

3S Technology | NGL Recovery

3S (SuperSonic Separation) Technology*, offers an advanced gas processing solution. The technology enables high-efficiency separation of gases using supersonic flows and is a proven alternative to traditional methods like turboexpanders and chillers (see Appendix 1.1).

3S Technology was developed in 1997 and patented worldwide in more than 30 countries. It is applicable for both offshore and onshore facilities.

With more than 10 installations across Russia and China, processing more than 10 billion cubic meters of gas annually, 3S Technology has been proven to substantially raise efficiency and increase revenues of the existing Gas Processing Plants (GPPs), as well as raise production capacity and reduce capital expenditures for the construction of new GPPs by 20-40% (see Appendix 1.2).

NGL Recovery

3S Technology is used to assure NGL recovery and separation from the natural, associated, or flare gas for further sale or own use at the plant, aimed at maximization of production & economic effect.

Residual NGL	NGL from flare gas	NGL from own use gas
Integration of 3S Technology into the existing GPP or pipelines allows to recover residual NGL.	3S Technology allows to recover NGL from the flare gas, adding to revenue & reducing ecological impact.	NGL separation using 3S Technology from gas used for own needs, such as compressors, power generators, etc.**

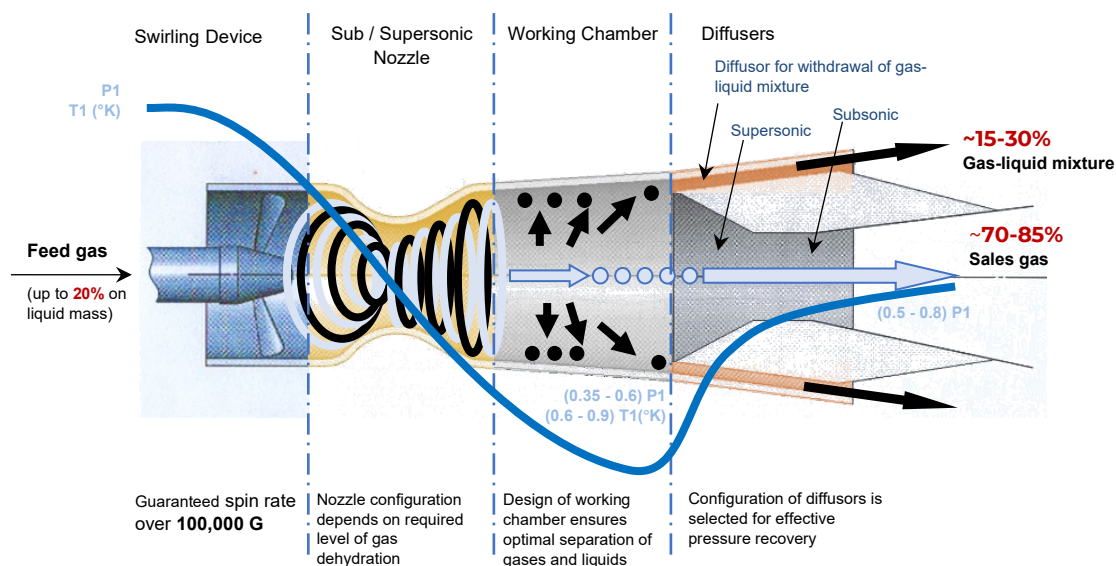
Key Features

- *Lower CAPEX & OPEX:* Compared to conventional systems (see Appendix 1.3), 3S Technology has low cost of installation, operation, and maintenance. No rotating parts leads to minimal wear and tear.
- *Efficiency & Compactness:* 3S Technology provides a compact solution for deep recovery of C3+ fraction. It can be installed on a wide pressure range and is highly tolerant to flow variation.
- *Quick Payback:* High NGL recovery rates along with lower costs, lead to a shorter payback period – typically less than 2 years.
- *Environmental Effect:* Using 3S Technology for NGL separation substantially reduces environmental damage resulting from flaring.

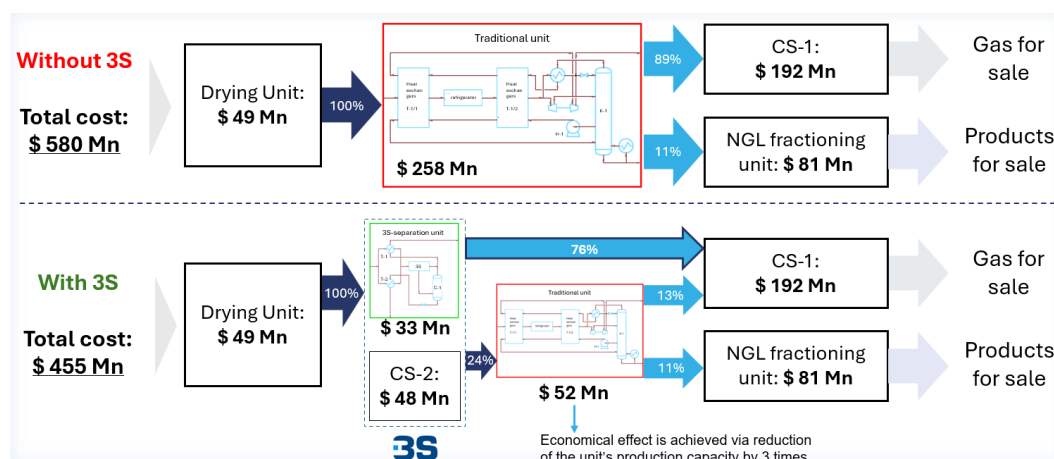
* For more information, please visit <https://engo3s.com>

** Allows one to create an additional revenue stream by capturing C3+ fraction, which otherwise would be lost

Appendix 1.1: 3S Technology Unit Overview



Appendix 1.2: Cost-Effectiveness of 3S in GPP



Appendix 1.3: 3S vs. Turboexpanders and Chillers for NGL

No	Criteria*	3S Technology	Turboexpander	Chiller
1	Essential gas specification limitations	Any pressure range**	Cannot operate on high pressure	At high pressure, a much larger chiller is required
2	Flow variations tolerance	±15% for single unit, any flow covered by multiple units	No tolerance for flow change	No tolerance for flow change
3	Extraction %	up to 96%	up to 99%	up to 90%
4	Time estimate for design, assembly & installation	6-8 months	12-18 months	12-18 months
6	Annual maintenance requirements	up to 7 days	30-90 days	30 - 60 days
7	Overall installation costs estimate, 40MMSCFD	~ \$10 mln	~ \$20 mln	~ \$15 mln
8	Annual operating costs	Low	Very high	High
9	Annual maintenance costs	Minimal	High	Significant
10	Average Payback period	2 years	5 years	4 years
11	Other substantial criteria	No rotating parts	Requires reserve unit for maintenance and back-up	Requires external energy supply

* The estimates are based on one of the most recent company projects, and may vary depending on various factors, including customization requirements for each project.

** In case of low pressure, a compressor might be additionally required.