

A System to Optimize Acid Gas Removal While Purifying Wastewater

ADDRESSING ENERGY AND WATER SECURITY

Treatment of hydrocarbon gases such as natural gas to remove acidic (“sour”) gases including carbon dioxide (CO₂) and hydrogen sulfide (H₂S) – known as acid gas removal (AGR) – is critical for meeting emissions regulations and making gas safe for pipeline transport. However, current AGR systems have high energy requirements, operating costs, and equipment corrosion rates, and also discharge wastefilled produced water.

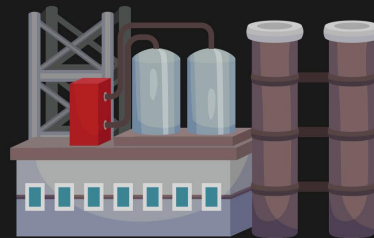
AGR plants also currently do not have a means of economically treating and reusing discharged water.

This makes surfaces, soil, and underground water susceptible to pollution – a priority concern in areas where fresh water is scarce and costly.

A HYBRID SOLUTION

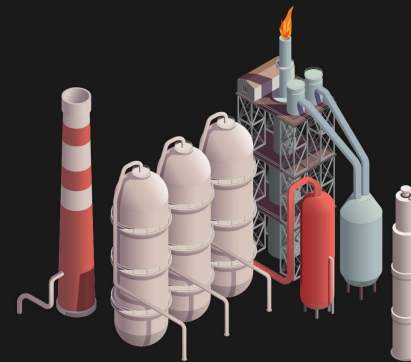
HBKU is addressing these challenges with an optimized hybrid AGR-forward osmosis system that integrates AGR with waste water purification.

It replaces conventional cooling system methods of AGR with three new economizers and a new processor, and applies a modified solvent and proprietary amine blend to enhance acid gas loading and absorption. Along with a novel thermal integration design, the technologies have the capability to significantly reduce the energy required for regenerating rich amine streams, maximize oil production, minimize water pollution and CO₂ emissions, and reduce costs.



APPLICATIONS

- Oil and gas
- CO₂ emissions mitigation
- Enhanced oil recovery
- Existing and new AGR plants



VALUE PROPOSITIONS

Energy-saving: Reduces regeneration energy by 20%, steam use by 70%, solvent rate by 40%, pumping power by 46%, and eliminates electric air coolers and reflux water pumps.

Robust: Maximizes oil production (up to one barrel per day for each 10,000-12,000 SCFD), boosts sour gas loading by 69%, and increases AGR plant capacity to handle more sour gases.

Green: Reduces flaring/ venting of CO₂ into the atmosphere; protects soil and groundwater from contamination by AGR produced water and wastewater

Economical: Reduces corrosion rates and maintenance costs, and lowers capital, foundation, steel structure, and overall footprint costs for AGR plants.

Efficient: Helps to maintain plant capacity during all seasons – even during summer when current AGR plants often operate at reduced capacity



PATENT STATUS

Patent US11446603 /
US20200171423A1 Granted



LICENSING OPPORTUNITIES

Hamad Bin Khalifa University is offering this technology for license.
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