GENERATING A SUSTAINABLE FUTURE

FULL CIRCLE GENERATION

The Background

Following four years of development, the Full Circle Energy (FCG) consortium announced financial close on Northern Ireland's first large scale waste to energy facility in November 2015. Located adjacent to Bombardier's wing assembly facility on Belfast Harbour Estate land, the facility represents a significant environmental step forward for Northern Ireland as a whole.

As Northern Ireland's leading waste treatment operators, RiverRidge was and still is responsible for achieving landfill diversion for several of Northern Ireland's local authorities including Belfast City Council, Causeway Coast and Glens Borough Council, Derry City and Strabane District Council and Armagh City, Banbridge and Craigavon Council.

Belfast City Council

Armagh City Banbridge & Craigavon Borough Council

Derry City & Strabane District Council
Comhairle Chathair Dhoire & Cheantar an tSratha Báin
Derry Cittie & Strabane Destrick Coonc

Causeway Coast & Glens Borough Council

Ensuring continuous and cost effective access to waste to energy facilities was recognised early on as being the single biggest risk factor associated with this critical service.

Bombardier had for some time identified escalating energy costs as one of the biggest risks to their global competitiveness. Having developed their £150m wing assembly facility, the company needed to ensure their energy strategy supported such an ambitious project.

With the above drivers in mind, the two organisations with differing but mutually beneficial goals, began working on the development of a waste to energy facility in 2013. 24 months and thousands of man hours later, FCG was born.

FCG is an investor led consortium consisting of Equitix, P3P Partners and RiverRidge, and is managed by EMS Management Services Ltd.

BOUYGUES ENERGIES & SERVICES

The construction contract was undertaken by Bouygues Energy and Services, a division of France's Bouygues Construction. The global giant employs over 12,500 people and registers annual sales in excess of €2.5 billion.

As well as taking responsibility for the design and construction of the facility Bouygues also took responsibility to operate the plant for the first 17 years of operation. Construction of the facility has taken 28 months and the 1.23 million man hours of construction were completed without any significant work-related incidents.

In March 2018 the facility secured its Renewable Obligation status with OFGEM therefore giving it access to the Government backed Renewable Obligation Scheme for the following 20 years.

With commissioning complete, the plant is currently being optimised to ensure maximum availability and throughput.

FULL CIRCLE GENERATION

The Facility

The facility is located on 8.53 acres of land within the Belfast Harbour Estate. Housed within a 11,800 sq. ft. building, the plant comprises three separate energy trains, each one capable of producing up to 5MWe every hour.

The plant uses gasification as its chosen heat recovery technology. Gasification is regarded as Advanced Thermal Combustion by OFGEM as distinct from incineration.

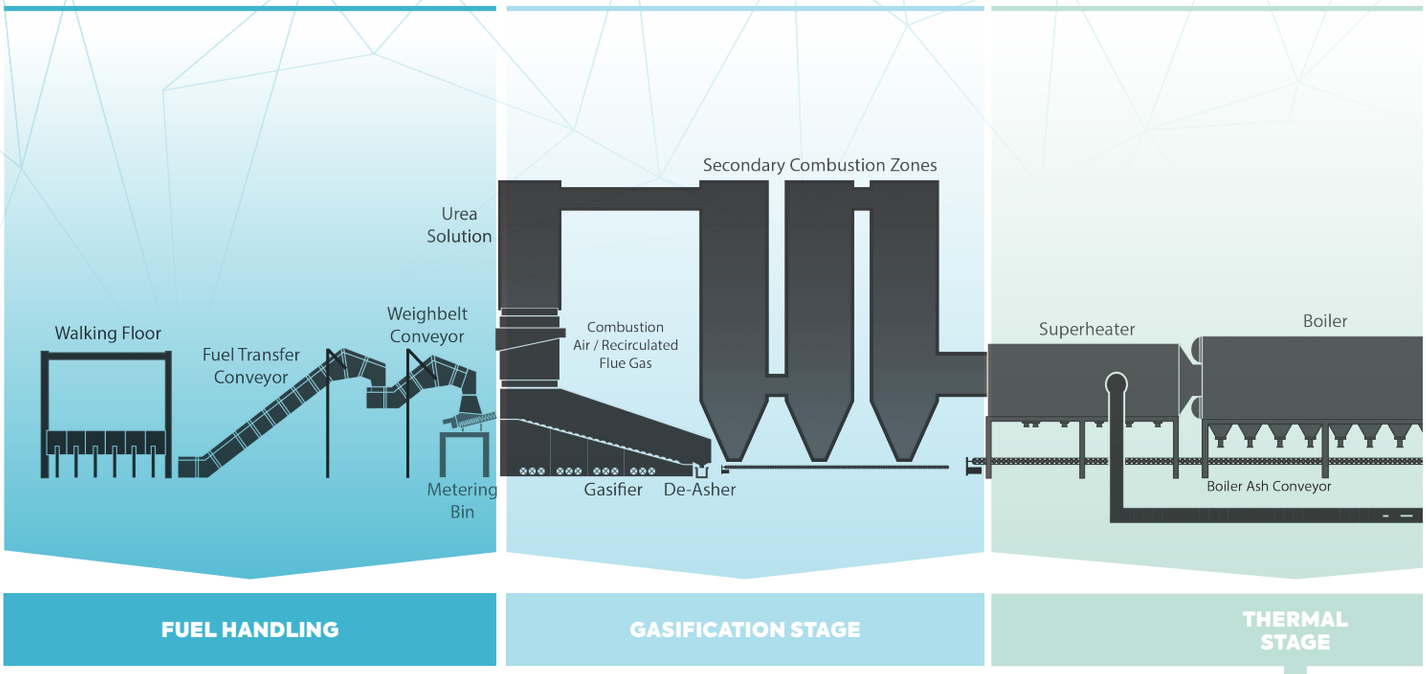
In line with this principle the design of the FCG plant has been certified as R1 by the Northern Ireland Environment Agency (NIEA).

Gasification itself is not a new science and is based on the extraction of a feedstock's gases in an environment devoid of oxygen.

By processing a feedstock in this environment, the feedstock itself does not burn but the gases, known as syngases, are released and it is these that are combusted.

Seen as more environmentally sensitive due to the fact the feedstock is pre-treated and hence all recyclable materials have been extracted, the technology is also more energy efficient than traditional mass burn incineration.

The Process

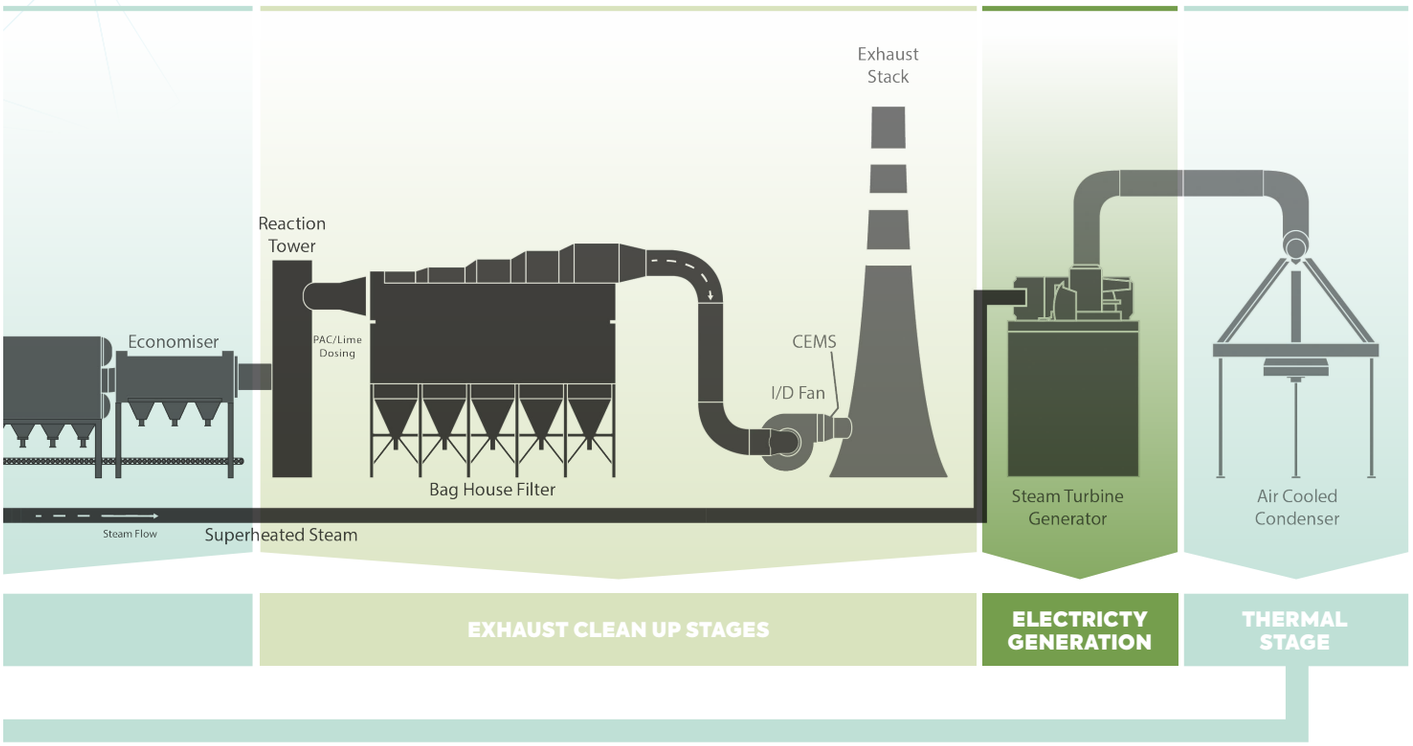


The Feedstock

Gasification requires a pretreated feedstock known as refuse derived fuel (RDF). Engineering RDF to an exact specification is where RiverRidge has established itself as a clear leader across the UK and Ireland.

Utilising RiverRidge's already established Material Recovery Facilities (MRFs) across Northern Ireland, the company can accept local authority household waste, extract all the recyclable materials and convert the remaining residual into a customer specific RDF.

The combination of RiverRidge's innovative waste treatment processes and the presence of FCG allow RiverRidge to provide a highly cost effective solution for Northern Ireland's local authorities.



As Northern Ireland's largest manufacturer and exporter of RDF, RiverRidge holds the exclusive feedstock agreement into FCG.

Once fully optimised, the facility has the capacity to combust upwards of 160,000mt of RDF annually.

Recycling Opportunities

While the facility is primarily focused on recovery, there are a number of recycling opportunities available through the process. After the recovery of energy from the RDF, residual materials known as fly and bottom ash are produced.

Bottom ash represents the greatest proportion of these residual materials with the plant producing around 30,000mt per annum when at full capacity.

The metal extracted from the bottom ash is recognised as recycling under current legislation however despite utilising bottom ash as an aggregate substitute, the categorisation of this material is still not considered recycling.

Discussions with the Department of Environment, Agriculture and Rural Affairs are ongoing to establish what opportunities there are to achieve a recycling classification for this material.

Bottom ash

Carbon8

Fly ash is the residual material produced following the clean up of the gases within the energy recovery process. While considered hazardous at the point of production, FCG has partnered with Carbon8 to find a more environmentally friendly use for the material that avoids landfill.

Carbon8's innovative solution combines the fly ash with carbon dioxide and cement to produce an aggregate substitute.

The process has achieved end-of-waste status by the Environment Agency in England. A similar discussion with NIEA is underway to reclassify the product as recycling as opposed to recovery.

Combined, the reclassification of both waste streams would allow Northern Ireland to generate an additional 33,000mt of recycling figures each year.

Benefits of FCG

Locally based facility which displaces the need for the continued export of RDF to Europe

Sterling based gate fee pricing which prevents exposure to volatile exchange rate movements

14.85MW of non-fossil fuel derived energy which helps Northern Ireland meet its renewable energy targets

Capacity to accept up to 160,000mt of household waste derived RDF and therefore ensure NILAS targets are continuously met

A safe and secure solution which addresses Northern Ireland's waste infrastructural needs

30 permanent skilled jobs during operations along with the securing of numerous indirect jobs across the Northern Ireland economy

Genuine possibilities of enhanced recycling numbers

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