ThioSolv will Guide Anaerobic Digestion into a New Area – Complete Sustainability

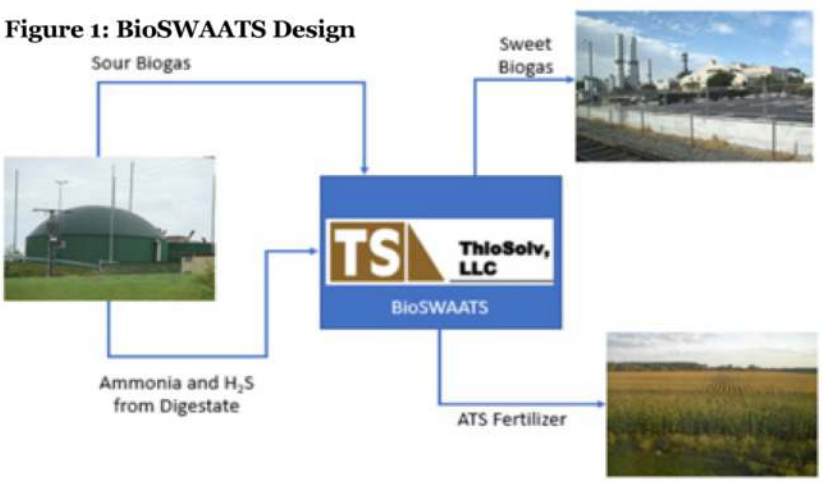
Article written by Matthew Ray with ThioSolv, LLC

The recent passing of the Inflation Reduction Act (2022) has contributed to the notoriety of and growth in renewable sources of energy, including anaerobic digestion. With all this growth, the major challenge of emissions of hydrogen sulfide ("H2S") and ammonia from these anaerobic digesters has posed an increasing challenge for dairy farms, swine farms, poultry farms, and other institutions and companies working with farms to construct anaerobic digesters. Whether it be the cost of removal or inability to get the emissions levels low enough to move forward with operation, emissions have been a significant hurdle when working to add an anaerobic digester to a farming operation. The BioSWAATS processes are capable of processing the ammonia and H2S in the digestate and the H2S in the biogas producing organic ammonium thiosulfate fertilizer ("ATS") and organic ammonium bisulfite ("ABS") used in producing ATS and industrial applications.

The methods today, such as iron sponges, activated carbon, synthetic, biological micro-organisms ("bugs"), or membranes are all currently being used to deal with these sulfur emissions challenges along with acquiring emissions allowances. While the prior mentioned methods reduce the emissions, they cannot eliminate nearly all emissions and do have to be replaced after the saturation point is reached– resulting in expected operating costs. All of these solutions have issues and are operating costs without returns on the investment. There is a simple solution that not only reduces emissions and does not need replacement, but also brings the emissions down to essentially zero and provides farmers with crop nutrients that can provide a revenue stream to the operation. That simple solution is ThioSolv LLC's unique patented processes. Our simple process, as shown in Figure 1, uses the ammonia from the digestate and the H2S from the digestate and biogas to produce a high value-added fertilizer, ATS and ABS.

ThioSolv, LLC, has been effectively removing emissions from gas

Figure 1: BioSWAATS Design

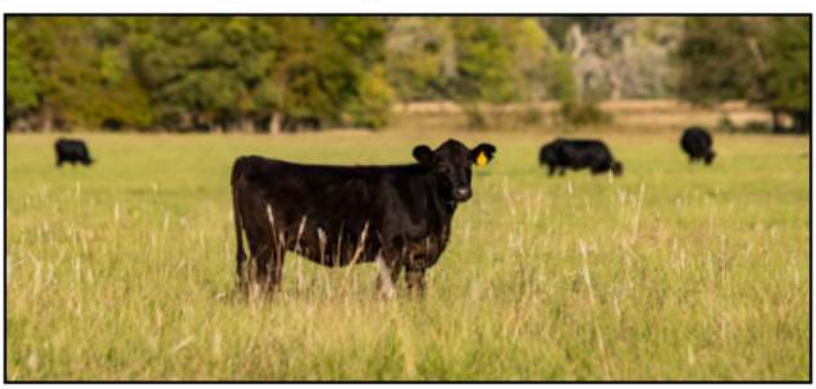


streams for over 15 years in the oil and gas industries and has several unique, licensable processes applicable specifically for anaerobic digesters. ThioSolv can cater to both large digesters (Over 4000 dairy cows) – through its BioSWAATS family of processes – and to smaller digesters (Under 4000) with its smaller-scale BioSWAATS family of processes. ThioSolv's processes can operate 24/7 with nearly no downtime – reacting the H2S and ammonia from gas streams and producing an organic ammonium thiosulfate ("ATS"). Furthermore, ThioSolv will handle the transportation and marketing of the ATS through its connections – allowing the digester owner(s) to get a percentage of the netback for no hassle. What was once considered an operating cost for anaerobic digesters now can earn a return on the investment. Start turning your operating cost into another operating income stream with ThioSolv, LLC's technology.

Whether it be a large or small digester, these challenging emissions can also be contained in digestate as well as gas streams. ThioSolv has a unique process to take stripped ammonia and H2S from digestate by adding sulfur dioxide ("SO2") or burning sulfur to SO2 producing an ammonium bisulfite/ATS solution. This solution is then used to remove all of the H2S from the biogas. ThioSolv's BioSWAATS family of processes eliminates virtually all emissions, creates no waste liquid streams, produces only organic products that ThioSolv can place in the market and provides a revenue stream back to the owner.

ThioSolv, LLC, is a simple solution to your emissions problems by taking your emissions challenges and turning them into sustainable, organic ATS fertilizer that contributes to crop production and provides a return on investment. A new opportunity for revenue, fertilizer production, and sustainability is here – let's achieve it together.

For further information, check out our website at ThioSolv.com or feel free to reach out to us by email at Matthew.Ray@ThioSolv.com or by phone at (210) 870-0078. ThioSolv has 6 related process patents and 5 pending patents for production of ammonium thiosulfate, ammonium bisulfite and/or ammonium sulfate. ■



ThioSolv, LLC
Simple Solutions

Digester Issues?

- Digestate has ammonia or H2S problems?
- Biogas has H2S problem?

Decisions

Ammonia or **H2S** or

- Burning
- Leave in Digestate
- Ammonia Losses

BioSWAATS

- Recover Both
- Organic Ammonium Thiosulfate
- Organic Ammonium Bisulfite
- Sustainable
- Positive Cash Flow
- Lower Emissions

- Create Waste
- High Operating Cost
- Expensive Disposal

Matthew Ray (210) 870-0078 • Matthew.Ray@ThioSolv.com • ThioSolv.com