

## Flare Gas Recovery



Associated Gas Processing Facility

**Oil & gas producers always try to optimize their production plants. Despite this, a significant part of the gas is flared because it is perceived that there are no easy ways to monetize it. When oil prices are high, flare gas is a relatively insignificant revenue stream, especially if there is no cost incurred for greenhouse gas emissions. However, with the current low oil prices and increasing environmental concern, utilization of this flare gas is commercially attractive and good for the environment.**

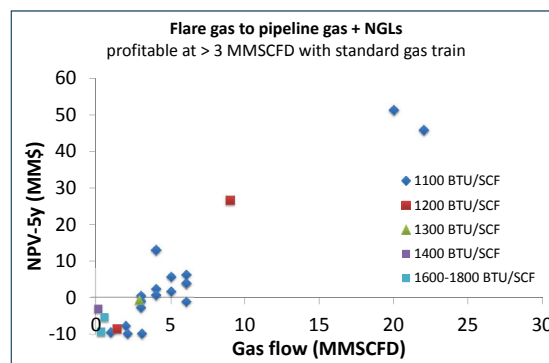
**At Frames, we offer solutions to recover a large part of the currently flared gas in a profitable way. We select the most optimal product and process lineup, with short payback times and reduced emissions, and we take care of the equipment procurement, construction, and startup.**

## Solution

Traditionally, flare gas recovery is done with re-compression, for example, either for enhanced oil recovery or by re-injecting into the main process. This adds cost but does not add income directly. We believe that it is possible to use a lean and mean process train to turn flare gas into profitable products rather than waste. Depending on the location and available infrastructure, the valuable product can be electricity, LPG, or pipeline-quality natural gas (in order of increasing profitability). In the absence of a nearby gas grid pipeline, production of CNG, LNG, or synthetic crude oil, methanol or dimethylether (via a GTL process) may be more suitable.

### Decision making

Each gas contaminant and each gas product influence the optimal lineup of treatment steps, and expertise is required to quickly evaluate these. An internal study focusing on Iran has shown that approximately 50-70% of the currently flared gas resources in Iran can actually be made into valuable products with a payback period of five years as shown in figure below. The exact payback time depends on the gas flow, the caloric value, and the amount of sour gas contaminants. Based on this study and more than 3 decades of experience in the upstream oil & gas industry, we at Frames are able to help you select the product and the processes required, and evaluate the economics. Together with you we will work in the whole trajectory from conceptual design to plant start-up.



Net present value after five years in relation to gas flow

### Natural Gas

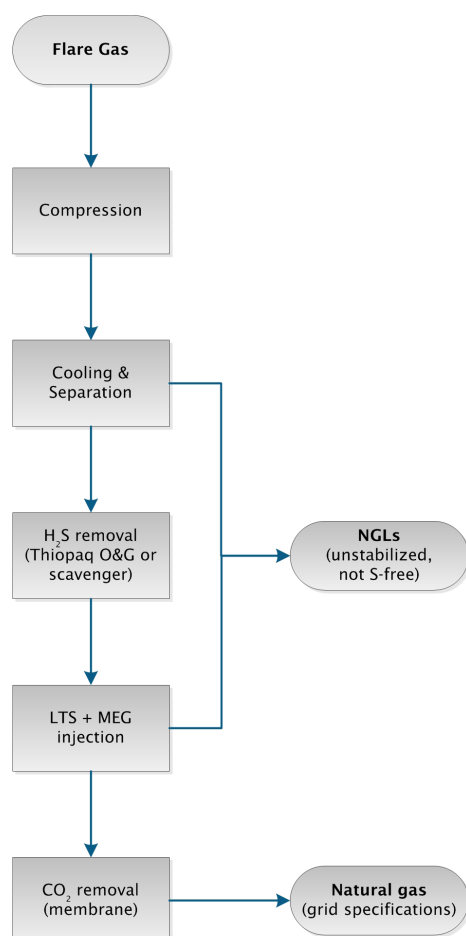
For gas flows larger than 3 MMSCFD, treating the gas to export pipeline quality is often profitable, possibly with additional LPG removal. These products have strict specifications, so the process train will consist of CO<sub>2</sub> removal H<sub>2</sub>S removal and dewpointing. For low pressure associated gas this will be preceded by compression. As flare gas is at the end of the production chain, high flexibility and robustness are imperative.

## Flare Gas Recovery

In a case study, we selected high selectivity CO<sub>2</sub> membranes for CO<sub>2</sub> removal, the Thiopaq O&G process for desulfurization, and a Low Temperature Separation (LTS) package with MEG injection that combines dew point control with NGL recovery as shown in figure below. This lineup delivers pipeline quality natural gas and LPG that can be admixed with the produced oil. Further upgrading the LPG and condensate stabilization are optional, if a local offtake party is available. We use a modular approach for our equipment design to offer both flexibility and short delivery times.

### LPG

For very rich flare gas sources (>5% C<sub>3+</sub> and/or >20 bar), removing the LPG can be done separately, and a simple LTS unit is the best choice. The C<sub>3+</sub> fraction can either be separated and admixed to the current oil transport line, or purified further to more strict LPG export specifications.



### Other products

For very small gas flows (<3 MMSCFD), minimizing the investment is your best bet. With a gas engine or gas turbine, preceded by small scale H<sub>2</sub>S removal, the energy content of the flare gas can still be utilized. Frames has experience with the commonly applied technologies for small scale sulfur recovery, being solid bed scavengers and the THIOPAQ O&G process, as well as power generation with high efficiency contaminant destruction.

For locations without access to a natural gas pipeline, alternative products such as Compressed Natural Gas (CNG) or Liquefied Natural Gas (LNG) can be considered. For very large onshore flare gas sources, producing synthetic crude oil via a Gas to Liquids (GTL) process is another option, and Frames can be of aide in assessing which product is most suitable for your location.

### Conclusion

Gas that is currently being flared does not need to be a burden, it is a resource that can increase a plant's profitability while reducing its emissions. From recompression or simple LPG extraction up to natural gas production or even a small-scale LNG facility, we are your partner that will provide a solution that combines a proper balance of CAPEX and OPEX with a modular and transportable construction philosophy.

# Flare Gas Recovery

## Project Management

At Frames, we look at the bigger picture. Our team of in-house experts works with our clients to understand their business, striving to create optimized solutions that ensure a competitive edge.

From optimizing production to cutting operating costs, we work to fully integrate our Frames solutions into your production system within budget, on time and according to specifications, for years of trouble-free operation.

We understand your expectations for high performance, and use industry-leading project management and document control to design, construct and commission high-quality products where and when you need them. Our centralized engineering and construction teams in the Netherlands work together to find effective solutions for each unique project. Our global network of offices, suppliers, and trusted service providers enables us to accomplish the most challenging projects.



Process optimization to remove flare



TEG Regeneration Skids with OVC

## Added Value

- Monetize your waste stream while reducing your CO<sub>2</sub> footprint
- Built for your unique business needs and operating conditions
- Skid-mounted units that easily integrate into your production system
- Low energy demands with optimized heat integration technology and low emission systems
- Robust and reliable units designed with lean engineering methods

## References

- UGS Castor - Escal UGS, Spain
- L9-FF-1 modification - N.A.M, The Netherlands
- Stublach - Storengy UK, the UK
- UGS Gournay sur Aronde - Storengy, France
- Ha'py Production Increase Project - BP, Egypt
- Qatif - Saudi Aramco, Saudi Arabia
- Northern Oman Gas - Occidental of Oman, Oman

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# Frames Family Tree

