**California Hospital Association Report**

# "Water Conservation in California Hospitals: Feasible Options"

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*Introduction:*

This report was prepared at the request of California Hospital Association for the purposes of addressing the unique role of hospitals with respect to the consumption, and more importantly, the *conservation of* water in California. This report will only address the interior or building specific water use and not landscape irrigation.

*Background:*

Although California is in the midst of a severe drought condition, it is not a new phenomenon. Some areas of the State fare better than others with respect to rainfall/snowfall, water storage and accessibility to water, but the fact remains that much of the State is quite arid, yet remains water hungry. Arguably, much of the raw water consumption is related to agriculture and fisheries, however for treated water, aggressive conservation in domestic use for commercial, institutional and residential is important and can make a positive impact on the utilization of this precious resource. The question is how much can and should hospitals be expected to contribute towards this common goal of water conservation.

*Water Uses in Hospitals:*

Hospitals and healthcare facilities in general are unique water consumers compared to the typical commercial user. Detention facilities would also constitute a similar category of unique user, in that much of their water consumption can be tied in some way to their mission and the core functionality for what goes on within the walls of the facility.

According to the Healthcare Environmental Resource Center (HERC) and Practice Greenhealth Green Guide for Healthcare Series-Water Conservation Strategies, domestic water use on healthcare facilities accounts for 25% of the total water use and non-domestic accounts for 75%. The domestic use is basically for sinks, showers, toilets and urinals and the non-domestic includes everything else plus irrigation; so in terms of the greatest opportunity for reductions, the primary focus should be on non-domestic consumption.

We believe this is sound strategy for other reasons as well, because the majority of domestic use is principally for infection control and basic patient and public use to maintain functionality of the facility. Also, the number, type and location of fixtures in healthcare facilities are substantially code driven. That is not to say that there are not opportunities for conservation but the benefit may not be as great as in other areas.

Typical domestic water use is from the following fixture types:

- Lavatories
- Water Closets
- Urinals*
- Hand Washing Sinks**
- Bathtubs
- Showers
- Drinking Fountains
- Ice Machines
- Clinical Service Sinks

* Normally used only in public restrooms; very little use in hospitals.
** There is a substantial amount of documentation that justifies the need for extensive hand washing sinks although an equal amount of evidence suggests that alcohol based hand rubs are as effective except where hands are very dirty or blood stained, and in these cases, water based hand washing is the most effective. Alcohol based hand rubs would be an option in those circumstances where the facility desires additional infection control hand washing that is beyond code minimum, because the code specifically defines a hand washing sink as being supplied with hot and cold water.

In the category of non-domestic use or 'process' related, the following water consumers are typically found in a healthcare setting:

- Kitchen Sinks
- Prep Sinks
- Scullery Style Sinks
- Pre-Rinse Units
- Dishwashers
- Garbage Disposers
- Washing Machines***
- Cooling Towers
- Liquid Ring Vacuum Pumps
- Humidifiers
- Steam Boilers
- Glassware Washers (Laboratories)
- Sterilizers

- X-ray/film processing units
- Dialysis and other treated water systems
- Water Features

*** Typically healthcare facilities outsource laundry but occasionally a residential grade washing machine is used.

As can be seen, the non-domestic uses tend to be either related to food service/dietary, clinical/laboratory or process (such as sterilizers and humidifiers which are steam intensive). Irrigation is also a big part of the non-domestic use but as mentioned earlier, this report addresses the interior areas only.

*Conservation Opportunities/Practices:*

As can be seen from the list, there are quite a number of water consuming devices and thus significant opportunity to save water, however many of the possible improvements, such as in the case of an existing hospital, require replacement of the device with a unit built to today's higher standards of low water use. Depending on the extent of the improvements, the building official for hospitals, California Office of Statewide Health Planning and Development (OSHPD), may require plan review, permitting and construction oversight, adding financial burden, time and disruption. This is due to the fact that hospitals are required to operate 24 hours per day, 7 days per week, as well as following seismic activity. Thus, hospitals have more stringent building codes than most buildings, so upgrades often are better suited to a replacement after useful life and/or tied to a facility renovation.

The best strategy initially is to audit the current water use by installing meters at strategic locations in the facility, then develop a plan of action around areas of excess consumption, trends in over-use or opportunities for reduction that are simple and easy. Also, create an awareness about water conservation with employees, patients and visitors. Evaluate daily routines of staff and maintenance and housekeeping to monitor and encourage efficient practices and procedures.

New facilities have the greatest opportunity for water conservation, however in both new and old facilities, the use can be dramatically impacted by personnel behavior and maintenance practices, so the effectiveness of awareness campaigns and improved operational practices should not be underestimated. In our experience, the majority of healthcare groups and their facilities are very focused on sustainable practices and are active participants in voluntary conservation. There are a number of organizations that promote awareness such as the U.S. Green Building Council and their LEED™ rating system, Green Guide for Healthcare (GGHC), Healthcare Without Harm and others that the healthcare facility managers are very supportive of and participate in regularly. As a practitioner we know firsthand that the architectural and engineering

communities also advocate strongly for conservation, so there is a great deal of momentum built up.
Most of the traditional water conserving techniques, such as low flow fixtures, are appropriate in a healthcare setting, but waterless urinals as an example, are prohibited by California adopted building code as amended by OSHPD.

Following is a list of specific opportunities for water conservation within the healthcare setting. Each opportunity is given an "implementation code", designating the ease of difficulty of implementation, and each carries a note number. The notes, following the list provide additional information about suggested opportunities.

The implementation codes are as follows:

A. Easy retrofit, low cost.
B. Easy retrofit, high cost.
C. Moderately difficult and/or disruptive/expensive.
D. Extremely difficult retrofit. Should be considered for implementation during major construction or renovation activity and/or phased in over time.

*Best Practice Water Conservation in Hospitals:*

| Device | Implementation Code | Notes |
|---|---|---|
| • High efficiency toilets (HETs) (1.28 gallons per flush [gpf]) can be as low as 1.1 with matched fixture and trim. | A | 1 |
| • Dual flush toilets (1.6 gpf high/1.1 gpf low) | A | 2 |
| • Ultra High-efficiency tank toilets (as low as 0.8 gpf) | A | 1 |
| • High efficiency urinals (HEUs) (.5 gpf) | B | 1 |
| • Ultra High efficiency urinals (UHEUs) (.125 gpf) | B | 3 |
| • Low volume showerheads (2.0 gallons per minute [gpm] or less) | A | 4 |
| • Ultra Low flow showerheads (0.5 to 2.0 gallons per minute [gpm]) | A | 18 |

| | | |
|---|---|---|
| • Metering faucets on non-clinical applications | A | 5 |
| • Install water efficient ice machines | B | 22 |
| • Infrared control for all hands free applications | A | 6 |
| • Optimum hot water temperature maintenance systems | D | 7 |
| • 'Water Sense' labeled faucets (1.5 gpm) | A | 18 |
| • 'Dry' vacuum pumps | C | 8 |
| • High velocity pre-rinse spray heads (1.6 gpm or less) | A | 18 |
| • Non-boiler based (connectionless) food steamers | B | 9 |
| • Cooling tower automatic ph/conductivity controllers | A | 10 |
| • High efficiency dishwashers with high temperature rinse and/or ultrasonic pre-rinse. | C | 18 |
| • Non-water based or water saving type x-ray processing | C | 11, 24 |
| • Reclaimed water condensate coolers | C | 12 |
| • Metering for benchmarking and optimization | C | 17 |
| • Water pressure reducing valves where pressure is in excess of the amount required | C | 17 |
| • Sterilizers equipped with water saving devices | A | 18, 24 |

*Operations-Based Best Practices: [practices rearranged by magnitude of cost]*

| Practice | Implementation Code | Notes |
|---|---|---|
| • Full loads for sterilizers, autoclaves, dishwashers and | A | 13 |

| | | |
|---|---|---|
| clothes washers before use | | |
| • Track water use via Energy Star's Portfolio Manager | A | 18 |
| • Capture and reuse as much steam and air conditioning condensate as possible | A/B | 16 |
| • Implement trap maintenance program and/or electronic trap monitoring program | B | 14 |
| • Optimize cooling tower sequence and condenser water conductivity control | A | 14 |
| • Instruct cleaning crews to use water more efficiently, including window cleaning intervals | A | 14 |
| • Avoid continuous surface blow down on steam boilers for water quality | C | 15 |

*Opportunities for 'Beyond Best Practice*:

| Practice | Implementation Code | Notes |
|---|---|---|
| • Incorporate 'hybrid' cooling towers that use the 'dry' portion with climatic conditions that are favorable and only use the 'wet' portion in peak conditions | D | 17 |
| • Meter water intake and discharge. Set-up trending and benchmark against yourself or like facilities | D | 19 |
| • Composting in lieu of Garbage Disposers | B | 20 |
| • On-site water treatment for re-use | D | 23 |
| • On-site water storage | D | 23 |

Notes:

1. This should be evaluated on a case-by-case basis. Often fixture rough-ins can be different than the existing fixture installed thus making a like-for-like replacement difficult or expensive. Also, may not be appropriate if fixture is connected to long horizontal waste runs with conventional slopes.

2. This often can be done with a simple flush valve replacement like the Sloan dual flush (Uppercut™) or equivalent.

3. 'Pint' urinals have been operating successfully for several years in many locations.

4. Most major manufacturers are producing 1.5 gpm showerheads. Water Sense® label requires a demonstrated flow of 2.0 gpm or less.

5. If single control mixing style is used, a tempering or blending valve may be required, adding to the cost of installation.

6. Power is required unless battery powered controls are available. Some manufacturers are adding water wheel and/or solar battery recharging like the Sloan ((SOLIS™) or equivalent.

7. This can be a huge water waste if users are forced to wait substantial periods of time until hot water reaches the faucets. Effective water temperature maintenance systems through heat tape or recirculation are costly and are seldom designed properly. Wait periods should not exceed 10 seconds. Localized instantaneous water heating can also be effective here.

8. Most modern vacuum pumps do not incorporate liquid ring and if they do, are available with water conservation kits.

9. May be space dependent.

10. Most cooling towers are equipped with chemical feed and bleed systems although could use more frequent calibration and maintenance.

11. Water based x-ray processing is being phased out in most facilities and is likely already been upgraded to digital.

12. Code requires a maximum temperature being discharged to the drain and thus normal practice was to temper the condensate from steam sterilizers and similar products with fresh water. Although using reclaimed water in a retrofit condition would be very difficult.

13. Kitchen dishwashers need to be checked on a regular basis to make sure solenoid valves and water level switches are functioning in the prewash, wash and rinse tanks.

14. This is likely already being done.

15. Most large steam boilers use either continuous blow down or timed blow down to control solids build-up and scaling inside the boiler. Modernizing the treatment approach and improving make-up water quality will significantly reduce or eliminate the need for blow down.

16. Cost depends on how much is currently being wasted.

17. Better application for new facility opportunity, but can be retrofit.

18. Can take considerable getting used-to. User experience generally not satisfactory compared to traditional shower heads with conventional flow rates, however the limited use in hospital/healthcare environments may not be an issue.

19. New facility opportunity: need to determine how many meters and where they are placed. Good for metering irrigation and cooling towers.

19. Maybe unpopular process change and difficult from a managerial perspective; change in procedures for handling food waste. Adjust and maintain automatic infrared sensors to make sure proper operation. Infrared sensors must be calibrated to ensure water use only when washing hands and not be triggered by users passing in front of the faucet.

20. Install automatic shut-off valves to shut off water flow to the unit when not in use. If shutting off is not possible determine the minimum flow the unit can sustain and set it to this level.

21. Shut down the unit when not in use, if possible.

22. Suggest reviewing http://www.allianceforwaterefficiency.org/Ice_Machines.aspx, for excellent summary of ice machine water efficiency.

23. Can be very expensive to operate and maintain and a high space consumer.

24. May be included already as SPC 5 compliance item.

*Summary/Conclusion:*

The unique nature of hospitals provides both challenges and opportunities for water conservation. The challenges lie in attempting to apply conventional

methodologies to an environment whose mission is patient care and critical processes such as infection control and reliability of operation is paramount. The opportunities lie in continued vigilance on the part of the organizations responsible to carry out those missions and in continuing to embrace and advocate for application of best practices.