= Lynemouth power station =

Lynemouth Power Station is a coal and biomass fired power station which provides electricity for the UK National Grid . Until March 2012 , it was the main source of electricity for the nearby Alcan Lynemouth Aluminium Smelter . It is located on the coast of Northumberland , north east of the town of Ashington in north east England . The station has stood as a landmark on the Northumberland coast since it opened in 1972 , and has been privately owned by aluminium company Rio Tinto Alcan throughout its operation until December 2013 , when RWE npower took over . In January 2016 it has been acquired by Energetický a pr?myslový holding .

The station is one of the most recently built coal @-@ fired power stations in the United Kingdom , but with a generating capacity of only 420 megawatts (MW) , is now one of the smallest operating . Two separate wind farm plans currently have permission to be built near the station , one for a 13 turbine wind farm near the smelter and another three turbine wind farm to the north of the station . In 2009 , Alcan announced that they hope to fit the station with carbon capture and storage technology . In 2011 , it was announced that the power station may be converted to burn biomass only , in a bid to avoid government legislation . RWE npower have confirmed they are committed to conversion to biomass .

= = History = =

In 1968 , Alcan had applied for planning permission for the construction of a new aluminium smelter in Northumberland at Lynemouth . Later that year , Alcan was granted the permission and site preparation would soon begin . However , to meet the electric demand of the new smelter , a power station would also be needed to be built . Therefore , Lynemouth Power Station was constructed only 800 m (2 @,@ 600 ft) from the aluminium smelter .

The two establishments were constructed in South East Northumberland as part of an incentive to lower the high unemployment numbers . The site was also chosen because of the Ellington and Lynemouth collieries . Ellington Colliery sunk in 1909 , with Lynemouth Colliery sinking 18 years later . However , in 1968 , the two collieries were connected underground by the Bewick Drift , from which coal was brought to the surface . The Drift had no rail connection , and so coal was sent to the washery at Lynemouth by conveyor belt . The power station was constructed nearby the end of the conveyor belt .

Both buildings were designed by architects Yorke Rosenberg Mardall , with engineering consultation from Engineering & Power Consultants Ltd . The power station was constructed by Tarmac Construction and the smelter by M.J. Gleeson Company . Both the power station and smelter were brought into operation in March 1972 .

= = Design and specifications = =

The power station is divided into structures , which mainly include a boiler house and a turbine hall . Both of these structures have a steel frame foundation in the walls with aluminium cladding . Other structures include a single 114 m (374 ft) tall chimney made out of solid reinforced concrete , and coal delivery and sorting plant .

The station 's boiler house houses three 380 MWth International Combustion boilers , which are fuelled by pulverised bituminous coal . Each of these provide steam for one of three 140 megawatt (MW) Parsons turbo @-@ alternators , situated in the station 's turbine hall . These give the station a total generating capacity of 420 MW . The electricity generated was fed at 24 kilovolt (kV) to a substation to power the smelter during operation . The substation also has a 132 kV connection to the National Grid , where electricity is distributed to homes and other industries by Northern Electric Distribution Limited . The smelter 's two pot lines required 310 MW of the 420 MW that the power station produces , so the excess 110 MW which was fed into the national grid . Since the mothballing of the smelter , all exports now go to the grid .

Between 1999 and 2000 , the power station was given a turbine upgrade . In 2000 , the station 's

condensers were also refurbished . The condenser refurbishment was carried out by Alstom . These improvements saw an increase in the station 's generating capacity , thermal efficiency and MWh production .

= = Operations = =

= = = Coal supply and transport = = =

The power station is the leading coal customer in Northumberland , burning 1 @,@ 200 @,@ 000 tonnes of coal a year , with a weekly coal consumption between 25 @,@ 000 and 27 @,@ 000 tonnes . The station has relatively limited coal storage facilities , and is only able to hold three to four weeks worth of its fuel .

The station was designed specifically to burn coal from the Northumberland coalfields . The neighbouring Ellington Colliery originally fed coal directly to the power station using a conveyor belt from its Bewick Drift Mine , situated 970 metres (3 @,@ 180 ft) from the station . Within a year of the power station opening , 3 @,@ 000 men were employed between the Ellington and Lynemouth collieries , producing over two million tons of coal a year , the majority of it being sold to the power station . In 1994 , Ellington Colliery connected underground with Lynemouth Colliery , but coal continued to be taken straight to the power station 's coal sorting area using conveyor belts . This supply was supplemented by coal from local opencast mines . However , Ellington Colliery was forced to close when it flooded in January 2005 . The station burned the colliery 's remaining coal stock after it closed , and since then coal has been sourced from opencast mines in Northumberland and Scotland , but now a small amount of import is necessary .

Coal is now delivered to the station mainly using rail transport and is unloaded at the station using a merry @-@ go @-@ round system . Trains supplying the station use the Newbiggin and Lynemouth branch line of the Blyth and Tyne Railway , which also serves the smelter . This line was originally used to export coal from the local coalfield , and also had passenger services . These passenger services ceased in 1964 , and now the line is only used to serve the power station and smelter . Coal from the local opencast mines is brought to the station by road using heavy goods vehicles . Coal is graded and washed at the station prior to being burned .

With only one significant opencast in the local area mining past 2008 , along with another smaller opencast at Stony Heap , there is a need for more local supplies of coal for the station because of the risks in depending upon overseas sources of coal . Long distance supplies of coal can see sharp fluctuations in price , as well as the flexibility and security of the supply , whereas local sources aren 't as vulnerable to interruptions and have fixed , contracted prices . The station is not an established importer of coal , having only imported since 2005 . It is situated a long way from the major coal unloading ports of Teesside , Hull and Immingham , which have been booked by power stations closer to them . This means that coal for the power station needs to be imported via Blyth or the Port of Tyne . However , because of the small sizes of these docks , they can only receive ships from Poland and Russia . Due to high production costs and industry restructuring in Poland though , the only realistic source of imported coal for the station is Russia . The environmental impact of shipping 1 @,@ 000 @,@ 000 tonnes of coal from Russia to Lynemouth is the production of 12 @,@ 812 tonnes of CO_2 , whereas hauling coal from local mines to the station would produce only 703 tonnes of CO_2 . There are currently two local opencast mines for which planning approval have been granted , one at Shotton near Cramlington approved in 2007 , the other at Potland Burn near Ashington approved in October 2008 . However , the coal mined from Potland Burn would have too high a sulphur content to meet the station 's environmental requirements , meaning it wouldn 't be an immediate choice of coal for the station . Coal had been provided by the Delhi surface mine at Blagdon , owned by Banks Developments , since 2002 . It finished extracting coal in March 2009 , following the permission of extension proposals to its original plans in May 2007 .

= = = Water use = = =

For creating the steam to turn steam turbines and generate electricity , and for cooling the steam coming away from the turbines , water is needed , and is thus beneficial to have near any thermal power station . The cooling water that is used in the Lynemouth power station is taken from a body of water located close to the plant , the North Sea . The water is transferred from the sea to the plant by a series of shafts and tunnels . There are three condensers (one per each generating set) in the interior of the power station , which are used to cool the heated water before it is reused in the steam cycle . The cooling water is then transferred back to the North Sea .

Water used in the steam cycle is taken from the local mains water , supplied by Northumbrian Water . Up to 300 @,@ 000 tons of mains water per year is used in the station , however it has to be cleaned of impurities before use . This is done at an on site water treatment plant that uses a process of ion exchange to remove impurities such as silica and control PH levels so as to avoid boiler tube corrosion . This treated water is used to make superheated steam in the coal @-@ fired boilers , that will turn the turbines before being recovered in the condenser and reused .

Operating close to the power station is a fishing bait company , Seabait . Seabait uses some of the excess hot water that the plant generates to grow worms four times as fast as in the wild . The worms are used for several purposes , primarily for providing worms as bait while fishing . However , the worms are also frozen , packaged and exported to seafood farms . This is seen as environmentally beneficial as it reduces the need for bait digging in natural habitats .

= = = Ash removal = = =

Fly ash and bottom ash are two byproducts made through the burning of coal in power stations . Ash is normally dumped in the station 's Ash Lagoons landfill site , which is located on site . Since 2006 , ash produced at Lynemouth Power Station has been recycled and used as a sub @-@ fill material in the construction industry and in the production of grout . In 2007 , 63 @,@ 000 tonnes of ash from the station , along with 100 @,@ 000 tonnes of ash from the Ash Lagoons , was taken and recycled . In September 2007 , Pulverised Fuel Ash was utilised as a filling material in the capping of Woodhorn Landfill , which had been used for the disposal of spent potlining from the smelter .

= = = Biomass usage = = =

In December 2003 the Environment Agency granted permission for the plant to co @-@ fire biomass fuels in the station . Since 2004 three different types of biomass fuel been in use at Lynemouth ; Sawdust and Wood pellets from FSC certified forests and Olive residues . These fuels are mixed with the coal on the conveyor belt into the power station . In 2004 11 @,@ 000 tonnes of biomass fuel were used in the station . Biomass conversion ambitions have increased , with the site currently aiming to be 100 % biomass fired from 2015 .

The station earned the world class OHSAS 18001 health and safety certificate in 2003 , ahead of Alcan 's global targets . All of the station 's staff were required to take place in safety audits to improve working practice at the station . The certificate was presented to the station 's manager by Wansbeck MP Denis Murphy on 15 March 2003 . The station 's attention to health and safety was further recognised on 6 June 2007 when they were honoured by the Royal Society for the Prevention of Accidents (RoSPA) with a RoSPA Occupational Health and Safety Award at the Hilton Birmingham Metropole Hotel . Workers at the station had been audited by RoSPA for 10 years before receiving the award .

= = = Coastal defence = = =

In late 1994 , the power station was flooded to a foot deep of sea water , after a freak high tide and strong winds . This led to a sea defence system being constructed to protect the building . The problems came about because of the temporary closure of Ellington Colliery . Tipped waste from the colliery had been used as a coastal defence measure , but as the colliery had closed , waste was no

longer being tipped . The colliery was reopened by RJB Mining , and in July 1999 the station ensured the future of the colliery by signing a contract with RJB Mining to be provided with 3 @,@ 000 @,@ 000 tonnes of coal from Ellington Colliery and opencast mines in Northumberland , over the course of three years . The colliery closed for good in 2005 , leading to problems with coastal defence again , threatening the station 's coal stocking area . This required to a £ 2 @.@ 5 million new coastal defence scheme be put in place , involving the use of large rocks as a defence wall .

= = Environmental impact = =

The power station 's use of biomass since 2004 has been part of an attempt to reduce its carbon dioxide (CO2) output . In 2002 and 2004 the station met its targets for reduction in greenhouse gas emissions . Despite this , in 2006 the power station was revealed as having the fourth highest CO2 emissions in the north of England , for producing 2 @,@ 685 @,@ 512 tonnes of CO2 per year . However , generally the station reduced it CO2 emissions by 65 % between 1990 and 2010 , and the local air quality meets UK and European standards .

= = Windfarms = =

In 2006 a proposal was made by Hawthorn Power , an offshoot of UK Coal , to construct three 110 m (360 ft) tall wind turbines on an unused part of the station 's coal sorting area , north of the power station . Permission was granted for the turbines in February 2008 . In July 2010 , it was revealed that the project 's new developer , Clipper Windpower , would be using the site to erect the country 's first super @-@ efficient wind turbines , called Liberty Wind Turbine . However , this meant the height of the turbines would increase from 110 m (360 ft) to 130 m (430 ft) . Each turbine would have a rating of 2 @.@ 5 MW , but only three turbines would be built . The wind farm would produce enough electricity to provide power for 1 @,@ 690 houses . One turbine is expected to be erected initially , while environmental issues are assessed .

ScottishPower Renewables also have permission to build 13 wind turbines near the aluminium smelter . They were initially refused planning permission , which they submitted in November 2006 . This was because their site is spread over two council boundaries and Wansbeck Council approved the scheme , but Castle Morpeth refused . An appeal hearing was given in April 2008 , and permission was eventually granted in January 2009 for the construction of up to 13 turbines , producing 30 MW of electricity .

= = Future of the station = =

Following a visit to the station by Prime Minister Gordon Brown on 3 July 2009 , it became apparent that Rio Tinto Alcan were hoping to be able to demonstrate Carbon Capture and Storage (CCS) technology at the station in the future , using " pre @-@ combustion " CCS technology . This would have involved treating the coal prior to burning so that less CO2 was produced , with any remaining CO2 being pumped under the North Sea into an aquifer . However , due to the economic climate , Rio Tinto did not commit the funding for the project themselves , and did not secure any of the required £ 1 billion European Union funding available for demonstration of CCS technology . In November 2009 it was announced that a variety of energy experts were preparing for the £ 1 billion bid to the Government for investment . The plans included a pipeline into the North Sea , and the upgrading of one of the station 's generating sets from 140 MW to around 375 MW , to safeguard the supply of electricity to the aluminium smelter .

The European Commission (EC) claimed that Alcan is in breach of their operating licence as the station has failed to " significantly reduce its emissions " . The UK Government contested the allegations , as the power station and smelter combined then provided 650 jobs and a contribution of £ 100 @,@ 000 @,@ 000 to the local economy , in an area heavily affected by the loss of traditional heavy industry . They lost the court case over it and on 22 April 2010 , the European Court of Justice ruled that the plant was subject to the emission limit values of the European

directive on Large Combustion Plants . As a consequence , the station has to have at least £ 200 million worth of adaptations made to it so that it conforms to the directive , or be shut down . A date has not yet been given for it to conform , but two options for saving the station are the CCS project , or a switch from coal to biomass as a fuel .

Lynemouth 's future came further under threat in March 2011 , following carbon cutting measures announced in the 2011 United Kingdom budget . The government 's plans meant that the station would cost an extra £ 40 million a year , erasing Rio Tinto Alcan 's profits on the station . This has made the station 's operators consider the option of converting the power station to operate on biomass only to avoid the penalties . However , this conversion itself would cost £ 50 million and then using biomass instead of coal would cost an additional £ 170 million a year .

= = Cultural use and visual impact = =

Since its construction , the station has made appearances in a small number of films shot locally . These include :

Seacoal ? a film made by Amber Films in 1985 . The station is features heavily as a backdrop in the beach scenes , where the characters are working , collecting seacoal . Photographer Mik Critchlow (who would later become involved with Amber Films ' sister company Side Gallery) also documented the seacoalers at Lynemouth , between 1981 and 1983 . He also used the power station as an industrial backdrop to some of his images .

Billy Elliot ? a 2000 film directed by Stephen Daldry . The power station and the smelter both feature as an industrial backdrop in the film 's cemetery scenes . The power station 's coal sorting area is used to represent a colliery .

The chimneys of both the power station and the smelter are strong landmarks on the local coastline , and can be seen over a 25 @-@ kilometre (16 mi) stretch of coast , from Cresswell down to South Shields pier .