Water Reduction Recommendations for Harvard Business School

We investigated Harvard Business School (HBS)'s water use to find additional areas in which the campus can reduce its overall water usage. Most of HBS's water use comes from three categories: heating & cooling, irrigation for landscaping, and domestic/dining uses. As of FY16, HBS has been able to reduce its water use by about 4% below 2006 levels, achieving this through a combination of behavioral campaigns and physical updates to campus facilities including automatic and dual flush toilets, automatic sinks, low pressure showers in the dorms, and more. FY17 appears to be on track for 10-15% reduction thanks largely to the irrigation audit that took place last summer and subsequent improvements to the automated irrigation system. However, in order to reach the 30% reduction goal by 2020 (baseline 2006), which is part of the overall Harvard **Sustainability Plan**, HBS will have to find additional ways to reduce water usage.

A Student Sustainability Associate **independent project from the last school year** (2015-2016) also revolved around HBS water usage, and looked into the feasibility of a recycled water vendor that can replace the cooling tower water with reused water from other campus processes. As that project continues to be investigated, we found the following additional areas for savings in water usage on campus.

- Rainwater collection
- Well water use
- Campus behavioral campaign

We first researched rainwater collection, which is an interesting and growing means of reducing water usage in residential, commercial, and industrial applications. We looked both at the current efforts of our campus as well as efforts of other large institutions to collect and reuse rainwater. HBS has already begun to implement rainwater collection as a means of offsetting water usage in the newest building on campus, Klarman Hall. This system has a storage capacity of 20,000 gallons and has the potential to offset over 1.5 million gallons of irrigation water from the overall campus water usage over a period of ten years. While this only equals roughly 0.5% of the entire campus water usage over the same period, similar systems covering the remaining available rooftop space on campus have the capacity to reduce total campus water usage by almost 5%. This puts HBS much closer to the goal of 30% water usage reduction, but at a significant cost of several million dollars.

Rendering of HBS Klarman Hall.

Secondly, we investigated the possibility of utilizing well water to offset water used for irrigation on campus. Drawing water from a well is not entirely sustainable, as not all of the water drawn from the ground is returned to the underground water table, but doing so does reduce the amount of water drawn from the Boston water supply. Since irrigation water requires minimal filtration (large, solid particles must be removed to avoid staining buildings and sidewalks), we focused our efforts on the ability of well water to offset this particular use of water. We discovered that Harvard University is currently drawing from a well to irrigate the athletic fields located west of HBS campus. This proved our hypothesis, but because of the age of the well we were unable to find accurate numbers to extrapolate for a system that could offset usage across the HBS campus. Therefore, we used estimates from outside sources to determine that a system costing about $350,000 could offset 2.5 million gallons per year, or about 8% of the annual campus water usage. Not only does this reduce the campus water usage, it also saves HBS approximately $21,000 per year on water costs. In considering such a project, the campus would also have to conduct a study to understand the impacts of drawing such a large amount of water from the water table.

The third area, a campus-wide behavioral campaign, came out of our research into what other universities have done to be successful in their water usage reduction goals. A flagship for water use reduction in the academic community has been the University of California system, which, due to recent droughts in much of the state, was forced to cut back on water usage. We found that these efforts, born out of a sense of urgency, were among the most effective and led to reductions of over 20%.

We also looked at case studies from Costa Rica and elsewhere that showed that when people were aware of how much water they were using, compared in parallel to others in their neighborhood, they tended to reduce the amount of water that they consumed. For HBS, we suggested a number of efforts to increase transparency of water usage on campus at HBS, such as using the TV monitors in Spangler to display live data on monthly use. We also suggested some organized and structured outreach to the dining staff to gather ideas as to how the organization can reduce water usage in the food preparation and cleaning processes.

Water saving technique in kitchen environments include pre-wash, soaking and rinse basins.

One challenge unique to higher education institutions with behavioral campaigns is the regular turnover of the MBA student population as well as other short-term education programs. This turnover hinders the ability of our campus to gain long-term buy-in of a sustainable campaign to reduce water usage. However, targeting the permanent staff with a long-term campaign may produce better results.

For a small-scale environment like HBS, reducing water use is a difficult task and will require a great deal of buy-in and interest from multiple parties, including senior leadership. We hope that the ideas we have explored and presented will help advance this cause and move the conversation forward.