



Commercial Laundry Facilities Introduction

Commercial, institutional and industrial (CII) laundry facilities clean large quantities of fabrics in a wide range of varieties and uses. Some are on-site facilities dedicated to washing fabrics used at the location; these are often referred to as an On Premises Laundry (OPL). OPLs are typically found in hotels, hospitals, nursing homes, prisons, universities, etc. Centralized contract laundries that launder fabrics from other businesses (such as uniforms, restaurant table cloths, bed linens, etc) are usually referred to as "Industrial Laundries". In either case, both types of facilities use vast amounts of water at varying degrees of efficiency. The potential for water conservation exists in most all facilities and should be part of every utility's CII water conservation strategy.

Water and wastewater costs represent more than 50% of the total operating costs in the typical commercial laundry. The managers of these facilities are likely to be very interested in participating in any water conservation strategy deemed cost-effective. Keep in mind that the quality of their service is paramount to the success of their business: all water conservation measures must maintain the effectiveness of cleaning the fabrics.

Commercial laundries deal with fabrics that are soiled beyond the level of typical residential clothes in both: (1) variety of dirt, grime, stains, food, chemicals, bacteria, grease, biological hazards; and (2) the concentration of these substances embedded in the fabric. You cannot compare the water use of residential clothes washers with commercial laundering equipment.

Water is the universal solvent in the world, and there are practical limits to the reduction of water quantity and the ability to clean fabrics. The greatest water conservation opportunities often exist in the various methods of reusing or recycling water from the machines. The extent of a laundry's ability to recycle water usually lies in the facility's ability to filter, clarify and sanitize the effluent water from the washing machines.

While industrial laundries often use in-house staff to manage the total operations and maintenance of the washers, OPLs often rely on contractual service firms to: (1) supply the detergents and chemicals; (2) maintain the equipment; and (3) determines the wash formulas, whose components include the chemical recipe, type of cycle, duration of each cycle, water temperature, amount of water, and when each of these ought to occur for each wash classification and size of wash load. Water utilities seeking to improve water efficiency must garner the cooperation of both the business owner and the chemical supplier and service

contractor to achieve success. In some cases, these service providers own the washers and lease them to the business.

Washer-Extractor

Small to medium size laundries mostly rely on equipment referred to as washer-extractors. These look and operate somewhat similar to a residential front-loading clothes washer, except washer-extractors are 3 to 30 times larger. The name ‘washer-extractor’ is derived from the high speed spin cycles used between wash and rinse cycles to extract the water and detergent from clothes using centrifugal force. The largest models are huge; allowing workers to easily stand up inside the wash drum for service and maintenance. The fabrics are washed in batches, similar to a residential washer.

Washer-extractor efficiency is usually measured in gallons per pound of fabric, as opposed to residential machines that measure efficiency in gallons per cubic foot of capacity. The typical washer-extractors require 3 to 4 gallons (11.3 L to 15.1 L) of water per pound of fabric cleaned. The most efficient machines have built-in water recycling capabilities; storing the rinse water from the previous load to supply wash water in the subsequent load, using less than 2.5 gallons per pound (9.5 L) of fabric.

For washer-extractors without built in recycling features, there are auxiliary recycling systems available that can be attached to washer-extractors to filter and sanitize the rinse water to be reused or the wash water supply. These systems vary in quality, size and efficiency. Many OPL are installed in relatively small spaces, where the washers, dryers, chemical storage, and folding/stacking/sorting benches fill most of the available space. The space does not always accommodate additional recycling equipment and related water storage tanks. Recycling the water requires adjustment in chemicals and detergents used in the wash and rinse water to maintain the quality of the washing process. This requires the chemical supply contractor to be involved in planning any such retrofits.

Tunnel Washers

Tunnel washers (sometimes called “continuous batch washers”) are very different than washer extractors; long chambers (8’x8’x30’ (2.4 m x 2.4 m x 9.1 m) and larger) constructed with a series of compartments, called “pockets”, through which a large internal auger (similar in shape of a large corkscrew) slowly turns to pull the laundry through the different pockets. The first few pockets mix detergent and chemicals (bleach, sanitizers, degreasers, etc) in the water and fabric to soak and wash. Augers move the fabric to subsequent pockets, dedicated to rinse functions. Water moves in a counter flow direction to the laundry and is therefore used several times before being sent to the drain. At the end of the tunnel the washed fabric is removed automatically in the form of a large cake, mechanically compressed before being fed into the line of dryers. Water consumption rates typically found in these washers are approximately 2.0 gallons (7.5 L) per pound of wash, or about two-thirds that of the typical washer-extractors.

These units are very expensive and are only used in the largest OPLs; most often they are found in industrial laundries with very high production rates. Tunnel washers are inherently water-efficient and are highly automated to maximize the throughput of the laundry. The high cost of water and wastewater has induced many industrial laundries build on-site water filtering and treatment facilities on the premises. There are no known pre-packaged systems available to improve water efficiency at these industrial laundries. Any improvements require a site specific, engineered system.

Summary

In general, 2 gallons of water used per pound of clothes is considered a “good” water efficiency standard for commercial laundries; though this is not always achievable for heavily soiled fabrics. As a reference: one set of queen size bed sheets weigh about 3 pounds; requiring 6 gallons of water to wash and rinse. Water conservation measures should not impair the cleaning or sanitation goals of the laundry operation. Recycling rinse water for the wash cycle is always recommended, except in very rare situations where health codes prohibit such use in specialized situations.

Further water recycling requires special equipment to filter, sanitize, treat, and store the water; this equipment is expensive to install and maintain. The cost effectiveness of such measures is calculated on a case-by-case basis. Ozonation and membrane technologies offer exciting opportunities to advance clothes washing efficiencies far better than 2 gallons per pound (7.6 L). Both of these systems allow for greater reuse of the water, and can also reduce chemical and energy costs of the laundry. These technologies are already proven effective in some applications, and are advancing rapidly. Water utilities embarking on commercial laundry water conservation programs should investigate local resources for these technologies, and promote such systems as appropriate. In some laundries, water efficiency can be improved to less than 1.5 gallons per pound.

The water savings potential of a commercial laundry can be easily calculated, as in the following example:

Site data: **hotel**, 500 rooms, 70% average occupancy

Daily average of bed linens = 350 sets X 3 lbs = 1,050 lbs (350 sets X 1.36 kg = 476 kg)

Daily average towels sets = 350 sets X 1.75 lbs = 612.5 lbs (350 sets X .79 kg = 276.5 kg)

Pre-existing efficiency: 3.1 gallons/pound (11.7 L / .45 kg = 26 L/kg)

Proposed efficiency: 1.8 gallons/pound (6.8 L / .45 kg = 15.1 L/kg)

Efficiency differential: 3.1 – 1.8 = 1.3 gallons/pound savings (26 - 15.1 = 10.9 L / kg savings)

Annual Savings:

$(1,050 + 612.5) \times 364 \text{ days} \times 1.3 = \mathbf{786,695 \text{ gallons}}$ (2,977.1 m³)

There are many variables affecting laundry use in hotels, such as: occupancy rates, bed sizes, towel sizes and quantities placed in rooms, laundry operational practices, business versus resort type business, etc. The above example is only a simplified version of the type of analysis needed to truly assess and project water savings potential.

For more information please see the following documents:

[Sullivan, G et al \(2008\) SEMPRA Commercial Laundry Program Measurement and Evaluation](#)

[Riesenberger, J. and J. Koeller \(2005\) Commercial Laundry Facilities](#)

[WMI \(2006\) Assessment of Water Savings for Commercial Clothes Washers](#)