Use of a Syngas gas analyser in a project involving both Microwave Induced Plasma (MIP) Gasification and Solid Oxide Fuel Cells (SOFC) to improve energy output efficiency.

What is Gasification?

Gasification is an emerging thermal technology that is being used to generate energy from solid carbonaceous feedstocks (e.g. biomass, waste and solid recovered fuels). The gasification process operates under sub-stoichiometric oxygen conditions, at temperatures >700^{o}C, using a carbonaceous feedstock, to produce low energy synthesis gas (syngas). The syngas, comprising largely of hydrogen and carbon monoxide, can then be used for downstream heat and power generation using gas engine, gas turbine or fuel cell technology.

Plasmergy, a novel microwave induced plasma gasification process developed by Stopford, presents a disruptive approach for the generation of energy from waste in both scale and efficiency.

Improving the efficiency of the Plasmergy process

Stopford, a leading Innovation, Consulting and Project Engineering company, is currently working to integrate its Plasmergy technology with Solid Oxide Fuel Cells (SOFC) in order to achieve a step-change in energy generation efficiency when compared to more conventional gas engine technology.

Key to enabling effective integration is optimisation of the chemical composition of the syngas, alongside the removal of contaminants, such as H_2S, HCl, tars, particulates, and alkali compounds. Hence the real time measurement and monitoring of key gas species and contaminants is critical.

3D Representation of Stopford's Plasmergy Technology for the Treatment of Clinical Waste

The Solution

To achieve this, Stopford approached Cambridge Sensotec for their Rapidox 5100 Syngas analyser together with suitable accessories for a gas conditioning upstream of analysis. The analyser is used to determine the syngas composition that is fed into the fuel cell (as conditions of the plasma gasification are changed, the composition of syngas changes as well as efficiencies) and the gas conditioning is used to remove contaminants (as listed above).

Rapidox 5100 Syngas Analyser

Particulate, PTFE and Carbon Trap filter set

Large Bubbler Filter Housing (filled with water)

The Result

Dr. Michael Wilkinson, Stopford's Lead Technologist, said that "using the Rapidox 5100 with these accessories has provided an online solution enabling quick access to real-time syngas data".

Dr. Ben Herbert, Technology & Innovation Director at Stopford comments that "the Rapidox 5100 system has been instrumental in supporting the development of our Plasmergy technology, supported by great service from Cambridge Sensotec".