Greening Municipal Waste Treatment: A Case Study of Using Food Waste and Fats, Oils, and Grease (FOG) to Improve Biogas Recovery from the City of Mesa's Northwest Water Reclamation Plant (NWWRP)

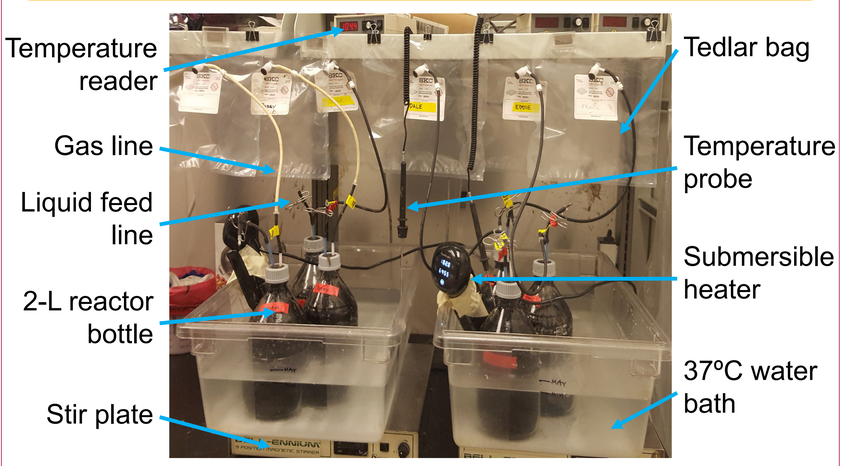
Michelle Young[*a], Rick Kupferer[a], Niel Curley[b], Tom Sheber[b], Eric Auerbach[c], Brian Bubela[d], and Bruce Rittmann[a]

[a]Biodesign Swette Center for Environmental Biotechnology, Arizona State University, Tempe, AZ 85044; [b]City of Mesa, AZ, 85211-1466; [c]ARCADIS U.S., Inc., Long Island City, NY 11101; [d]ARCADIS U.S., Inc., Phoenix, AZ 85008; [*]aumny@asu.edu

Food waste and FOG addition increases natural gas production while diverting waste from landfills

Bench-scale studies explore the feasibility of **adding food waste (FW) and fats, oils, and grease (FOG) to anaerobic digesters** to improve CH_4 recovery and decrease the biosolids sent to landfills. The study is based on current Mesa NWWRP operating conditions and utilizes actual FW/FOG streams. The study is on-going.

Experimental design

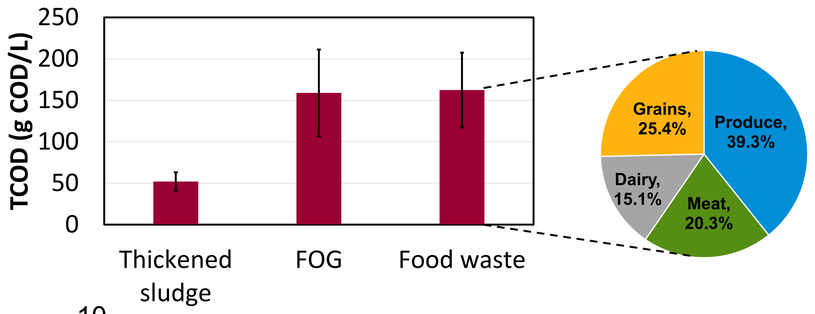


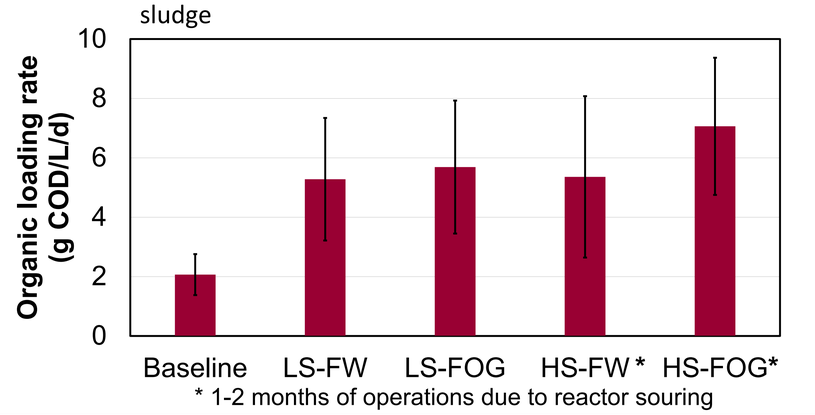
Reactor	Feed rates (mL/d)			HRT (d)
	Thickened sludge	Food waste	FOG	
Baseline	58	0	0	25.9
LS-FW	58	29	0	17.2
HS-FW	58	35	0	16.1
LS-FOG	58	29	6	16.1
HS-FOG	58	29	9	15.6

LS = low-strength feed HS = high-strength feed

FW and FOG feed rates were based on projected yearly volumes and required to maintain > 15 d reactor HRT. Thickened sludge was obtained from Mesa NWWRP. Food waste was obtained from 6 local businesses and non-profits. FOG was obtained from the Tempe Grease Cooperative. Reactors were operated as semi-batch reactors fed every 2 to 3 days for 4 months unless otherwise noted.

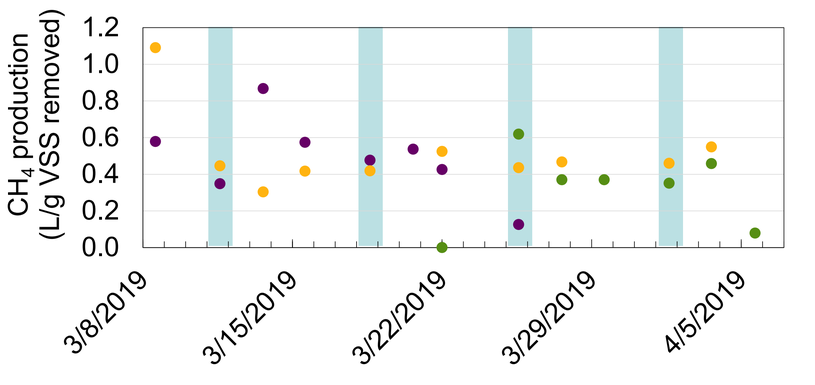
Feed stream composition and organic loading rate varied due to real-world variations in stream composition

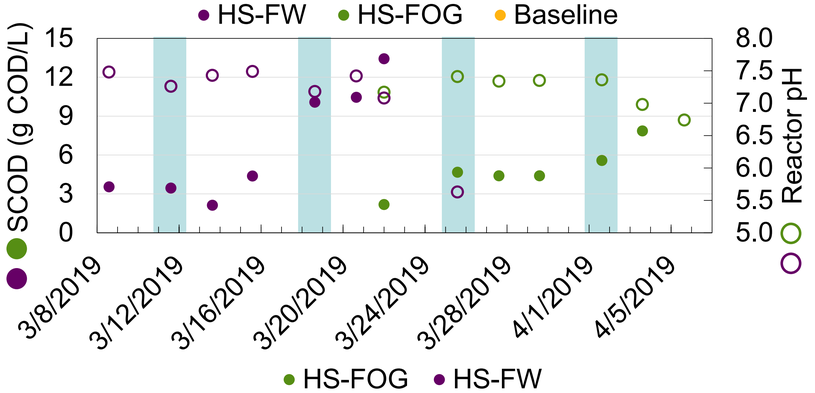




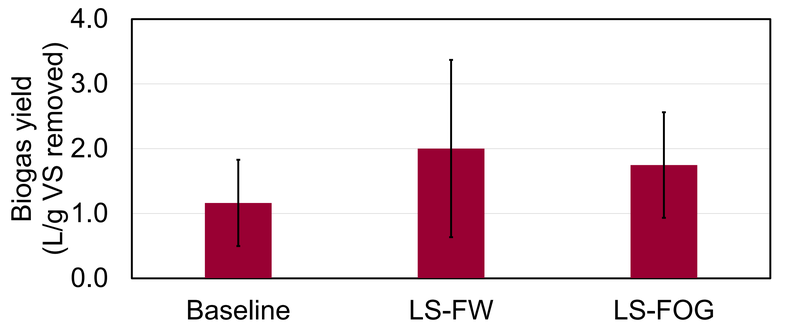
* 1-2 months of operations due to reactor souring

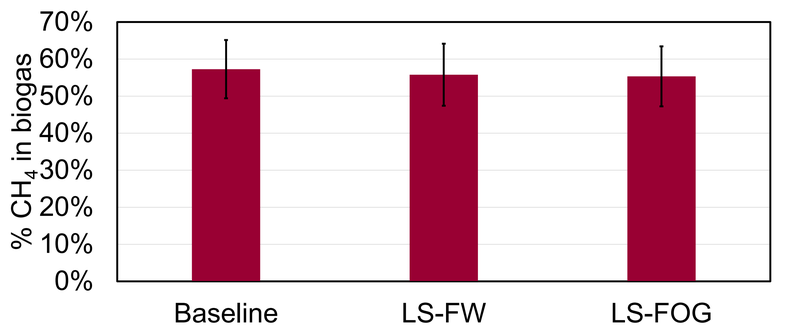
Consecutive high weekend loadings caused the high strength reactors to sour



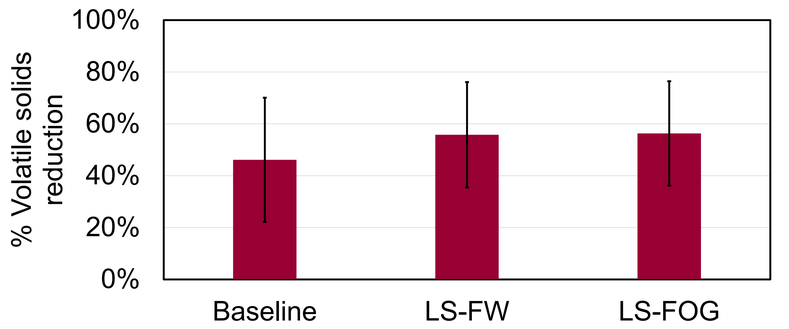


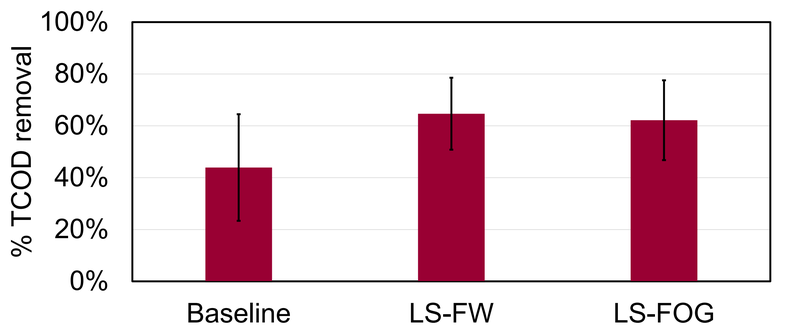
The low strength FW reactor had higher biogas yield due to high organics loading with fewer lipids…





…and consistently better effluent quality





Acknowledgements

Funding was provided by the Cities of Mesa and Tempe, AZ.

Presenting author contact information

Email: aumny@asu.edu Website: environmentalbiotechnology.org