

Expand sulfur recovery unit capacity with oxygen enrichment



As environmental legislation mandates stricter sulfur dioxide emission standards and products with lower sulfur contents, sulfur recovery plant loadings are increasing. To meet this need, Air Products offers a range of oxygen-based technologies engineered to increase sulfur recovery unit (SRU) capacities by 10 – 100+%, thereby often eliminating the need for building expensive new sulfur recovery plants.

Air Products provides complete support for SRU oxygen enrichment including HAZOP, pre-commissioning, training and startup support. We are a global leader in oxygen technology and production and we will help you to determine the most cost-effective mode of oxygen supply. To date, we have implemented over 50 SRU oxygen enrichment projects worldwide.

Key benefits

Increase capacity—when an SRU is faced with hydraulic or residence time limitations, its capacity can be increased via oxygen enrichment of the combustion air. Oxygen enrichment allows use of the existing SRU while producing new, lower sulfur products that comply with today's regulations for processing heavier, sour feedstock to maximize margins. Also, oxygen enrichment is a low-cost method of meeting regulatory agency mandates for redundant SRU capacity.

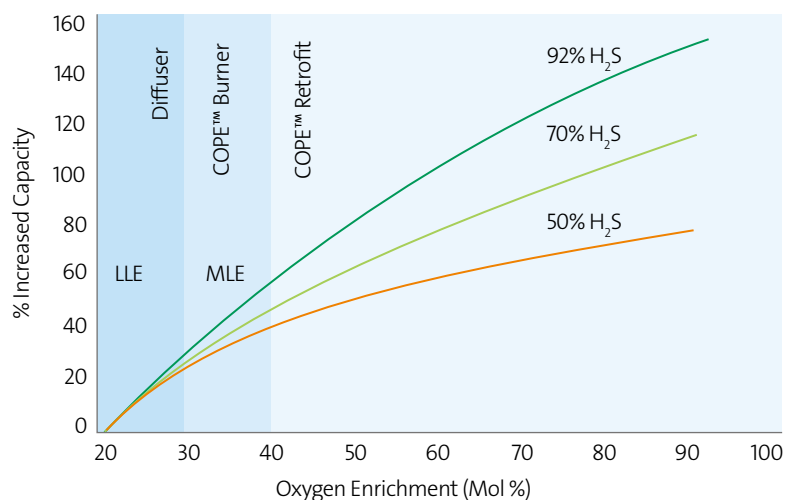
Reduce cost—SRU oxygen enrichment is only 5–25% of the cost of building a new SRU, depending on the enrichment technology deployed. It is also economical for grassroots Claus plants as a result of smaller equipment for the same acid gas capacity.

Increase operating flexibility—oxygen enrichment provides a flexible method for expanding SRU capacity. The oxygen flow rate can be easily adjusted to meet the changing needs of a refinery. Unlike physical expansion, no penalty is incurred for operating at reduced capacity, since the costs of oxygen enrichment are essentially variable. There is also no reason to incur a capital penalty associated with building an oversized SRU that is fully utilized just a few times a year.

Reduce emissions—the reduction of nitrogen diluents leads to higher conversions in the SRU. Also, less nitrogen entering the Tail Gas Cleanup Unit (TGCU) results in higher hydrogen sulfide partial pressure in the amine absorber, yielding better absorption and lower sulfur emissions.

Quick implementation—the time required to modify an SRU for oxygen-based operations is relatively short and does not require a shutdown of the SRU. For low-level enrichment (21–28% oxygen), the oxygen supply can be “hot-tapped” into the combustion air main while the sulfur plant is in operation. This completely avoids downtime and associated production loss.

Figure 1: SRU Capacity Increase with Oxygen



*SRU capacity expands as oxygen is added to the combustion air. New, lower sulfur products can be produced without affecting performance. Oxygen enrichment can also allow plants to use a heavier, more sour crude feedstock without affecting capacity. COPE™ is registered trademark of Air Products and Chemicals., and Goar, Allison and Associates, Inc.

Supply modes

Oxygen for SRU oxygen enrichment can either be delivered to the refinery from Air Products' extensive gas supply network or generated on-site. The volume requirement for oxygen and the somewhat erratic demand pattern have made liquid oxygen (LOX) the predominant mode of supply. Vacuum swing adsorption (VSA) may be a viable mode of supply for refineries that have a requirement that is steady. On-site cryogenic generation is more likely to become cost-competitive in medium/high-level oxygen enrichment scenarios. We work closely with you from the project's outset to help determine the most cost-effective mode of supply.



A customer station for LOX typically consists of a liquid oxygen storage tank, a vaporizer, and a pressure and temperature control station. The LOX is delivered by a tanker truck to the tank and is withdrawn and vaporized from the tank for consumption.

For a technical evaluation of your SRU operation to show the level of oxygen required for your desired capacity increase, please complete the questionnaire at airproducts.com/sulfurout.



Utilizing proprietary technology and an easy-to-install modular design, the PRISM Oxygen VSA generators are ideal for lower purity, on-site oxygen gas applications where they are an economical alternative to cryogenically produced or truck-delivered liquid oxygen.

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