



ENHANCING FERMENTATION EFFICIENCY, REDUCING WATER FOOTPRINT, AND OPTIMIZING PLANT ECONOMICS

Ethanol production plays a key role in the global biofuel industry, but many plants still operate below optimal efficiency due to process limitations.

NICO Nanobubble Technology introduces an advanced approach that enhances fermentation, improves wastewater treatment, and enables sustainable water reuse without major process changes.

INDUSTRY CHALLENGES

Ethanol plants commonly face:

- Limited oxygen transfer during yeast propagation
- Inconsistent fermentation performance and yield variability
- High COD load in spent wash and wastewater
- Energy intensive aeration systems
- Low water reuse efficiency
- Process instability under fluctuating loads

Traditional aeration systems often result in low gas utilization efficiency, increasing operational costs and affecting overall plant performance.



THE NICO ADVANTAGE

Nanobubbles smaller than 200 nm offer unique properties that improve process performance:

- High gas transfer efficiency
- Long retention time in liquids
- Enhanced biological and chemical interactions
- Stable and uniform oxygen distribution

This leads to better process control, improved efficiency, and sustainable plant operations.



KEY APPLICATIONS IN ETHANOL PLANTS

Fermentation Enhancement

- Improved oxygen availability during yeast propagation
- Enhanced microbial activity and stress tolerance
- Reduced batch variability
- Better fermentation consistency

Wastewater Treatment Improvement

- Higher oxygen transfer for biological oxidation
- Improved breakdown of complex COD
- Enhanced biodegradability
- Reduced load on downstream treatment

Water Reuse and Process Optimization

- Effective oxidation and disinfection
- Control of biofilm in pipelines and tanks
- Improved water quality for reuse
- Reduced dependence on freshwater

MEASURED OPERATIONAL BENEFITS

Fermentation Performance

- 3–8% increase in ethanol yield
- 10–20% reduction in fermentation cycle time
- Improved batch consistency and throughput

Wastewater Treatment

- 20–40% COD reduction (oxidative stage)
- 30–50% reduction in aeration energy consumption
- Reduced hydraulic retention time (HRT)

Water & Resource Optimization

- 30–60% increase in water reuse potential
- Up to 40% reduction in freshwater intake
- Reduced chemical consumption and sludge generation

WHY CHOOSE NICO NANOBUBBLES?

Engineered for Process Performance

- Stable nanobubble generation with precise gas control
- Multi-gas capability: Air / Oxygen / Ozone
- High gas transfer efficiency (OTE advantage)
- Retrofit-friendly skid integration
- Minimal hydraulic disruption
- Scalable across plant capacities

Designed for Real-World Ethanol Conditions

- Compatible with fermentation, ETP, & reuse systems
- Reliable operation under variable organic loading
- Suitable for molasses and grain-based ethanol plants
- Automation and sensor integration ready

MOVE TOWARDS SMARTER ETHANOL PRODUCTION

Upgrade your plant with a solution that improves efficiency, sustainability, and profitability.
NICO Nanobubbles. Powering the future of ethanol processing.

Mobile: +91 88005 88911 | E-mail: info@niconanobubbles.com | Website: www.niconanobubbles.com