



How to Save Over 12 Million Gallons of Water with One Decision: Upgrade the Hospital's Sterile Processing Department's Equipment

Stanford Hospital & Clinics case study – Playing a key role in community water savings

Throughout its history, Stanford Hospital & Clinics has been at the forefront of discovery and innovation, as researchers and clinicians work together to improve health on both a local and global level. This pioneering spirit was recently demonstrated at the medical center which has taken large steps to reduce overall energy and water use. In 2012, one of these reductions was unplanned as they came from a department within the hospital not normally associated with environmental savings.

The Sterile Processing Department (SPD) or the Central Sterile Supply Department (CSSD), which plays a key role in infection control, focuses on the critical processes involved with washing, disinfecting and sterilizing instruments for surgical procedures. Because the SPD focuses on cleaning and sterilization, which requires water and steam, an efficiency initiative may not be top of mind for this department. Historically, SPD's have had to use a significant amount of water in order to meet their critical objectives of cleaning, disinfecting and sterilizing instruments on a daily basis.

The vision of Stanford Hospital & Clinics and the SPD Management Team is for the facility to ensure that it takes the right steps in every opportunity. "Everything has the opportunity to come full circle if we pay attention to it and make smart environmental decisions." Says Krisanne Hanson, Sustainability Director for Stanford University Medical Center. "We're caring for the environment within the environment of care. One of Stanford's goals is to be among the most water efficient hospitals in Northern California." **Issues Facing California Water Supplies**

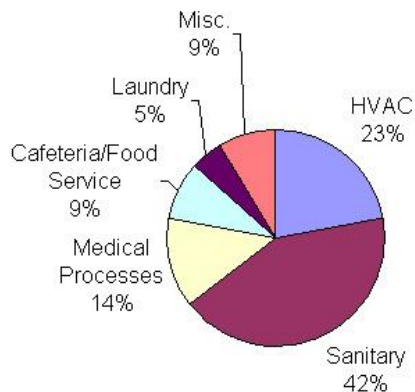
Stanford Hospital & Clinics is located in Palo Alto, California, a city which is subject to water rationing in the Bay Area, so the opportunity for saving water can not be overlooked. The U.S. Environmental Protection Agency's (EPA) guide for communities recommends that by using water more efficiently and by purchasing more water efficient products, we can also help mitigate the effects of drought¹. How much precipitation California will receive in any given year is unpredictable, in that California's climate is highly variable. For California, the 2011-2012 Water Year drew to a close on September 30, going down on record as the driest year since the 2007-09 droughts.² What makes water reduction initiatives that much more critical is that while some agencies have built regional projects to increase local water supply and storage, California's state and federal water systems have not seen any major upgrades since the State Water Project was completed in 1973, despite the addition of nearly 14 million residents. And according to population projections, the total population will increase to 60 million people by the year 2050, an increase over 56% from the 2000 census numbers.³ In response to these forecasts, State mandates under SB 7 require cities to reduce per capita water consumption 20% by the year 2020.⁴

Hospital Water & Energy Use

Hospitals are often the largest water users in the communities they serve. Hospitals were ranked 6th among the 16 ranked and weighted NAICS Codes for High Energy, Water and Wastewater Use in a 2009 Reclamation study for Southern California.⁵

A 1995 Massachusetts Water Resources study asked how much water does a typical hospital use and found that water use can vary anywhere from 40 to 350 gallons per capita (individual served) each day which demonstrates much variability among hospitals. This study also identified five major areas of water use in a hospital setting in which Sanitary was the largest water user (42%) and acknowledged the SPD was a significant user of water within the Sanitary area, to ensure the functions of sterile processing. With the water and sewer costs of these facilities averaging over 20 percent of total utility costs, the more efficient hospitals can deliver patient care at lower cost.⁶

Average Water Use by Category of Facilities Studied



Source: Massachusetts Water Resources Authority, 1996 Facilities studied include hospitals with 138–550 bed capacities, in-patient admissions of 5,100 to 11,600 per year and annual water use ranging from 15–67.2 million gallons. The seven hospitals studied included: 1 large Boston, 1 large long-term care, 4 small community, and 1 regional urban.

Cost is also a concern for the city of Palo Alto. Water rates for drought areas and specific municipalities across the country have surged in the past dozen years. Prices at least doubled in more than a quarter of the locations and have even tripled in a few. The USA TODAY survey of 100 municipalities found residential water bills in at least one in four places have doubled in the past 12 years; the San Francisco Bay Area incurring +211% increase in costs.⁷

Background

Stanford Hospital & Clinics had been in the process of evaluating the renovation of the Sterile Processing Department when they realized they could take a leadership role in water efficiency and select a solution that would give a significant amount of water back to the community.

The process began with a business case that documented frequent equipment breakdowns and scarcity of parts because of the equipment's age. An audit of the department showed the sterile process equipment had demonstrated significant aging and needed to be replaced. The previous sterilizers (3) and cart washers (2) were installed in 1989, over 20 years ago, and the previous washer/decontaminators (4) were installed in 1999 and were about 11 years old.

Stanford had appropriated a capital budget for the replacement project. With varying construction costs, the construction team foresaw the cost of the equipment consuming most of the funds. Staying within the budget, purchasing new equipment and renovating the physical space could be a problem. The original idea was to simply replace existing equipment with new, while making no changes in equipment locations. This would provide new equipment but not provide any savings in workflow or staff efficiency. Stanford made the decision to look at other manufacturers to see what was available and what would be financially possible for this renovation.

Key Issues

- **Old sterile processing equipment needed to be replaced**
- **Limited budget for both new equipment and construction costs**
- **A focus on process improvement initiatives meant selecting the most efficient equipment in terms of complete processing time**
- **Keeping the department operational with service to the OR's during construction and installation of new equipment**
- **City of Palo Alto and Stanford could be affected by water rationing in the Bay Area**
- **Ongoing rising cost of water**

Solution

The Stanford team consisted of members of Sterile Processing Department, Engineering and Maintenance, and Design and Construction, who undertook a thorough analysis based on the team's goals. The team took 12 months to evaluate three manufacturer's designs, workflow concepts and equipment. The project was awarded to Belimed. Joe Muraski, Director of the SPD stated, "The comparison data showed the Belimed equipment solution would clearly provide the hospital the most environmentally conscious solution available. In addition, it lowered the overall operational costs and netted the most efficient equipment processing times for our department. All while improving the consistency of outcomes delivered to the OR."



Joe Muraski, Director of the SPD and Chelsea Thomas, SPD Manager in front of the side by side Belimed sterilizers.

Business Case Criteria & Analysis

Equipment Costs

Stanford first looked at the cost from each manufacturer to replace the previous equipment. They realized they could replace the three steam sterilizers, four washer/decontaminators plus two cart washers and stay within budget with Belimed equipment, but this was just one element of the business case.

Operational (Utilities) Costs

The Stanford team felt saving operational costs would have the biggest impact on the hospital over the next five years. Currently, about 8 percent of U.S. energy demand is used to treat, pump, and heat water. With increasing energy prices, as well as rising water and sewer rates, there is a large and growing opportunity for hospitals to reduce their operating costs and environmental impact through efficiency programs that include water management.⁸ Stanford looked at the operational cost of the equipment based on water, sewage, steam, HVAC impact and electricity using Palo Alto's municipally-owned current rates. They compared both the annual cost as well as the five year cost.

Belimed equipment achieved significant operational cost savings in which the total 5 year operational savings for the Belimed solution is nearly 400% less than Stanford's existing equipment's operation costs and between 300% and 400% lower than the comparable competitive solutions.

Processing Efficiency

Like many facilities today, Stanford is leading in lean process improvement efforts and the SPD team is committed to understanding the efficiency of the equipment and the affect on the amount of items processed per shift. A shorter cycle time allows them to decrease the turnaround time of instrument sets; ensuring that any reduction in time does not affect quality of the equipment output.

Table 1: Comparison of total equipment cycle times

Total Equipment Cycle Times (minutes)	Manufacturer: Previous	Manufacturer: A	Manufacturer: B	Manufacturer: Belimed
Steam Sterilizer*	110	135	125	110
Washer/Decontaminator	45	45	23**	35
Cart Washer	40	20	15	7

*Cycle time may extend based on load content, such as rubber and plastics. Total cycle time would include; cycle, unload, and cooling. Belimed sterilizer eliminates door cracking and also includes the cool down of instruments.

**Cycle time includes shortened dry time

Water Usage Savings

Due to frequent and highly profiled public discussions of possible water rationing in the Bay Area, the team's goal was to find a company which reduced the amount of water used annually. Upon this analysis, the team discovered the opportunity to significantly reduce the facility's water usage in a manner that would have a meaningful impact on the facility and could give back to the community.

The table below shows a breakdown of water usage for each of the various companies along with the cost associated based on current Palo Alto rates.

Table 2: Comparison of water usage

Water Usage	Manufacturer: Previous	Manufacturer: A	Manufacturer: B	Manufacturer: Belimed
1 Year Usage				
Gallons	17,574,750	15,447,611	9,210,167	5,378,883
Acres	53.9	47.4	28.2	16.5
1 Year Cost	\$449,436	\$411,355	\$358,674	\$214,377
5 Year Usage				
Gallons	87,873,750	77,238,055	46,050,835	26,894,415
Acres	269.7	237.1	141.3	82.5
5 Year Cost	\$2,247,180	\$2,056,775	\$1,793,370	\$1,071,885

Key Success Factors

Sterile Processing Department

- Utility savings of \$172,154.58 over their original existing equipment yearly, with a decrease of about 12,195,867 gallons of water per year.
- Equipment efficiency, reduced turnaround time for instrumentation back to OR, with no loss of quality or equipment/instruments coming out dry.
- Equipment design allowed for automated unloading of both sterilizers and washer/disinfectors. This has the potential to reduce worker's comp injuries and daily fatigue experienced by staff moving tons of instruments and equipment annually.



- Sliding rather than swinging equipment doors thus reducing door space requirements and reducing risk of staff injury due to blindsiding or burning.
- Sterile processing department incorporated the use of clean steam which will improve instrument quality, lengthen the life of the instruments, reduced instrument repairs, and will eliminate mineral buildup in the sterilizer chamber.
- The Belimed sterilization cycles eliminate the extra process step of a 20-45 minutes door crack practice.

7 minutes from now, this cart will be clean, dry and ready for the next step in the reprocessing loop.

Equipment and Maintenance

- Equipment design helps to prevent wet loads detrimental to infection control.
- Equipment components are stainless steel including valves and chamber for clean steam.
- Most Belimed parts are non-proprietary which allow more competitive pricing and shortens lead time.
- Developed a dedicated service team to monitor and perform preventative maintenance checkups to extend equipment lifespan.
- Improved design with less moving parts reduces the chances of mechanical issues



Clean, dry instruments make their way down the Belimed automated conveyor system.



The SPD team on the decontamination side.

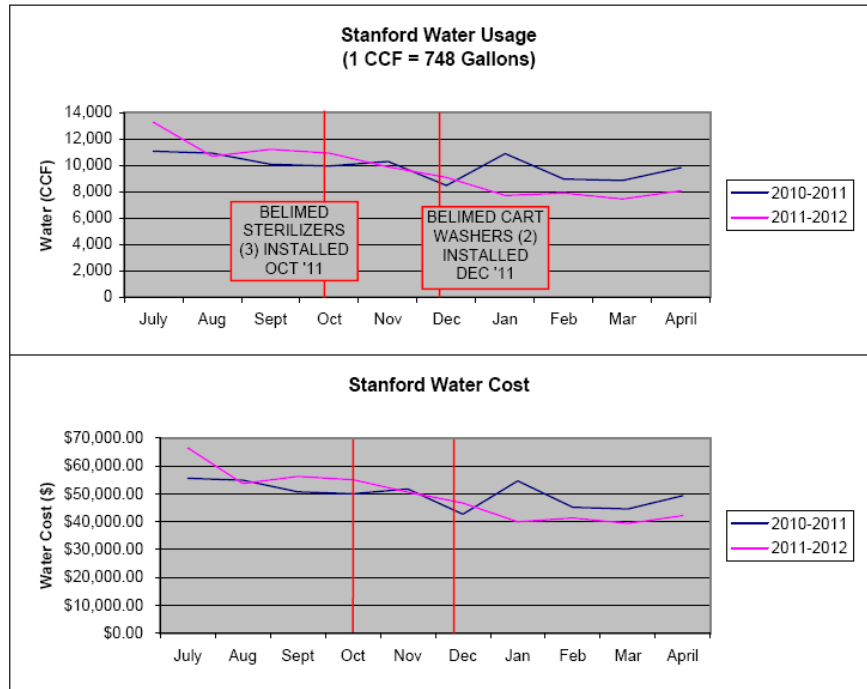
Design and Construction

- Utility savings.
- Smaller footprint of the equipment with front service access for the Sterilizers including no need for additional service room.
- Smaller footprint also allows for more usable space for staging carts and better maneuverability within the department.

Realized Savings

To understand if the proposed solution was in fact delivering the anticipated water savings, Stanford Hospital & Clinic's, Senior Energy Manager, Sheikh Nayeem, followed The International Performance Measurement and Verification Protocol (IPMVP), applicable to LEED (Leadership in Energy and Environmental Design) applicants, reviewed metered rates and usage, and compared these figures to the previous year. The conclusion is that the water savings exceeded expectations and goals, saving the facility and the City of Palo Alto over 12,000,000 gallons of water.

Date	Cost (\$)	Water Usage (CCF)
7/22/2010	\$55,585.56	11,079
8/24/2010	\$54,878.27	10,936
9/24/2010	\$50,730.74	10,077
11/2/2010	\$50,071.20	9,960
11/23/2010	\$51,718.21	10,293
12/10/2010	\$42,716.70	8,471
1/10/2011	\$54,685.48	10,896
2/4/2011	\$45,164.33	8,972
3/4/2011	\$44,615.77	8,857
4/7/2011	\$49,403.38	9,826
5/5/2011	\$59,582.03	11,886
6/6/2011	\$54,828.81	10,926
7/8/2011	\$66,496.42	13,285
8/4/2011	\$53,756.06	10,704
9/7/2011	\$56,292.94	11,221
10/6/2011	\$55,081.18	10,942
11/4/2011	\$50,632.25	9,878
12/6/2011	\$46,701.55	9,090
1/9/2012	\$40,008.98	7,720
2/8/2012	\$41,382.39	7,905
3/19/2012	\$39,380.11	7,456
4/13/2012	\$42,229.15	8,091



Data Source: Stanford University Medical Center provided Belimed with water usage data from July 2010 through April 2012, which represented consumption before and after equipment installation. The team compared meter readings over a four month period prior to installation totaling 28.8 million gallons of water, to the same four month period in 2012 following installation. The consumption in 2012 totaled 23.3 million gallons of water. The four month comparison demonstrated savings of 5.5 million gallons of water and is expected to result in over 12,000,000 gallons of water saved each year based on projected surgical case volume and equipment usage.

Rebates

Stanford submitted their data to the City of Palo Alto and received a generous \$50,000 rebate from the city. Stanford would have been eligible to receive up to \$100,000 in rebates if they had registered the project with Santa Clara Valley Water District as well as the City of Palo Alto prior to the project beginning. However, since the measurements provided covered an annual period, proved significant savings, and achieved set goals; Stanford was awarded the rebate from Palo Alto. Stanford recommends to other facilities with similar initiatives and water conservation goals, register their project as early as possible in order to receive maximum municipal rebates where available.

Community Benefits

This water story is significant. As healthcare facilities look for ways to become more operationally efficient, saving millions of gallons of water per year in the SPD might be the ideal place to start saving.

The technology used in the Belimed washer and sterilizer products has always been designed to use less water, utilities and chemicals resulting in a significant reduction in resources.

With the realized waters savings, Stanford Hospital & Clinics effort is able to:

- power 11 homes
- water 199 homes
- fill 309,600 baths
- save 104,840 lbs. of CO₂

in one year, with the power, water and CO₂ saved by making the decision to use Belimed equipment.

Conclusion

The hospital is off to a good start with these contributions, which is a great example of leadership by the Sterile Processing Department and Stanford University Medical Centers vision to explore environmental conservation opportunities within every department. “The team made an informed decision by identifying and prioritizing core departmental practices of SPD departments and green technologies that increased overall efficiency and our bottom line. It gave back millions of gallons of water to the community and helped ensure strong clinical performance and outcomes,” says Joe Muraski. “We couldn’t be happier with Belimed’s commitment to service and support. This was truly a team effort and we look forward to continuing to build our partnership for years to come.

About Stanford Hospital & Clinics

Stanford Hospital & Clinics is dedicated to providing leading edge and coordinated care to each and every patient. It is internationally renowned for expertise in areas such as cancer treatment, neuroscience, surgery, cardiovascular medicine and organ transplant, as well as for translating medical breakthroughs into patient care. Throughout its history, Stanford has been at the forefront of discovery and innovation, as researchers and clinicians work together to improve health on a global level. Stanford Hospital & Clinics: Healing humanity through science and compassion, one patient at a time. For more information, visit www.stanfordhospital.org.



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This Case Study was co-authored by Stanford Hospital & Clinics and Belimed.

