There’s Value in Those Byproducts!

- Your organic load, water & nutrients have value
- Treating the high COD streams is key - Yeast, Hops, Trub,
- Options include Aerobic and Anaerobic treatment
  - *Anaerobic Digestion* is well suited to breweries;
    - It can eliminate BOD surcharges
    - Produces valuable renewable power & heat from biogas
    - Contributes to your Bottom Line
- Done right, Anaerobic treatment can return 12 – 25% ROI
- It’s not complicated – think fermentation
Should I Consider Anaerobic Pretreatment?

• Yes, if you are on a path to;
  – Production restrictions caused by hydraulic or organic limits
  – Exceeding 100,000 bbl/year
  – A 150 bbl or larger brewhouse
  – Spend over $400,000/year on surcharges and/or byproduct disposal and trucking costs

• Yes, if you simply want greater control over growth and profitability

• The economics are very site dependent – Growing brewers in high cost areas may benefit now
Tribrid-Bioreactor™ for Brewing Byproducts

Prefabricated Pump Skids or Modules

No internal moving parts

Best of breed pumps, controls, filtration, CHP

Low OPEX: No Chemicals, only 2 continuous duty pumps

Water reclaim options for up to 80% of flow

Robust, 3 phase design separates SRT and HRT & protects against overloading
Case Study: Magic Hat, Burlington, Vermont

Anaerobic Digestion of High Solids Brewing Wastes

• Eliminated WW discharge constraints which allowed Doubling of Brewery Capacity
• Reduced byproduct handling costs by 60%. From $1M/year to under $400,000
• Zero Capital Investment - PurposeEnergy Built, Owns, Operates, Maintains the facility – Shared Savings
• Produces over 1/3 the Brewery’s electricity needs - enough to power 200+ homes
100% of Yeast, Hops, Trub, & CIP flows are converted to biogas, clean water & a bit of natural fertilizer aka “Brew Doo”

No pretreatment, separation or screening

Influent averages 20,000 mg/L COD

Cleaned Effluent averages 20 – 40 mg/L BOD

Tribrid-Bioreactor™ removes 99% of the organic load

Robust design absorbs inevitable shocks, surges and accidents

Powers 200 kW CoGen Unit - More than 2 GWh Produced!
Case Study: Dogfish Head - Milton, Delaware

Anaerobic Digestion Paired with Water Reuse

• Digesting all brewing byproducts except BSG
• Will eliminate hundreds of waste truck trips
• System will repurpose 80% of the daily flow for CIP, boiler makeup, process use...and deliver it at 98°F!
• Projected to save 55 MGY of water at full production
• Biogas created powers a 1.2 MW CHP system
Dogfish Head Craft Brewery - Digestion Paired with Water Reuse

Challenge
• Rapid growth swamped town’s POTW
• Field application led to production constraints & climbing costs

Solution
• Digest organic waste in Tribrid-Bioreactor™
• Treat effluent via UF/RO
Lessons Learned

• Caution! - Byproducts can limit your growth if not well managed
• There are economies of scale - growing Craft Brewers take note
• Location Matters
• On-site treatment gives you control
• The right design is absolutely robust, never compromises production, and is worry free
• It’s not complicated – think fermentation!
Thanks for digesting this.
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