



Energy for generations

Carrington Power Station



Welcome to Carrington Power Station

Carrington Power Station is a 884.2MW plant that generates enough electricity to power more than one million homes and businesses. The station is owned and operated by the Irish energy company ESB.

Carrington is the latest addition to ESB's power generation portfolio and has an overall Combined Cycle Gas Turbine (CCGT) net efficiency of approximately 58%, one of the most efficient of its kind in the UK.

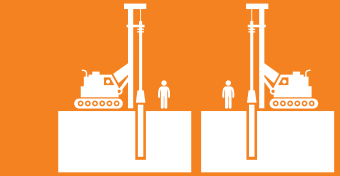
All photographs courtesy of Greg Harding.



4.88 million hours worked



3,051 good catches



2.4km of gas mains pipeline laid



4,893 people inducted

CONSTRUCTION STATISTICS



22,232 permits issued



35,000 m³ of concrete poured



800-900 workers on site during peak construction times



Carrington Power is located on the site of a former Coal Fired Power Station close to the villages of Carrington and Partington in the Greater Manchester Area and 12km south of Manchester City Centre. The Manchester Ship Canal and the River Mersey run along side the power station.

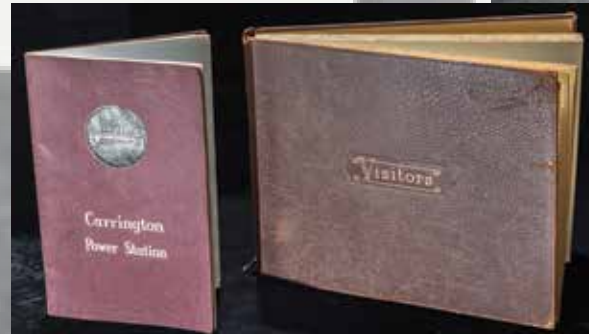
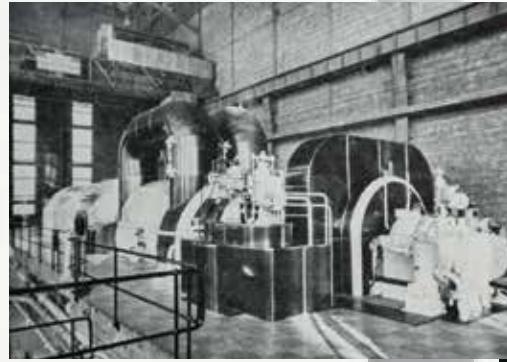
The new station is a combined-cycle power plant using natural gas, a clean, efficient fuel to generate 884MW of electricity.

A combined-cycle power plant (CCPP) uses both a gas and a steam turbine together to produce up to 50 percent more electricity from the same fuel than a traditional simple-cycle plant. The waste heat from the gas turbine is routed to the nearby steam turbine, which generates additional power.

Carrington consists of two CCPP KA26-1 units. At operating design conditions, each CCPP unit generates 442.3 MW net output.

The station generates enough power to meet the electricity needs of one million homes in the UK and began commercial operation on 18 September 2016.

CARRINGTON IN THE PAST



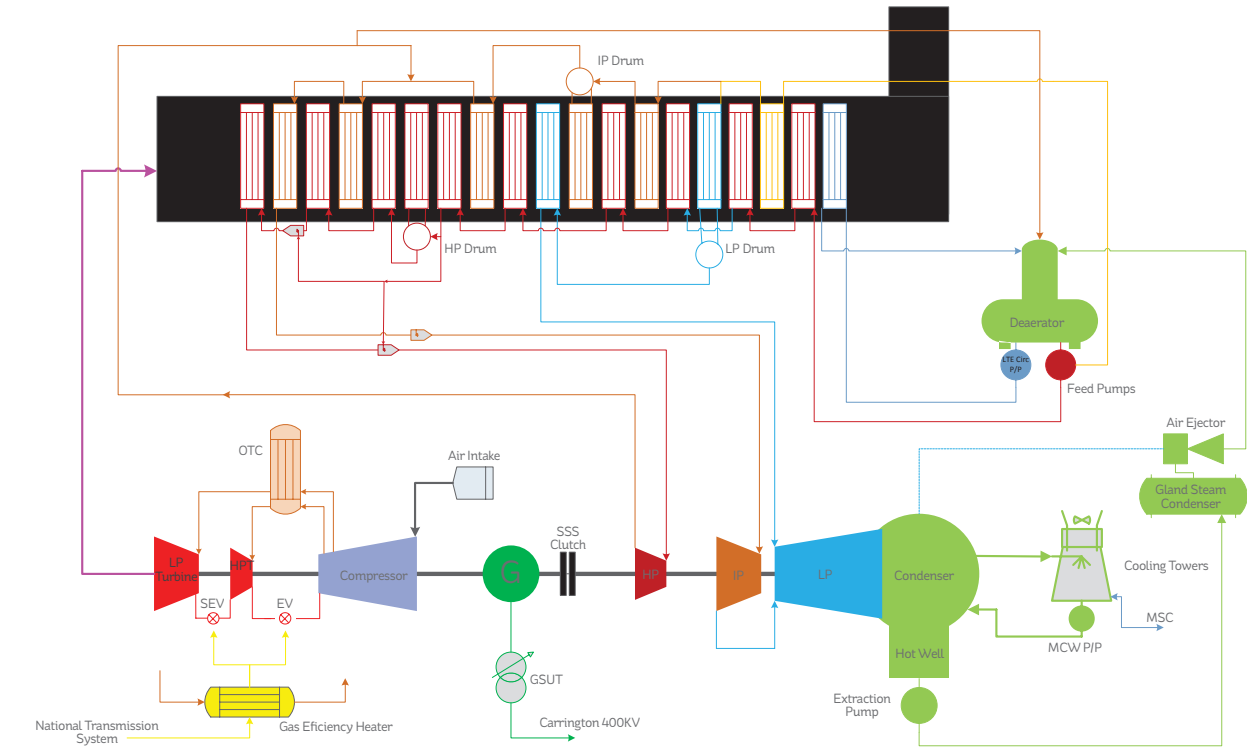
Carrington in the Past

The original Carrington site was acquired in 1916 and it became the home of a coal fired power station, the construction of which began in 1947. The power station was opened on 20 July 1956 and generated electricity until 1991.

The station produced power with four hydrogen-cooled 60 MW Metropolitan-Vickers turbo-alternators, giving the station a total generating capacity of 240 MW. Steam for the generators was provided by 7 boilers.

The construction of the station involved the formation of 7850 reinforced concrete piles. The 2 brick chimneys stood at 350 feet high (106.7m), which is over 30m taller than the stacks of the new station. The coal handling plant had a capacity of 206,000 tons and the conveyor belts could transport 400 tons of coal per hour.

The circulating water system required 13,000,000 gallons per hour (approximately 49210 m3/hour). The station had a 132kV control room. A future station, also with a capacity of 240MW, was planned but never built.



Power Train Schematic

The Power Train

Each power train includes an Alstom GT26 gas turbine, a horizontal triple-pressure heat recovery steam generator (HRSG), a TOPGAS hydrogen-cooled generator and an Alstom STF15C triple pressure reheat steam turbine with axial exhaust and all other auxiliaries to operate the plant. The total combined power output of the two power trains is 884 MW.

Gas Turbine

The GT26B gas turbine burns a mixture of compressed air and gas. When this mixture is ignited, the products of combustion expand over the blades of the turbine which generates torque on the shaft. Each gas turbine contributes roughly 293 MW to the overall plant output.

The thermal block of the GT26B gas turbine contains the compressor, two combustion chambers, a high-pressure and a low-pressure turbine, inside a common outer housing. The main feature of the GT26 gas turbine is sequential combustion. The gas turbine incorporates two combustors that operate simultaneously and sequentially, providing higher thermal efficiencies with lower temperatures and emissions.

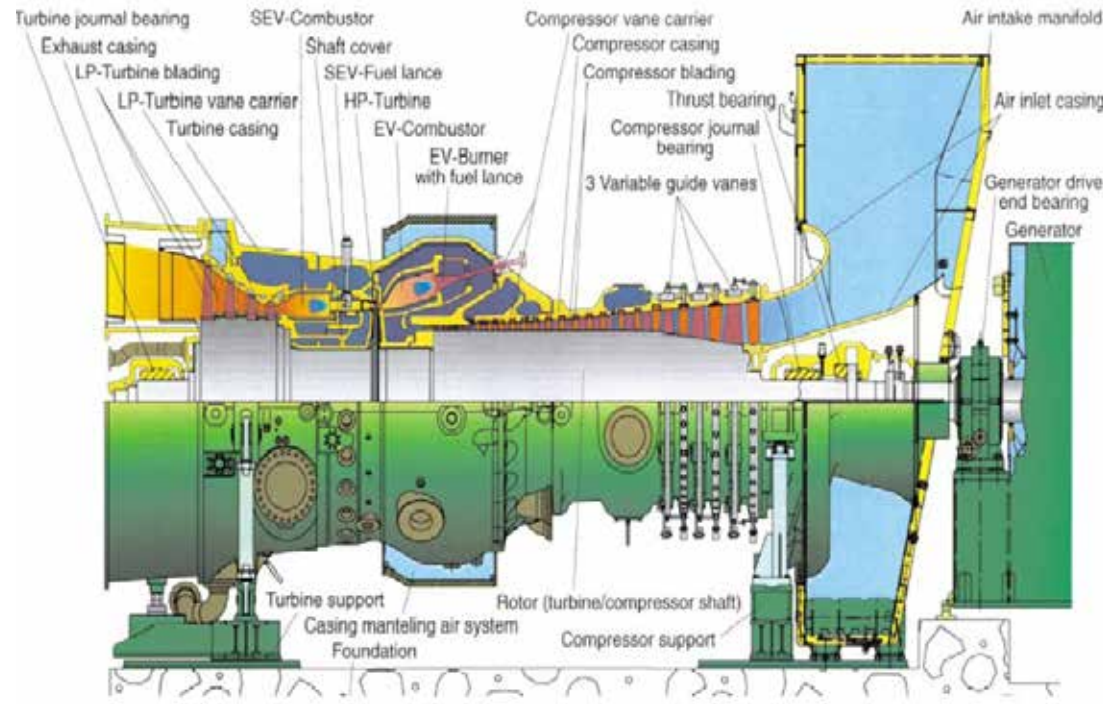
Gross power output	293 MW
Exhaust temperature	620°C (initial point of explosion of a volcano)
Speed of rotation	3000 rpm
Weight	400 tonnes = 2 x Boeing 777s
Footprint	58.8 m2

HRSG

The Heat Recovery Steam Generator, HRSG, is a boiler which is designed to use the heat from the exhaust gases of the gas turbine to create steam for the steam turbine. This increases the overall efficiency of each unit.

Steam Turbine

The steam turbine adds approximately 161MW to the overall power output of each unit. There are 3 cylinders within the steam turbine; each generate a different amount of power.



GT26 Gas Turbine



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Building a Brighter Future

A brighter future is built on the decisions of today. That is why we invested in the development of Carrington Power Station, one of the UK's most flexible and efficient plants.

Our new combined cycle gas turbine (CCGT) plant has the ability to generate enough electricity to meet the needs of more than one million homes and businesses. And all in a sustainable and efficient manner.

At ESB, we are committed to a carbon free energy future, powered by clean electricity and we believe gas is an important transitional fuel.

The flexibility provided by Carrington allows more renewable generation to come on stream, while preserving security of supply and affordability for our customers.

Sustainability, as always, is at the heart of our corporate strategy. For example, we used the nearby Manchester Ship Canal to transport heavy loads during development while our staff used public transport to travel to and from our work site. But our sustainability plans go beyond such acts.

We remain committed and focused on investing and innovating to create a brighter future for all. From reducing the carbon intensity of our generation portfolio to adapting the network to facilitate more distributed energy resources, we want to empower our customers and support the wider decarbonisation of society through the electrification of heat and transport. It is a bright future. Together, we can make it happen.



Barge transport was used where possible for all heavy loads, such as the gas turbines. Shipments from global locations such as China, Indonesia, Germany, Poland and Spain navigated to Ellesmere port in Liverpool and eventually along the Manchester Ship Canal to the Carrington site.

The 40 km trip from Ellesmere to Carrington was undertaken a total of 20 times. Across the 800 kilometres of waterways travelled, approx. 8,000 tonnes of equipment was transported.

- 50% more efficient than road transport
- 200 tonnes of carbon dioxide emissions prevented
- Distance 33% shorter by canal

Given the large workforce at the project, a 'green travel plan' was also implemented where workers were transported to and from the site via double-decker buses from satellite car parks. These measures reduced the impact of traffic on local residents.

Due to the sustainable approaches adopted during construction of the station, the project was shortlisted for a UK corporate responsibility award in 2014.

ABOUT ESB

ESB is Ireland's foremost energy company. ESB is the owner of the distribution and transmission networks in the Republic of Ireland and Northern Ireland (through its subsidiary Northern Ireland Electricity), with a combined Regulated Asset Base of c.€8.8bn. ESB has a 50 per cent market share of the Single Electricity Market (SEM) and operates 17 power facilities in Ireland and the UK with a generating capacity of 3,190 MW.

Wholesale power is sold into the SEM and the GB electricity market at the prevailing market price.

ESB has been a leading independent generator in the UK for over 24 years, having invested £1.8bn in the UK and developing a pipeline of low carbon and renewable technologies. Uniquely ESB is the only company to have built a large gas-fired plant in the UK since 2013. Our new Carrington CCGT has been completed in time for Winter 2016-17. Other current projects include a new energy from waste wood plant under construction at Tilbury, Essex.

Since ESB was established in 1927, it has always endeavoured to bring light and energy to the people it serves, allowing individuals and communities to fulfil their potential in every walk of life. This is achieved not only through the provision of critical energy infrastructure, but also through ESB's contribution to the economy in the form of investment, taxes, dividends and jobs; in addition ESB is committed to playing a full role in society by acting responsibly in how it conducts its business, working towards a low carbon future and supporting the communities in which it works.

ESB's ambition is to secure a sustainable future based on the provision of clean electricity, distributed on a smart grid, to empower customers that facilitates the electrification of heat and transport.

More detailed up to date information on ESB and the environment within which it operates can be referenced at <http://www.esb.ie/main/about-esb/annual-report-2014.jsp>