

Candidate Technology 12: Ozone Laundry¹²

Technology Name	NuTek Ozone Laundry Support System			
Technology Solution(s)	<input checked="" type="checkbox"/> Water Use Efficiency	<input type="checkbox"/> Increase Water Supply	<input type="checkbox"/> Reduce Use of Potable Water for Non-Potable Uses	<input type="checkbox"/> Water Management Tools
Sector(s)	<input type="checkbox"/> Agricultural	<input checked="" type="checkbox"/> Commercial	<input checked="" type="checkbox"/> Industrial	<input type="checkbox"/> Residential
Industry Segment(s)	Commercial: Hotels, Resorts, Nursing Homes, Healthcare Facilities, Athletic Clubs, Prisons, Central Laundries, and Schools Industrial: Textile and Light Industrial Manufacturing			
Drought Resilience	<input type="checkbox"/> High		<input checked="" type="checkbox"/> Medium	<input type="checkbox"/> Low
Water Benefits	<input checked="" type="checkbox"/> Reduces Water Use	<input type="checkbox"/> Increases Water Supply	<input type="checkbox"/> Produces/Uses Recycled Water	<input type="checkbox"/> Reduces Water Loss
Electric Benefits	<input checked="" type="checkbox"/> Energy Efficiency (Reduces kWh)	<input checked="" type="checkbox"/> Demand Response (Ability to Shift Load?)	<input type="checkbox"/> Distributed Generation (Increase Ability to Produce Clean Energy)	<input type="checkbox"/> Increase Energy Storage (Ability to Store Energy)
GHG Benefits	Yes. By eliminating the need for hot water for a sizable percentage of linen, reducing the number of wash cycles, and reducing drying times, the OLSS can significantly impact a facility's carbon footprint by drastically reducing the amount of carbon dioxide and other greenhouse gases into the atmosphere.			
Implementation Timeline	<input checked="" type="checkbox"/> ≤ 3 years		<input type="checkbox"/> 3-7 years	<input type="checkbox"/> > 7 years
Estimated Simple Payback	1.5 years.			

What is the technology?

Standard industrial clothes washers on the market today consume 3.1 gallons per pound of clothes. High-efficiency clothes washers, holding Energy Star certification, aim to reduce water use by 45%, with proposed efficiencies of 1.8 gallons per pound of clothes. The NuTek Ozone Laundry Support System uses the natural disinfecting properties of ozone gas to increase the efficiency of cleaning agents. This allows for users to reduce water and energy use tied to on-premise clothes washers and increase savings.

How does it work?

The NuTek Ozone Laundry Support System captures oxygen gas from the air and uses electricity to trigger a reaction to create ozone or O₃ gas. With the use of the patented Passive

¹² Data provided Nutek Ozone staff.

Injection Technology, the ozone is injected into the unit during a wash cycle. The O3 gas particles produce cleaner, whiter, softer clothes with a multifaceted approach:

- Envelop clothing, killing 99.99% of bacteria as tested by the CDC.
- Open weaves of fabric to easily loosen soils from fabrics.
- React with chemicals in cleaning agents to boost efficiency.
- Extracts the maximum volume of water and chemicals, leaving clothes free of excess water.

Applications for Tulare County

The technology would primarily target the industrial and commercial sectors in Tulare County. Hotels, resorts, nursing homes, healthcare facilities, athletic clubs, prisons, central laundries, and schools are all potential customers that would benefit from this technology. The multifarious benefits of NuTek OLSS would aid in the movement towards drought resilience, electric reliability, greenhouse gas emission reduction, and environmental risk mitigation in Tulare. Large agriculture-focused commercial and industrial sectors in Tulare are looking to join the movement, and NuTek’s OLSS systems appear to be a good fit.

What are the benefits?

Technology Name	NuTek Ozone Laundry Support System
Sector	Agricultural, Industrial
Industry Segment	Agricultural: Dairy Farms, Crop Farming Industrial: Wastewater Facilities
Water Benefits	<u>Level of Drought Resilience:</u> High <u>Type of Drought Benefit:</u> <ul style="list-style-type: none"> • Reduces Water Use and Demand • The system enables target adopters to reduce water usage associated with clothes washing by 35% by utilizing fewer wash and rinse cycles. In addition, with the disinfecting properties of ozone, hot water consumption will be reduced by 90-95% for light to medium soiled linens. As a byproduct, waste water emission will be reduced. This unique technology is one part of the movement towards drought resilience in the commercial and industrial sectors in Tulare
Water Resources	<u>Type of Water Resource Benefit:</u> <ul style="list-style-type: none"> • Because water is used more efficiently, there is less demand for potable water used in non-potable settings.
Electric Benefits	<ul style="list-style-type: none"> • Energy Savings: The ozone penetrates the fabrics and partially opens the weave, creating more space between fibers allowing for water, soil, and cleaning agents to flow in and out of fabrics, thus increasing extraction efficiency. As a result, drying times will be reduced by up to 50%. Along with reduced drying times is the elimination of energy associated with water heating. Ozone replaces the need for heated water in the washing process with its disinfecting properties.

Technology Name	NuTek Ozone Laundry Support System
Cost-Benefit Analysis	<ul style="list-style-type: none"> • Due to the additional technology associated with NuTek Ozone Laundry Support Systems, the initial cost is higher than conventional on-premise laundry systems. Current prices, including installation, shipping, and training range from \$15,400 to \$37,400. However, with high water and energy savings, the return on investment for the OLSS systems are competitively short. • According to several case studies, an average return on investment is 4.1 months with local rebates and energy savings incentives, and less than 18 months without a rebate (please see case studies below).
Other Benefits: Health and Safety	<ul style="list-style-type: none"> • Looking at the chemistry behind ozone-detergent interactions, the ozone acts as a catalyst for laundry detergent, improving its effectiveness due to the weave-opening and disinfecting properties. This results in a 20%-30% reduction in chemical use per wash cycle. • As tested at Accuratus labs, ozone is the most powerful oxidant for sanitizing surfaces with a bacterial disinfecting efficiency of 99.99%. • When looking at the life-cycle processing of ozone, no chemicals are used in the direct production. Ozone is produced for OLSS under similar conditions to the natural process. Oxygen gas is flowed through a chamber while being exposed to UV light, causing a chemical reaction, and creating ozone. • Similarly, after ozone is used, it rapidly decomposes into oxygen gas, thus, the product has no negative environmental or regulatory risks. • Lastly, a recent all state memo issued by the Center for Medicare & Medicaid Services (CMS) has recognized ozone cleaning as an acceptable method of processing laundry.
Other Benefits: Environmental	<p><u>Reduces GHG Emissions</u></p> <ul style="list-style-type: none"> • By eliminating the need for hot water for a sizable percentage of linen, reducing the number of wash cycles, and reducing drying times, the OLSS can significantly impact a facility's carbon footprint by drastically reducing the amount of carbon dioxide and other greenhouse gases into the atmosphere. When multiplied by millions of pounds of laundry across thousands of On-Premise Laundries in Tulare, ozone becomes a major contributor to reducing greenhouse gas emissions.
Other Benefits: Economic	<ul style="list-style-type: none"> • There are four areas of cost savings with the product: water savings, energy savings, extending linen life, and local incentive programs. Across previous installations, the product has qualified for custom rebates and incentives from local utility providers totaling between 34%-70% of total project costs. • More importantly, the OLSS provides ongoing annual energy savings by reducing water, electric, and gas bills year after year. • The manufacturer has worked with Accuratus Labs to study the effect of ozone on a variety of linens over an extended period. The findings show that the product extends linen life by 23%, saving thousands of dollars spent annually on linen replacements. Tied with this is the elimination of costs associated with expensive and harsh fabric softeners which are replaced with the use of ozone.

Case Studies

The NuTek OLSS has a proven track-record of water savings, electricity and gas savings, linen lifetime extension, and chemical costs savings. Units have been installed across hotels, resorts, and prisons across California, while awaiting the opportunity to enter nursing homes and healthcare facilities with their new Sustainable Healthcare Solutions division. With current systems, OLSS has seen annual savings between \$2,183 to \$45,770 per year. The following are case-studies depicting cost-benefits:

- **DoubleTree by Hilton - Anaheim, California:** Projected electricity savings: \$9,104.51, and projected annual savings with the OLSS: \$36,559.41, with a total project price of \$29,900.00. The ROI for this system is 122%.
- **Santa Barbara County Jail – Santa Barbara, California:** The jail processes 2,000 lbs. of laundry every day to service an average of 1,200 inmates. The pre-ozone cost to wash per load was \$5.07. The post-ozone cost to wash per load is \$1.60. Energy savings of \$3.47 per load x 624 loads per month = \$2,165.28 per month, or \$25,983.36 per year. The installation of NuTek's OLSS reduced natural gas consumption by 88.1%, water use by 18.8%, chemical, electrical and sewer costs by 12-18%.
- **Lowes Coronado Bay, Coronado Bay, California:** Gas, water and electricity savings per load of towels post ozone is \$8.60 per load. Gas savings for washers, gas savings for dryers and electric savings per load of sheets is \$3.28 per load. Gas, water & electricity savings for rugs and hand towels is \$1.40 per load. Total monthly energy savings equals \$2,183.22, per NUS Direct Consulting.
- **Doubletree Fess Parker Resort, Santa Barbara, California:** Annual savings in natural gas for washers = \$12,350, natural gas for dryers = \$5,136, water savings = \$9,313 and electricity for both washers & dryers = \$1,979 per year. Ozone equipment payback in 12 months.
- **Sheraton Majestic Hotel, Anaheim, California:** Annual water and natural gas savings = \$36,204, natural gas for dryer's savings = \$9,565.87, total annual energy savings = \$45,770.87 with a pay back in 7.6 months.