Department for
Business, Energy
& Industrial Strategy

Esseco Case Study

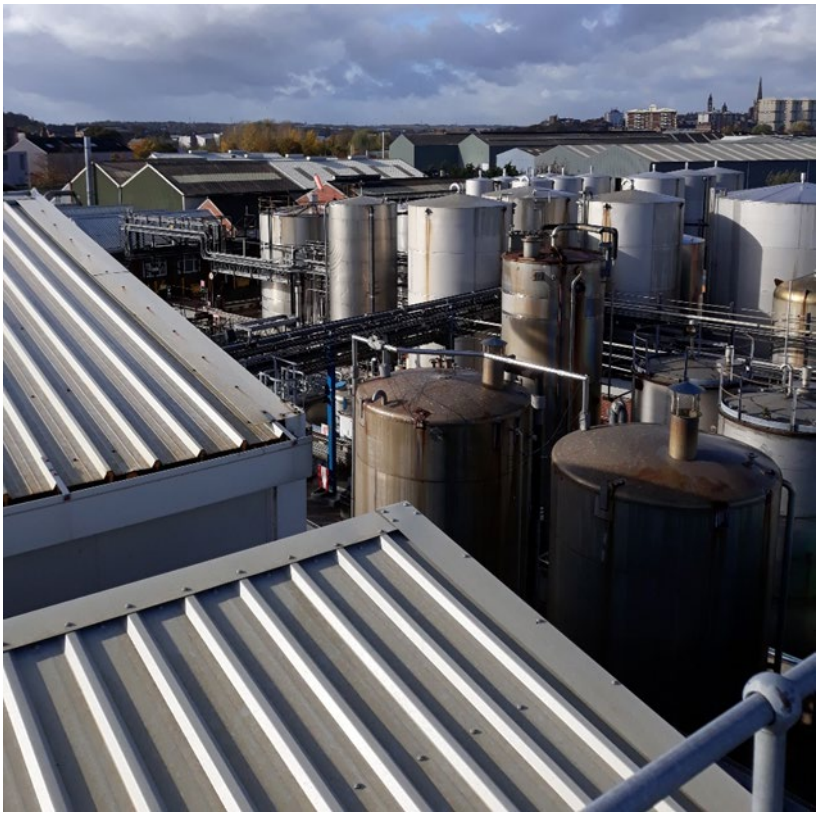
Industrial Heat Recovery Support (IHRS) Programme Case Study

November 2020

Context

Esseco UK was originally founded in 1878 and today still operates from its original site in Wakefield, West Yorkshire. A wholly owned subsidiary of the Esseco Group, a family owned Italian industrial chemical group that has focused on the manufacture of inorganic chemicals and winemaking products for a century.

Esseco UK manufactures products based on Sulphur, Carbon Dioxide, Ammonia, Alkali Hydroxides, Allyl Chloride and several key organic acids, as feedstocks, for global supply into a broad range of different industries including water treatment, oil and gas, feed and food, agriculture and speciality de-icing.



ESSECO (UK) GENERAL VIEW

Our current range of products revolves around the use of several key raw materials including Sulphur, Carbon Dioxide, Ammonia, Alkali Hydroxides, Allyl Chloride and several key organic acids.

Esseco UK has grown substantially during the last decade due in part to significant investment in Sulphur Burning Technology. This investment has enabled Esseco UK to increase capacity and remain competitive for Esseco UK’s range of Sulphur based products. At larger scales, this technology is often paired with heat recovery for combined heat & power generation but, at the scale operated on the Esseco UK site, this technology is rarely considered to be economic and the main focus has always been to ensure that the equipment is functioning and cooled appropriately rather than any particular concerns with regard to heat recovery.

SULPHUR BURNER (FOREGROUND) Associated process plant & location for heat recovery to the rear.

The site is an upper tier COMAH registered site, licensed and regulated by both the HSE and the EA. Change is therefore very strictly managed and regulated to ensure all appropriate safety and environmental implications of any modification or retro-fitted equipment are considered before, during and afterwards to ensure no reduction in control of hazards is experienced. Consequently, the principal focus on these activities revolves mostly around manufacturing capability of core products and less time and resource on investigating large scale technical evaluations of energy saving technologies unless they have an extremely short payback.

In recent years there has been some extensive evaluation of the need to improve the reliability of the on-site steam generation equipment as steam supplies are critical to the site’s manufacturing processes.

How IHRS supported our project

Location of the new heat recovery boiler

The IHRS scheme was promoted via the Chemical Industries Association to all its members and this, combined with some previous audit work that highlighted the opportunity to utilise the heat available from the sulphur burner as an energy source (heat recovery) as opposed to an energy demand (river water cooling) prompted some more detailed investigative work supported by the IHRS phase 1 funding.

Before the promotion of the scheme, the identified potential was always low on our list of priorities because it was considered both highly technical and challenging to deal with as well as only offering us a payback that was deemed as insufficient for commercial opportunities based on other higher return project that were in the pipeline.

The application process indicated that we needed to conduct some more thorough evaluation of the opportunity and brought it to the attention of the senior management team in a focused way that encouraged decision makers to support the idea and evaluate in more depth.

The feasibility study process itself resulted in more senior management commitment as the requirement to review and sign off the process to proceed to preliminary engineering also, by itself, generated support and continued commitment to the concept.

Benefits and Added Value

The principal benefit of the feasibility study was that it demonstrated that, by proceeding with the project, if all challenges were met, the project would actually deliver operational benefits for the site by tackling challenges related to cooling water availability and supply. Whilst these could not be formally quantified at that stage, the concept of reducing reliance on external cooling water was actually a technical breakthrough that has been perceived to be an operational benefit above and beyond the energy and monetary savings that may well support further growth in the site's overall manufacturing capability. This resulted in significant senior management and shareholder buy-in to the concept, provided the economic case for proceeding could be made.

Preliminary Engineering has highlighted some more detailed technical challenges as well as revealing some detail around potential energy utilisation that meant decisions were taken to remove them from further evaluation.

The findings of the feasibility study were that at almost all times there was an excess of heat available beyond the on-site demand. This led to further investigation of alternative uses for this heat, beyond those existing, in order to manage the energy production without compromising manufacturing output. However, in preliminary engineering, it became apparent that all potential technologies for utilising this surplus heat were too expensive to be justifiable.

The preliminary engineering also revealed technical challenges around corrosion potential that resulted in significant re-evaluation of the heat recovery equipment requirements. The most significant of these was that the steam production pressure has had to be increased above that previously required for site use. During preliminary engineering a further potential technology then became apparent that will require further detailed investigation, as time constraints for delivery prevented this during that phase, but which will hopefully deliver additional onsite energy generation rather than wasting the energy in pressure reduction.

The project conservatively estimates savings of 9,302 MWh/annum and carbon savings of 1,823 tonnes per annum. Projected monetary savings are around £180,000 per annum. In addition to these savings, the feasibility study also highlighted opportunities to further reduce overall energy consumption and costs by more effective production scheduling with this as the focus. These will need to be properly investigated and quantified after the project has been completed as they require a complex modelling of capability and production scheduling to realise but could easily become one of the principal unexpected benefits of the project. Non-energy benefits are reduction in river water extraction and reliance on the poor quality cooling water from this source.

Lessons learned

Non-core and technically challenging projects can be a particularly hard "sell" within production focused Non-core and technically challenging projects can be a particularly hard "sell" within production focused organisations however detailed investigations and challenging external minds can highlight significant opportunities to use one opportunity to "unlock" further benefits that would otherwise go undiscovered.

The discipline, and senior management focus, required to follow through on such grant funded activity has actually become a significant "enabler" to delivery of such projects.

George Stammers, Engineering Project Manager says:-

“The grant availability has now advanced this project for delivery in line with the timescale but the real breakthrough in this project was the discovery of the non-energy related benefits around production capacity that have resulted from seeing the opportunity within the problem.”

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