Power from waste

EQTEC makes its mark in the USA

Gasification technology specialist EQTEC has signed an MOU with Phoenix Energy as exclusive technology supplier for two gasification projects in California.

Staff report

EQTEC, a company that specialises in waste gasification solutions for energy projects, has signed a Memorandum of Understanding with Phoenix Biomass, a California based power company, to supply its proprietary gasifier technology (EGT) for two power plants in California, USA.

Ian Price, CEO of EQTEC plc, commented: "We are delighted to be the exclusive supplier of technology to Phoenix Energy. The USA is a key country for waste to gasification technology and we are excited to be entering this market with our first project with Phoenix Energy. These Californian projects are exciting opportunities for EQTEC … and demonstrate our ability to be commercially competitive in delivering projects of differing scale and operating on many fuel types globally."

The two contracts together are expected to be valued in the region of EUR 10 million. EQTEC will supply a 2 MWe gasification plant and a 3 MWe gasification plant within 12 months from the date of the MOU, ie by September 2019. Financial close is expected in late Q4 2018 with the purchase contracts to be executed soon after that.

Subject to the outcome of these first two projects, Phoenix has indicated its wish to utilise the technology and equipment on other future projects in the USA as part of its gasification technology project development pipeline. Phoenix Energy is a private power company that builds, owns and operates on-site biomass gasification plants in partnership with businesses in the agricultural, waste, and forestry industries.

The technology

EQTEC gasifier technology is based on a bubbling fluidised bed reactor suitable for a wide range of waste and biomass. It is a well established technology that guarantees a high degree of availability and reliability in the plants that use it.

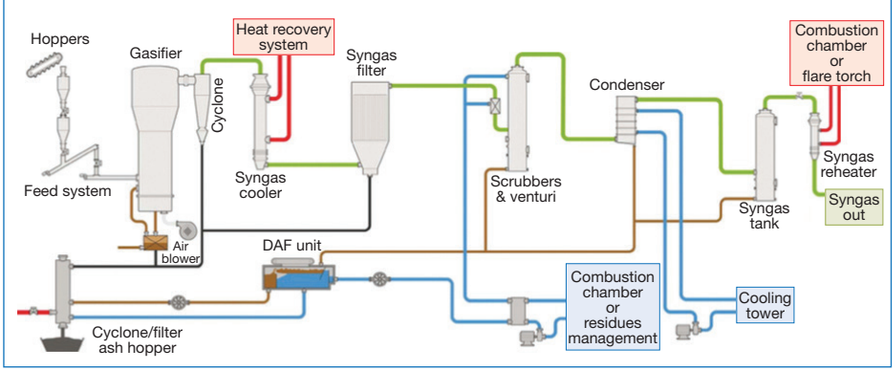
In the EGT set up, combustible material reaches the plant in the form of pellets or chips; a continuous weighing system using load cells guarantees control of the amount of combustible material that is received by the installation. These materials are fed into the gasifier via a water-cooled screw feed connected to a variable speed electric motor to control the amount of waste supplied, depending on its density.

The gasifier reactor consists of a steel container, usually cylindrical, coated on the inside with a layer of refractory insulation material. Bubbling fluidised bed reactors are widely used because of their versatility in terms of the diversity of solid fuel they can gasify, chiefly because they can achieve a better mixture between inert and combustible material due to the high heat transfer index, and because they can reach high heating temperatures rapidly. Other advantages include easy operation and high thermal yield.

Inside the reactor, a bed of solid particles is maintained in a fluid state by injection of air through the rear of the reactor. The pressure should be slightly higher than atmospheric pressure and the temperature higher than 80 deg C. The fluidisation air is supplied by a compressor and is uniformly distributed at the base of the reactor by a system of nozzle type diffusers. The technology also enables the use of mineral catalysts to accelerate the decomposition reactions in combustible materials with a low reactivity.

These conditions of operation and design favour the optimum decomposition of the combustible materials, giving rise to a flow of gas fuel or synthesis gas at a high temperature which leaves the reactor and passes through a conventional cyclone followed by another high efficiency cyclone, where the majority of the particles suspended in the gas are removed. The decelerating hoppers connected to the back of each cyclone help capture the particles.

EQTEC gasification – principle of operation and basic components



Fluidised bed gasifier using EQTEC gasifier technology

Filtering and purification

For this system, which is of vital significance in making use of the solid fuel carried by the gas current, EQTEC employs conventional cyclonic particle separation systems. The flow of particles is driven by a mechanical system to the reactor to completely extract its available chemical energy and help achieve a high combustion efficiency.

Once the gas has passed through the solid separation system the resulting gas flow is taken through a thermochemical treatment that reduces the fraction of tars present to the level of milligrammes per cubic metre of gas.

The thermal cracking and reforming reactor creates the conditions necessary for the decomposition of hydrocarbons (tars) that to a large extent, due to effect of the reac- tions that take place, become part of the gas current in the form of lighter combustible gaseous compounds that provide heat energy ie the formation of H_2 and carbon monoxide.

As a result the gas leaves the reactor chamber at a temperature of around 600 degC and in a second stage part of its thermal energy is transferred to a heat recovery circuit that supplies other sections of the plant. At the output of this unit the temperature of the gas flow is around 340 deg C.

The gas then passes through a dry cleaning system to eliminate solid particles from the gas flow, and, with the most advanced technology for hot filtration through membranes, can eliminate particles of up to 5 microns. The high gas filtration temperature prevents the condensation of steam on the filtering surface thus increasing the system availability and extending the useful life of the membrane.

Once the gas is clean and dry, the gas flow is reheated (using the thermal energy that was extracted from the system itself) and is then ready for use. The object of reheating the gas is to prevent condensation either during its transfer to the machinery room or when it mixes with the intake of cool air for combustion.