed the first neon discharge tube in 1910. The bright red light of the neon tube was ideal for advertising signs. In 1930, the sodium vapour lamp was introduced. Characterised by its bright yellow light, it was adopted mainly for street lighting, where its long life was a great asset.



One of the greatest advances in electric lamp technology was the development of the fluorescent lamp. It marked a big increase in efficiency because the fluorescent coating of phosphors on the inside of the tube made ultraviolet light visible. First demonstrated by the American company General Electric in 1935, early fluorescent tubes produced coloured light and were conceived as feature lights. The use of fluorescent tubes for general lighting came about when researchers discovered blends of phosphors that would produce white light. By 1980, fluorescent lamps were supplying about 80% of the world's artificial lighting.

During the last 20 years another form of fluorescent lamp has come into use. In the 1970s, rising energy costs and growing environmentalism alerted companies to the sales potential of low-energy lamps. The Dutch company Philips, the world's largest light bulb manufacturer, led the way in 1980 with its first long-life, low-energy 'light bulb'. This type of lamp is, in fact, a narrow, looped fluorescent tube with a standard bayonet or screw fitting. It thus combines the convenience of the light bulb with the energy efficiency of the fluorescent tube.

For more information:

Visit The Museum's National Electricity Gallery.

Read Clark, Ronald W. *Edison: The Man Who Made the Future*. London: Macdonald & Janes, 1977.
O'Dea, William. *The Social History of Lighting*. London: Routledge & Kegan Paul, 1958.