MOLEAER
ADVANCING NANOBUBBLE TECHNOLOGY

MEISTER



NANOBUBBLE PRETREATMENT RESTORED ANAEROBIC DIGESTER PERFORMANCE

Client: Meister Cheese Company, Muscoda, Wisconsin, USA

Treatment Plant Metrics:

- On-site anaerobic digester with biogas cogeneration
- NanoShield installed Fall 2022 – present
- Patented nanobubble pretreatment process for anaerobic digestion (U.S. Patent 12,729,146)

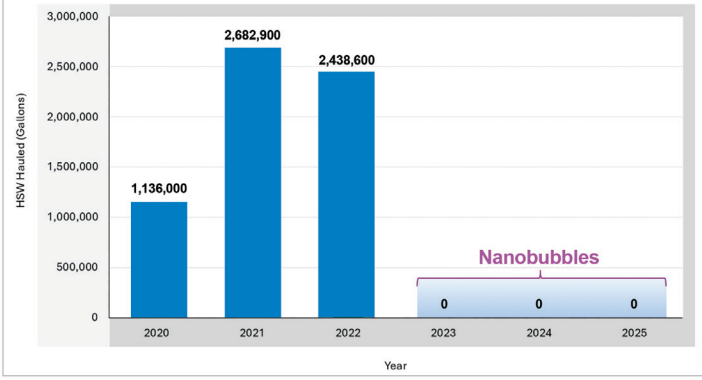
Key Challenges:

- FOG, QACs & CIP compounds inhibiting biological treatment
- Digester operating below treatment capacity
- Costly high-strength wastewater hauling

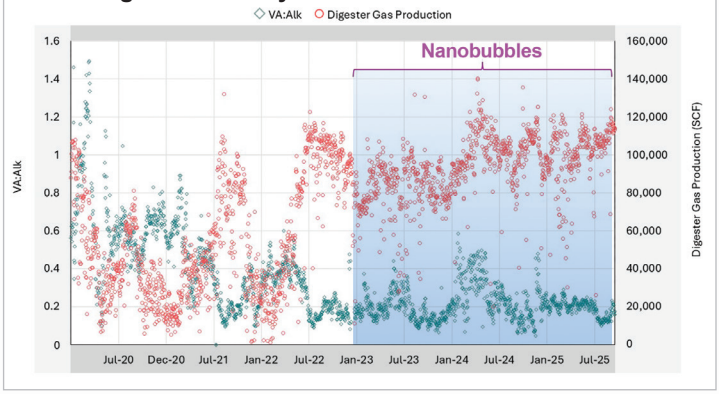
Annual Performance Results:

- $100K in energy savings
- $1 million+ in trucking costs
- $54K in Quat Blocker (chemical) savings
- 4000+ labor overtime hours per

Annual High-Strength Wastewater Hauling Volume



Digester Stability Before and After NanoShield



Challenge

Wastewater Became a Bottleneck to Growth

Meister Cheese treats its wastewater on-site in an anaerobic digester that generates renewable biogas. As production increased, fats, oils and grease (FOG), quaternary ammonium compounds (QACs) and other compounds introduced through Clean-in-Place (CIP) procedures inhibited biological treatment, preventing the facility from fully utilizing its existing anaerobic digester. Meister was forced to haul millions of gallons of high strength wastewater off-site each year and faced two costly options: invest millions more to expand its wastewater treatment plant or continue paying to haul wastewater.

Solution

NanoShield Nanobubble Pretreatment

In Fall 2022, Meister deployed Moleaer's NanoShield on the digester recirculation loop and upstream lift station. By reducing the inhibitory effects of QACs and FOG, NanoShield recovered treatment capacity within the existing treatment process, enabling higher organic loading without expanding infrastructure or disrupting operations.

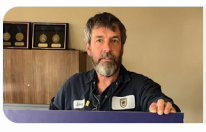
Results

Recovered Treatment Capacity

- **$1M+ annual savings,** with <1-year payback
  - High-strength hauling eliminated by year two (2.4M gal→0)
  - **$100k** annual energy savings from increased biogas production
  - **$54k** annual chemical savings (quat-blocker eliminated)
- **Recovered wastewater treatment capacity**
  - Supported approximately **54%** higher organic loading
  - Enabled continued production growth within existing infrastructure
- **~$10M in wastewater CAPEX avoided**
- **Stable through every post-installation winterwhile processing higher organic loading**

Recover More Capacity from Existing Infrastructure

Meister demonstrates how recovering wastewater treatment capacity can eliminate wastewater as a constraint to growth. By optimizing existing infrastructure, facilities can reduce operating costs, increase energy recovery and support continued production without major wastewater capital investment.



> "We're planning to increase production by more than 20 million pounds of cheese and whey products since installing Moleaer equipment in our wastewater process. That includes avoiding approximately $10 million in wastewater CAPEX improvements we otherwise would have needed to make. Moleaer's technology."
>
> **Larry Harris**, *Master Cheesemaker & Operations Manager, Meister Cheese Company*

Discover how nanobubble pretreatment solves common wastewater challenges:
www.moleaer.com/industries/wastewater

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