Supporting the migration from coal to a new generation of engineered fuels using a mix of biogenic & non-recyclable waste materials for thermal power plants

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In November 2018, SIMEC Atlantis Energy Limited, a global developer, owner and operator of renewable and sustainable energy projects with more than 1,000MW of green power projects in various stages of development, appointed RJM International working alongside WSP, to carry out a FEED study to facilitate the conversion of a coal-fired plant to generate electricity from 100% waste-derived energy pellets.

This is a world-first project and post-conversion, the plant at Uskmouth in Wales, will export 220MW of baseload power, with the bulk of the power going to an adjacent steel-making plant to make "green steel".
RJM and SIMEC Atlantis have been working together since 2016 to bring SIMEC Uksmouth Power Station (SUP) back online.

This paper will show how multiple options were explored for this dormant coal-fired power station to return it to service, through a Combustion Audit in 2016 and a Biomass Feasibility Study in 2017, which concluded biomass was not a viable commercial option.

It will also show how the route of converting the plant to run on energy pellets made of co-mingled waste was tested with an Energy Pellet Feasibility Study & a Pre-FEED Study in 2018. These studies suggested that this could be both practically and financially possible.

This work led to the current FEED study working towards a unique pellet solution, never before seen in a thermal-fired power station.

The paper will also cover off how the three stages of the FEED project have been tackled:

Stage1: Milling and combustion, characterisation of the pellets and materials handling. This stage

includes small-scale test-firing, CFD analysis work, leading to final pellet design options, plus investment decision to proceed to further stage.

Stage 2: Final pellet design options further developed. Large-scale test-firing and overall project refinement.

Stage 3: Final report produced leading to final investment decision.

A first-of-its-kind solution, this FEED project aims to provide a world-class reference plant for future conversions of power stations to be able to run on energy pellets derived from co-mingled waste, typically a mix of biogenic material (paper, wood and cloth) and non-recyclable plastics.

As a business operating at the cutting edge of combustion optimisation and emissions reduction, RJM is as committed as SIMEC Atlantis Energy, the operator, to using this project as a blueprint for further conversion of similar plants worldwide to help address the key challenge of how waste material can be treated in an environmentally-responsible manner and used to generate low carbon energy.