CASE STUDY

Biogas Desulfurization Plant for Citrus Industry

- **Client**: Lucci Group, Citrusvil
- **Location**: San Miguel de Tucumán, Argentina
- **Solution**: Biogas desulfurization plant with washing columns

Background

Formed in the 1970s, Citrusvil is a leading company in the global market, dedicated to the production, processing and commercialization of lemon and its derivatives, a pioneering industry in the southern hemisphere. With its operational base located in the province of Tucumán, Argentina, Citrusvil prioritizes sustainability in all its processes; an assumed commitment that led to the development of a sustainably integrated production system. Citrusvil has the first lemon effluent treatment plant in the world, capable of generating biogas and producing electricity from renewable sources. The biogas generated by the effluents contains hydrogen sulfide that is corrosive to cogenerators and boilers. Therefore, it is essential to desulfurize the biogas. Citrusvil needed a solution to treat the biogas produced and meet the H_2S requirements for the biogas optimizing operating expenses, including a biogas scrubbing system with caustic soda has a soda consumption 5 times higher than the plant currently installed at Citrusvil.

Challenges

The lemon industry has seasonal production that starts in March and ends in September.
One of the main challenges was to build a plant to adapt to biogas production peaks during the peak production season. Hydrogen sulfide peaks reach 6,000 ppm, with an average of 2,500 ppm.
The desulfurization generally used in this type of plants involves washing biogas with caustic soda.

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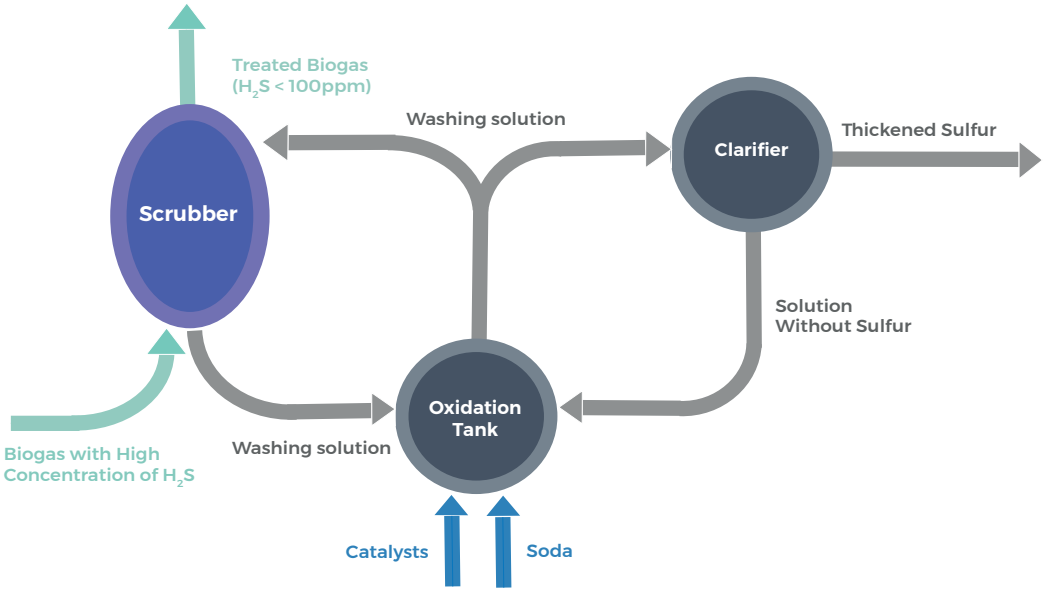
This last solution is very efficient in terms of residual H_2S in the gas, but at the same time consumes a large amount of soda, since it transfers a large amount of CO_2 contained in the biogas to the liquid phase. The proposed solution allows the Customer to treat the biogas produced by three anaerobic lagoons and meet the H_2S requirements for the biogas fed to the cogeneration plant.

Solution

The plant includes 4 columns (each one treats a flow of 500 m³/h) of washing for the removal of H_2S - hydrogen sulfide - and two oxidation tanks. Fluence applies a wash without transferring the CO_2 to the liquid phase; the concept is to carry out a synergistic process of transferring H_2S from the gas to the washing solution, followed by an oxidation stage of this solution (in which the sulfur is converted to solid sulfur). Solid sulfur is purged from the oxidation tanks by sending it to a clarifier for thickening and removal from the system. This treatment guarantees biogas to have an H_2S lower than 150-200 ppm, the maximum value required for cogenerators.

Process Flow



Results

Wastewater is an affordable and sustainable source of water, energy, nutrients, and other recoverable materials. Cutting-edge technologies offer significant circular economy opportunities for cities and human settlements. The technology in question takes up little space and is easy to operate. It carries out a desulfurization that requires a chemical consumption of less than 80% compared to conventional plants and removes the hydrogen sulfide from the biogas to be used as renewable energy. This is applicable to any sector of the agricultural industry and contributes to one of the most important challenges in Argentina, reducing greenhouse gas emissions. It is one of the first biogas treatment plants in Argentina and also the first Fluence facility for the RenovAr project. RenovAr is Argentina's incentive program for electric energy from renewable sources such as biogas. With this solution, the Customer manages to inject 3 MWh into the network during peak production hours.