

Flare Gas Recovery - Case Study



Flare gas recovery is one of UnitBirwelco's cleaner products. Provided out of our Birwelco division in Halesowen, who have over 50 years' experience in flare systems. Flare Gas Recovery (FGR) is an especially attractive product as it offers attractive emissions reduction and comes with financial benefits.

The FGR systems are individually tailored to suit the flare gas composition, liquid content, flaring frequency and flowrate presented by each individual client.

To illustrate economic viability, equipment and engineering costs must be quantified, along with monetary savings attributable to the captured gas stream. A typical UnitBirwelco refinery installation is considered, comprising a skid-mounted liquid ring compressor, seal liquid cooler and separator, plus all associated pipework, instrumentation, valves, steelwork and engineering work.

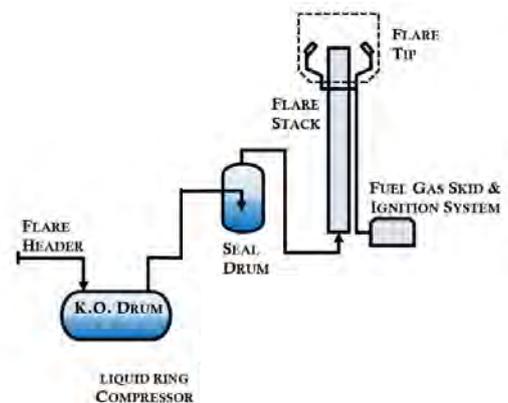
This includes a full control system, with local and off-skid control panels. The entire package is designed, fabricated, installed and commissioned by UnitBirwelco.

This gives our prospective client the full picture in terms of costs – something most engineering firms cannot provide (as they must outsource elements such as fabrication, instrumentation, control, installation and commissioning)

A Flare Gas Recovery System - Case Study

Based at a UK refinery, an existing, continuously-fired flare that presented an ideal opportunity for a retrofitted flare gas recovery system.

Previously wasted gas travelling to the flare tip is intercepted by our package, and the liquid and gaseous components are separated. The gas is routed to the plant fuel system and liquid is routed to the plant effluent facility. A summary of fluid flowrates achieved by the package are as followed –



Stream	Design Flowrate (kg/hr)
Total Fluid Flowrate into FGR System	2509
Recovered Gas (to refinery fuel system)	1720
Recovered Liquid Flow	744
Resulting Flow to Flare	45

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It is clear from the above tabulated data that our system offers an exceptionally high capture efficiency. Under normal, continuous conditions only 1.8% of the original flare gas flow is sent to the flare stack, resulting in an impressive 98.2% reduction in emissions to atmosphere.

Additionally, our system reclaims 69% of the flare stream in the form of versatile/valuable hydrocarbon gas that can be reintroduced to the plant fuel system.

The liquid content of the flare stream, comprising mainly water and particularly environmentally damaging long-chain hydrocarbons, is captured in a controlled manner – allowing processing in the site effluent facility, rather than previously uncontrolled flaring.

The equipment itself supplied by UnitBirwelco comprises of a compact, skid-mounted system including a liquid ring compressor, a separator vessel, and a seal water cooler. UnitBirwelco offer bespoke designs to suit a client's needs, our equipment selection is driven by client requirements. Broadly, a liquid ring compressor presented the most cost-effective, low-maintenance option in this scenario, due to significant levels of liquid entrained in the incoming flare gas stream. This compressor type can comfortably handle entrained liquid without the need for maintenance-intensive duty/standby filters and costly addition separators. This minimises shutdown/maintenance times, as well as maximising performance of the package as a whole.

The value of the recovered gas stream is calculated based on the heat content of the gas and industrially-verified, current gas prices provided by the UK Government Department for Business, Energy and Industrial Strategy.

The client's recovered gas stream has a value of approximately £0.16 / kg, this produces a reclaimed gas stream value of £138 per hour under normal operating conditions (and £275 per hour at maximum capacity). Using a typical assumption of 48 weeks of continuous operation per year (leaving 4 weeks for routine site shutdown), this produces an annual reclaimed gas value of approximately £1.11 million. This clearly illustrates the exceptional economic performance of our flare gas recovery package, and why it is so attractive to our clients.

Payback period provides a useful tool to assess the economic viability of any capital project, and can be defined as follows:

$$\text{Payback Period} = \frac{\text{Total Capital Cost}}{\text{Annual Cash Flow}} \text{ [Years]}$$

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By inputting our economic data for normal operation, we found that the payback period for this specific case was 4.7 months.

With a payback period of under 5 months, it is evident that UnitBirwelco's Flare Gas Recovery system presents an economically attractive project for operators of all sizes. When combining the short payback period with the low total capital cost, this makes FGR an ideal way to improve economic efficiency and environmental impact of a plant.

As a carbon negative company, UnitBirwelco offer bespoke Flare Gas Recovery solutions as both new-build and retrofit packages. These systems have proved that they provide significant cost savings, with attractive typical payback periods of less than five months. Normal/continuous flaring rates can be reduced by over 98%, drastically reducing emissions to atmosphere. Our Flare Gas Recovery packages provide an excellent vehicle for both cost and emissions reduction – making them an ideal solution in increasingly cost-driven and environmentally conscientious global energy and oil & gas industries.



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