BioElectrochemical Treatment Technology (BETT™) makes wastewater treatment BETTer

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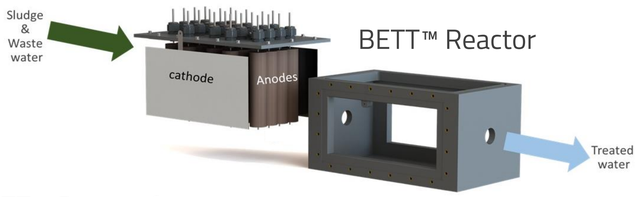
Global pilot details

Locations: Escondido, CA & Tijuana, Baja California, Mexico
Applications: Swine waste & Municipal Sewage treated to irrigation quality (according to WHO standards)
Flow rate: 150 gpd (0.6 m^3/d) swine waste & 700 gpd (2.6 m^3/d) residential sewage
HRT: 4 hours
Parameters monitored: COD, TSS, Nitrate, Nitrite, Ammonium, Phosphate, pH, DO, conductivity & electricity production



BETT™ Reactor

BETT™ System for swine waste treatment

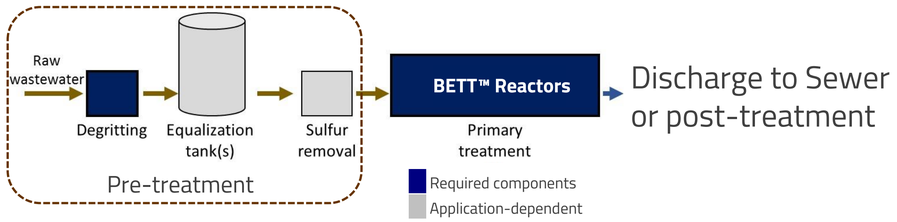
Compelling value proposition

Conventional wastewater treatment is OPEX intensive. BETT™ is a proven wastewater treatment technology which delivers:

- Energy positive treatment (0.2-0.8 kWh/kg-COD)
- Generates electricity directly (no methane)
- Reduces primary sludge by up to 80%
- Reduces treatment footprint up to 90%
- No nutrient dosing required
- Food & beverage customers can realize savings of up to $2mm/yr per facility

BioElectrochemical Treatment Technology (BETT™)

BETT™ system for onsite residential sewage treatment



The Results

The swine waste pilot has been running continuously since March 2016 and demonstrating a treatment rate of 1–5 kg-COD/m^3·d. The treatment rate and power production is dependent on COD loading and has been consistently high enough to offset the power requirements for running system (0.2 kWh/kg-COD). BETT™ is a gravity fed system with minimal pumping requirements, which will consistently provide OPEX savings for end-users. Higher COD waste streams can result in energy positive applications. Longer HRT and/or post-treatment results in higher quality effluents and potential reuse opportunities.

4 hour HRT – BETT™ treatment		
Parameter	Influent (mg/L)	Effluent (mg/L)
TCOD	1148	637
Nitrate	3.00	0.00
Nitrite	0.03	0.01
Ammonium	17.0	24.0
TSS	545	130

4 hour treatment

What problems we are solving

- Fast treatment times (4 hours) minimize equipment footprint by up to 90%
- Minimal maintenance requirements due to few mechanical parts and 94% less secondary biomass production relative to aerobic systems.
- Energy recovery, sludge elimination and no nutrient dosing leads to OPEX reductions up to 95% compared to conventional aerobic and anaerobic technologies
- Added post-treatment can enable onsite water reuse for industrial customers
- No methane production simplifies operations and energy recovery processes
- Modular and easily scalable system can adapt to small (<1000 gpd) and mid-sized (100,000+ gpd) volume requirements
- Each BETT™ reactor is remotely monitored giving users immediate performance indicators
- Remote troubleshooting minimizes system down-time for maintenance/repair, and the need for full-time operators.

What this means for the future

BioElectrochemical Treatment Technology (BETT™) is wastewater treatment done BETTer.

	Aquam BETT™	Aerobic Standard	Anaerobic Standard
Treatment time	**4 hours**	8 hours	15 days
Energy recovery	**Yes (no methane)**	No	Yes (methane)
Total* sludge management	**Annually**	Daily	Monthly
Nutrient dosing	**No**	Yes	Critical
OPEX	**$0.1k**	$3k	$2K

*primary sludge transformation to energy, and secondary sludge reduction