Hitachi Zosen INOVA

Rookery South / UK Waste to Energy Plant



Rookery South Energy Recovery Facility: Clean Energy from 545,000 Tonnes of Non-Recyclable Waste Each Year

The Waste to Energy plant in the former Rookery South brick clay extraction pit generates electricity to power more than 112,500 households. It comes with the latest technology, including a state-of-the-art combustion control system and a complex flue gas treatment set-up to minimise emissions.

The new Waste to Energy (WtE) plant at Rookery South in Bedfordshire, around 75 km north of London, treats 545,000 tonnes of solid municipal and commercial waste to generate more than 60 MW_{el} of electricity for the national grid.

The energy generated by the plant supplies more than 112,500 households with electricity. This makes it a key component of an increasingly selfsufficient UK waste management industry. The plant also has an upgrade option to enable the extraction of process steam for district heating purposes in the future.

The Rookery South Limited operating company, a collaboration between Covanta, Green Investment Group and Veolia, awarded the contract to construct the turnkey plant to Hitachi Zosen Inova (HZI) in March 2019, building on a partnership going back to earlier joint projects. HZI and Veolia can look back on the successful delivery of the Newhaven project in 2011, and HZI built the Poolbeg plant in Dublin, which went into operation in 2017, on behalf of Covanta.

The Rookery South Energy Recovery Facility is HZI's 11th project in the UK. All HZI's installations play a key role in the UK's sustainable waste management industry and in England's endeavours to reduce or avoid landfill and the export of waste overseas.

Carefully Chosen Site with Many Advantages

Rookery South Pit, a former brick clay extraction pit, was chosen from 340 potential sites after a thorough analysis. Besides very good road connections and the potential availability of a connection to the rail network, the deciding factor was its central location within the waste catchment area. Another advantage is that using the former clay extraction pit, which lies ten metres lower than the surrounding land, can reduce the visible portion of the plant, with a positive effect on the overall landscape.

Active Conservation of the Landscape Part of the Job

HZI and Covanta have done extensive landscaping work at Rookery Pit to create the facility. The goal has been to preserve the local recreation area and assure comprehensive watercourse and flood protection. The work on site has included landscaping a pond to serve as a attenuation pond. Vegetation has been planted on the southern shore. There's a beach, two jetties and extensive pedestrian and bike paths have also been created. More trees, hedges and shrubs, as well as grass have been planted around the installation. Woods are being grown at the southern edge of the site, also designed to provide extra screening of the plant. At the facility, part of a wall and roof sections have been planted, with irrigation provided by a rainwater catchment basin.

State-of-the-Art Technology for Maximum Efficiency

The scope of supply covers the turnkey plant including the construction work. The technological design is geared to very high overall efficiency. The plant operates with HZI's proven grate firing system combined with a modern combustion control system (CCS+) to reduce running costs. The software monitors the combustion process and supplies real-time data to an AI module that responds automatically in extraordinary events. The detailed data created in the process enable a very high degree of automation, allowing plantspecific safety reserves to be exploited more effectively and operations to be optimised.



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Waste Receiving and Storage	Combustion and Boiler	Flue Gas Treatment	Energy Recovery	Residue Handling and Treatment
 Delivery hall Waste bunker Waste crane Control room 	 Feed hopper Ram feeder HZI Grate Superheater Economiser Primary air Secondary air 	 Additive silo Lime slaker XeroSorp[®] (dry sorption) Fabric filter Induced draught fan Silencer Stack 	 Feed water tank Steam turbine Air cooled condenser Transformer Electrical power generation 	26 Bottom ash extractor27 Boiler ash extraction28 Bottom ash hall29 Residue silos
	12 Five-pass boiler	20 SNCR DyNOR		

The heat released in the combustion process is used to generate superheated steam in a five-pass boiler; this steam is fed into the turbine. Carefully selected steam parameters ensure a combination of high efficiency and boiler safety. In the course of this process over 60 megawatts of electrical energy is generated. An integrated boiler rapping monitoring system proactively prevents excess, premature boiler fouling, as well as minimising operating costs.

State-of-the-Art Flue Gas Treatment Minimises Emissions

A modern WtE facility has to reliably run in compliance with minimal emissions requirements. A multistage flue gas treatment system consisting of a dry sorption reactor, fabric filters and DyNOR[®], HZI's modern SNCR, guarantees that the plant not only meets the stringent legal requirements, but regularly comes in well below them. The use of a modern lime slaking unit, for example, ensures the optimum use of materials. Before the flue gas leaves the plant through the stack, a continuous measurement system monitors compliance with the stringent emissions requirements. To also be equipped for future requirement, the flue gas treatment system has been designed from the outset to allow the possibility of extension and enabling the plant to offer steam or heat to future off-takers. 1

General Project Data		
Owner	Rookery South Limited	
Operator	Covanta Energy Limited	
Commissioning	2022	
Components supplied by	General contractor for the turnkey plant,	
Hitachi Zosen Inova	including construction work	
Plant design	Hitachi Zosen Inova	

echnical Data		
Annual capacity (nominal)	545,000 t/a	
Number of lines	3	
Maximum throughput per line	25 t/h	
Heat value of waste	7 MJ/kg (min.), 13 MJ/kg (max.)	
Heat capacity per line	60 MW _{th}	
Type of waste	Mixed municipal and commercial waste	

Combustion System		
Grate type	HZI's air-cooled reciprocating grate	
Grate design	3 grate lines with 5 zones per line	
Grate size	Width: 7.9 m; length: 10.5 m	

Boiler		
Туре	Five-pass boiler	
Live steam mass flow rate per line	82 t/h	
Live steam pressure	75 bar	
Live steam temperature	440 °C	

Flue Gas Treatment

Type of system	Dry sorption reactor, fabric filter, SNCR
Volume flow of flue gas per line	117,667> 119,167 Nm³/h

Energy Recovery

Туре	Extraction condensing turbine
Electric power	60 MW _{el} at 100%