

Cascade H₂S

Biogas Desulfurization

Low-cost, reliable and regenerative bulk H₂S removal.



Cascade H₂S installation



High bulk H₂S removal efficiency from up to 10,000 ppm down to ~100 ppm, then polishing step down to <4 ppm.



Similar CAPEX to sacrificial media approach, but with only 15-30% of the OPEX. Payback in < 1 year for existing projects.



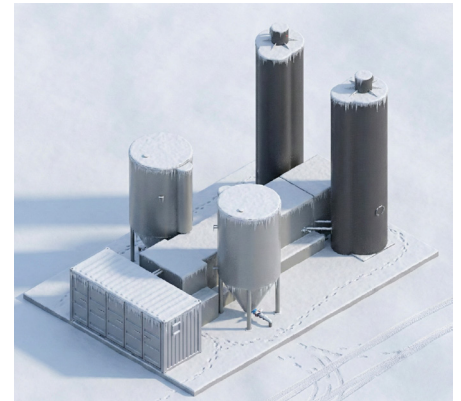
Oxygen-free. The process neither requires the addition of oxygen nor adds it to the treated gas and has no reliance on sensitive biology.

Cascade H₂S Operating Range

Inlet Flow	Typical H ₂ S levels (ppmv)	Temperature Range
250~2,500Nm ³ /h	up to 10,000	-40 to 40°C
150~1,550scfm		-40 to 104°F

*Higher flow rates can be accommodated with multiple units.

i Please [contact us](#) to size your system. Cold weather packages available.



Lowest Cost Solution

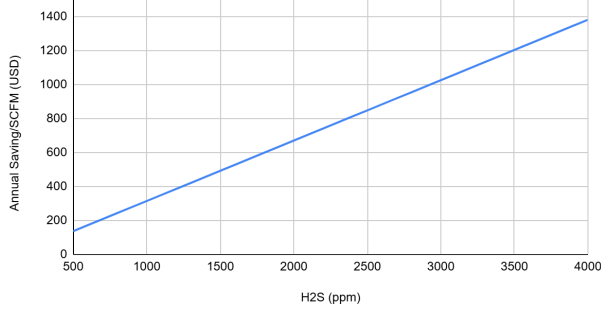
Cascade H₂S Advantages

- Prevents pipeline shut outs**
 Ensures upgrading systems can meet pipeline requirements for RNG, because oxygen is neither required nor added.
- Simple and reliable**
 Robust to variation of flow, H₂S concentration and ambient conditions. Easy operation with fully automated system maximizing productivity.
- Low costs**
 Designed specifically for biogas with cost-focused manufacturing. The regenerative process operates at low pressure allowing the use of cost-optimized materials, allowing for minimized CapEx and OpEx.

Alternative Technologies

- Sacrificial media approach**
 High operational costs from frequent media replacement and production interruptions.
- Biological systems**
 Complex operation, slow startup times, and vulnerability to microbe mortality.
- Oxygen injection**
 Risk of pipeline shut outs due to strict North American oxygen limits in RNG.

Est. Annual Savings Cascade H₂S vs. Sacrificial Media



Exceptionally fast Return on Investment

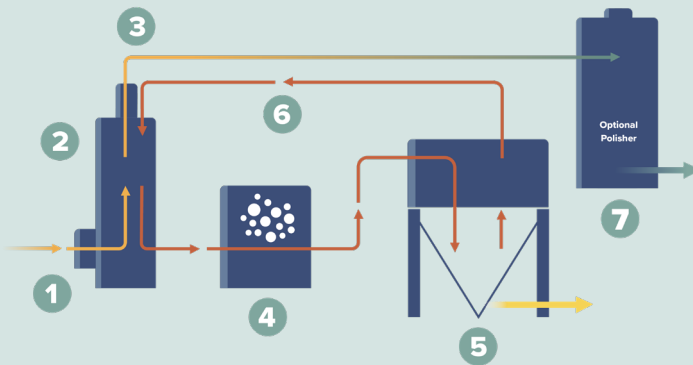
Existing Projects: Add Cascade H₂S bulk removal ahead of sacrificial media vessel(s) to slash OPEX

- Payback can be in less than a year
- Estimated annual savings of over USD \$500,000 (based on 3,000ppm H₂S and 500scfm)

New Projects: Start with the right technology

- i** To find your estimated annual savings with Greenlane Cascade H₂S, locate your biogas H₂S concentration on the x-axis, go vertically to the blue line then horizontally to the y-axis. Multiply this number by your project's biogas flow (scfm).

How Cascade H₂S Works



1. Raw biogas flows from the digester at low pressure and enters the scrubbing tower.
2. Biogas flows countercurrent to a regenerative chemical solution. No oxygen is added to the treated gas.
3. Treated gas exits through the top of the scrubber scrubber with ~100 ppm H₂S content.
4. Sulfur rich solution is regenerated in a separate oxidation tank.
5. Regenerated solution flows from the oxidation tank to a sulfur separator removing elemental sulfur solids that can be spread on fields as fertilizer.
6. Clean, regenerated solution returns to the scrubbing tower in a continuous process.
7. Gas treated by Cascade H₂S is further treated to pipeline spec (≤ 4 ppm) by the optional polisher.

The Greenlane Advantage

Solving the industry's most challenging problems for over 35 years with more than 500 systems sold into 32 countries.

- + 24/7/365 expert technical support
- + Remote monitoring and management
- + Priority spare parts incl. warehousing/logistics
- + Proprietary software and equipment upgrades
- + Commissioning, training & performance optimization
- + Service contract options

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