UBC Social Ecological Economic Development Studies (SEEDS) Student Report

An Investigation into Sustainable Water Consumption in the University of British Columbia's New Student Union Building Project

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ABSTRACT

In order to maximize the sustainability of the new Student Union Building being built by UBC, it is important to ensure that the water in the new building is managed and consumed in an ecologically and socially responsible manner, while still providing users with satisfactory drinking water. In order to do this, it is vital that those making the decisions on this topic are well informed of the different methods of providing drinking water from a social, environmental, and economical viewpoint. This report compares four methods of providing water: water fountains, bottled water, WaterFillz Kiosks, and other types of water filtration systems. It was found that, although ecologically and economically sound, water fountains suffer from a poor public image that greatly limits their popularity. Bottled water, although convenient and popular, is expensive and bad for the environment. WaterFillz Kiosks, although far from perfect, were found to be the best solution. It is recommended in the short term that WaterFillz Kiosks are used to provide drinking water, while in the long term the use of water fountains should be encouraged. It is also recommended that in the near future, the University of British Columbia look at the possibility of banning the sale of bottled water on campus.

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GLOSSARY

Carbon Block Filtration: a method of water filtration that uses activated carbon to chemically absorb contaminants and impurities.

Polyethylene terephthalate (PET): a strong and lightweight type of polyester commonly used in food, beverage, and other liquid containers, such as water bottles. PET is naturally colorless and transparent.

Sediment Filtration: a method of water filtration which passes water through a filter. The filter traps suspended matter such as sand.

Social Engineering: solving a problem by altering human behavior as opposed to a technological fix.

Ultraviolet Disinfection: a method of water filtration that uses ultraviolet light to ensure water is free of harmful organisms.

LIST OF ABBREVIATIONS

Alma Matter Society	(AMS)
Polyethylene Terephthalate	(PET)
Student Union Building	(SUB)
University of British Columbia	(UBC)

1.0 INTRODUCTION

Without water human beings would cease to exist, but water is an environmental issue, a health issue and a political issue. Bottled water is one of the most popular ways of drinking water due to its convenience, perceived health benefits and advertised higher quality, but it is not ecologically friendly. It is estimated that more than 85% of plastic water bottles end up in landfill sites or as litter on our roadsides [1]. Tap water is much friendlier to the environment, but not always perceived as safe. Therefore, people have been seeking a better alternative for drinking water. The WaterFillz Kiosk, designed by the company SafeStar, is a water purification and cooling system that is fed with basic tap water. The University of British Columbia (UBC) Alma Matter Society (AMS) is considering using a WaterFillz Kiosk as the primary source for drinking water in the new Student Union Building (SUB). The following analysis based on a triple-bottom-line assessment of these options examines the benefits and drawbacks of tap water, bottled water, WaterFillz Kiosks and other filtration systems. Ultimately, this report recommends that the WaterFillz Kiosks be used in the new SUB building, while encouraging the public to drink from water fountains in the long term. Additionally, it is also recommended that UBC consider banning the sale of bottled water on campus.

2.0 TAP WATER

Tap Water is an interesting alternative to consider. Most solutions being considered (except bottled water) are based on the idea of using tap as their input. For example the WaterFillz Kiosk connects into the same line of water as all the basic taps do; however, WaterFillz adds its own filtration and dispensing system. This idea extends to the benefits of tap water. Most drawbacks of tap water are social problems.

2.1 Environmental

Logically tap water has the smallest environmental impact of any option being considered. Options like the WaterFillz Kiosk or alternative filtration methods use tap water, and energy to produce the water they dispense. Regardless of the method chosen (except bottled water) the same tap water is being used and creating the same piece of the environmental footprint, while filtration systems add another energy component to the environmental footprint.

2.2 Economical

The economic implications of tap water parallel the ideas of tap water's environmental implications. Any filtration system is still using the tap water that will have to be paid for, plus the energy and maintenance of the system. While instead using just the tap water would have a smaller economic impact. The other aspect to consider is the idea that tap water does not bring in any revenue, whereas bottled water does. Depending on the view taken this could be considered an economic loss (see section 3.3 on the economics of bottled water for more information on this).

2.3 Social

The social implications are where tap water starts to show why it is not the current method of choice. Estimates in the United States are that between 500,000 and 7,000,000 people get sick every year from drinking tap water [2]. The Drinking Water Quality Report published annually by the City of Vancouver states that all measures of water safety in Vancouver fall within Canadian Guidelines [3] implying that it should be safe to consume this water directly. Yet numbers like the ones out of the United give tap water a poor public image. As Nancy Toogood (Food and Beverage Manager, UBC AMS) stated they believe that everyone who is

willing to drink tap water in a public location already does, implying that perhaps this is a larger social engineering* problem in need of a temporary technical fix [4].

One other aspect of tap water that impacts its public acceptance is the aesthetic features of tap water, such as clarity and temperature. Tap water often comes to the consumer appearing less clear than bottled or filtered water. Another big problem that keeps people away from tap water is the lack of cooling available to tap water, something another solution could most likely offer. In Vancouver the average temperature of tap water temperature can get above fifteen degrees Celsius in the summer months [3]. This is higher than a desirable temperature for consumption. See figure 1 for the distribution of Vancouver water temperature by month.

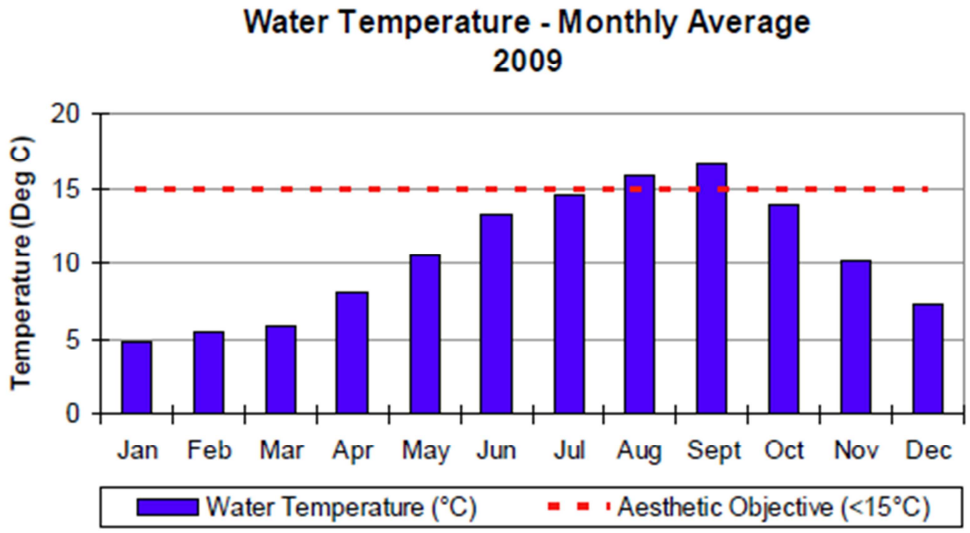

Figure 1– Average Monthly Water Temperatures in Vancouver [2].

Overall, tap water is an interesting idea as it provides the baseline for most of the other solutions discussed in this report, which allows for a minimal environmental and economic impact. However, not everyone is willing to drink tap water. Therefore, an alternative solution must be provided for these people.

*This and subsequent terms can be found in glossary on p.vi

3.0 BOTTLED WATER

In the past few decades, the use of bottled water has become ubiquitous across the globe. Bottled water consumption has been rising steadily in Europe, North America, South America, and Asia since 1997 [5]. In fact, the per capita consumption of bottled water in the United States dropped by 1.8% for the first time in ten years in 2008, after previous growth ranging from 3.5% to 10.6% per year [6].

Currently, the Student Union Building at UBC sells 60 to 70 thousand units of bottled water per year in over the counter sales [7]. Economically, at approximately $2 CAD per bottle, it is likely that these sales are significant – however; at approximately 13 grams of polyethylene terephthalate* (PET) per bottle - adding up to 845 kilograms in a year – the ecological impact is also undoubtedly worthy of consideration [7].

The purpose of this section is to investigate the social, ecological, and economic aspects of selling bottled water as a primary source of drinking water. The social aspects include an investigation into the reasons many people have embraced bottled water in the past decade. The ecological considerations include an investigation into the environmental footprint (energy and material consumption) of bottled water throughout the entire life cycle of a PET bottle. The economic considerations concern the potential loss of income that would accompany any change in sales policy pertaining to bottled water.

3.1 Social

When analyzing the use of bottled water, it is pertinent to understand the reasons why many people choose to purchase bottled water over any other form of obtaining drinking water. According to [8], the most common motivating factors (in order of increasing importance) include the perceived health benefits, quality, taste, and convenience of bottled water.

3.1.1 Perceived Health Benefits and Quality

The majority of participants discussed in [8] claimed that bottled water conferred some health benefits over tap water, most commonly attributed to the mineral content of mineral water, but very few were able to cite any specific health benefits. This is perhaps unsurprising, as bottled water has been marketed very heavily as especially natural or pure [9] (see Figure 2), when in fact (in Canada) bottled water and tap water must adhere to very similar standards of quality, health, and safety [10]. This means that although bottled water manufacturers may

advertise vague health benefits (with some backing up their claims with “pseudoscience” [11]), both bottled water and tap water must meet the same minimum standards that have been set to ensure the quality of the water and the safety of consumers.

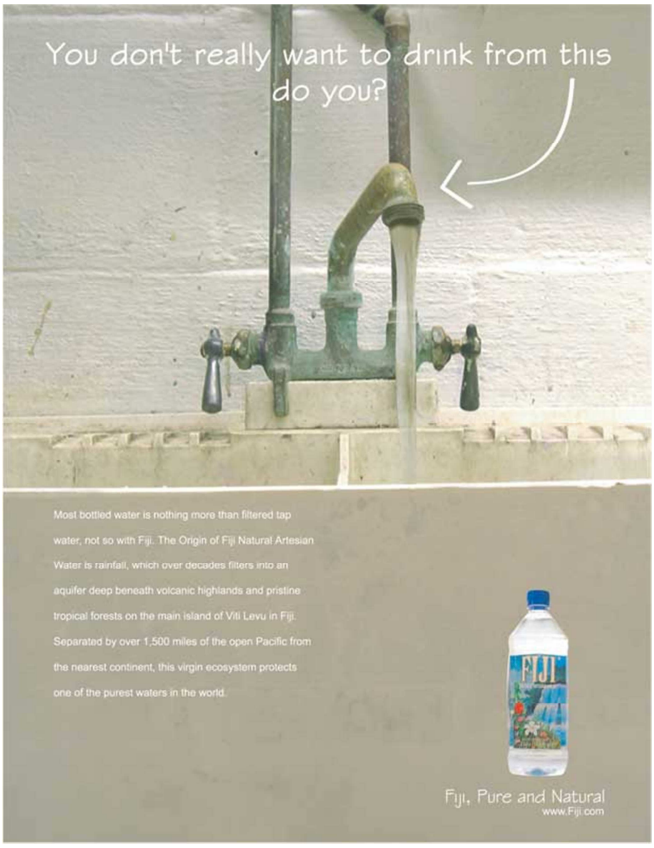

Figure 2 - An advertisement for Fiji brand bottled water [12].

3.1.2 Taste

It can be difficult to evaluate water based on taste, as taste is completely subjective, but certain trends in evaluating the taste of water do appear. The most common words used to describe desirable qualities in the taste of water include “neutral”, “natural”, and “cold”, while the most common undesirable taste is “metallic” [8, 13, 14]. Results from blind taste tests of different brands of bottled water and tap water often contradict each other, which only show that there is no consensus on what tastes best. It should be noted that tap water supplied to UBC by Metro Vancouver is sampled and tested for aesthetic quality, such as taste and temperature – the results of which can be found online [15].

3.1.3 Convenience

Convenience – found in [8] to be the most influential factor in the decision to purchase bottled water – appears, on the surface, to be one of bottled water's strengths. However; once purchased, a reusable water bottle confers the same level of convenience as bottled water, if not more. Because bottled water must be purchased at a store whenever desired, over time a reusable water bottle (which can be refilled using tap water) ends up being much more convenient.

3.2 Environmental

While personal convenience is commonly cited as a driving factor behind purchasing bottled water, the complete lifecycle of the container, which involves very little convenience, is often overlooked. A considerable amount of energy is required to create, package, transport, refrigerate, and recycle/dispose of plastic water bottles.

3.2.1 Bottle Creation

Individual, single-use plastic water bottles are almost exclusively made of polyethylene terephthalate (PET) resin, which is manufactured by combining ethylene glycol and terephthalic acid [16]. The PET resin begins as small pellets that are melted down and injected into a mold, which is then heated and shaped into the familiar bottle shape [16]. The total amount of energy, from resin creation to bottle completion, is approximately 100 MJ per kg of bottles [16]. There has, in recent years, been an effort to reduce the amount of PET used in each bottle, resulting in an average of 32% less plastic being used per bottle manufactured [7].

3.2.2 Packaging, Transportation, and Refrigeration

The process of cleaning, filling, sealing, and labeling bottles is a task most often performed by high-volume labeling and packaging machines that consume about 0.014 MJ per bottle. This turns out to be a very small amount (one third of a percent) of the total energy that is consumed in the production of the bottle [16].

Transportation costs vary significantly based on the distance the product must travel and the mode of transportation. Table 1 provides an estimate for the amount of energy consumed, per ton of cargo, per kilometer for various modes of transportation.

After arriving at its destination, bottled water must be chilled to be considered palatable, and in most cases this occurs at the consumer's home. [16] estimates this consumes roughly 0.2 MJ of energy per litre of water. For the purposes of this report, it is assumed that storing and

cooling bottled water at the Student Union Building consumes approximately the same amount of energy as a common household refrigerator. This is obviously a conservative estimate, as, in general, vending machines consume much more energy than most refrigerators

Table 1 - Energy consumed, per ton of cargo, per kilometer for various transportation methods of bottled water. Data compiled by [16].

Cargo ship/ocean (MJ t^{-1} km^{-1})	Air cargo (MJ t^{-1} km^{-1})	Rail (MJ t^{-1} km^{-1})	Heavy truck (MJ t^{-1} km^{-1})	Medium truck (MJ t^{-1} km^{-1})
0.37	15.9	0.23	3.5	6.8

3.2.3 Recycling/Disposal

In order to recycle PET water bottles, they must first be collected and transported to a recycling center. While there, the bottles are crushed, pressed into bales, shredded, and refined [17]. The resulting flakes of PET are used in the creation of new plastic products, a process that consumes an estimated 66% less energy compared to the original manufacturing process discussed in the above sub-sections [17].

If a bottle is not recycled and is instead disposed of along with unrecyclable garbage, it will likely join the estimated 18 billion kilograms of PET waste projected to end up in American landfills in the next decade [17]. Once there, it is unclear exactly how long it will take to decompose, as very little sunlight or air reaches any garbage in a landfill, due to more garbage constantly being piled on top [18].

3.3 Economic

As mentioned before, according to [7], bottled water currently generates around 120 to 140 thousand dollars in revenue per year at the Student Union Building. Without considerably more financial statistics from the Food and Beverage organizations at the SUB (such as total beverage sales), it is difficult to make any solid conclusions of the significance of this number. However, as bottled water is a very popular product, it can probably be safely assumed that water sales rival those of other beverages. With only a handful of popular bottled beverages being sold, it follows that bottled water sales constitute a notable chunk of total bottled beverage sales.

If the sale of bottled water is to be discontinued at the SUB, then it may be possible to regain some of the financial losses sustained in the process by instead selling reusable (and more

sustainable) water bottles that can be refilled for free wherever water is available. These could possibly be sold over the counter or in vending machines, and potentially have two main effects: one, the revenue generated could offset the lost bottled water sales, and two, the sale of reusable drinking containers could promote sustainable water consumption. There is reason to believe that banning the sale of bottled water at the SUB (or even the entire campus) is possible and worth consideration – as of November 2010, at least 25 universities in North America have completely banned the sale of bottled water on campus [19]. These universities include the University of Ottawa [20], the University of Portland [19], the University of Winnipeg [21], and Washington University [22].

4.0 WATERFILLZ KIOSK

As discussed in the previous section, purchasing bottled water is a very popular method of obtaining drinking water. However, there are many negative implications of such a solution, most notably the environmental impacts. Because of this, many companies have designed and made available various water dispensing machines that ensure a high standard of purification and taste of drinking water while also avoiding the negative environmental impacts of bottled water. SafeStar Products is currently offering their latest product to meet this need: the WaterFillz Kiosk [23].

The WaterFillz Kiosk, a water delivery machine has a width of 36-inches, a length of 24-inches and a height of 72-inches. The Kiosk filters, refrigerates, and delivers drinking water from a tap water input at a rate of 1 liter per 20 seconds [24]. The Kiosk has three phases of purification, including sediment filtration*, carbon block filtration* and ultraviolet disinfection*. At peak consumption, the WaterFillz Kiosks use 46 watts of electric power, meaning with such low energy consumption, WaterFillz Kiosks can easily be powered by a modest number of solar panels. The water capacity of WaterFillz is 22 liters of refrigerated water but an additional refrigeration vessel can be installed at an extra cost. To keep the filtration system operational, maintenance is required 1-2 times a year.

The following analysis focuses on the environmental, economic and social impacts of the WaterFillz Kiosk.

4.1 Environmental

The ecological influences of WaterFillz are seen mainly in the manufacturing of materials and energy consumption.

As Donna Klaassen, the marketing and sales manager of SafeStar, explains in [26], the exterior of the Kiosk is made from 100% stainless steel front and sides, while the back and top are made from galvanized steel. Galvanized steel is 98% recyclable while stainless steel is 100% recyclable. SafeStar Company designs the WaterFillz unit using end-of-life products, which compose 40% of the unit’s material. The other 60% of its material comes from manufacturing processes. Donna Klaassen also suggests that there is a secondary market that recycles usable scrap for many stainless steel markets [26].

The interior material includes some plastics. In [26], Klaassen explains that those interior materials can be broken down by ultraviolet light, (the Kiosks contains an ultraviolet light bulb), but they are kept inside of the WaterFillz unit and are not exposed to ultraviolet light and sunlight. Therefore, they will rarely fail or need replacement.

Another factor to consider about the units relating to sustainability is the energy consumption. As SafeStar reported in [25], the UV Light bulb runs on 12 watts of power and its lifetime is approximately 9000 hours (12.5 months). A single refrigerator in the Kiosk operates on less than 46 watts at its peak consumption when it is refrigerating, which is considerably less than the average vending machine, which draws as much as 1500 watts. Like home refrigerators, the refrigeration units will turn on and off when it is running to maintain a desired temperature – it is when the unit is not at its target temperature that the peak energy consumption occurs. Therefore, the WaterFillz Kiosk unit needs 80 watts of power in total, at peak usage, because it has two refrigeration units [26].

4.2 Economic

The greatest economic impact that must be considered concerns the cost of purchasing a WaterFillz Kiosk. One WaterFillz Kiosk costs $7500.00 CAD plus taxes. Additionally, decal re-wraps are approximately $500.00 CAD (first decal wrap is free) [26]. As discussed in an earlier section, maintenance is required one to two times a year for the Kiosks but Donna Klaassen adds that the cost of maintenance is inexpensive [26]. On the market sales of the Kiosks, Paul Wilson, the president of SafeStar Company, replied in [26] that SafeStar is targeting to sell 250 to 750 units from November 2010 to November 2011.

Aside from the cost of the WaterFillz units, their environmental impact also has a significant economic effect. Donna Klaassen pointed out that SafeStar installed a digital counter on every Kiosk unit. The reason for the digital counter installation is that SafeStar wants to collect the data in order to put a meaningful number to all of the wasteful use of plastic water bottles. According to [26], the WaterFillz units at the UBC SUB are the first to have the digital counters (see figure 3). UBC AMS replied in [4] that after the first two weeks of use, the units recorded over 7600 bottles saved. Recently more and more students are realizing the availability of free, cooled, and purified water from the WaterFillz. Due to positive feedbacks from users, SafeStar is planning to place a demo unit at a busy mall over the Christmas period to collect more data.

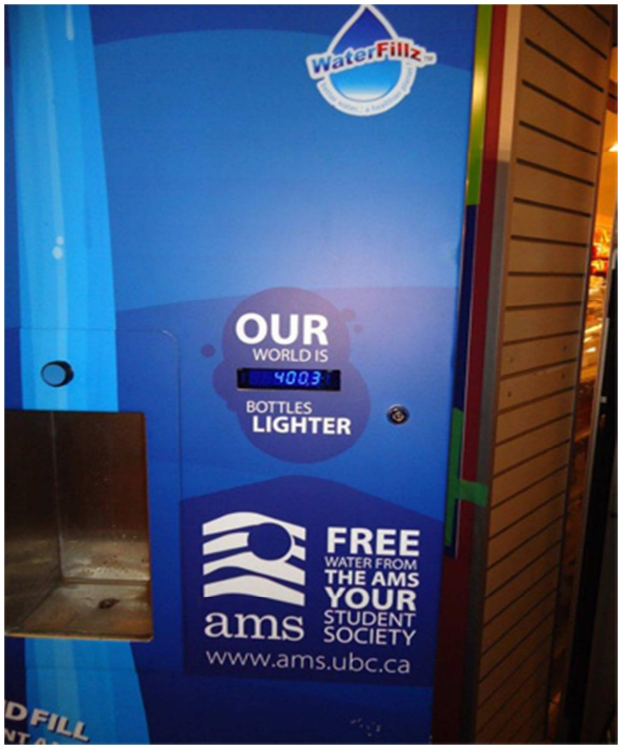

Figure 3 - The WaterFillz unit at the UBC SUB [25]

4.3 Social

According to the collections from SafeStar, Donna Klaassen mentioned in [26] that negative feedbacks about the units include the limited locations available and the users' concern of water safety. However, the responses from different conglomerates are the strongest evidence of social impacts. According to [24], presented by SafeStar, the University of the Fraser Valley and Simon Fraser University have taken delivery of new WaterFillz Kiosk demos until January 2010. As well, UBC Okanagan replaced water fountains with new WaterFillz Kiosk in June 2009 and has even designed their own custom WaterFillz Kiosk. In the future, UBC Okanagan is planning to install 100 Kiosk units campus wide.

5.0 ALTERNATIVE SOLUTIONS

For the purposes of this investigation alternative solution are defined as methods of water filtration and dispensing other than the WaterFillz Kiosk. For example, companies like Culligan offer customized water solutions for buildings similar to the UBC SUB. One large advantage to a solution like Culligan's is that it can be all inclusive, not only dealing with drinking water but any water distribution needs [27]; for instance the service could be used by the SUB's food and beverage services.

5.1 Environmental

All filtration techniques would result in a small environmental footprint that could be minimized in different ways depending on the needs of the SUB. For example, a solution using ultraviolet light for sanitization would use energy but have very little waste. Alternatively, a carbon filter based system uses almost no energy but requires the disposal and replacement of multiple filters over time. One of the benefits of an alternative solution is that it does leave the ability to be customized to the goals of the new SUB.

5.2 Economical

After an alternative filtration system is installed it is economically very comparable to the WaterFillz solution. They both require small amounts of maintenance and energy. Typically the big economical barrier to selecting an alternative solution, such as an "under the counter" solution from Culligan, are the high installation costs incurred by installing this type of system in a fully constructed and dry walled building. However with this project UBC is in a rare circumstance that installation could be built into the building design possibly alleviating the financial load significantly.

5.3 Social

Alternative solutions provide many of the benefits the WaterFillz Kiosk offers, including a high level of filtration and cooling of water. Water that has been filtered is generally received more positively by the public than tap water [28]. One potential issue with an alternative solution would be communicating to the public that the water is filtered. Many alternative solutions attempt to appear natural and elegant with taps similar to figure 4.

Figure 4 – Filtered Water Tap [29]

These taps have become so common place though that people may not recognize the difference between this solution and regular tap water. These taps are also easily open to contamination through contact. A solution with a hidden spout (like the WaterFillz Kiosk) is more sanitary, and easy to distinguish as filtered water. However something similar could be worked into the architecture of the building with a customized solution. This custom solution could possibly offer the same benefits as the WaterFillz Kiosk but with a smaller physical footprint.

6.0 CONCLUSION AND RECOMMENDATIONS

All solutions considered have their respective benefits and drawbacks in various areas of the triple bottom line assessment. Tap water has the smallest economic and environmental impact, but is perceived negatively by a large portion of society. Bottled water currently generates revenue for the AMS, but is an environmentally harmful solution. And filtration systems such as the WaterFillz solution have a minimized environmental impact, with significant upfront costs, and a very neutral social impact.

In conclusion, our recommendation is that the University of British Columbia implement a solution involving the WaterFillz technology for the new SUB. Using WaterFillz Kiosks best satisfies all three aspects of the triple bottom line assessment, meeting all high level needs. Alternative solutions (such as Culligan) can also meet all these needs; however, WaterFillz is a proven technology for our circumstance based on its success at other universities.

We also recommend in the long term that UBC work towards implementing one social change and one policy change. The social change is increasing knowledge about the safety of tap water, and encouraging the use of it for drinking water in conjunction with reusable water bottles. This change could reduce the environmental impact of water consumption, but this change is not feasible within the timeline of construction for the new SUB. Also, we recommend UBC consider banning the sale of bottled water on campus, based on the considerable negative environmental impact of bottled water and the success of other institutions in removing it.

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APPENDIX A – WATER CONSUMPTION SURVERY

In an effort to gain a better understanding of the social consequences of water selection our group created a survey to attempt to gain information from our peers. However due to a shortage of responses and a fairly uniform distribution within the responses we chose to not use the survey to support our ideas. The results of the survey are included in this appendix, but are not used at any point in our report.

WaterFillz Survey Results

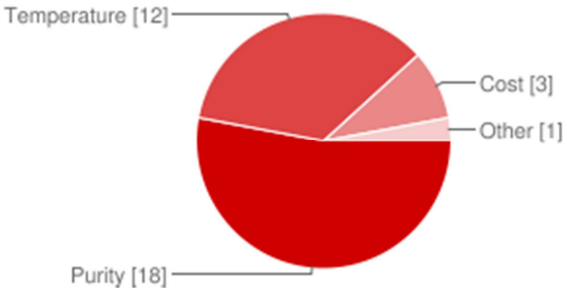
What is your age?

0-18	**2**	6%
18-24	**30**	88%
24-34	**1**	3%
35+	**1**	3%
Prefer not to Answer	**0**	0%

How are you affiliated with UBC?

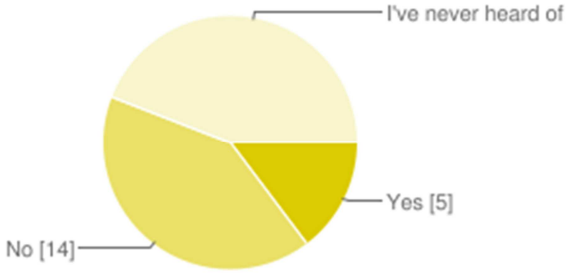
Student	**23**	68%
Faculty	**1**	3%
Staff	**0**	0%
Affiliated with another University	**7**	21%
Not Affiliated with UBC	**2**	6%
Other	**1**	3%

What is most important to you when consuming water?



Purity	**18**	53%
Temperature	**12**	35%
Cost	**3**	9%
Other	**1**	3%

Have you ever used a WaterFillz Station?



Yes	**5**	15%
No	**14**	41%
I've never heard of WaterFillz	**15**	44%

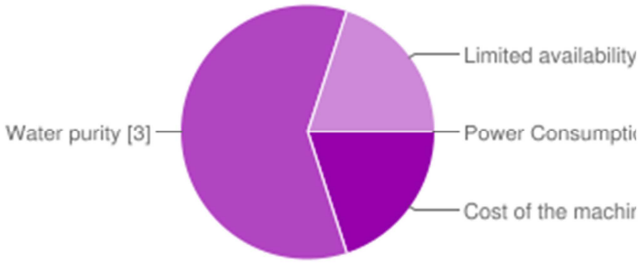
WaterFillz

Questions specifically about WaterFillz

How satisfied were you with the water dispensed by the WaterFillz station

Very Unsatisfied	**0**	0%
Unsatisfied	**1**	3%
Indifferent	**1**	3%
Somewhat Satisfied	**0**	0%
Very Satisfied	**3**	9%

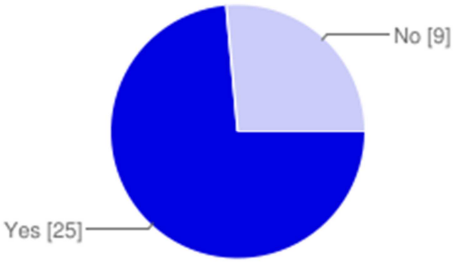
What is your biggest concern of using WaterFillz widely on campus?



Cost of the machine	**1**	3%
Water purity	**3**	9%
Limited availability	**1**	3%
Power Consumption	**0**	0%

Bottled Water

Do you drink bottled water?



Yes	**25**	74%
No	**9**	26%

What is the most attractive feature of bottled water to you?

Readily available	**8**	24%
Comes cooled	**6**	18%
Purity of Water	**7**	21%
Ease of Disposal	**2**	6%
I don't drink bottled water	**7**	21%
Other	**4**	12%

How often do you recycle bottled water bottles?

Never	**0**	0%
Rarely	**0**	0%
Sometimes	**6**	18%
Usually	**7**	21%
Always	**16**	47%
I don't drink bottled water	**5**	15%

APPENDIX B – REFERENCED E-MAILS

Included in this appendix are two e-mail's used as references ([4], and [26]). These e-mails have been condensed to relevant information. Color coding has also been maintained to assist in conveying ideas.

[4]
Subject: RE: APSC 261 Waterfillz Units Questions
From: Justin Ritchie (Sustainability@ams.ubc.ca), Nancy TooGood (FoodBevMgr@ams.ubc.ca)
To: [APSC 261 Water Consumption Group Leaders]
Date: Fri, 15 Oct 2010

Here's a shot at answering your questions, still waiting to get a technical manual. Let us know if you need any more clarifications or have more questions:

- Is it possible to look at any and all technical documentation related to these machines?

Working on getting the official technical manual for you.

- Is there any research documentation related to the procurement of these machines, such as alternatives considered and any other non-confidential data that we may look at?

We considered typical refrigerated water fountains and other more office water cooler style solutions. WaterFillz were chosen because they have successfully integrated with the target demographic of water bottle users at other universities and rapidly dispense cold filtered water

- What are some statistics on water bottle sales in the SUB? How has the installation of these machines impacted the sales of bottled water?

Nancy can provide detail here: 60-70k per year in OTC sales; is this number profit? or at $2/bottle does it equal 30-35k bottles sold per year? There have been an estimated 5,500 500ml fill-ups at both of the SUB WaterFillz stations since installation. This number is hard to pin down because the counters keep getting reset due to technical issues as we have the first ever WaterFillz units with counters.

- What sort of economic impacts have been seen since installation of these machines? Is there potential to bring in additional revenue with these machines? ie. advertising on them

Nancy can provide detail on economic impact here; Loriann mentioned a 5-6% drop in beverage sales campus wide? Seems rather ambitious to attribute this to WaterFillz. Plan is to advertise on the machines along with selling water bottles through vending machines located nearby.

- What are the target/current usage levels of the machines? What is the level of reduction of water bottle usage targeted?

We've had about 5,500 500mL fill-ups at each machine, how much of this was simply people that already used water bottles or how many actually displaced bottled water purchases is yet to be determined.

- Plans to make water fountains more accessible/usable in the New SUB? Current levels of water fountain use?

The New SUB will undoubtedly include some sort of WaterFillz like capability, whether we go with the machines or not will depend on analysis by APSC 261 groups and other factors such as space, etc...

- What sort of marketing has been done to increase usage of machines? Or even tap water?

All marketing on the machines has been word-of-mouth and visual recognition of the machines. Starting in late October a directed studies group from the Land and Food Systems Faculty will begin a sustainable water consumption marketing campaign of which these WaterFillz machines will be a major component.

- Has there been any testing been done to determine the water quality entering and leaving the machine?

No testing has been done on the water quality of the machine output, however the water certainly tastes good and chlorine free!

[26]
Subject: RE: Survey on WaterFillz
From: Donna Klaassen, Paul Wilson
Date: Fri, Nov 5, 2010
To: [APSC 261 Group]

In order to convince more people to accept the idea of WaterFillz, our team need more technical and statistical information about KIOSK.
Therefore, our team will appreciate if you can provide any answers or any documents relating to the following questions:

1. What's the approximately price of each WaterFillz unit?
$7500.00 per kiosk plus taxes but including installation.
First decal wrap is also included - decal re-wraps are approximately $ 500.00 (estimate)

2. What's the statistic of the marking sales of WaterFillz units? Please explain the question.
I think you might be asking about what statistics we have collected thus far from our digital counter on the units and why. We want to collect the data to put a face to all the unnecessary use of plastic in our environment and to offer a very easy way to reduce your contribution.

The units at your university are the first to have the digital counters. These units recorded over 6000 bottles saved during the first month of use. We had to reset the counters about 1.5 weeks ago, and the counters at the end of day on Thursday read 6000**+ IN THE FIRST WEEK** since the reset. More and more students are becoming aware of the availability of fresh pure water for free from WaterFillz and the popularity is growing! The students love it and I expect to see the unit count continue to increase!

We will need to collect more data before we can produce any statistics. We are discussing having the total number of bottles saved by WaterFillz universally on our website.

Also, we are placing a demo unit at a busy mall over the Christmas period and we hope to collect some interesting data and comments there which I would be happy to share with you then! Perhaps you may be interested to assist in data collection and users polls for your project?

3. How have users responded after using WaterFillz units?
Absolutely positive to help eliminate plastic bottles and also FREE!
Have you seen the line ups? These exist on every campus that has our machine so far! We were swarmed at times at SFU and every single user thought it was the best idea and want to know when there will be more available in other locations on campus!

4. Is there any negative response from users? (if possible)
Not enough locations as yet on a large campus.
We have not received negative feedback about the units at all. The only negative we have received is that there should be more of them everywhere we "live" - malls, schools, bus terminals, public places, recreation centres, gyms and so many other places.

People will say how they believe that the municipal water should be safe to drink. Municipal water in our city is of excellent quality once it leaves the central purification station, however, it then must travel through miles of pipes - some of which are 60 - 100 years old and contaminated along the way. The city adds chlorine to the water to make sure what we can drink from our taps remains safe to consume. Water lives, so pipes get contaminated over

years of extended use. Many buildings have older infrastructures that do not allow for fresh tasting, cold water delivery and most do not even have fountains (which potentially are NOT sanitary), leaving bathrooms as the only choice for filling points in public places. The WaterFillz resolves both the taste, cold, carbon foot print, convenience, and sanitation issues.

5. Is it possible to have a technical manual of WaterFillz units?
We are redoing our manual at present but will be happy to share when complete. We have attached the basic spec. Sheet in the interim.

6. How many units is your company targeting to sell WaterFillz this year?
From November 2010 to November 2011... 250 to 750 Units.