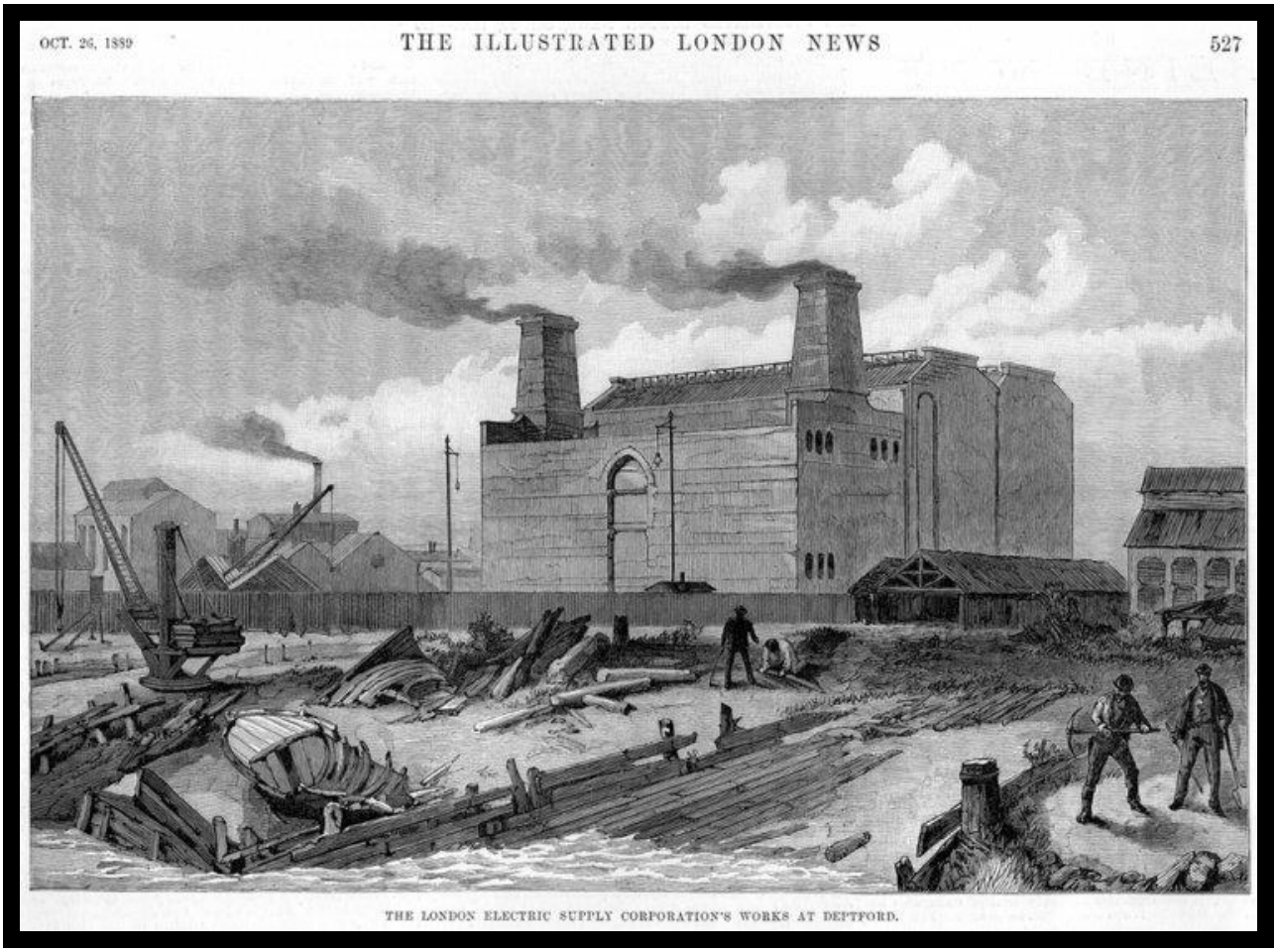


HISTORIC BUILDINGS AND EQUIPMENT

HYDRAULIC AND ELECTRIC POWER STATIONS

BRIAN ROBERTS

SIZEWELL B NUCLEAR POWER STATION SUFFOLK

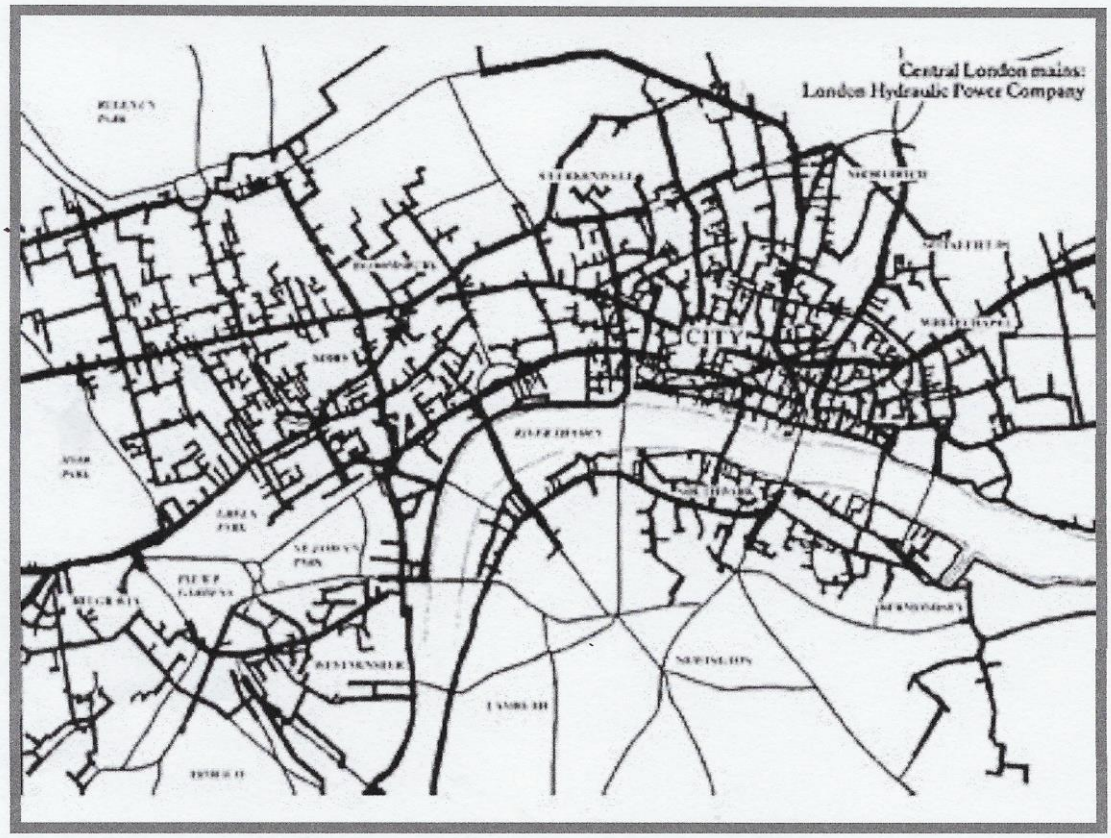
HYDRAULIC AND ELECTRIC POWER STATIONS

In page order:
Deptford, Sizewell B, London Hydraulic Power Co, Wapping,
Hydraulic Presses, Crane, Presses, Mains, Pimlico
High Holborn, Pearl Street, Jumbo Dynamo, DC Stations, Westinghouse Lab,
Niagara Falls, Grosvenor Gallery, Deptford, Steam Turbine,
Barking, Bankside, Deptford, Greenwich, Drax,
Kingsnorth, Beddington, Willesden, Nuclear, Calder Hall, Sizewell B,
Hinkley Point, Battery Station, Dinoric, Cruachan.

BATTERSEA POWER STATION (feature)

Switchboards.

LONDON HYDRAULIC POWER COMPANY



The London Hydraulic Power Company's Central London Mains

The Company was founded in 1871 and by 1927 had 184 miles of mains beneath London with pumping stations at Bessborough Gardens in Pimlico, Blackfriars Bridge, Albion Docks at Rotherhithe, Wapping Wall in the London Docks and at the City Road Basin in Islington. Water was pumped around these mains at a pressure of up to 700 pounds per square inch and used to operate cranes, lifts, theatre machinery, various presses and other equipment.

Following pictures from "" Pumps Bailed out an Industry and gave Power from afar," John Mortimer, *The Engineer*, "Highlights of 120 Years,"1976 (CIBSE Heritage Group Collection)

Hydraulic Power in London

Written by Andy Emmerson.

As a subject hydraulic power might not seem to have much connection with subterranea - until you realise that the high pressure mains ran below ground. This is an 'entry level' guide to the subject, with links to a number of other websites.

HYDRAULIC POWER - ITS NATURE AND USES

The secret of the utility of the hydraulic mains lies in the fact that water is virtually incompressible, and is therefore an ideal agent for transmitting power from one place to another. In London, water power was transmitted through a vast network of hydraulic mains to thousands of hotels, shops, offices, mansion blocks, hotels, docks and factories. Hydraulic power played an important part in the operations of lifts and cranes, but there were many other purposes for which the great pressure of the water was and still is used in industry.

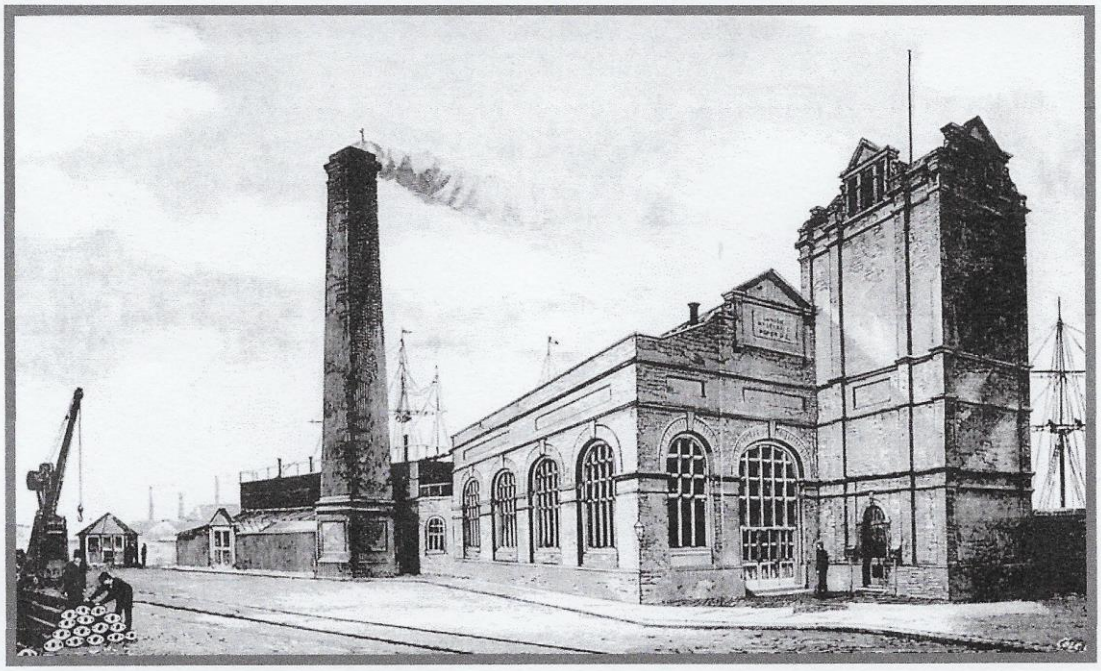
Water power in London was controlled by the London Hydraulic Power Company, incorporated by Acts of Parliament between 1871 and 1903. Until it closed in 1977, the company supplied water at a pressure of 700 lb. per sq. in., day and night, all the year round, through some 150 (180 before the war) miles of cast-iron and steel hydraulic mains laid under the streets of London. This great labyrinth of power lines was not built in weeks or months, and the gradual spread of the silent tubes went on for more than half a century. The number of gallons of water pumped each week through the company's mains in 1893 was 6,500,000; water pumped through the mains in 1933 averaged 32,000,000 gallons weekly. The mains were carried across the Thames at Vauxhall Bridge, Waterloo Bridge and Southwark Bridge. They cross under the river through Rotherhithe Tunnel and the Tower Subway beneath the Pool of London.

Before the LHP Company reached its zenith many dock and railway undertakings in London generated their own hydraulic power, using steam pumping engines and conspicuous 'accumulator' towers for storing this energy. A few such towers can still be seen, such as one close to the north end of Tower Bridge. Tower Bridge itself was operated by hydraulic power and the huge steam engines can still be seen in its engine room, now a museum.

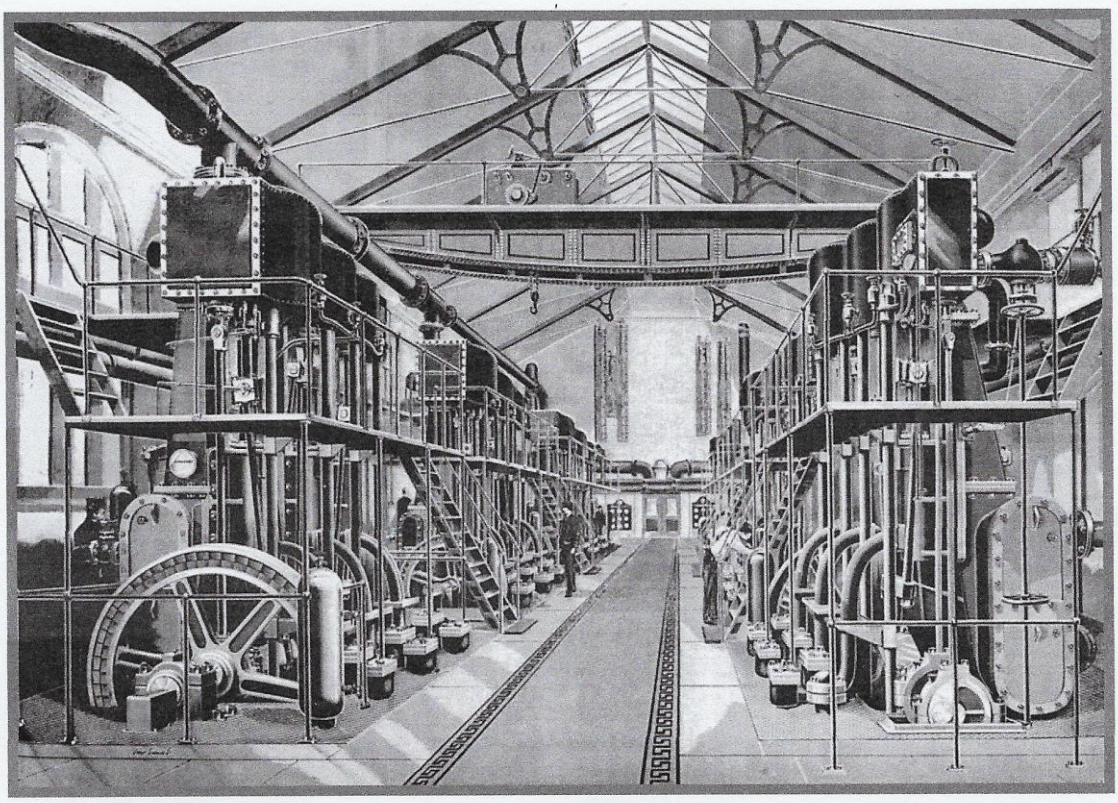
Once the London Hydraulic Power Company's mains spread out, covering much of London, and provided reliable service most users abandoned their own generators. Since the demise of the LHP Company the wheel has turned full circle, forcing users to install their own plant or convert to electric motors.

Applications for the enormous power of the hydraulic ram were manifold; it was used for cranes and lifts and could also be applied in presses for forging, stamping or flanging. At one time hundreds of such presses were in use throughout warehouses for baling cloth and paper, and for compressing scrap metal and other materials to facilitate transport.

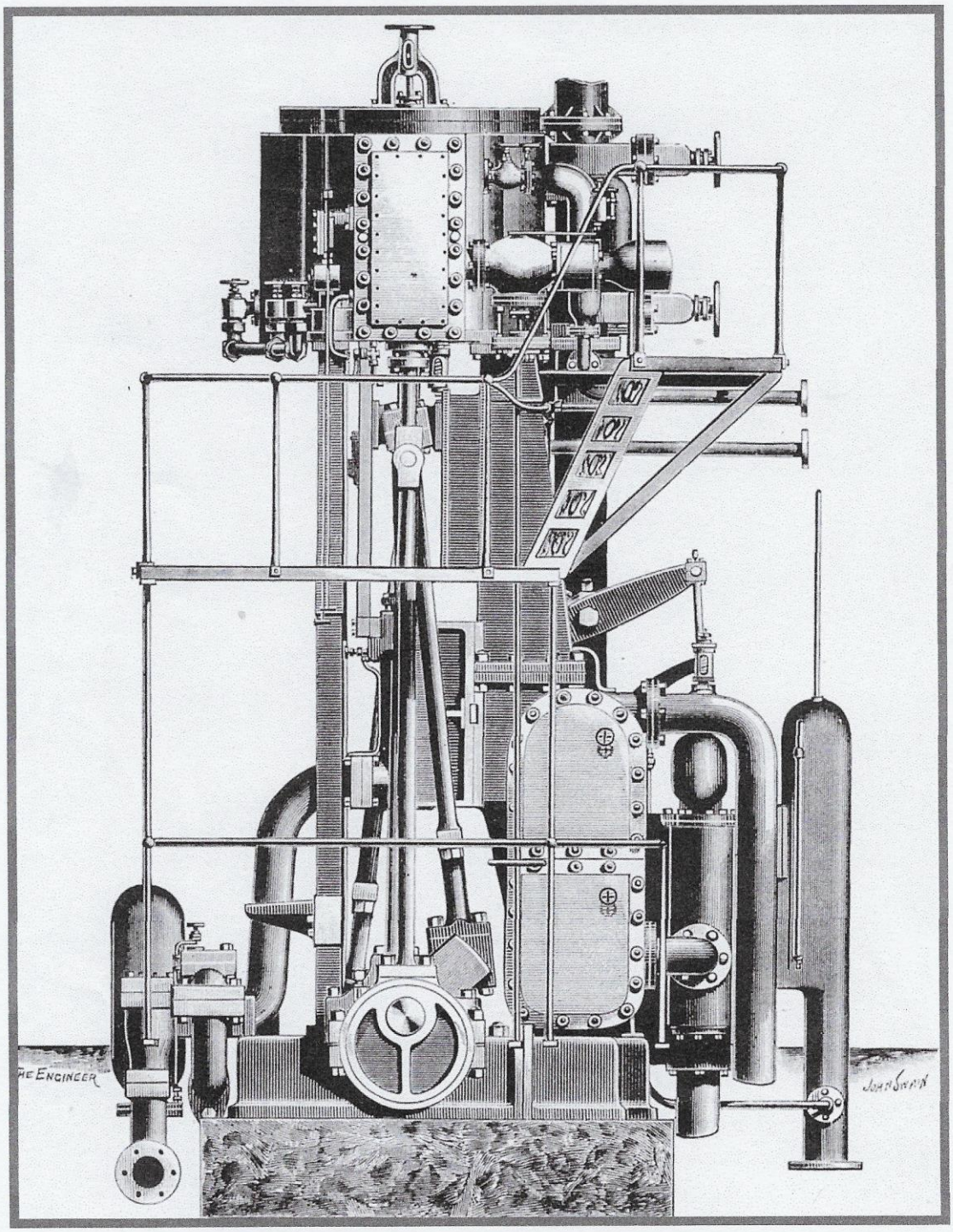
THE LONDON HYDRAULIC POWER COMPANY



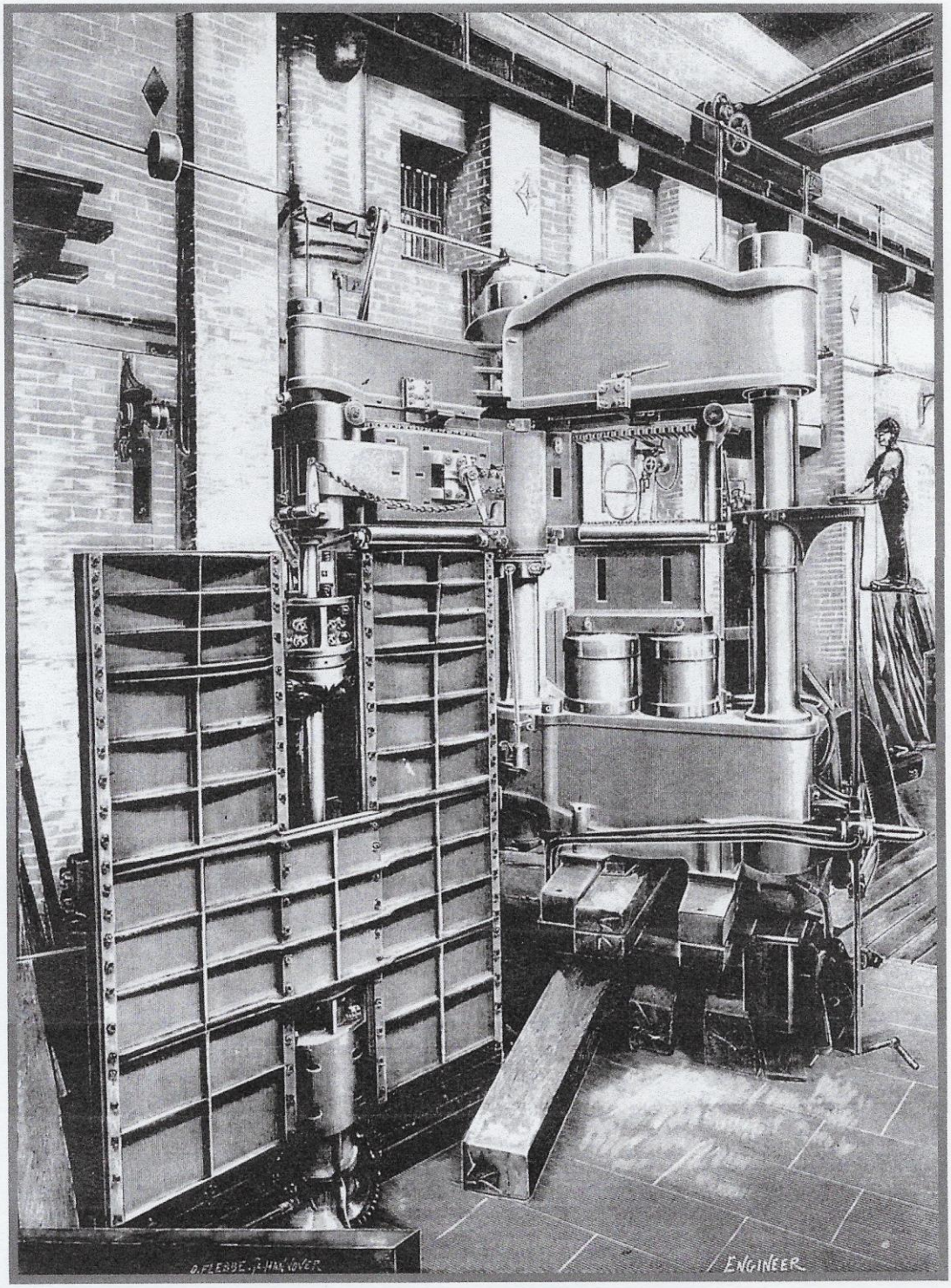
The London Hydraulic Power Company's Station, Wapping, 1893



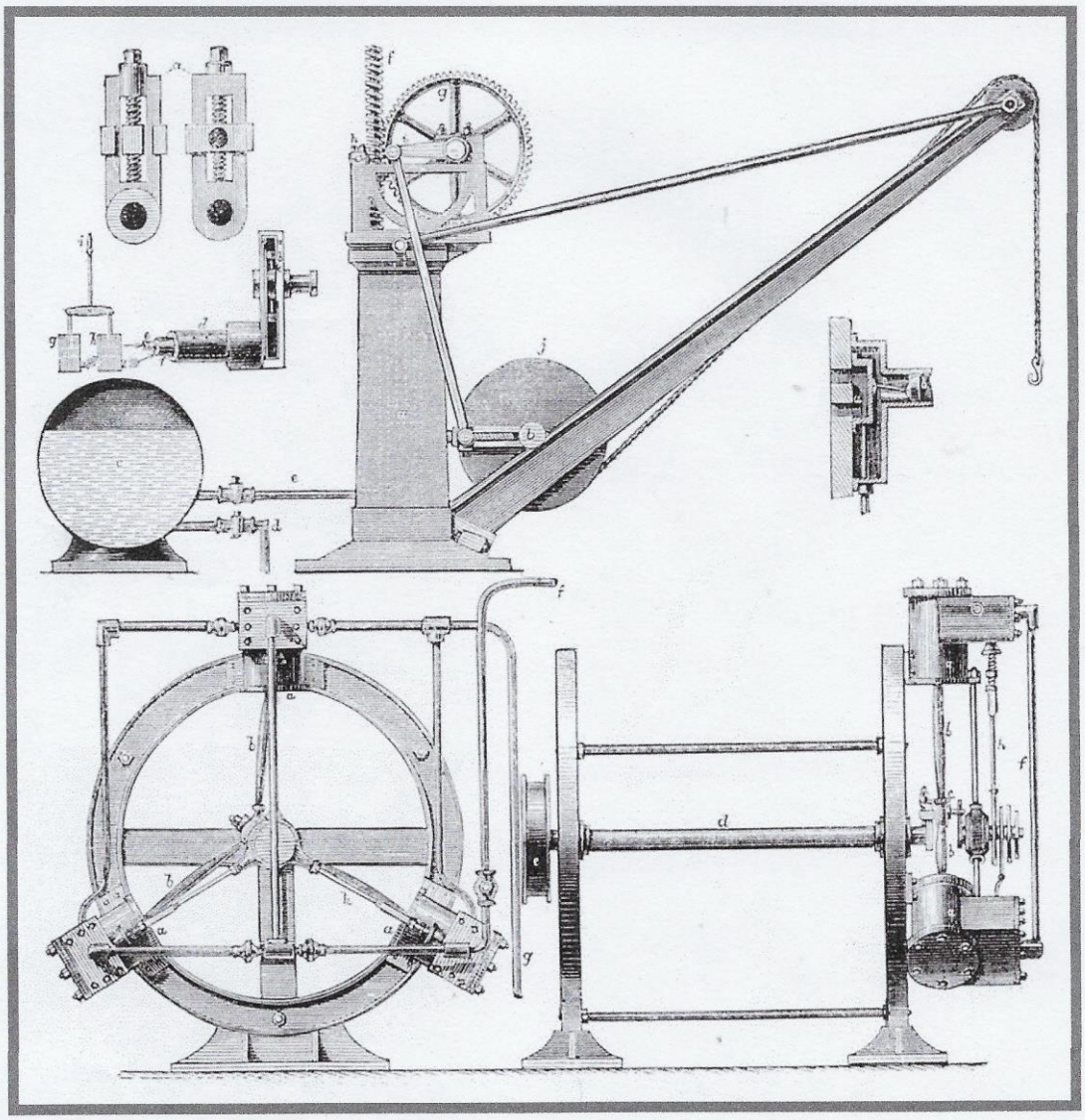
Engines and Pumps in the Hydraulic Power Company's Station at Deptford, 1893 by the Hydraulic Engineering Co of Chester



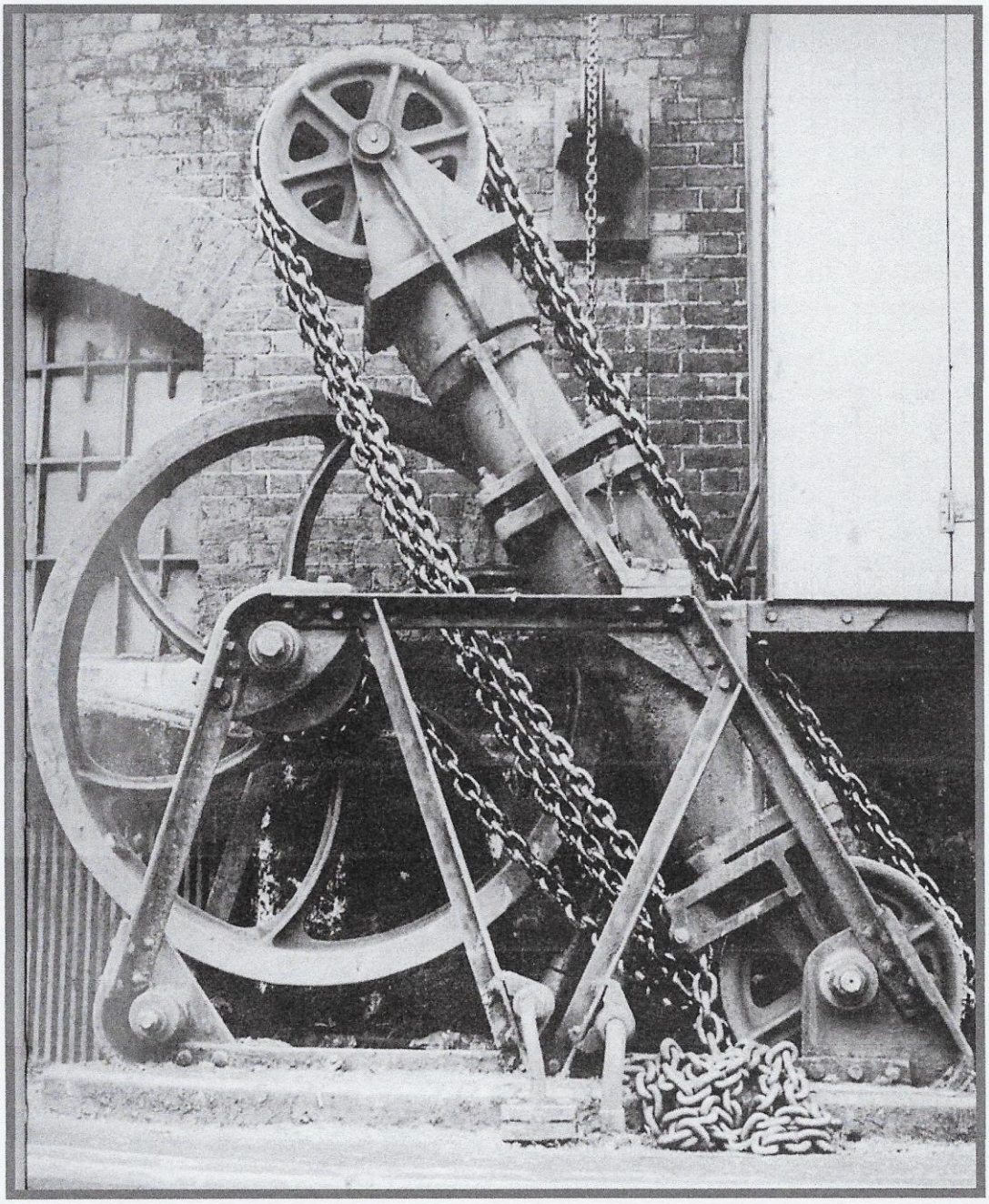
End view of engines and pumps installed in the London Hydraulic Company's Wapping Station, 1893



Cyclone Hydraulic Baling Presses, 1891
By Fawcett, Preston & Company, Liverpool
(To appreciate the size, note the man at centre height, extreme right)



Crane with Knowelden & Edwards Hydraulic Engines, Patent of 1858



Hydraulic Devil (Dockside Crane) at St Katherine's Docks in London

"London under London," Richard Trench & Ellis Hillman, 1984
(CIBSE Heritage Group Collection)

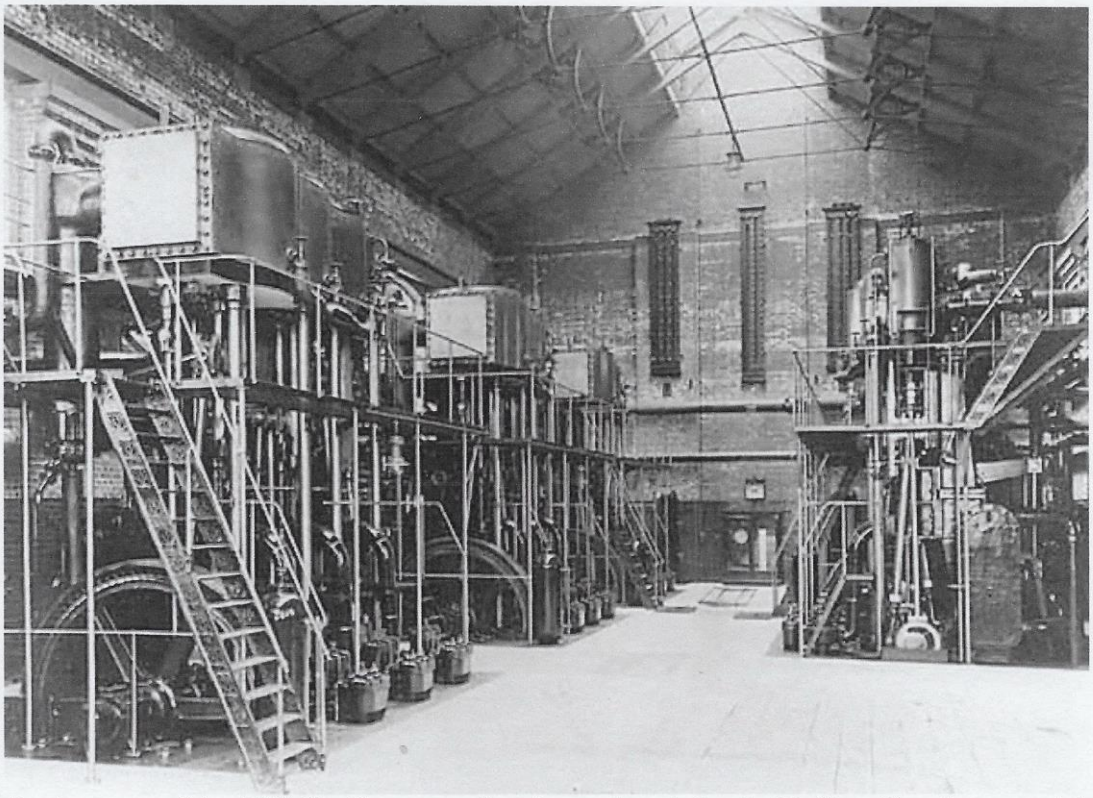
Replacing LHP Co. hydraulic mains in Piccadilly around 1930. The original cast-iron pipes with oval flange spigot and faucet joints are being removed and replaced with new steel pipes using Victaulic joints. Mercury Communications press photo.

Most of the pipes run just below the streets, although an important linking main ran through the old Tower Subway beneath the Thames (just west of Tower Bridge). Hydraulic power raised the curtain at the Royal Opera House, rotated the turntable at the Coliseum, raised lifts at the Bank of England (and thousands of other offices and flats) and opened dock gates on the Thames. In its heyday the company's hundreds of workers pushed out up to 30 million gallons a week at 850 pounds per square inch from its six pumping stations. Then everyone from hotels, gasworks and rail depots to the Tate Gallery, Tower Bridge and West End theatres used the system wherever lifting power was needed.

Soon before the redundant piece of Victorian high technology was bought by a business consortium for £1.2 million, the company's managing director, Albert Heron, who had been working for the company since 1935, was in command of just half a dozen staff, who carried out maintenance on the pipes, ranging in diameter from 2 inches to l0 inches. He told a reporter: "'The cast-iron pipes are in excellent condition. The six-inch pipes are one inch thick"

The system covers an area from Kensington in the west to the East End docklands. Five pumping stations at Wapping, Bankside, Pimlico, City Road and East India Dock were closed, the sixth at Rotherhithe acting as the LHP Co. headquarters.

"All the machinery went for scrap, no one took any notice when we advertised it for sale," said Mr. Heron. "Now a lot of industrial archeologists are crying crocodile tears." The system's death knell was sounded in the 1950s when the Port of London Authority and the Gas Board turned to other methods and the big rail depots moved from central London. "Now it's like waiting for a rebirth," said Mr. Heron. "I'm looking forward to business bucking up again." [Adapted from The Free Weekender, 25th September 1981]

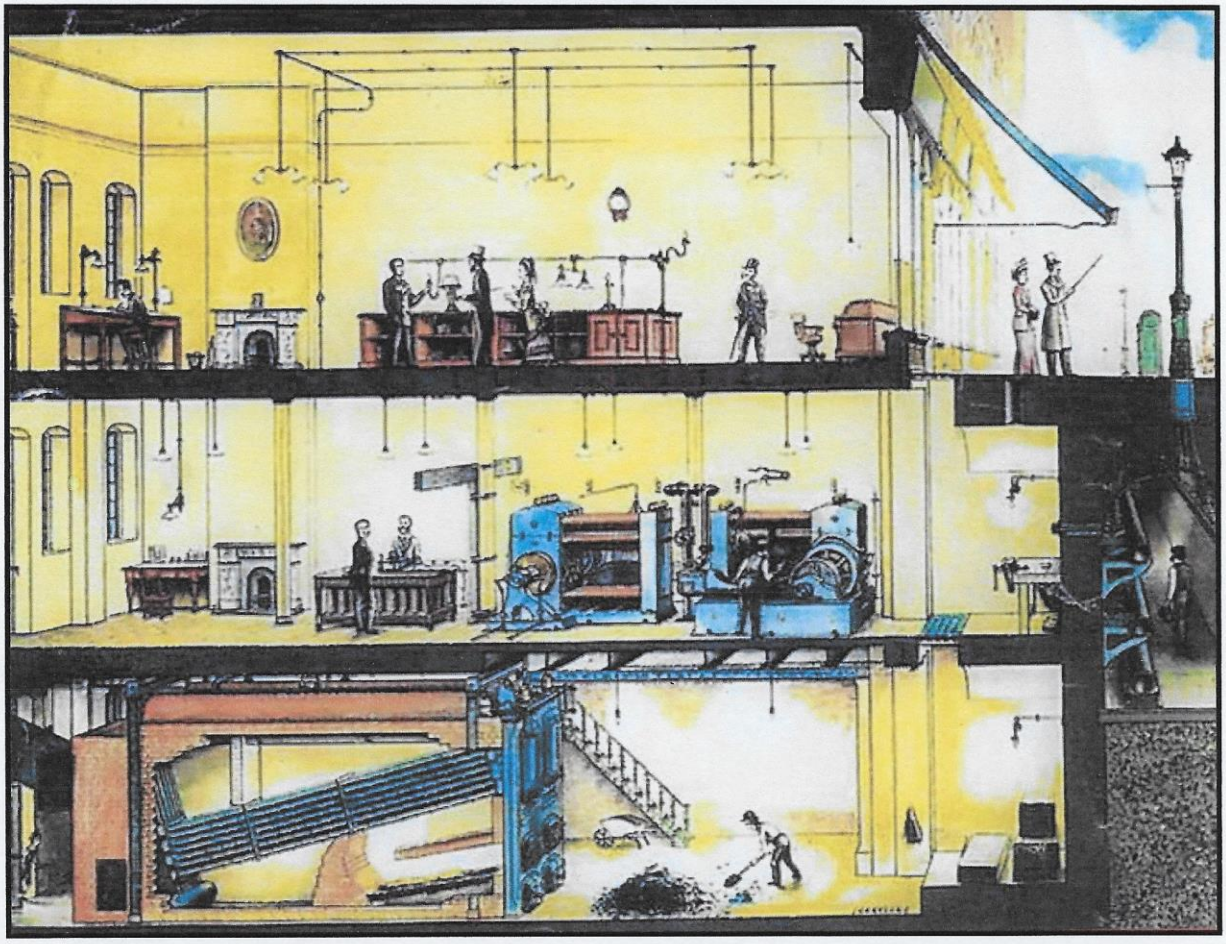


Engine room of the LHP Co. Grosvenor Road pumping station in Pimlico. The photo was taken in 1910, when the station was almost complete. The triple expansion steam engines drive high-pressure pumps. Mercury Communications press photo.

WHAT'S LEFT TO SEE

Not a lot is the simple answer. The Grade II*-listed Wapping Hydraulic Power Station on Wapping Wall has been transformed into a successful cultural amenity that has attracted international interest and has been compared favourably with the nearby Tate Modern. It was opened in October 2000 and belongs to the Women's Playhouse Trust. It was built by the London Hydraulic Power Company in 1892

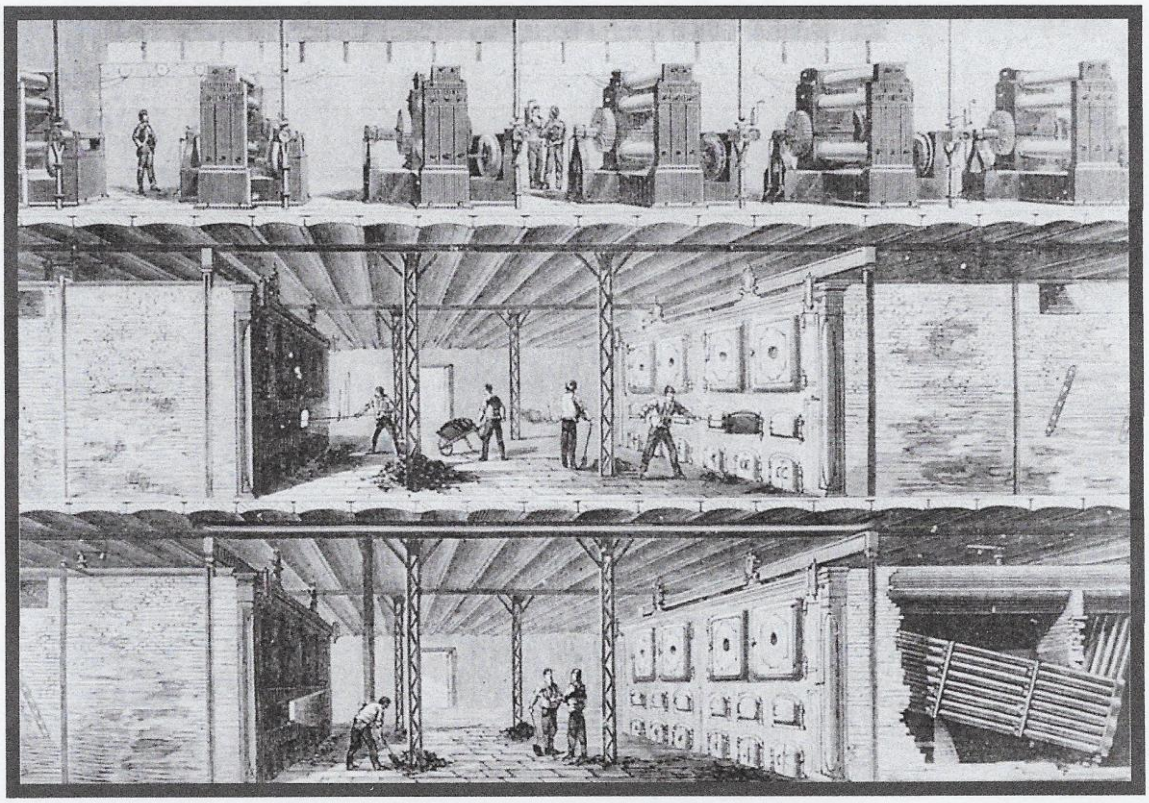
EDISON'S POWER STATION, HIGH HOLBORN, LONDON, JANUARY 1882

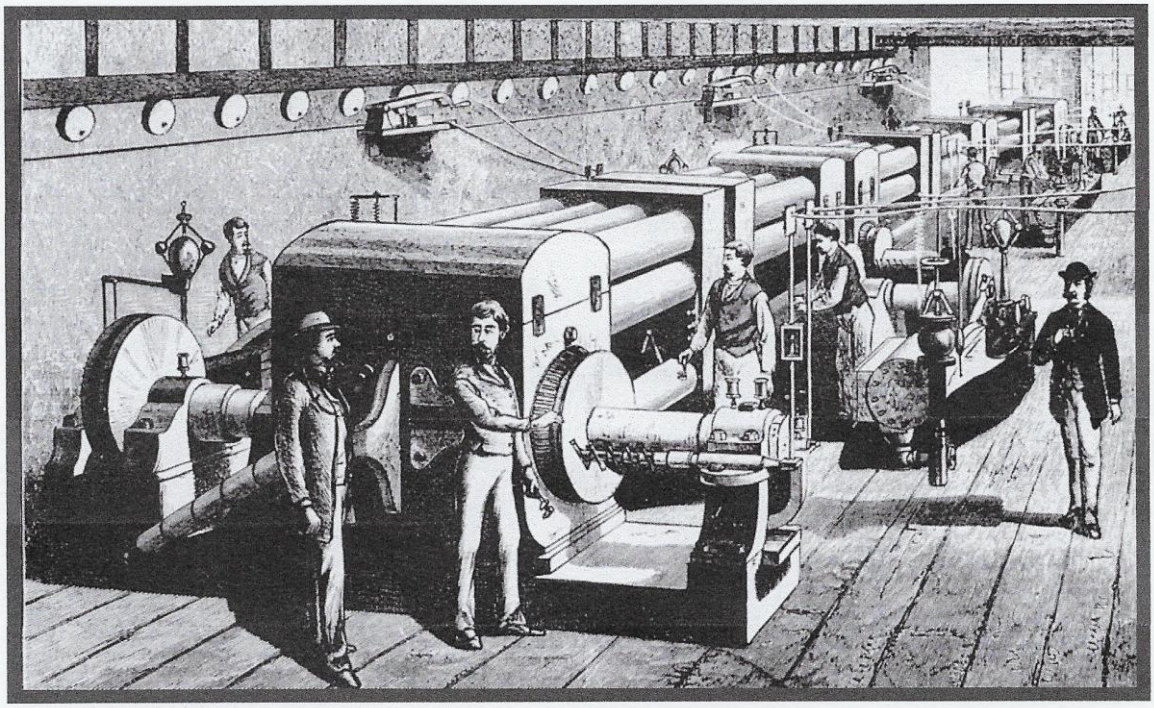


The Edison Electric Light Station at 57 Holborn Viaduct in London is believed to be the first public steam power station in the world to cater for the private consumer as well as for public lighting. It started to operate on the 12th January 1882, nearly a year before the much larger and highly publicised Pearl Street Station in New York (often quoted as the first).

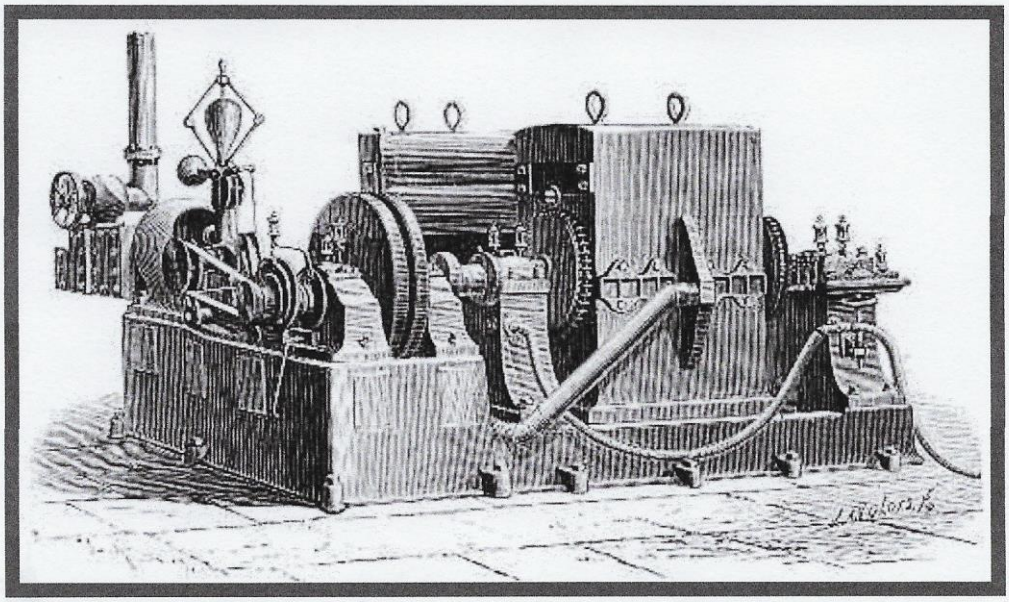
One report describes the installation: "Distribution was by DC at about 110 V by the two-wire system. Holborn Viaduct had roomy subways that carried the mains without the expense and legal problems of digging up streets. The two copper conductors were fixed in insulating material and carried in wrought iron pipes. Current for street lamps and for private consumers was taken…….via distribution boxes."

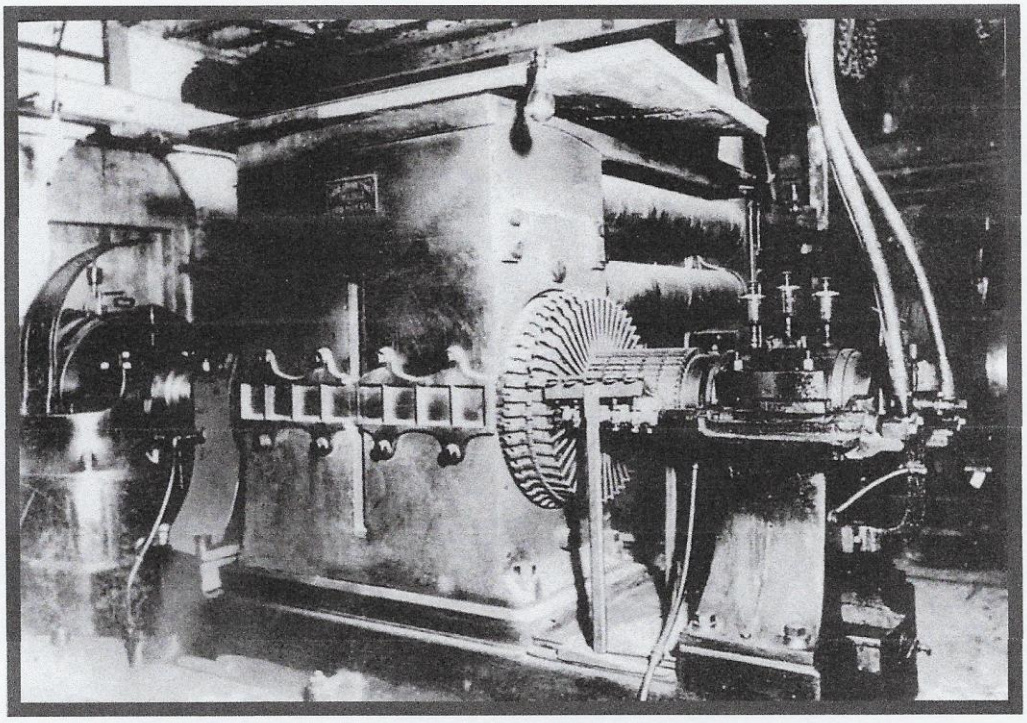
The initial system had 968 lamps (400 being added later) originally supplied from two Edison American built "Jumbo" dynamos, each driven by a 125 horsepower Porter-Allen horizontal steam engine connected to a Babcock & Wilcox water-tube boiler. Edison considered this, his experiment, satisfactory from the technical viewpoint, but it was running at a loss and he closed it down in September 1886.



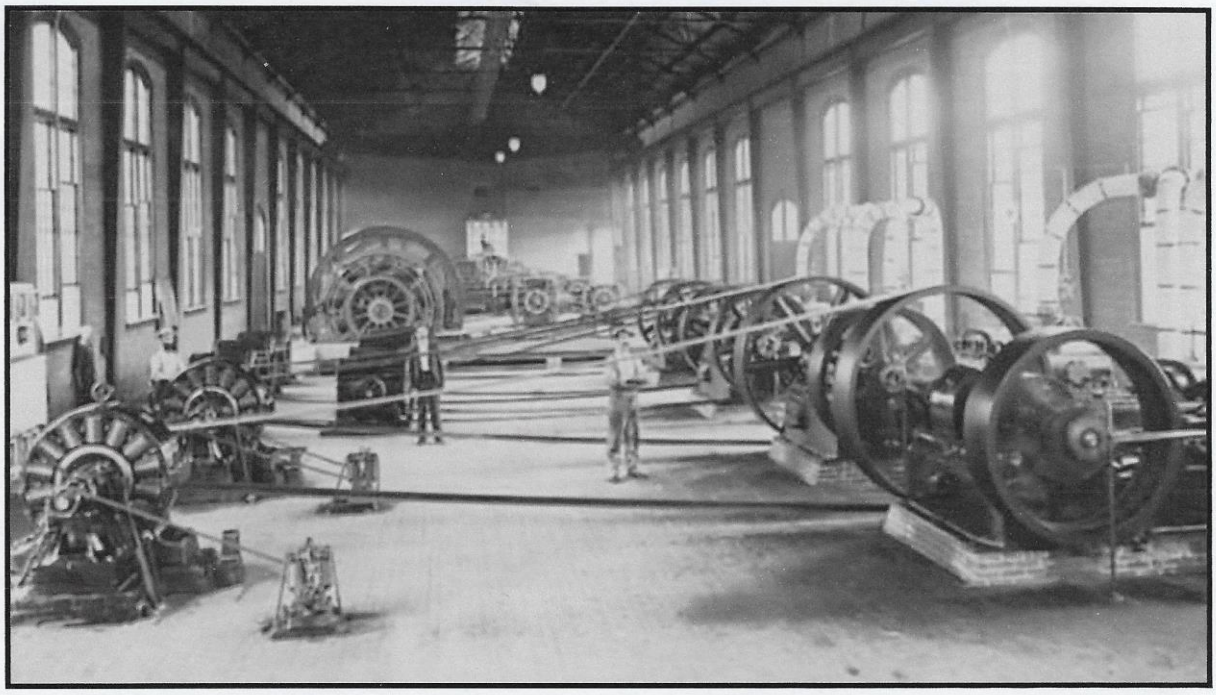


Edison's Pearl Street central station for electric lighting in New York, 1882
"Victorian Inventions"

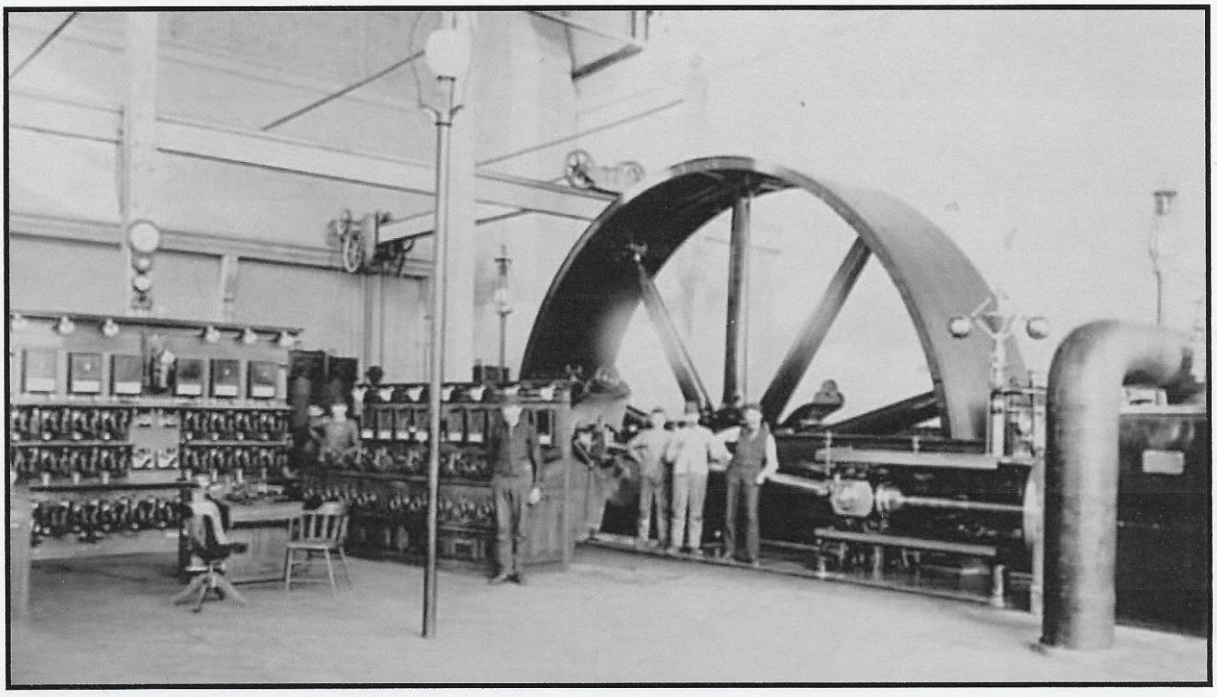




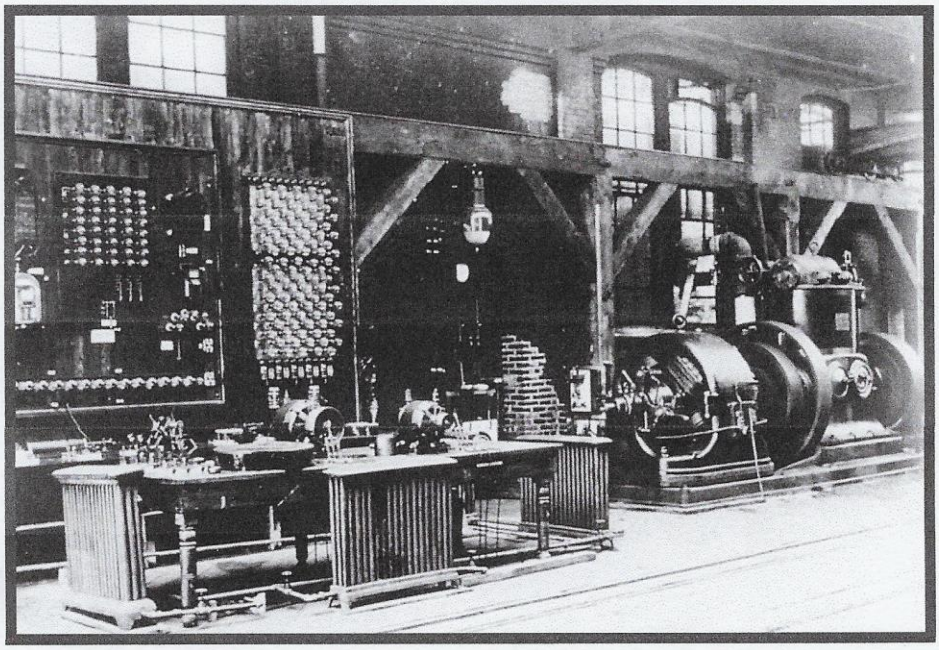
Edison's "Jumbo" dynamo from Pearl Street



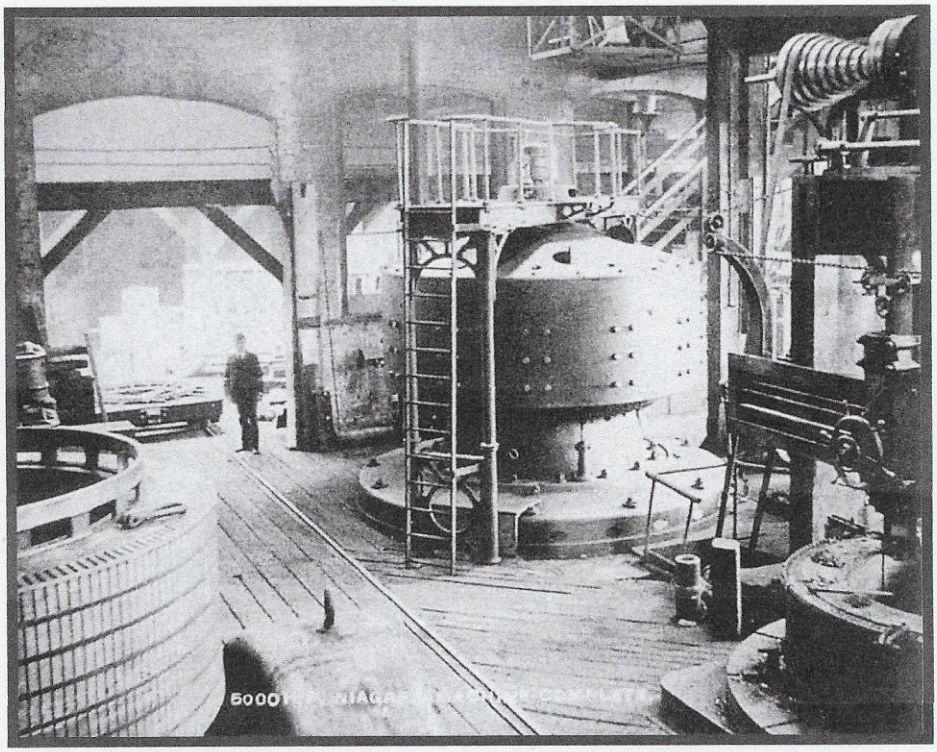
An early Edison electric light direct current power station



Edison electric light power station



Laboratory where Tesla and Westinghouse developed alternating current apparatus

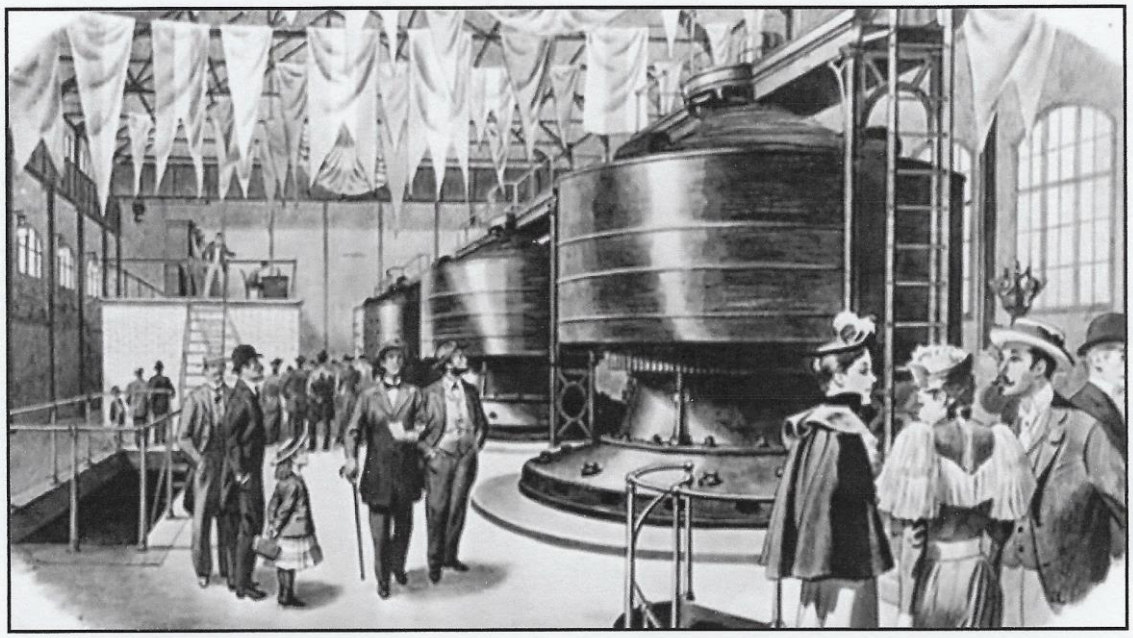


Niagara Falls power Station during construction, 1895
The first generator had a stationary internal armature and a revolving field for cooling

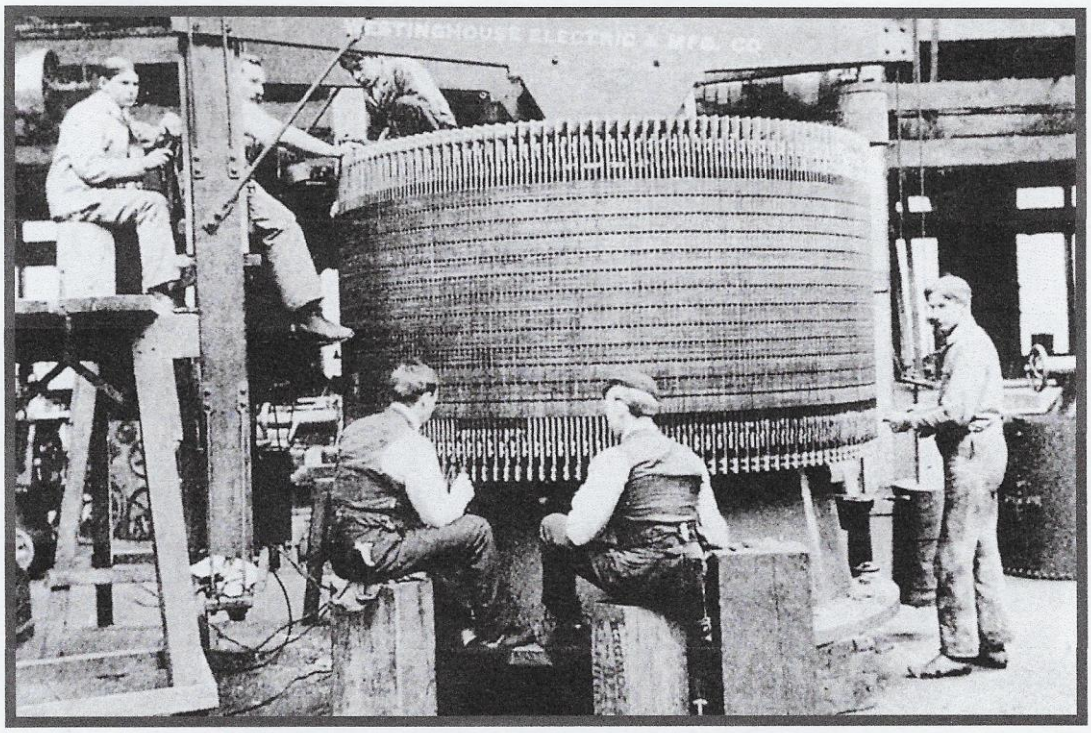
NIAGARA FALLS POWER STATION

In 1897, the famous Lord Kelvin (centre) visited George Westinghouse

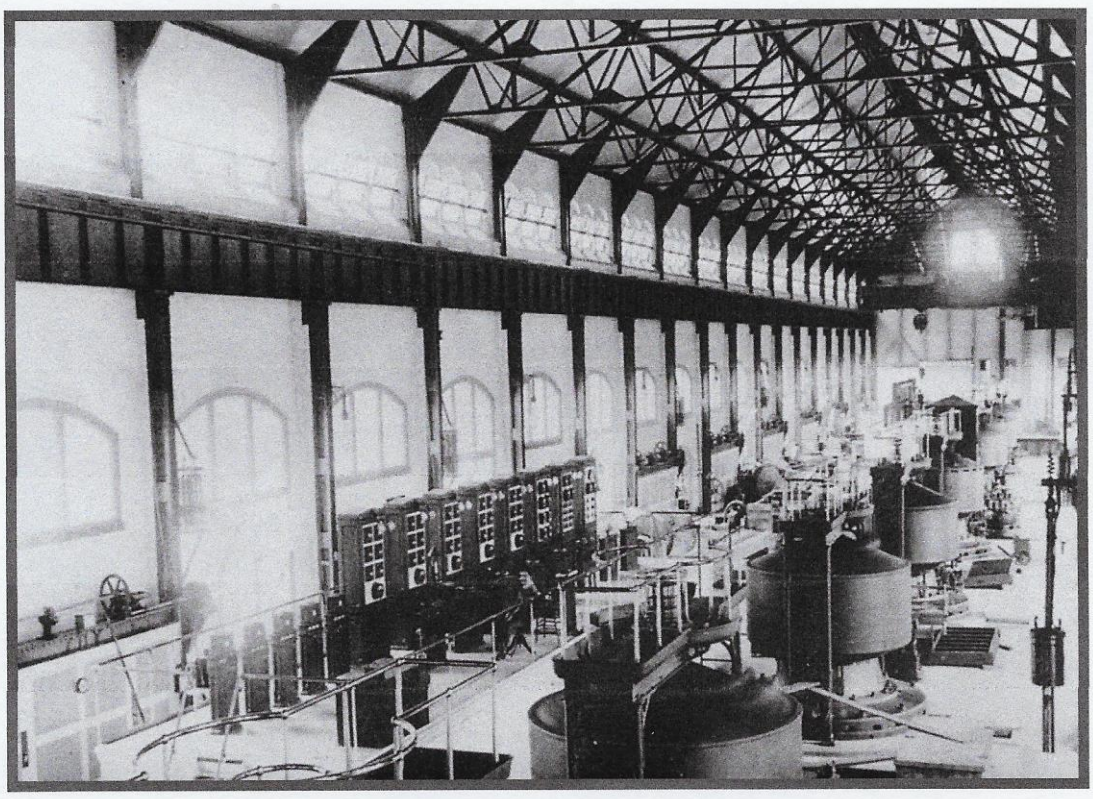
Lord Kelvin had previously been head of the Commission to advise on whether the Niagara Power Plant should be DC or AC. He favoured DC until having visited the Columbian Exposition he became convinced of the superiority of AC. Westinghouse was awarded the contract for the Niagara Falls Power Station in 1893



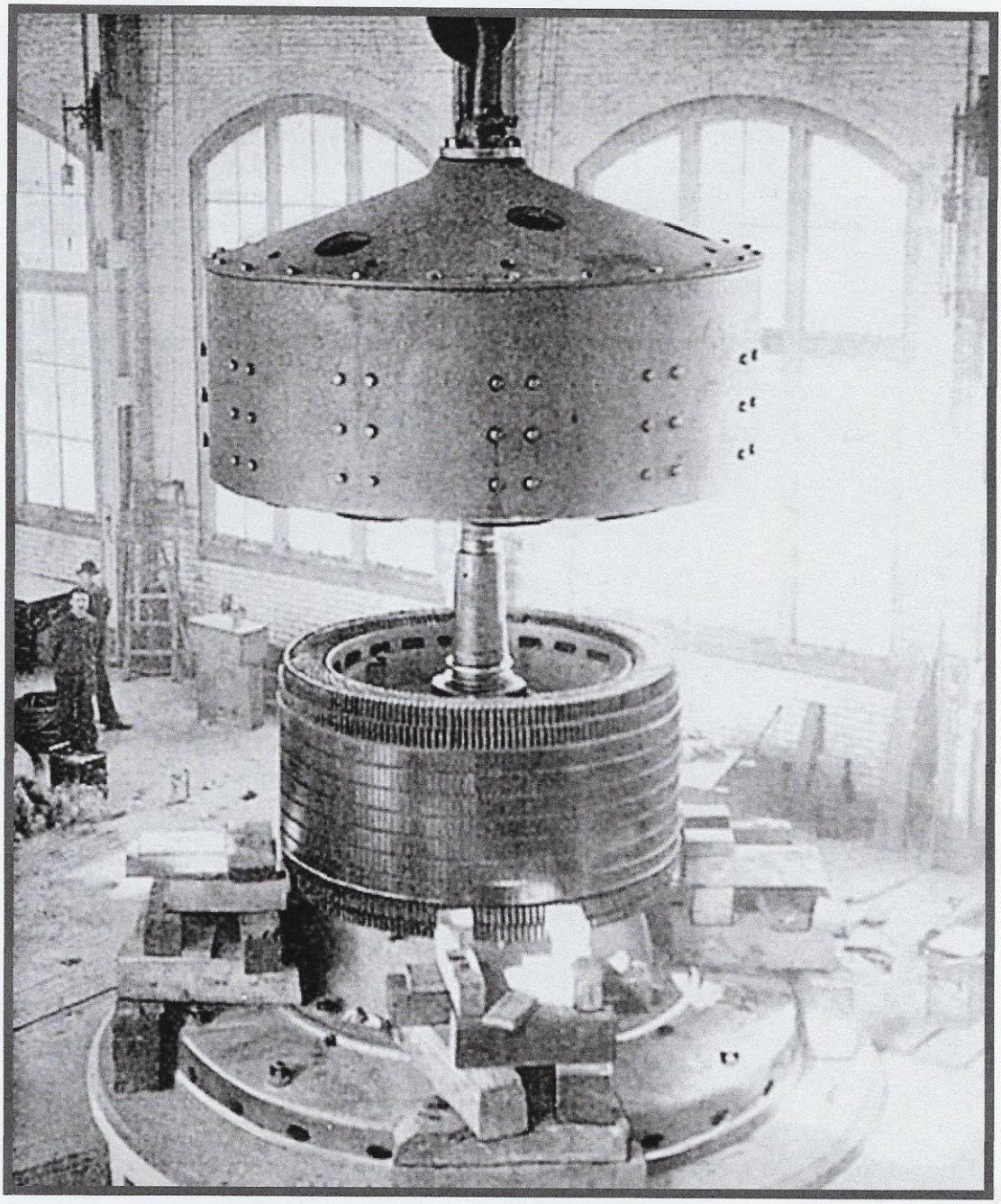
The opening of the first phase of the Niagara Falls hydroelectric power plant in 1896



Niagara generator under construction at Westinghouse, Pittsburgh in 1894

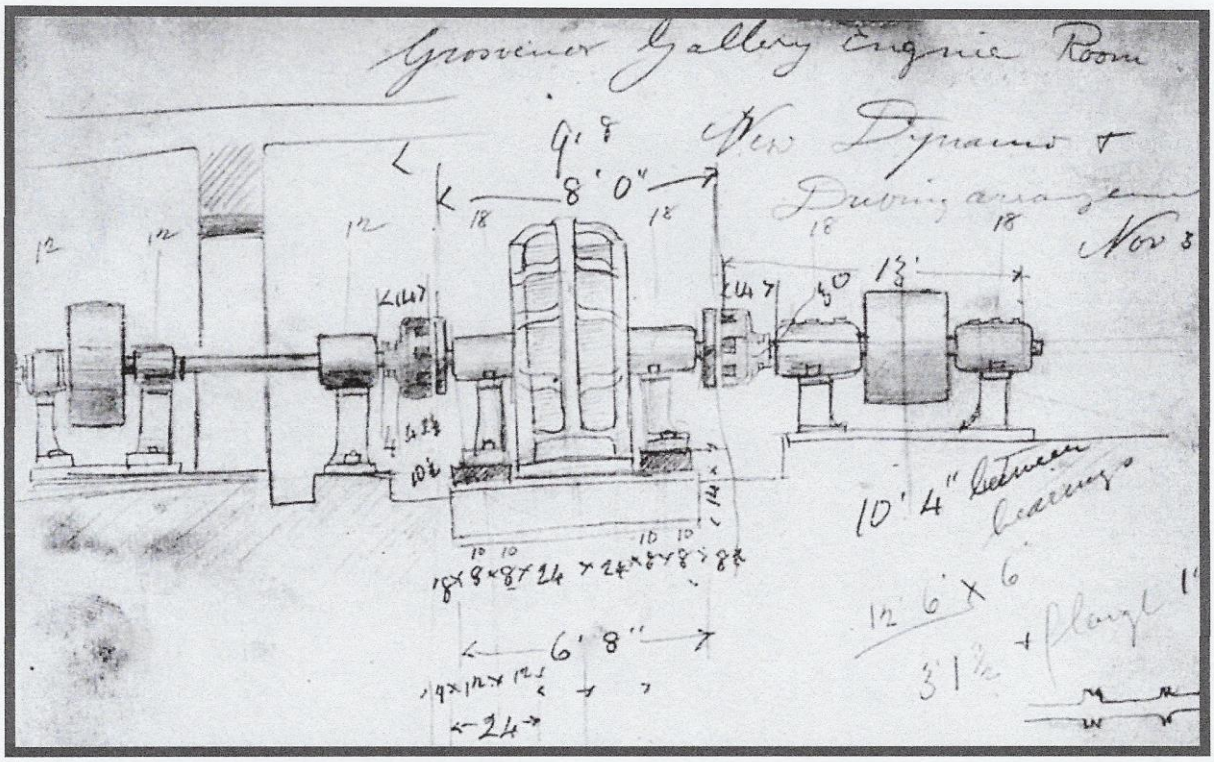


Edward Dean Adams Power Station at Niagara with ten 5,000 hp Tesla/Westinghouse AC generators

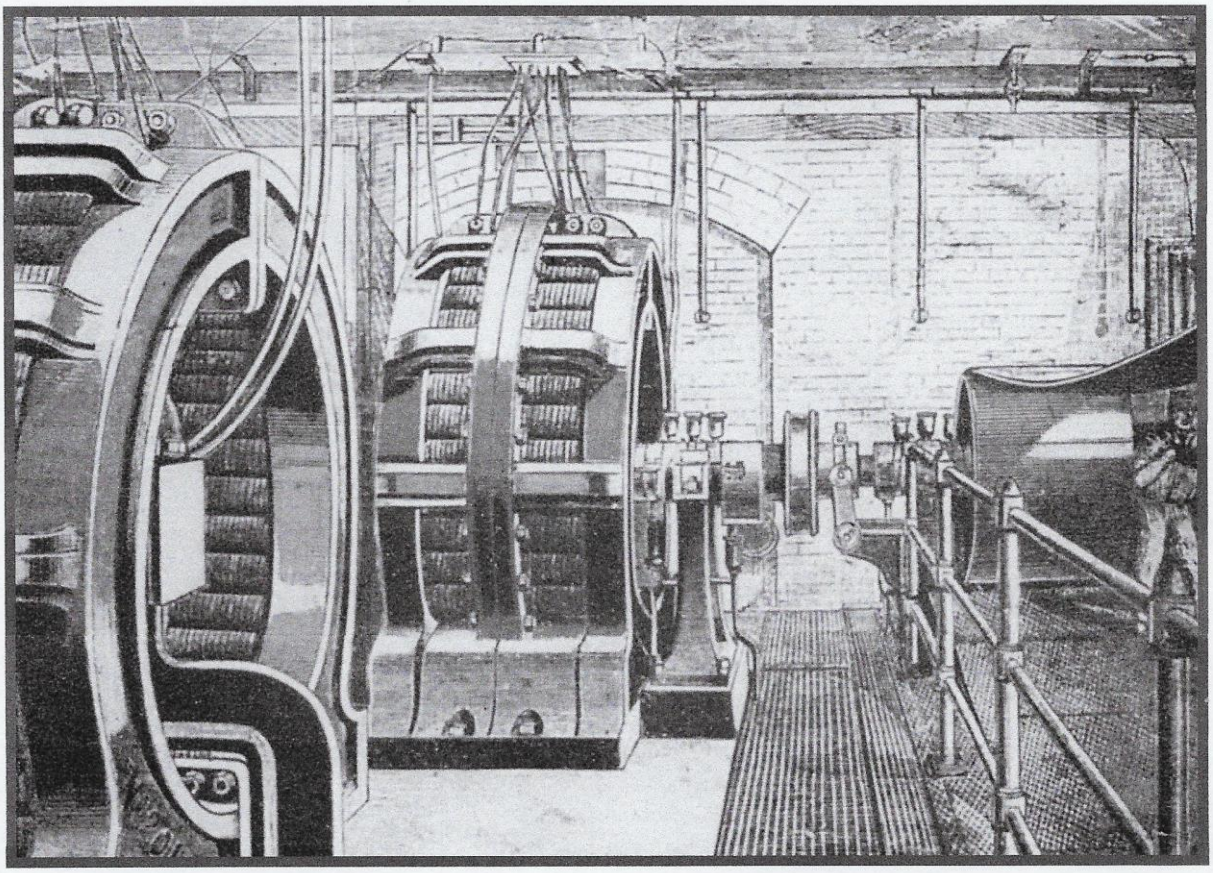


Assembling a generator

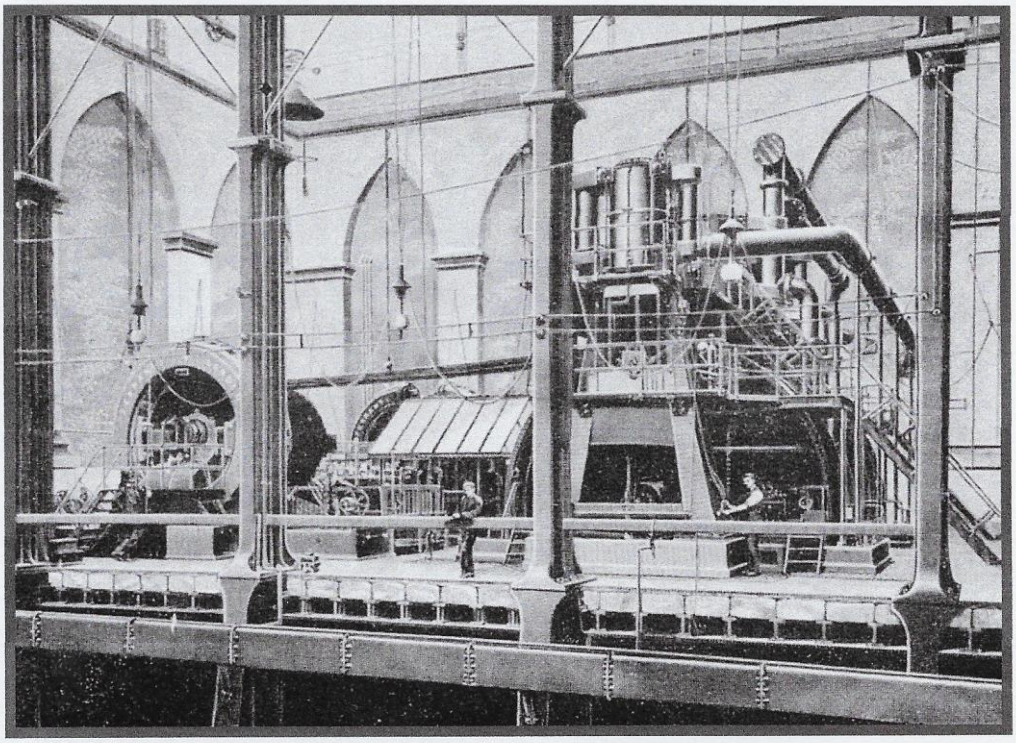
The generator hall at Niagara



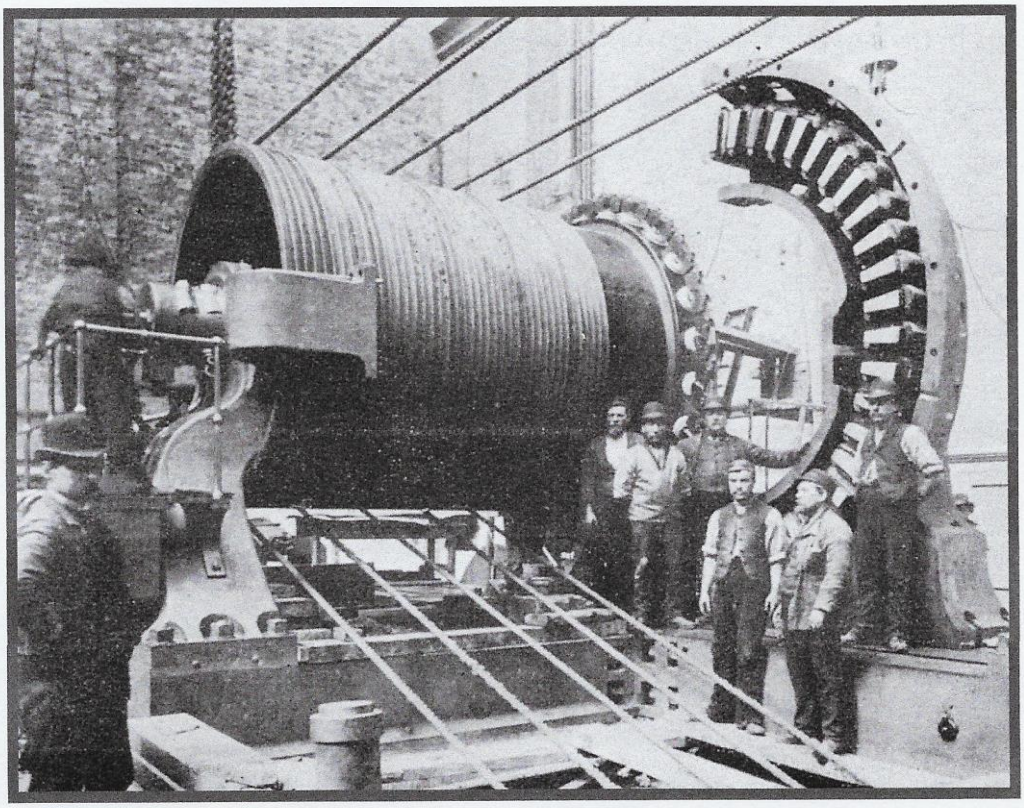
Ferranti's sketch design for the alternators at Grosvenor Gallery, London



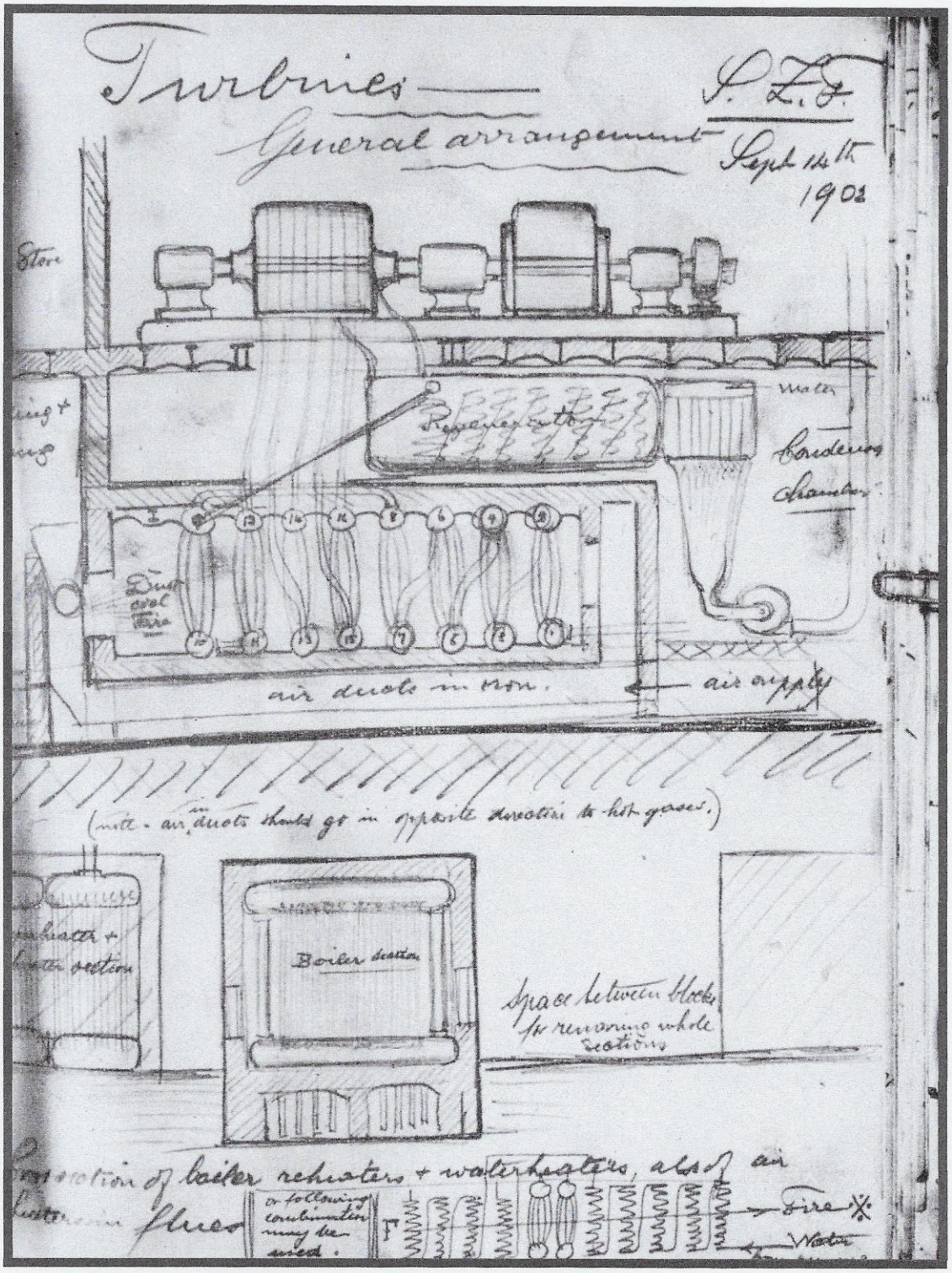
Ferranti 750 hp alternators at Grosvenor Gallery, 1887



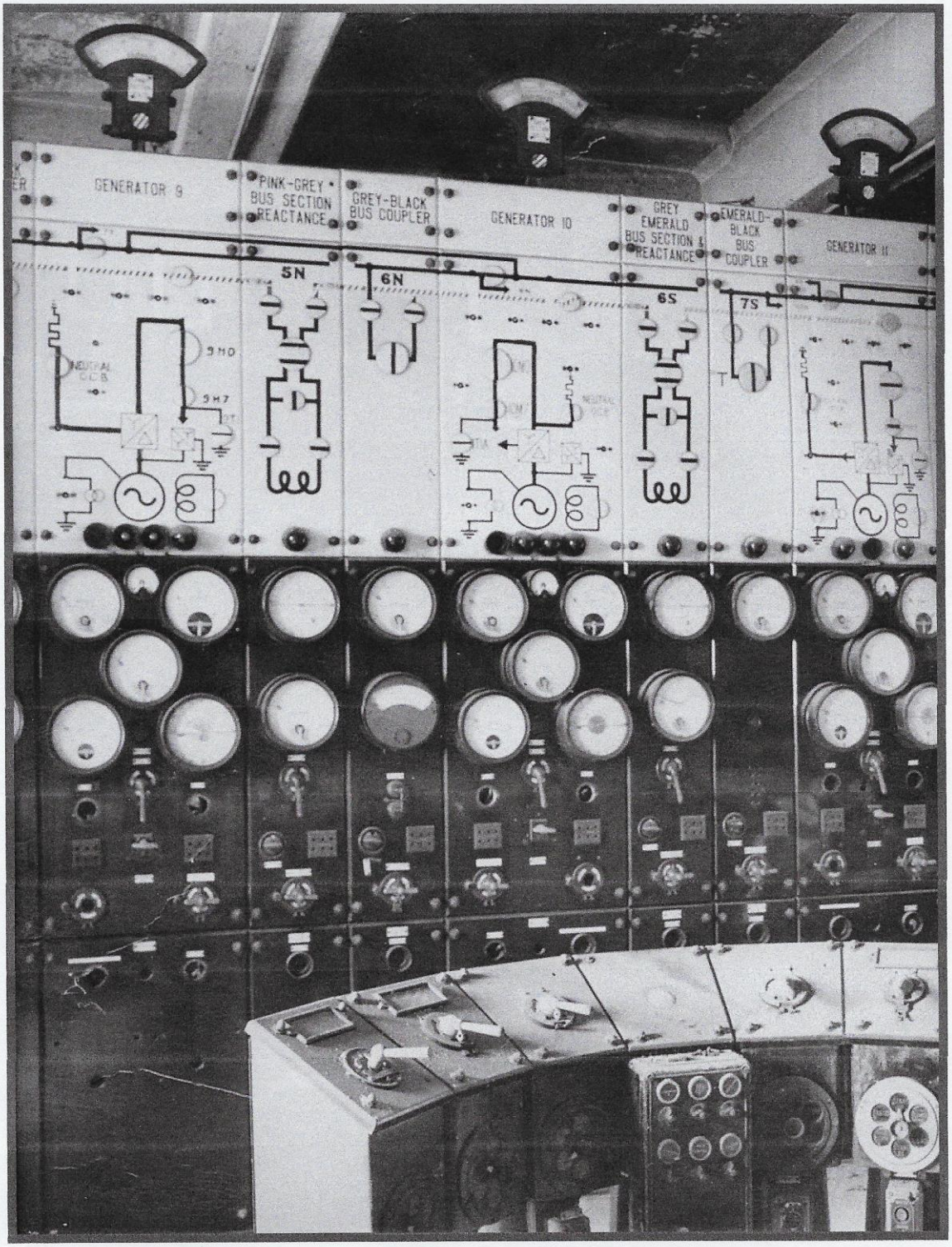
Ferranti 1000 KW alternators with 1500 hp Hick Hargreaves Corliss engines at Deptford, 1889



Ferranti alternator under erection at Deptford, 1889



Ferranti's notes of 1902 showing early ideas for steam turbine drive

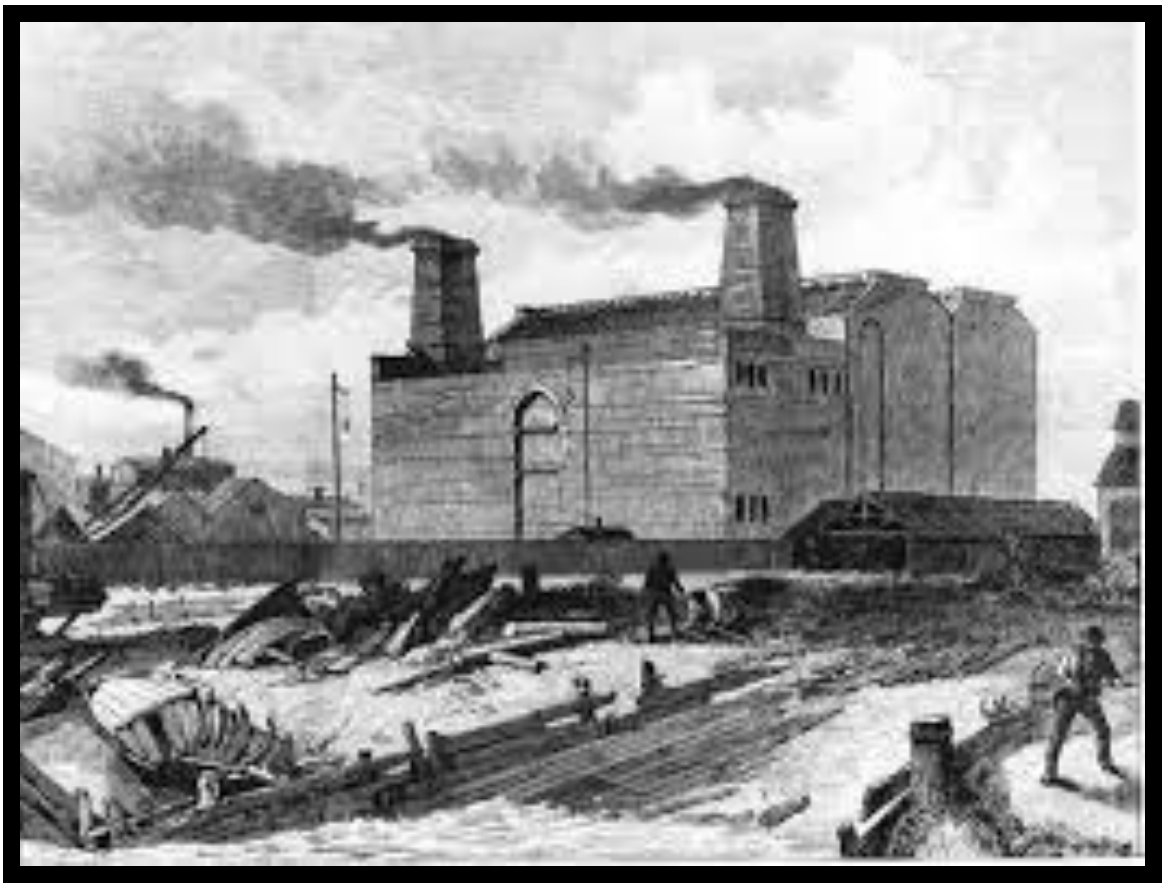


Barking Power Station, 1939
Poster from RCHM Exhibition "Recording London"
(CIBSE Heritage Group Collection)

Heritage Group visits have included Broomhill, Cragside, the Southern Electricity Museum in Christchurch and the Science Museum

BANKSIDE POWER STATION SOUTH LONDON

DEPTFORD POWER STATION SE LONDON



GREENWICH POWER STATION SE LONDON

DRAX POWER STATION UK LARGEST YORKSHIRE

KINGSNORTH POWER STATION THAMES ESTUARY

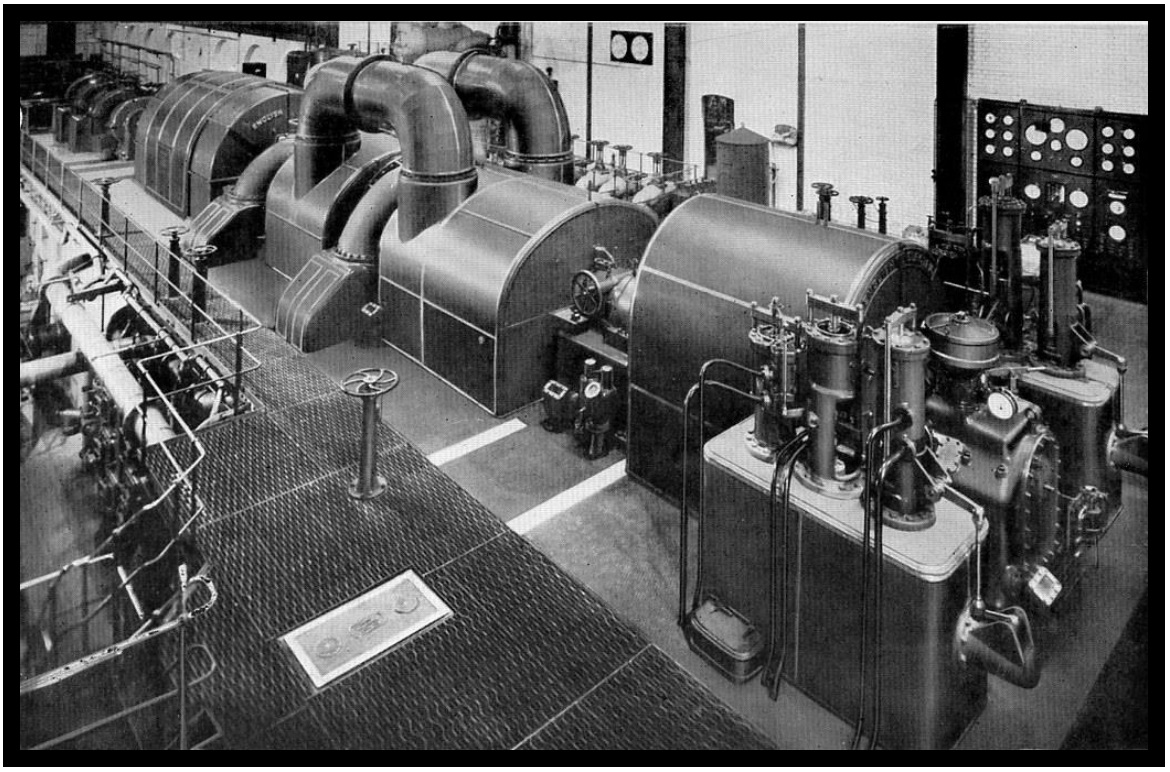
Hvdc power transfer, London installation

Abstract

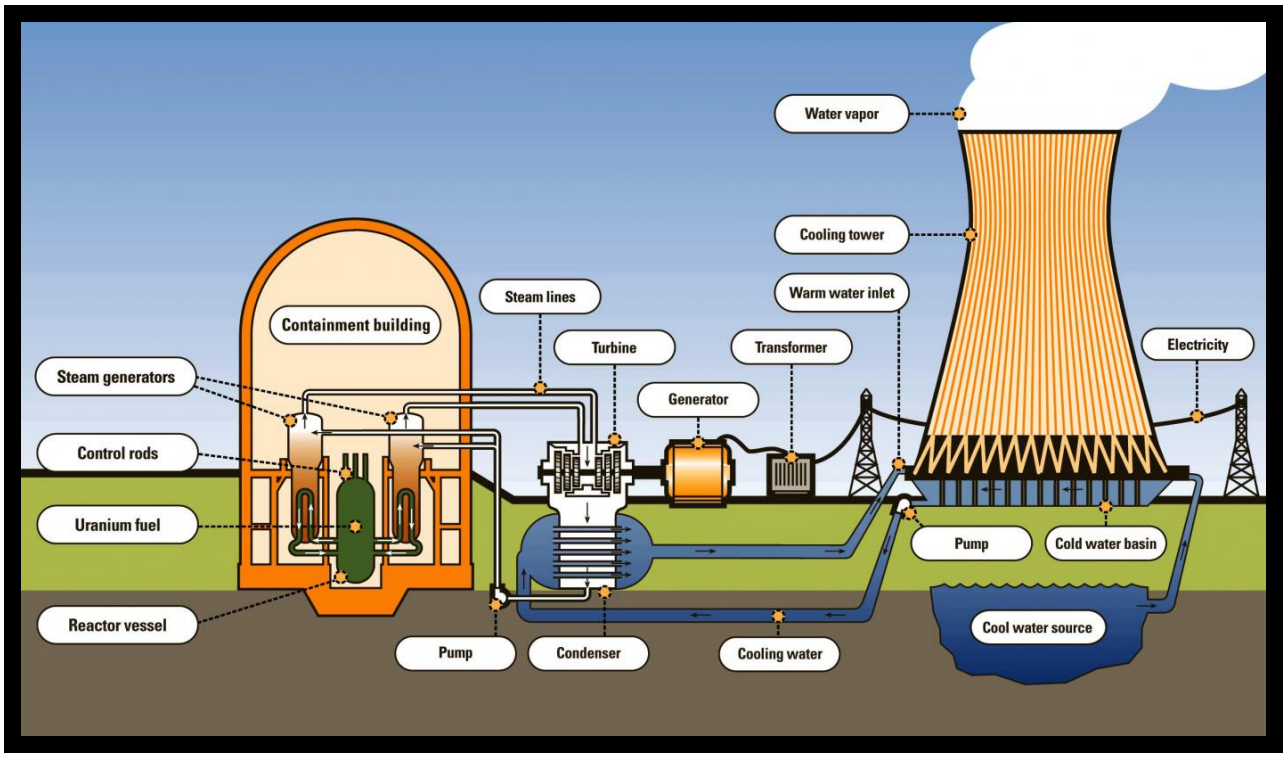
An advanced new dc transmission project, which is without parallel anywhere in the world, has been planned for London. English Electric will provide electrical conversion equipment worth 8.3 million pounds. In the scheme, due to be in service by 1970, underground cables will be used to transfer part of the power from a 2000-MW generating station now under construction at Kingsnorth on the Southern bank of the Thames Estuary to two points in London, Beddington, near Croydon, and Willesden.

BEDDINGTON POWER STATION NEAR CROYDON

WILLESDEN POWER STATION NORTH LONDON

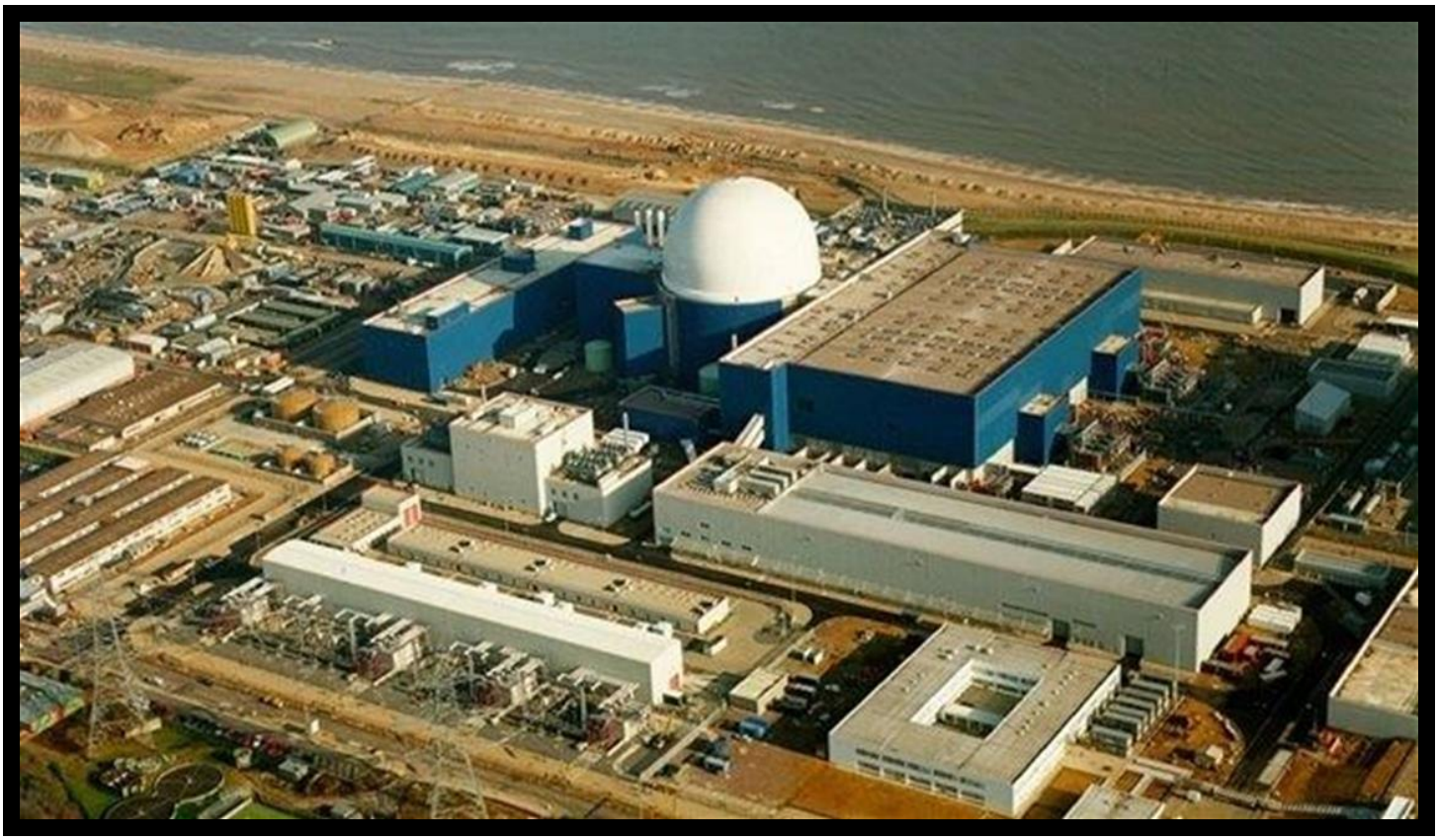


SCHEMATIC OF NUCLEAR POWER STATION



CALDER HALL NUCLEAR POWER STATION CUMBRIA

SIZEWELL B NUCLEAR STATION SUFFOLK



TURBINE HALL

HINKLEY POINT NUCLEAR POWER STATION SOMERSET

CENTRICA ELECTRIC BATTERY STATION

DINORIC HYDROELECTRIC POWER STATION WALES

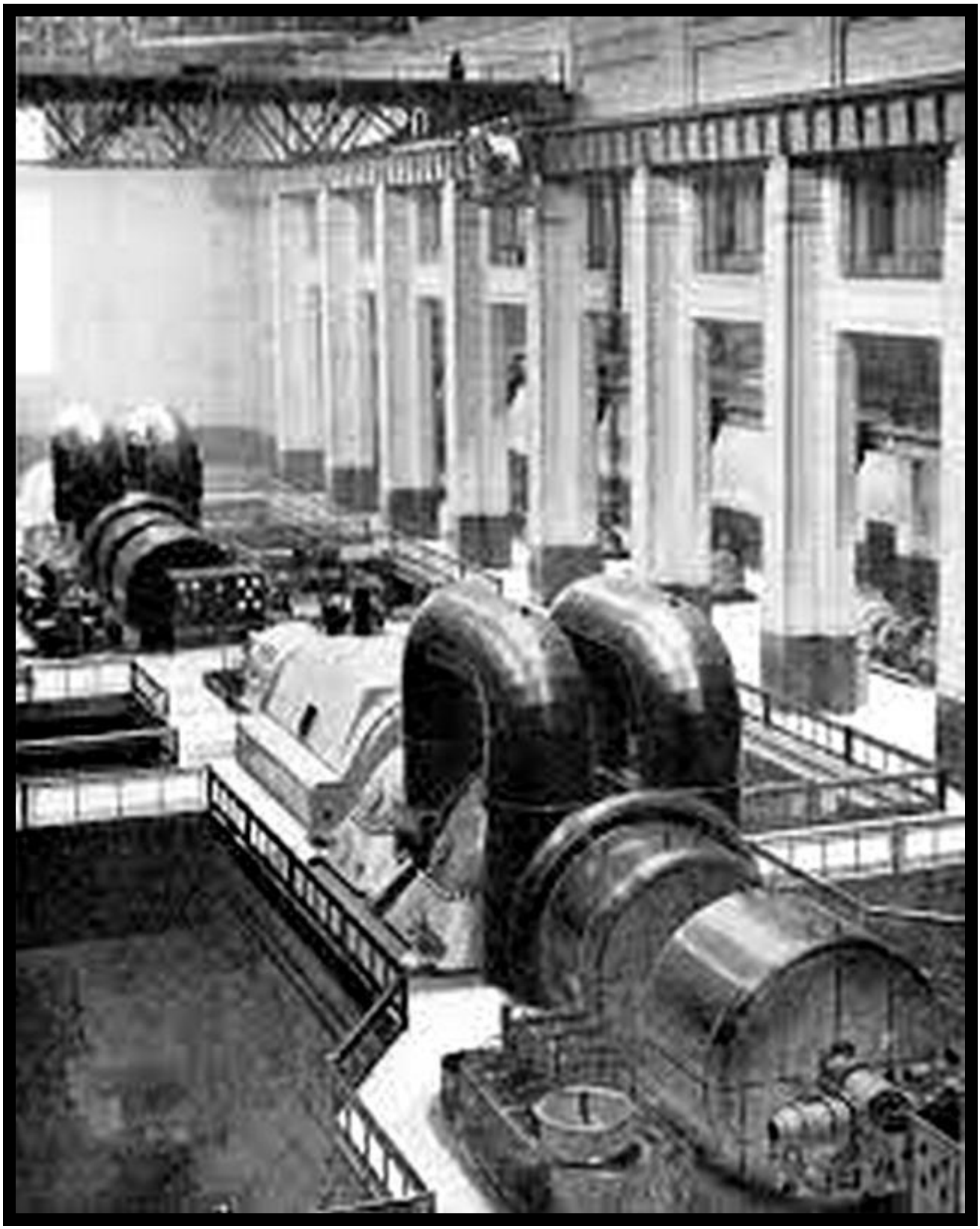
CRUACHAN HYDROELECTRIC POWER STATION SCOTLAND

BATTERSEA POWER STATION LONDON

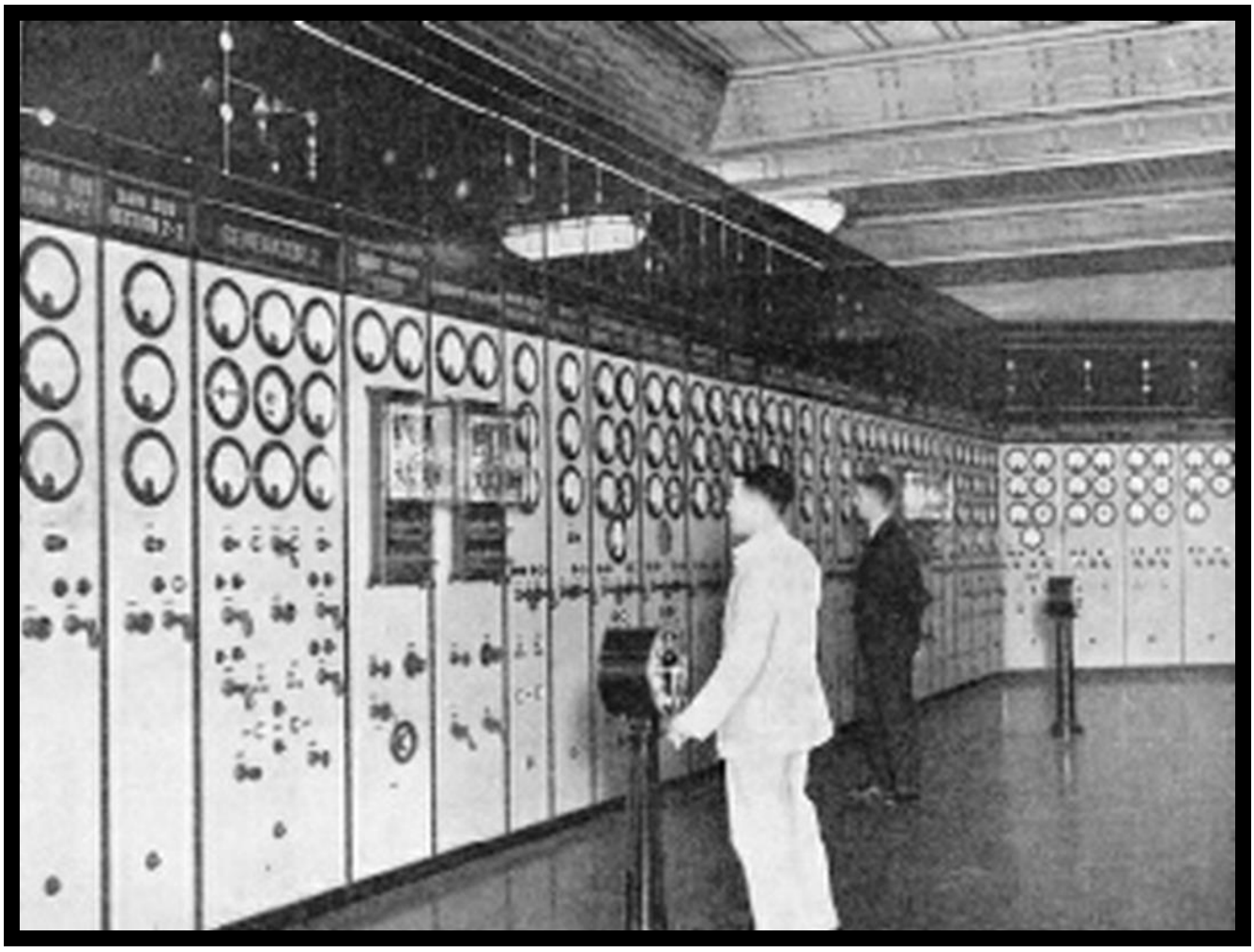
BATTERSEA POWER STATION "A" from 1935

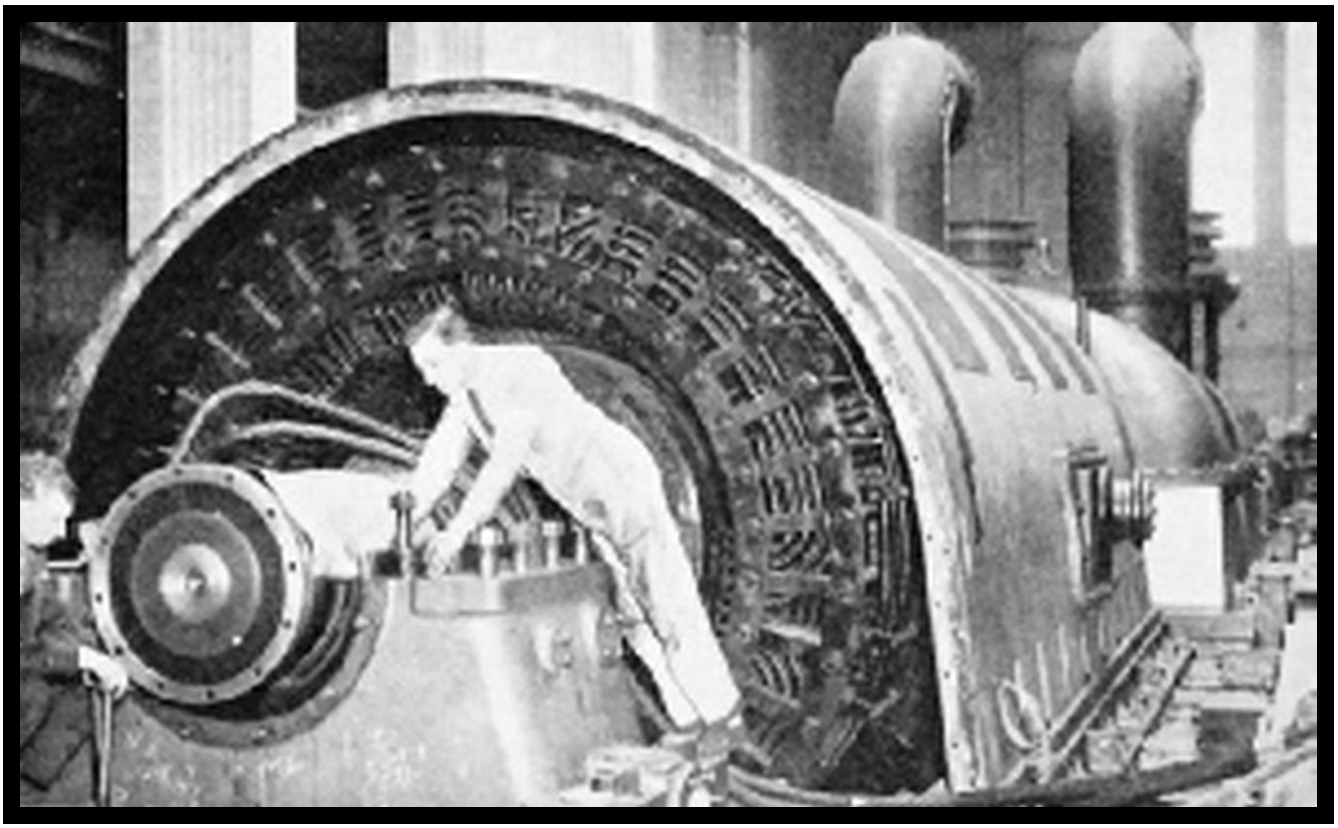
BATTERSEA POWER STATION "B" from 1944

BATTERSEA POWER STATION



BATTERSEA POWER STATION





BATTERSEA POWER STATION

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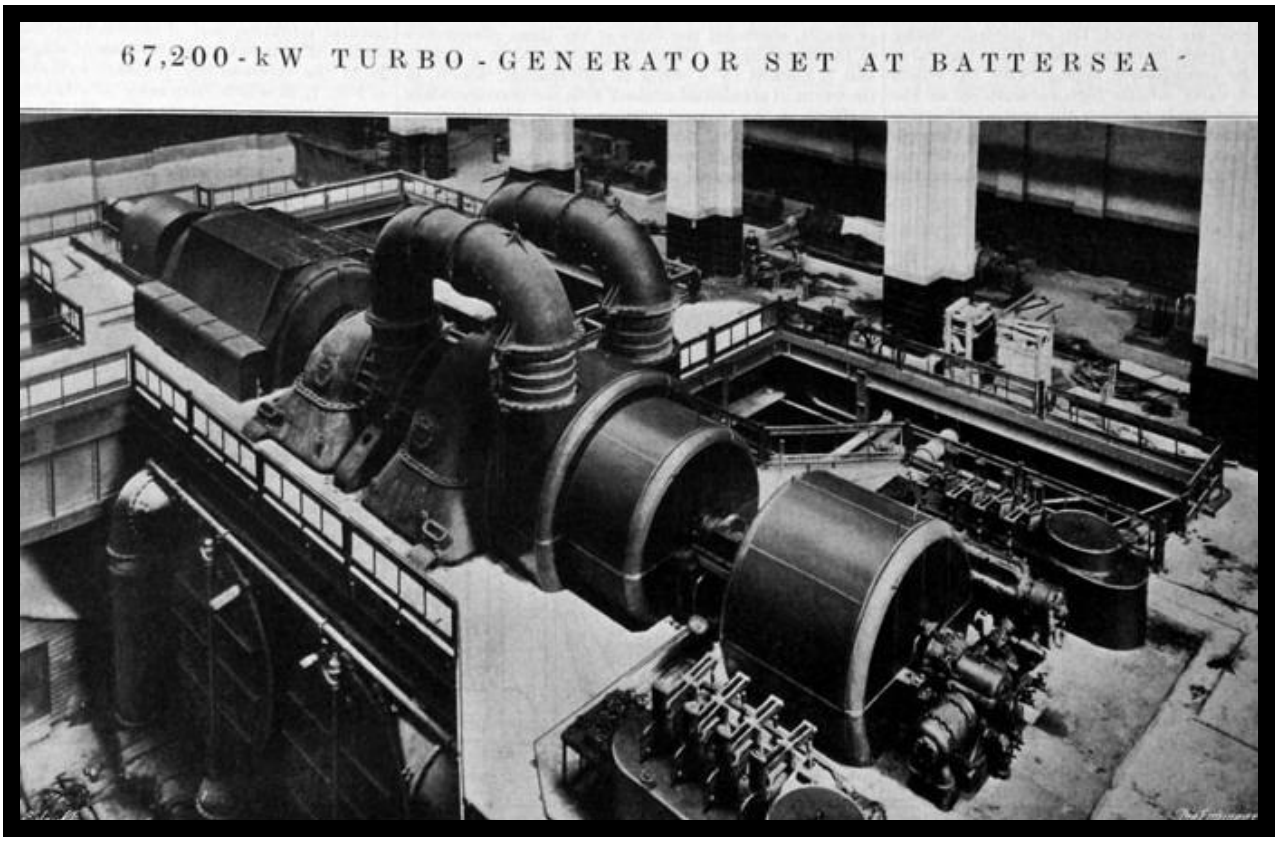
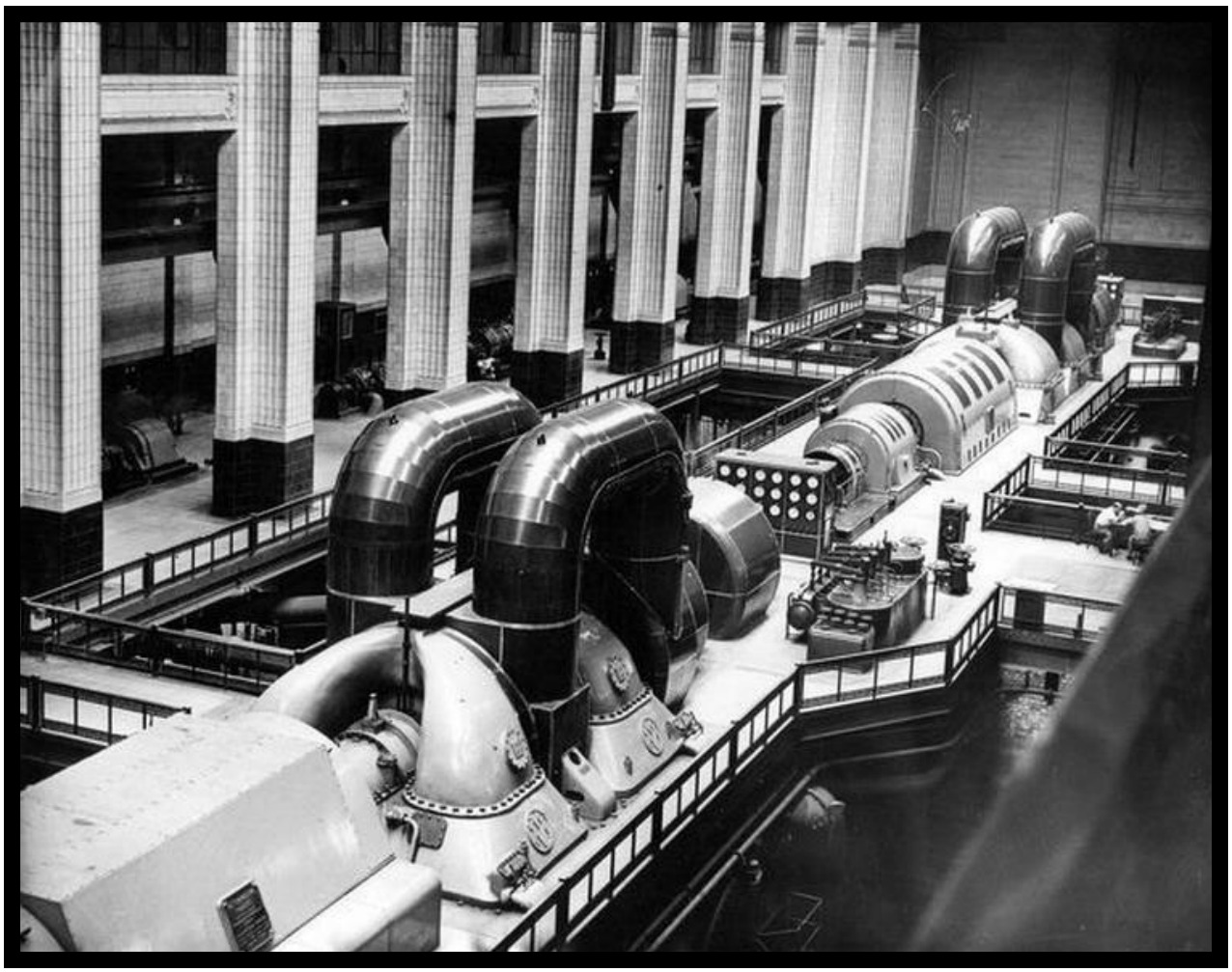
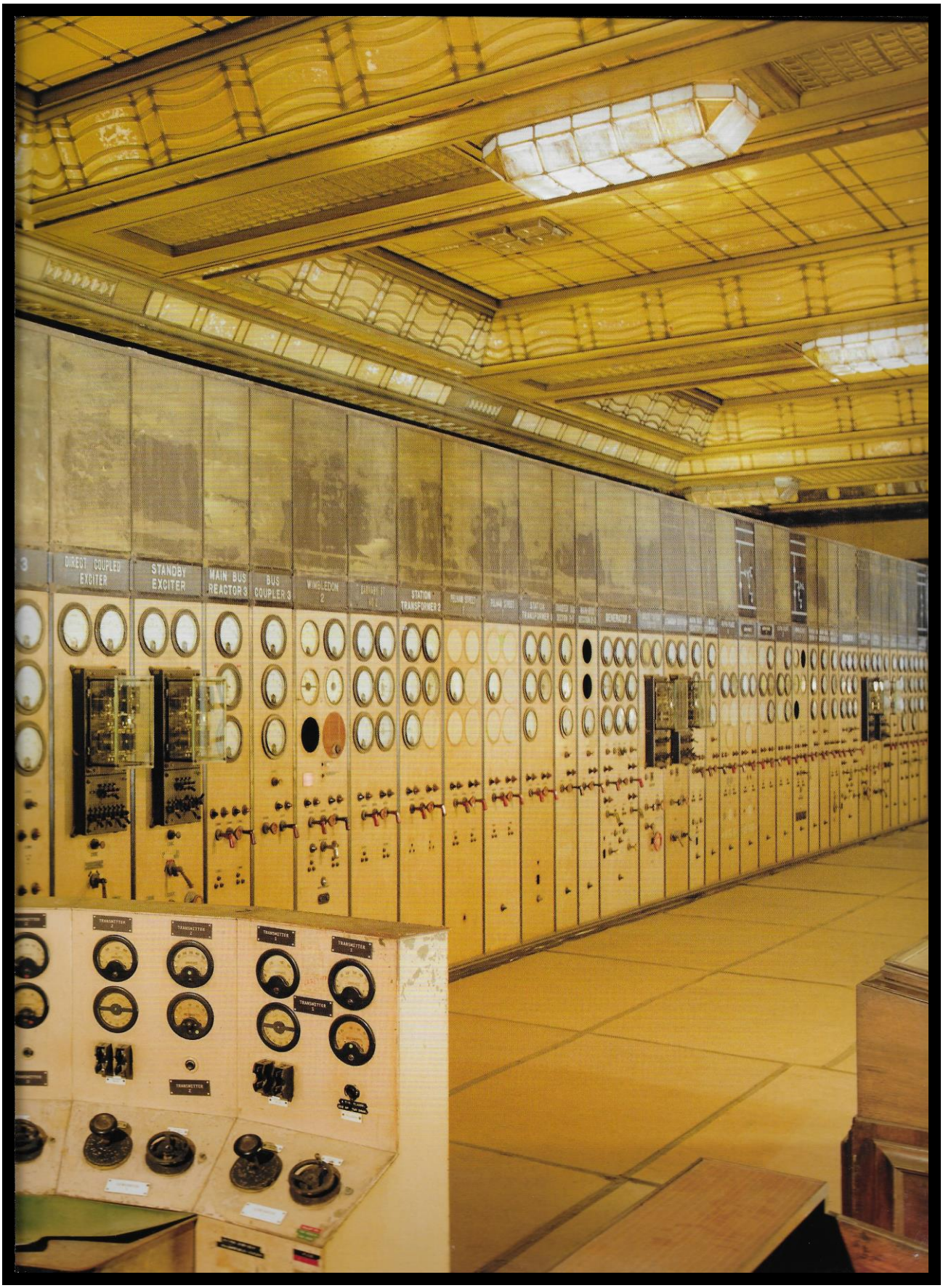


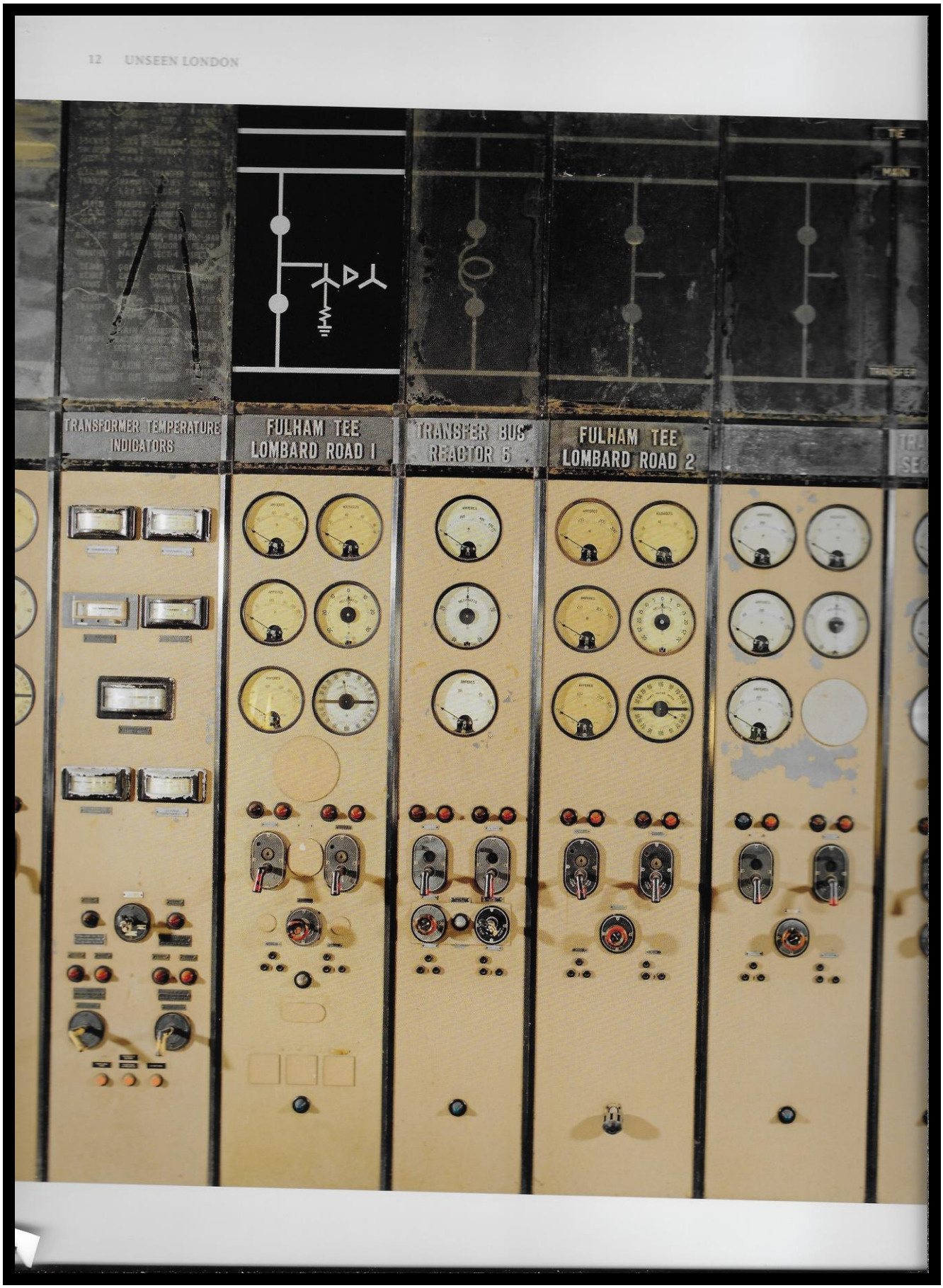


BATTERSEA POWER STATION



Colour photos from: 2017 Unseen London,
Peter Dazeley and Mark Daly,
Quarto Publishing, London

BATTERSEA POWER STATION



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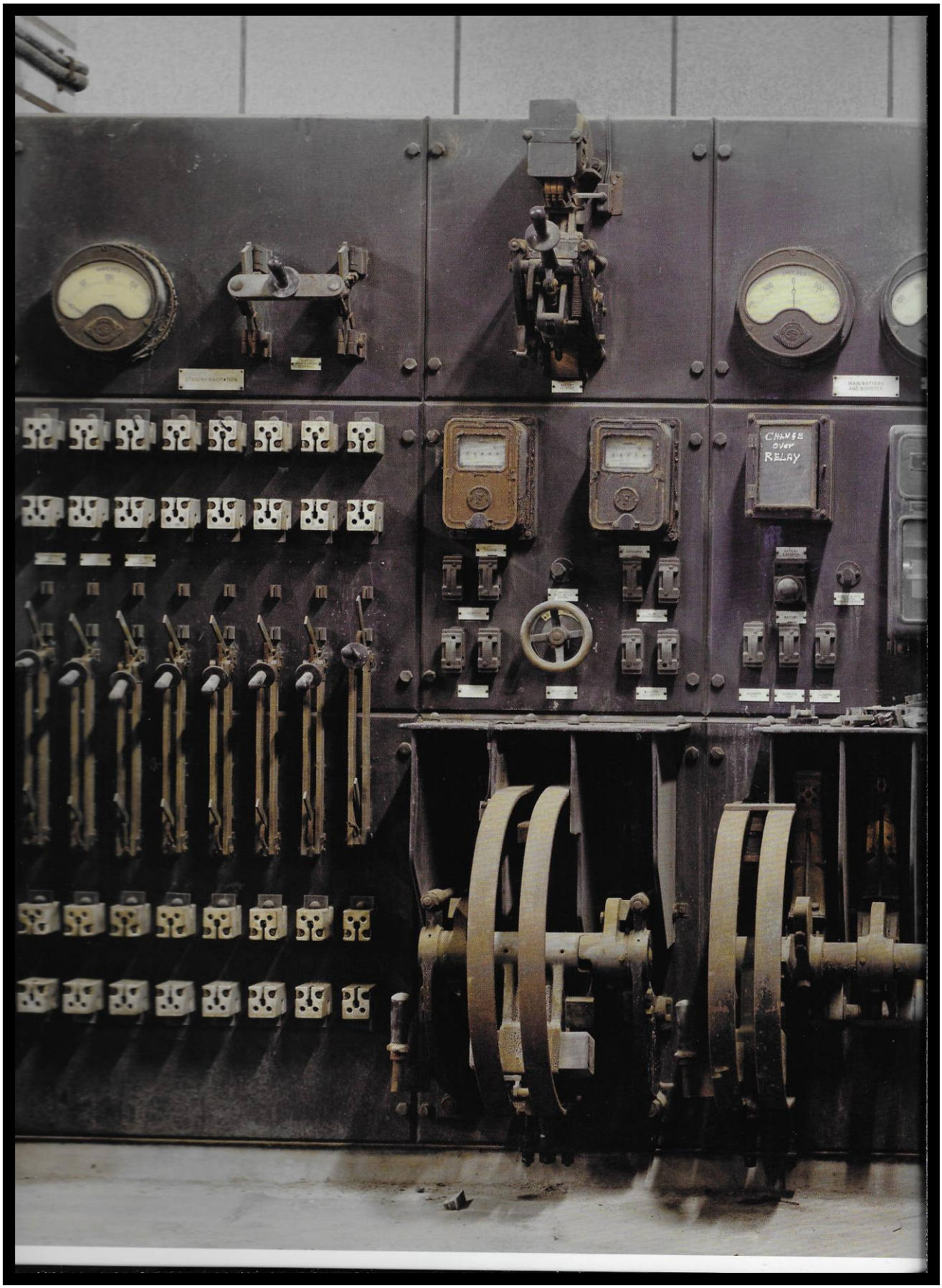
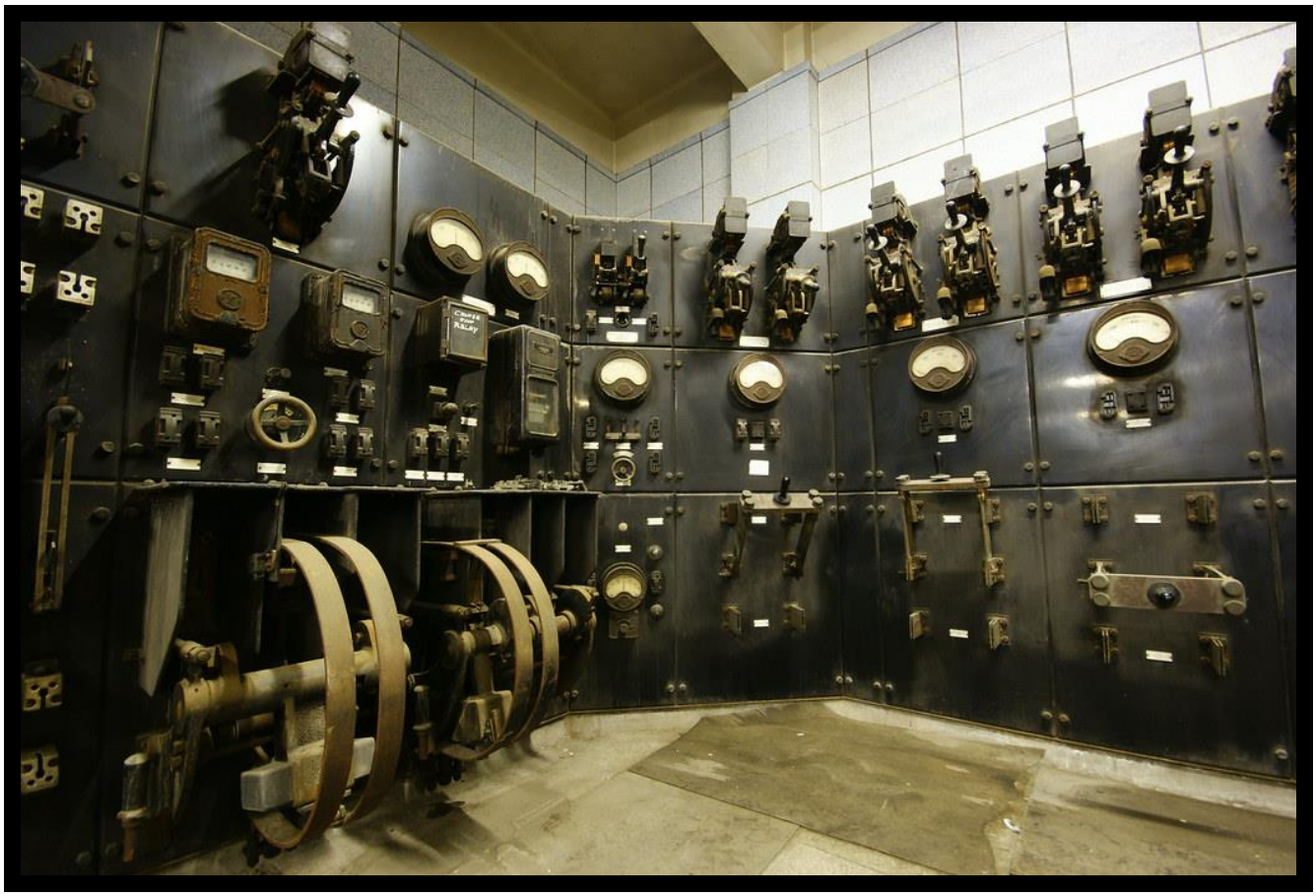
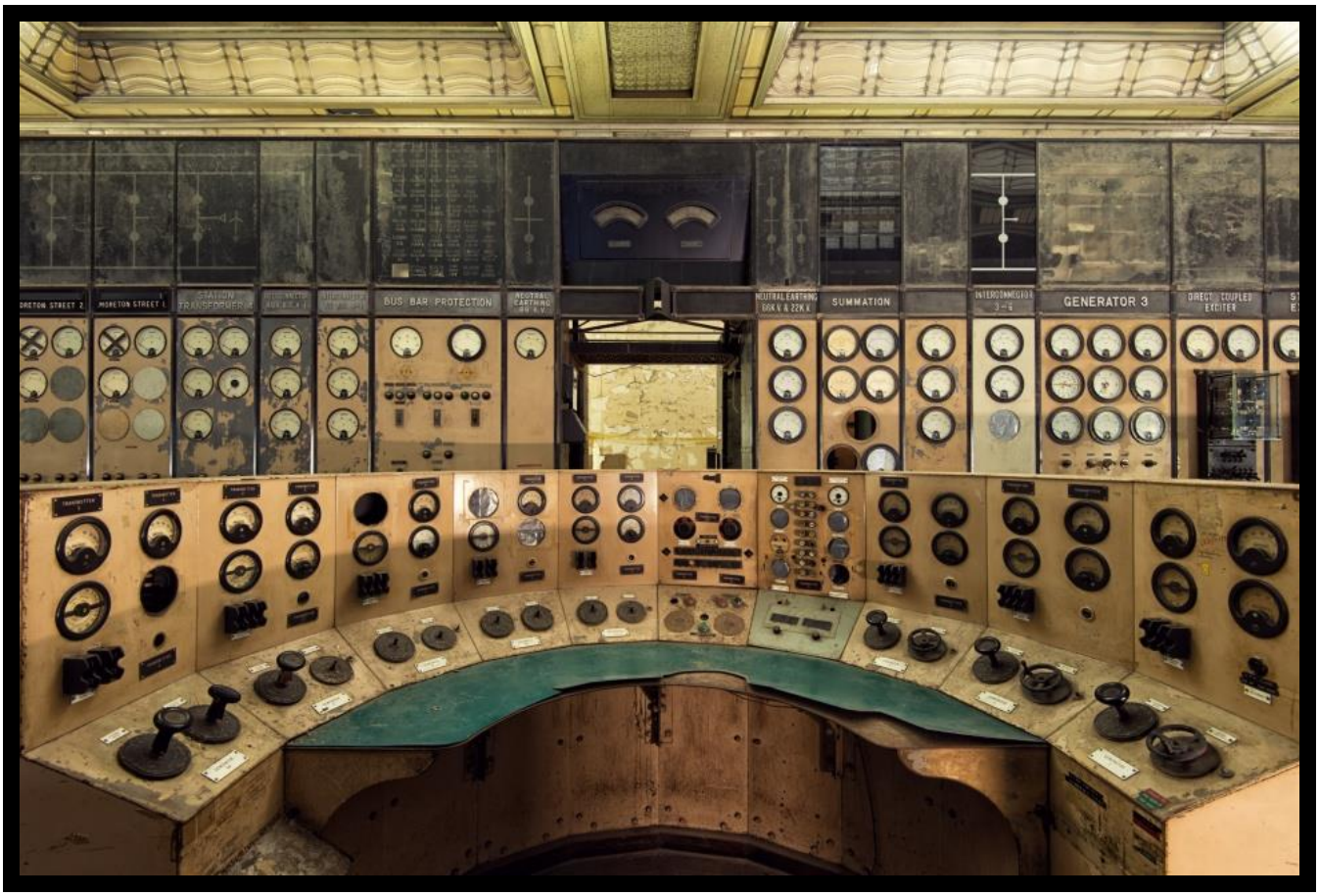
BATTERSEA POWER STATION



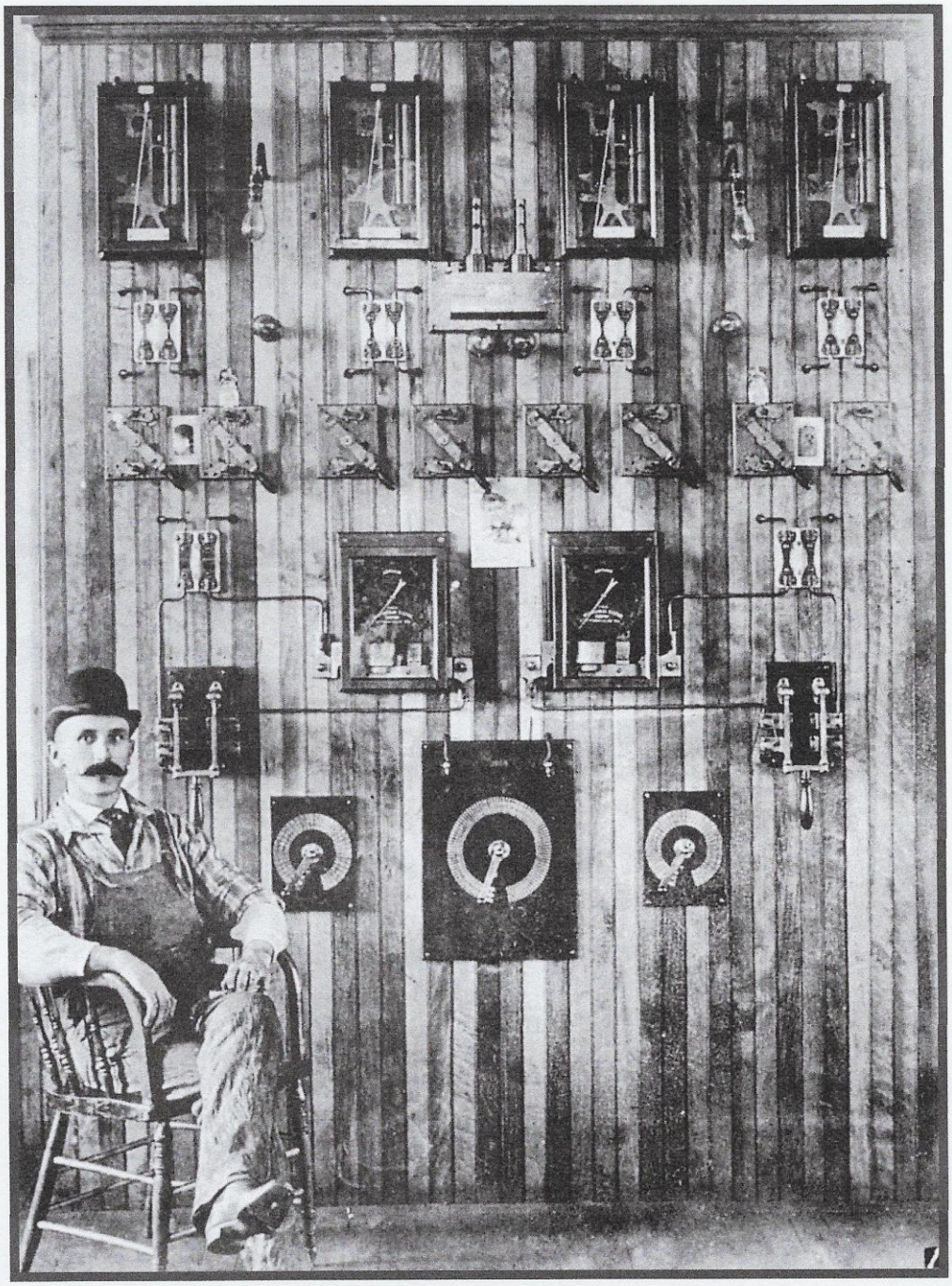
BATTERSEA POWER STATION



BATTERSEA POWER STATION



SWITCHBOARDS



Early alternating current switchboard
"Tesla: Master of Lightning," Margaret Cheney & Robert Uth, 1999
(CIBSE Heritage Group Collection)