Department for
Business, Energy
& Industrial Strategy

Castle Cement Padeswood Heat Recovery Project

Industrial Heat Recovery Support (IHRS) Programme Case Study

October 2020

Context

Hanson Cement owns and operates the Padeswood Cement works in North Wales. The Padeswood Kiln was commissioned in 2005 and was uniquely designed to burn alternative fuels for the clinker production process making it one of the most modern Kilns in the UK. The Kiln has a capacity to produce 2,650 tonnes per day of cement clinker. To drive the mechanical loads in the process the site consumes an average of 10 MWh per hour of electricity from the grid and process heating requirements are met through a mixture of fossil and alternative fuels.

Due to the modern design, the plant currently recovers surplus heat to dry the coal used to fire the kiln and preheat the raw meal mix. The management team at Hanson Cement were previously aware of the great potential to recover additional heat available from the Kiln and Cooler stacks to generate electricity via a waste heat recovery (WHR) system.

How the IHRS supported the project

Owing to constraints on internal resources, the Hanson management team applied for Phase 1 Feasibility Study and Preliminary Engineering funding to the Department for Business, Energy and Industrial Strategy's (BEIS) Industrial Heat Recovery Support (IHRS) programme to investigate the best available WHR technology solution and quantify the available heat energy for recovery.

The application for the Phase 1 scheme required early estimates of heat available for recovery, against the potential savings and costs to carry out the feasibility study/preliminary engineering. Hanson Cement were successful with their application for match funding and the funds were applied to use the external resource of Heatcatcher Ltd to work with the site operational team to deliver the Feasibility Study.

The Feasibility Study findings verified that a larger amount of heat could be recovered for onsite electricity generation than was initially expected. With the potential to reduce the sites electrical load from the grid by 45 % and associated CO2e savings of 11,341 Tonnes per year, Hanson Cement intend to progress to the next stage of Preliminary Engineering with the continued support under the IHRS programme.

Benefits and Added Value

At the outset of the project, it was expected that the existing equipment would be replaced with a more modern thermal oxidiser, which would be coupled with a heat recovery solution, evaluated through this feasibility project. As work proceeded, it has become apparent that an alternate technology, namely solvent recovery equipment driven by a small-scale Combined Heat and Power plant, has the potential to further reduce our environmental footprint and provide an improved commercial proposition compared to all of the thermal oxidiser/heat recovery options. Such potential could not be ignored and so, alongside Regenerative Thermal Oxidation and heat capture, we have evaluated the technology in parallel and it has become our anticipated preferred option at the conclusion of the feasibility study.

"This is the first of three waste heat recovery studies we are undertaking at each of our cement plants looking at different uses of low grade waste heat. This feasibility study has helped to quantify existing waste heat flows more accurately and identify opportunities to upgrade the unavoidable waste heat we have to maximise the potential generation of electricity. We would not have completed this work without the support of the IHRS programme."

(Iain Walpole, Environmental Sustainability Manager, Hanson UK)

Padeswood Kiln and Cement Plant

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