UNIVERSITY OF CALIFORNIA
Santa Barbara

DROPcycle™

Let us connect the drops.

An Eco-E Project submitted in partial satisfaction of the requirements
for the degree of

Master's in Environmental Science and Management

for the

Bren School of Environmental Science & Management

by

Greg Soulages
Kellen Klein

Committee in charge:
Emily Chan
Gary Libecap

March 2012

Final Report Approval Page

DROPcycle

As authors of this Eco-E Project report, we are proud to archive this report in the Bren School's library of Eco-E Projects. Our signatures on the document signify our joint responsibility to fulfill the archiving standards set by the Bren School of Environmental Science & Management.

Greg Soulages

Kellen Klein

The mission of the Bren School of Environmental Science & Management is to produce professionals with unrivaled training in environmental science and management who will devote their unique skills to the diagnosis, assessment, mitigation, prevention, and remedy of the environmental problems of today and the future. A guiding principal of the School is that the analysis of environmental problems requires quantitative training in more than one discipline and an awareness of the physical, biological, social, political, and economic consequences that arise from scientific or technological decisions.

The Eco-E Project fulfills a core requirement for the Master's of Environmental Science and Management (MESM) Program. It is a three-quarter activity in which small teams of students conduct customer research to develop a business model for a new environmental venture, in addition to focused, interdisciplinary research on the scientific, management, and policy dimensions of a specific environmental issue. This Final Eco-E Project Report is authored by MESM students and has been reviewed and approved by:

Emily Chan, Advisor

Gary Libecap, Advisor

March 2012

Table of Contents

Abstract

DROPcycle is a closed-loop bicycle delivery service for replacement water filters. Founded by Greg Soulages and Kellen Klein, the company offers consumers a simpler, more responsible method for purchasing and disposing of replacement filters.

DROPcycle capitalizes on a gap in the filtration market value chain, where consumers on college campuses invest in point-of-use filtration products but fail to maintain their filters, thereby compromising drinking water quality. Having identified major filter replacement inhibitors – lack of time and transportation, collective action problems, laziness, and forgetfulness – DROPcycle employs a business model that overcomes these obstacles, securing a profitable and recurring revenue stream. With text message ordering, automated reminders and billpay, weekly bicycle deliveries, and pricing comparable to traditional purchase avenues, DROPcycle makes filter replacement a painless procedure and great-tasting water an expectation, not a luxury.

Additionally, the company encourages responsible consumer behavior by offering discounts to those who recycle expired filters. Using existing but rarely employed recycling networks, DROPcycle helps convert old filters into recycled polypropylene products and waste-to-energy generation, all while drastically increasing filter recycling rates in served areas. The firm's low operating costs and franchisable business model present an attractive opportunity for expansion to urban communities and university campuses where filtration use is common.

Ultimately, DROPcycle aims to become a "force for good" that encourages sustainable consumer behavior, offers entrepreneurial students impactful employment opportunities, and enables reliable access to cleaner, better tasting water.

Acknowledgements

DROPcycle wishes to thank the following people for their valuable insight, guidance, and support throughout the entrepreneurial process:

Group project advisors – Emily Chan and Gary Libecap

Bren School faculty and researchers – Trish Holden, Arturo Keller, and Brandon Kuczenski

Eco-E Advisory Council members – Brooks Beard, Jim Boyden, David Kramer, Susan Mac Cormac, Angel Martinez, Edward M. Norton, Jordon Ramer, Marc Stuart, and Jack Theimer

Fellow Eco-E group project participants – Harry Vickers, Christian Wiesenthal, Owen Barrett, Lars Davenport, Susanne McFerran, Morgan Furst, Amanda Lindsay, and Alex Silvester

Our ever supportive friends, families, and significant others

Executive Summary

DROPcycle is a closed-loop bicycle delivery service, offering water filtration pitcher owners in college communities and urban centers a simplified, more responsible method for purchasing and disposing of replacement filters. DROPcycle will increase the rate at which filters are replaced and recycled – a value proposition leveraged to form partnerships that facilitate expansion through franchises protected by exclusive distribution rights. DROPcycle's franchise model scales operations to fit into the schedule of students motivated by positive impact, entrepreneurial experience, and supplementary income.

DROPcycle capitalizes on a gap in the filtration market value chain, where consumers invest in point-of-use filtration products but fail to maintain their filters, thereby compromising drinking water quality. Having identified major filter replacement inhibitors – lack of time and transportation, collective action problems, laziness and forgetfulness – DROPcycle employs a business model that overcomes these obstacles, securing a profitable and recurring revenue stream.

DROPcycle takes orders via text message or email, which are compiled in the same inbox. Each week, employees organize orders into a spreadsheet with basic information: name, phone number, and address. The spreadsheet is geocoded and converted into a map of delivery destinations to plan a route. One night per week, filters are delivered on bicycles – a more efficient and eco-friendly form of transportation in concentrated communities. Credit cards will be accepted via smart phone applications with the capacity for automated payments. Discounts will be offered to students that return expired filters to be recycled. Delivery and customer information is consolidated into accounting records and saved for reminder text messages, sent 2 months later as recommended by the filter manufacturer.

Water filtration pitchers offer environmental advantages over bottled water, yet the vast majority of expired filters are sent to landfills. Complicated recycling processes and high

shipping costs prevent consumers from recycling their filters through the manufacturer. DROPcycle offers discounts to those who return expired filters for recycling, drastically increasing filter recycling rates in served areas. DROPcycle collects old filters and passes them in bulk to existing recycling networks. These facilities are capable of converting old filters into recycled polypropylene products and waste-to-energy generation.

DROPcycle will enter the residential point-of-use (POU) water filtration market, comprised of companies that sell products designed to further purify tap water. The POU market is valued at approximately $550 million and growing an estimated 5% annually.[1] DROPcycle will leverage the existing base of POU filter owners to capture recurring revenue from replacement filter sales. An estimated 10 million people own filtration pitchers, spending $300 million per year on replacement filters.[1]

POU industry marketing campaigns focus on the small environmental impact of filtration systems relative to bottled water. DROPcycle's service will complement these marketing efforts by vastly increasing the recycling rate of expired filters while simultaneously increasing replacement rates. DROPcycle will leverage these benefits to obtain exclusive distribution rights with filtration companies in served areas as a competitive barrier to entry.

DROPcycle will acquire new customers by creating a group of brand advocates. Reaching customers online, through social media and online marketing, will allow them to quickly share the compelling DROPcycle model with friends. DROPcycle will reach a large number of customers upfront through grassroots marketing efforts, such as distributing household door-hangers and refrigerator magnets, posting flyers, and sponsoring local events. These materials will explain the simplicity of ordering replacement filters through DROPcycle and focus on enticing prospective customers to add DROPcycle as a contact in their phone.

---

[1] SBI, *U.S. Market for Residential Water Treatment Products* (Rockville, MD: SBI, 2008).

DROPcycle is in the process of launching a pilot study in Isla Vista. The focus of the pilot study is to ascertain the cost of acquiring customers and the company's ability to retain customers over time. Operational efficiency will also be monitored to refine metrics critical to profitability and ensure effective scalability. The firm's low operating costs and franchisable business model present an attractive opportunity for expansion to many concentrated communities with high rates of filtration product use. Ultimately, DROPcycle aims to become a "force for good" that encourages sustainable drinking water practices, offers entrepreneurial students impactful employment opportunities, and enables reliable access to cleaner, better tasting water.

Environmental analysis

Americans obtain their drinking water from a variety of sources. Although tap water is generally the cheapest and most accessible option (see Figure 1), millions of household consumers annually invest in products that either provide an alternative source of drinking water or further purify water from the tap. These products can be broken down into three broad categories:

1) Bottled water. Sold under hundreds of brand names, these products vary in bottle size, geographic source, source type (well water, distilled tap, spring water), packaging (glass or plastic), and carbonation.
2) Water coolers and dispensers. These freestanding devices dispense water from a larger source, most commonly a five-gallon jug. Many models cool or heat the water before it is dispensed. These products are often available for delivery, both to residential and commercial locations.
3) Point-of-use filtration products. Rather than offering an alternative source of drinking water, POU devices pass tap water through filtering mechanisms in order to further purify the existing water source. Common styles include faucet mounted, under-the-sink, and built-in refrigerator models, but filtration pitchers are the most popular domestic option.[2]

Regardless of brand or style, each of these goods bears an additional environmental cost when compared to tap water: the energy and materials needed for their production, distribution, use, and disposal result in increased greenhouse gas emissions, waste, and other detrimental impacts. Adequately assessing these impacts and the relevant political and social landscapes offers DROPcycle the opportunity to design a more attractive and environmentally responsible business model (see Appendix I – Literature Review).

Figure 1 – Annual cost and waste generation of drinking water sources

Product	Dasani Bottled Water[2]	Arrowhead Water Cooler (Delivery)[3]	Brita pitcher (1.5-qt model)[4]	Tap water[5]

[2] SBI, 2008.

				
Annual Cost[1]	**$1,273**	**$336**	**$53**	**$0.36**
Annual waste to landfill	**- 940 bottles (18.8 ft^3)/yr. to landfill[6]**	**Varies[7]**	**- 6 filters (0.05 ft^3)/year to landfill**	**N/A**

[1]Assumes eight 8 oz. glasses of water per day = 182.5 gallons/year.
[2]Assumes cases of 24, 20 oz./bottle = 49 cases/year. Source: beverageuniverse.com.
[3]Assumes three 5-gallon jugs/month. Source: arrowheadhomedelivery.com.
[4]Assumes one-time purchase of pitcher, new replacement filter every 40 gallons, PLUS cost of tap water. Source: amazon.com.
[5]National average cost of water = $2/1000 gallons. Source: "Water on Tap: What You Need to Know." EPA, 2009.
[6]Nationwide, only 20% of plastic bottles are recycled. Source: Tapped (film). www.tappedthemovie.com. One plastic Dasani bottle = 20 fluid ounces = 592 cm^3.
[7]Many water delivery services recycle used jugs several times before ultimate disposal or recycling.

Relevant environmental trends in the political, social, and commercial spheres

For much of the past decade, bottled water was America's favorite tap water alternative. Between 2000 and 2006, bottled water sales grew at a combined annual growth rate (CAGR) of 22.7 percent.[3] However, in 2008, both consumption and revenue declined for the first time in a decade.[4] These trends appear to be persisting.[5]

While the United States remains the world's largest bottled water market, slacking sales can largely be attributed to increased consumer awareness of the environmental burdens generated by these products. Over the past several years, mass media and environmental organizations have released numerous articles and reports on bottled water's negative

[3] SBI, 2008.
[4] Alice McKeown, "Bottled water consumption growth slows," *Worldwatch Institute – Vital Signs*, 25 Feb 2010, http://vitalsigns.worldwatch.org/vs-trend/bottled-water-consumption-growth-slows.
[5] Ben Block, "Bottled water demand may be declining." *Worldwatch Institute*, March 2012, http://www.worldwatch.org/node/5878.

impacts. "The Future of Drinking Water" series from Triple Pundit,[6] "Bottled Water: Pure Drink or Pure Hype?," the culmination of a 4-year study by Natural Resources Defense Council,[7] and the award-winning documentaries, *For Love of Water (FLOW)*[8] and *Tapped*[9] are just a few avenues by which the American public has been exposed to this issue. With issues like the Great Pacific Garbage Patch, over-capacity landfills, and the perils of plastic waste increasingly in the public eye, consumers have begun searching for more environmentally responsible tap water alternatives. Many schools, municipalities, and other organizations have gone so far as to ban the sale of bottled water entirely.[10]

Recognizing a marketing opportunity, point-of-use filtration companies have been quick to develop campaigns touting their environmental benefits over bottled water. Market dominators Brita and Pur have lead the charge, incorporating environmental messages into their packaging, TV and radio commercials, and websites (see Figure 2). Brita in particular has been aggressive with its anti-bottled water marketing, rebranding its products under the "Filter for Good" slogan, enlisting the support of environmentally minded celebrities like Jack Johnson, and prominently displaying its products' relative cost and plastic waste savings. As of March 2012, the Filter for Good campaign had over 74,000 "Likes" on Facebook.[11]

Despite their comparability to the highly regulated field of residential drinking water, the bottled water and point-of-use filtration industries have been subject to little government oversight. But while some bottled water companies have used the opportunity to produce water of questionable quality and environmental friendliness, point-of-use

---

[6] RP Siegal, "The Future of Drinking Water: A New 3P Series," *Triple Pundit*, 2 March 2011, http://www.triplepundit.com/2011/03/future-drinking-water/.
[7] Eric D. Olson, "Bottled Water: Pure Drink or Pure Hype?," *Natural Resources Defense Council*, April 1999, http://www.nrdc.org/water/drinking/bw/bwinx.asp.
[8] Irena Salina, Director, *Flow: For Love of Water*, 2008.
[9] Stephanie Soechtig and Jason Lindsey, Directors, *Tapped*, 2009.
[10] "Ban the bottle: A blog devoted to banning plastic water bottles and staying hydrated," March 2012, http://www.banthebottle.net.
[11] "Brita FilterForGood," March 2012, https://www.facebook.com/BritaFilterForGood.

companies have largely aimed to improve their health and environmental images as a means of market differentiation.

Figure 2 – Environmental marketing messages on popular POU product websites

"Filter for Good" campaign – Brita.com

"Clean Drinking Water for the Environment" campaign – Pur.com

The environmental problem

Although the point-of-use water filtration industry includes a variety of filtration products, low cost, easy-to-use pitcher models have proven most popular with consumers.[12] From an environmental perspective, these pour-through filtration pitchers offer numerous advantages over bottled water:

- Reduced plastic waste. The amount of water filtered with a Brita pitcher and one filter is equivalent to 303 bottles of water.[13]

[12] SBI, 2008.

[13] Assumes 16.9 oz. bottles of water and a filter lifespan of 40 gallons (Brita.com).

- Localized water supply. Filtration pitchers filter at a homeowner's tap, and don't require the displacement of water from distant watersheds and aquifers.
- Reduced energy and material consumption during production.
- Less emissions due to fewer vehicle miles traveled during transportation (filtration pitchers do not require frequent deliveries or trips to the store) and less fuel consumed during transportation (bottled water is much heavier to transport than filtration pitchers).

Indeed, water filtration pitchers represent a seemingly responsible alternative to bottled water. But one area where these pitcher systems stagger is in the realm of recyclability, particularly for their filtration mechanisms.

The limited recyclability of water filters is due in large part to the current technology and infrastructure of municipal waste streams. Polypropylene – plastic #5, the material used to construct the shells of most household water filters – is one of the most difficult plastics to recycle. An EPA report on municipal solid waste (MSW) specifies that less than 1 percent of polypropylene is recycled once generated. This number is slightly higher for containers and packaging (approximately 3 to 5 percent).[14] The complicated nature and higher costs of polypropylene recycling – due to sorting difficulties, material breakdown, quality variations, questionable durability, and other issues – means that only a limited number of U.S. municipalities and recycling facilities accept #5 plastics. In the case of water filters, recycling is further complicated by each filter's internal components; the activated carbon and ion-exchange resins generally used to purify water must be separated from the polypropylene shell prior to recycling the plastic. These internal contents can often be "recharged" or used for energy generation, but the complexity of this process and limited volume of each filter limits the feasibility of filter recycling.

Despite the challenges presented by water filter recycling, industry leader Brita has developed a unique recycling partnership with Preserve Products. Consumers can now

[14] "Municipal Solid Waste in the United States: Facts and Figures," *Office of Solid Waste – U.S. EPA*, November 2011, http://www.epa.gov/osw/nonhaz/municipal/msw99.htm.

drop off expired Brita filters at select locations or send them by mail to Preserve, allowing for the conversion of each filter's polypropylene shell into new mixed plastic consumer products and its content into renewable energy. The program officially began in January 2009 and is ongoing. According to Preserve, each Brita filter cartridge is completely recycled – the polypropylene shell replaces virgin polypropylene in Preserve's 100% recycled products, and the activated carbon and ion-exchange resin are incinerated for energy production.[15]

In spite of the company's efforts, the recycling rate for Brita's filters remains abysmally low. Exact recycling rates for Brita are not publicly available, but one recycling expert from Preserve Products suggested, "You probably couldn't guess low enough".[16] From a practical standpoint, it is not hard to see why:

- The recyclability of Brita filters is not prominently marketed. From the Brita.com home page, one must click at least two links before seeing any evidence that Brita filters are recyclable. On product packaging, Brita devotes only a small corner on the back of each box to educating consumers on the recyclability of filters.
- Brita filters can be purchased at a large number of nationwide retail chains, including Safeway, Walgreens, Costco, and Bed Bath & Beyond, as well as online from Amazon, Brita.com, and many other sites. Conversely, Preserve only offers 234 drop-off locations for the filters.[17] Many geographic regions are completely excluded, such as Southern California. Even if all Brita users were aware of this recycling system, reaching a drop-off location would prove difficult (and resource-intensive) for many.
- Customers unable to reach a drop-off location are encouraged to mail their filters directly to Preserve. However, neither Brita nor Preserve covers shipping costs.

---

[15] "Recycling Brita Filters in the United States," Preserve Products – *Recycline, Inc.*, 2011, http://www.preserveproducts.com/recycling/britafilters.html.
[16] Preserve Products director, telephone interview, 1 November 2011.
[17] "Gimme 5 Locations," *Preserve Products*, 2011, http://www.preserveproducts.com/recycling/gimme5locations.html.

Consequently, the cost of recycling a filter can nearly reach the cost of the filter itself.

Brita's current recycling system is too expensive and time consuming for many consumers, rendering the program largely ineffective from an environmental standpoint, and potentially inefficient for both Brita and Preserve.

The environmental opportunity

The difficulties associated with Brita's recycling program fly contrary to the end consumer's desire to be more environmentally conscientious. Customer research conducted by DROPcycle suggests that many Brita users feel guilty about generating excessive waste and are even willing to pay more for recycled and recyclable products.[18] Nonetheless, consumer behavior continues to contradict these expressed values.

This incongruity suggests that existing systems are too complex or covert for the average filter owner. Brita's inability to fully connect its admittedly environmentally beneficial system to its customers' pain represents a business opportunity for DROPcycle. By designing a business model that efficiently increases the usability and user-friendliness of existing recycling channels, DROPcycle can drastically increase filter recycling rates while simultaneously capturing value from consumer attraction to responsible business practices. Filling this "missing link" in the recyclability chain for water filtration products represents both a profitable and environmentally beneficial business opportunity – one that furthers the attractiveness of point-of-use systems and represents the market's most responsible alternative to tap water. DROPcycle aims to make the right thing to do also the easiest thing to do.

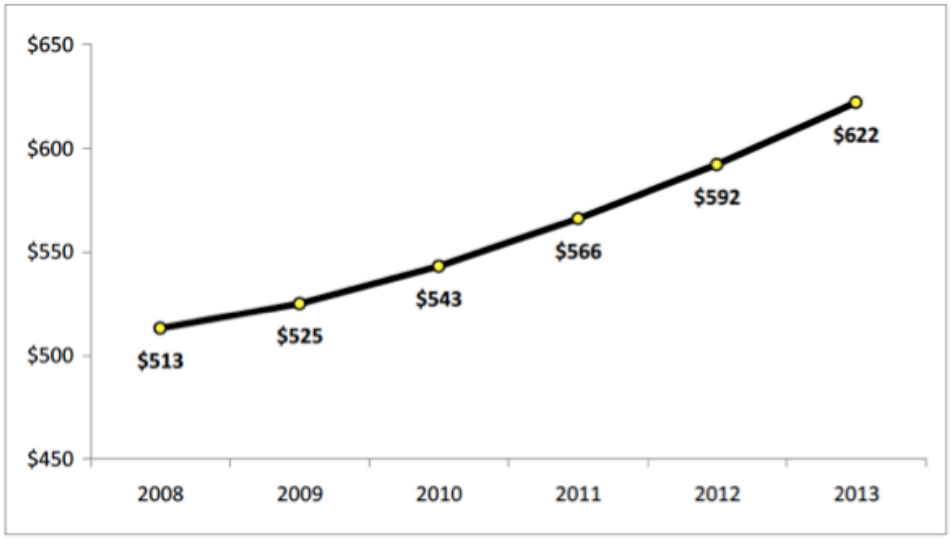
[18] "Water filter replacement cartridges," Online survey (n = 68), *SurveyGizmo*, conducted June 2011.

Opportunity Analysis

Industry Analysis

The residential point-of-use (POU) water filtration market encompasses all household filtration systems used for tap water, and includes pitchers, dispensers, faucet attachments, and under-sink filters. This differs from point-of-entry (POE) systems, which treat all household water as it enters from a municipal line or private well. Current sales of POU systems are estimated to be $592 million[19]. As displayed in Figure 3, sales are expected to grow at 4-5% annually in the near future.

Figure 3 – Historic and projected U.S. retail sales (in millions) of water filter products, 2008-2013



Source: "U.S. Market for Residential Water Treatment Products." Rockville, MD: SBI, 2008.

Market growth is driven by consumer preferences shifting away from alternative sources of quality water, bottled water and POE systems. Over the past decade, a dramatic increase in the use of bottled water sapped consumers away from the water filtration market. From 2000 to 2006, sales of bottled water increased at an average rate of 22.7% annually.[20] However, the recent economic downturn shifted the sales back toward POU devices, as consumers grew more aware of the much higher costs of bottled water

[19] SBI (2008)
[20] SBI (2008).

consumption.[21] Additionally, growing concern about the environmental and health effects of bottled water (e.g. BPA leaching and plastic waste) is predicted to help the filter market regain traction with consumers.[22]

> *Consumers are becoming less willing to pay a premium for still bottled water as negative press compares it to glorified tap water. Filtration systems are projected to become increasingly common, as the only negative aspect to these systems is that they require a filter change.* – Euromonitor (2011)

The installation of POE filters is closely correlated with the housing market because their expense can be included in a mortgage when a new house is built. The high cost of retrofitting households makes it unattractive to install POE systems in existing homes. POU filtration systems have met the demand for high quality water not provided by bottled water or POE systems.

Major Players

The POU water filtration industry is strongly oligopolistic. Brita dominates the industry with an estimated 60% market share in America, where The Clorox Company owns distribution rights.[23] Proctor & Gamble's PUR brand is the next biggest player, particularly for pour-through pitchers and faucet-mount systems. Other brands include Culligan, Mavea (owned by Brita), ZeroWater, and 3M, although market share for each of these companies pales in comparison to that of Brita.

Point-of-Use Business Model

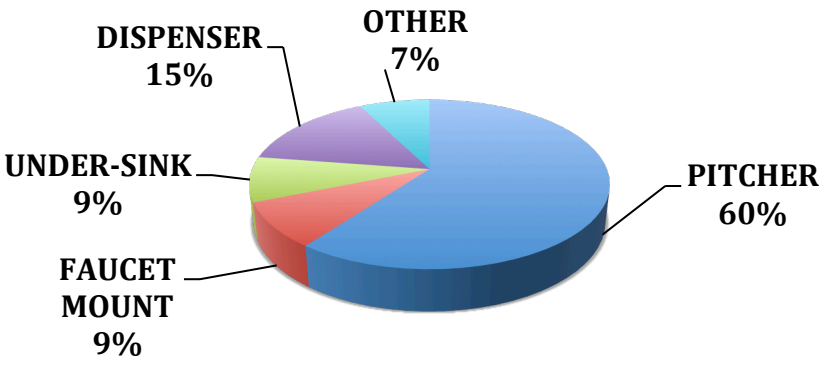
Brita pioneered the filtration pitcher in the 1970's and enjoyed patent protection until the 1990's.[24] Since then, a number of filtration products have filled the demand for improved tap water. The business model remains the same; sell pour-through filter receptacles that periodically require replacement filters. Through online surveys, DROPcycle determined the pitcher is the most popular receptacle (see Figure 4). Within a year, the revenue

---

[21] The Clorox Company, 2011 Annual Report (Oakland, CA: The Clorox Co., 2011).
[22] "Bottled Water – U.S.," report, *Euromonitor International*, 2011.
[23] "Equal Water," online survey (n=235), *SurveyGizmo*, conducted February 2011.
[24] SBI, 2008.

generated from replacement filters surpasses the initial sale. It is clear this recurring revenue stream comprises the majority of sales.

Figure 4 – Product type used by surveyed POU filtration system owners.



Source: "Equal Water," online survey (n=235), *SurveyGizmo*, conducted February 2011.

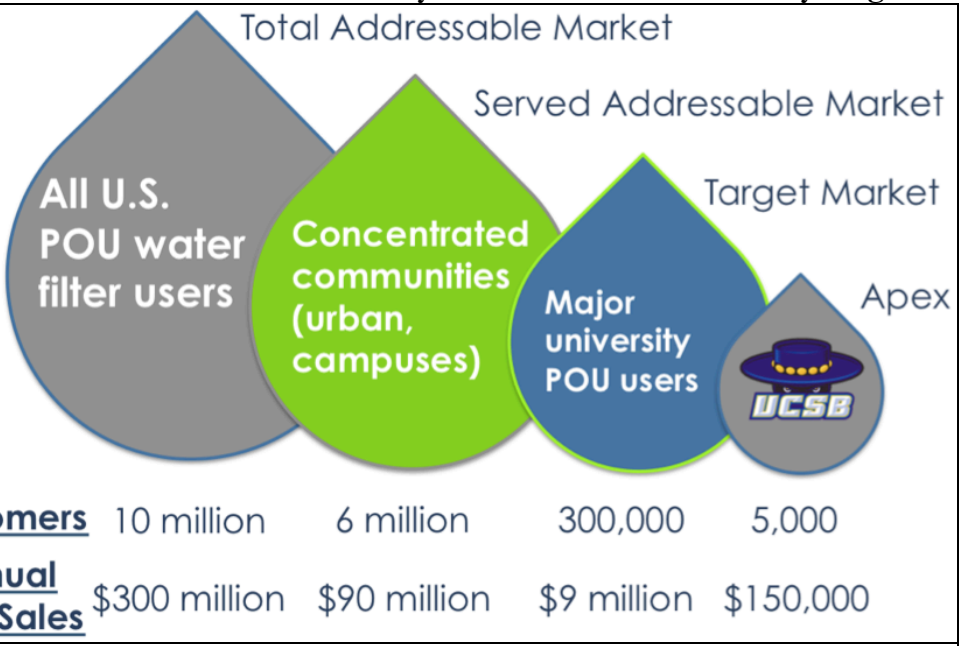
Market Size

DROPcycle will be a delivery service for replacement filters for water filtration pitchers. This allows DROPcycle to address the recurring revenue stream of the most popular filtration system. The number of filtration pitcher owners determines the market potential. As shown in Figure 5, the total addressable market encompasses all filtration pitcher owners and the amount they spend on replacement filters annually. DROPcycle's business model will constrain its servable market to people in urban areas. The delivery model is most profitable in concentrated communities, with college campuses being the most convenient and therefore the target market.

Marketing Trends

Competitors in the POU industry focus marketing campaigns on the environmental benefits of filtration pitchers over bottled water. They have strong socially and environmentally driven campaigns, such as Brita's "Filter for Good". Through its website, Brita has amassed over 5 million email addresses of consumers pledging to replace bottled water with Brita-filtered water.

Figure 5 – Market size as determined by filter owners within delivery range



TAM: All U.S. POU users = $600 million market/ Average $50 a year per person ($20 pitcher + 4 replacement filters @ $8 each) = 12 million users
SAM: Concentrated communities = U.S. users in urban areas w/>200,000 population = 58% of U.S. Census * 10 million users = ~ 7 million users
TM: 120 FBS universities * 10,000 students/university * estimated 25% use water filter = 300,000
Apex: Starting in Isla Vista/UCSB (6,000 households in IV, 3500 dorms on UCSB campus) * 50% use filter = 5,000 filter owners

Companies in the POU industry are reliant upon recurring revenue and differentiate based on environmental values. This presents an opportunity for DROPcycle to form partnerships with Brita and Preserve. The DROPcycle model simplifies the recycling process and encourages filter owners to replace their filters. DROPcycle plans to leverage these benefits to form exclusive distribution agreements and joint marketing campaigns.

Competitive analysis

DROPcycle's innovative distribution channel competes with traditional retail locations offering replacement filters. Super markets, large retailers, wholesalers, and online sources are traditional vendors of replacement water filters. The perceptual map below shows DROPcycle as both more convenient and more sustainable than traditional vendors (see Figure 6). DROPcycle can penetrate markets where accessing replacement

filters is difficult by delivering filters. DROPcycle ensures that old filters are recycled without hassling the consumer. These value propositions bode well with consumers that have chosen filtration pitchers for their environmental benefits relative to bottled water and want to avoid hassle of purchasing new filters.

Figure 6 – Perceptual map of DROPcycle's competitive position

DROPcycle recognizes that its success may attract new entrants to the retail market for replacement water filters. Local businesses could begin to carry water filters or entrepreneurs could enter the market using the same business model. DROPcycle will enforce barriers to entry by forming exclusive distribution agreements with major filter manufacturers. DROPcycle provides value to these companies by increasing both replacement and recycling rates, providing incentive for these manufacturers to do business strictly with DROPcycle.

Target Customer

DROPcycle is a delivery-based retail business focused on urban areas with dense populations of filtration owners that can be accessed by bicycle. These customers also find it may be hard to access new filters. Water filter owners are conscious of waste and

will choose the most sustainable option. DROPcycle's research found the neighborhoods surrounding college campuses to be populated with potential customers likely to be interested in the DROPcycle model. For reasons detailed in the customer research section, college students will see the value in a delivery service that also increases the sustainability of their POU filter.

Customer Research

Overview

DROPcycle represents the culmination of a 15-month long customer research and development process. With multiple iterations and pivots, the business' current form bears little resemblance to its founders' initial vision. Each adjustment to the company's business model is directly attributable to revelations from the firm's primary and secondary research. During this time period, the company conducted numerous interviews, focus groups, surveys, a pilot study, and other research in pursuit of market solutions that aptly fit consumer needs. The key learnings that guided DROPcycle's business development are detailed below.

Key Learnings

Water filtration pitchers are the most popular POU product type.

- 59% of surveyed POU filtration system users own pitcher-style products.

Source: Online survey (n=235) [February 2011].

DROPcycle business model implication: DROPcycle should enter the POU market with pitcher-style products.

Consumers' primary motivation for purchasing water filtration pitchers is to improve tap water taste.

- 80.9% of surveyed filter owners cited "improving the taste of my water" as the most important factor influencing their pitcher purchase.
- "Water here in Isla Vista tastes terrible. The Brita gets rid of the gross chlorine taste."

Sources: Online survey (n = 68) [June 2011], UCSB student interview [April 2011].

DROPcycle business model implication: Consumers may be less apt to respond to marketing touting perceived health benefits of systems.

Many water filtration pitcher owners are opposed to the waste generated by bottled water.

- "The best reason to own a pitcher, hands down, is to reduce plastic bottle waste."
- "Owning a pitcher saves a lot of energy and resources put into manufacturing plastic bottles, and pitchers are much more handy and convenient to use rather than having to constantly stock up on water bottles."
- When asked to list "the best reason to own a filtration pitcher," half of surveyed respondents cited avoided plastic waste.

Sources: Online survey (n = 68) [June 2011], UCSB student interview [May 2011].

DROPcycle business model implication: Highlighting water filters' advantages over bottled water could be a powerful marketing tactic.

Water filtration pitchers are very popular with college students.

- Perceived as a back-to-school necessity
- "Everyone in IV has one."
- UCSB students cited the convenience, compact size, and reduced waste compared to bottled water as primary motivators for purchasing filtration pitchers.

Sources: Online survey (n = 68), UCSB students interviews [spring 2011].

DROPcycle business model implication: College campuses are a promising target market – a large population of filter users in a relatively concentrated area.

Designing, manufacturing, and distributing a new brand of water filtration products is cost-prohibitive and infeasible.

- Market leaders Brita and Pur are subsidiaries of Clorox and Proctor & Gamble, respectively – both multi-billion dollar companies.
- "Selling any product in Whole Foods' retail locations requires two years of financial records, an external audit, and manufacturing capacity to supply all of our stores on at least a regional basis."

Sources: Clorox.com, pg.com, interview with Whole Foods store and sourcing manager [February 2011].

DROPcycle business model implication: The water filtration market and retail sales model are not conducive to a start-up pioneered by two graduate students with little design and manufacturing background. Penetrating the filtration market will mandate cooperation (rather than competition) with existing players and an innovative distribution method.

Brita is the most popular brand of water filtration pitcher.

- Brita dominates the point-of-use water filtration market, with an estimated 60 percent market share.
- 91.2% of surveyed filtration pitcher users owned a Brita product.
- 13 of 16 interviewed college students cited Brita as the only brand of water filter they knew. Many colloquially referred to the entire genre of products as simply "Brita filters."

Sources: SBI [2008], online survey (n = 68) [June 2011], UCSB student interviews [spring 2011].

DROPcycle business model implication: If DROPcycle elects to become a distributor of other companies' filter systems, selling Brita products will likely lead to the greatest revenue generation and customer acquisition.

Filter replacement is a significant pain point for filtration pitcher owners.

- Only 24% of surveyed filter owners consistently replace their filters within the recommended time frame.
- "I don't like having to remember and wonder whether I replace my cartridge often enough."
- "I don't have a car to get off campus and buy new filters. And then when I do get to the store, I always forget I need a filter."

Sources: Online survey (n = 235) [February 2011], UCSB student interviews [April 2011].

DROPcycle business model implication: A simplified filter replacement service could be a viable and attractive market entry strategy.

Replacement filters are heavy and expensive to ship.

- Brita filters weigh about 0.5 pounds each.
- Individual filter shipments to consumers would cost at least $3 each. Adding this cost to the sticker price would make filters significantly more expensive than at retail locations; including this cost in the sticker price would eliminate contribution margins.

Sources: Brita.com, USPS.com.

DROPcycle business model implication: Shipping replacement filters to customers is cost-prohibitive. An alternative model that personally delivers filters via bicycles to customers would help keep prices low, capitalize on the close proximity of consumers on college campuses, and minimize environmental impacts from transportation.

Many college students are willing to pay more for recyclable products, including water filters.

- When asked to rank filter design preferences, students were most interested in a filter cartridge that was 100% recyclable. Students were willing to pay $3 more for this feature.
- 67 percent of Millenials (consumers age 18-27) "believe the most successful businesses in the future will be those that practice sustainability."

Sources: UCSB student interviews [Spring 2011], Euro RSCG Prosumer Report [2011].

DROPcycle business model implication: Leveraging existing recycling networks and reducing the environmental impacts of water filtration could prove to be a competitive advantage and strong marketing tactic.

Few filtration pitcher owners recycle expired filters.

- 83.8% of surveyed filter owners said they threw away their expired filters. 8.8% claimed to recycle their filters.
- "I wish I could recycle my filters, but there's no such program. I throw them in the garbage."
- When asked about Brita's recycling rate, a representative from Preserve Products (Brita's recycling partner) stated, "You probably couldn't guess low enough."

Sources: Online survey, (n = 68) [June 2011], UCSB student interview [May 2011], interview with Preserve Products director [November 2011].

DROPcycle business model implication: Suggests that recycling processes (which do, in fact, exist) are poorly marketed and overly complex. Simplifying the recycling process could allow DROPcycle to capitalize on a trend consumers see as desirable (recyclability) but currently unobtainable.

Collegiates are attracted to simple, transparent, feel-good marketing.

- "Millenials want to partner with brands that respect the environment and the people they touch (customers, employees, supply chain). It is part of the broader consumer movement toward conscientious consumption."

Source: Euro RSCG Prosumer Report [2011].

DROPcycle business model implication: Marketing materials should communicate DROPcycle's environmental and customer benefits as succinctly and straightforward as possible.

College students are consistently connected to digital networks (i.e. phones and computers/internet).

- When asked, "What is the biggest difference between your generation and the previous one?" 47 percent of 18-25 year olds agreed that "my generation is more digital."
- All 16 interviewed students cited text messaging as the easiest way to communicate with their friends.

Sources: Euro RSCG Prosumer Report [2011], UCSB student interviews [Spring 2011].

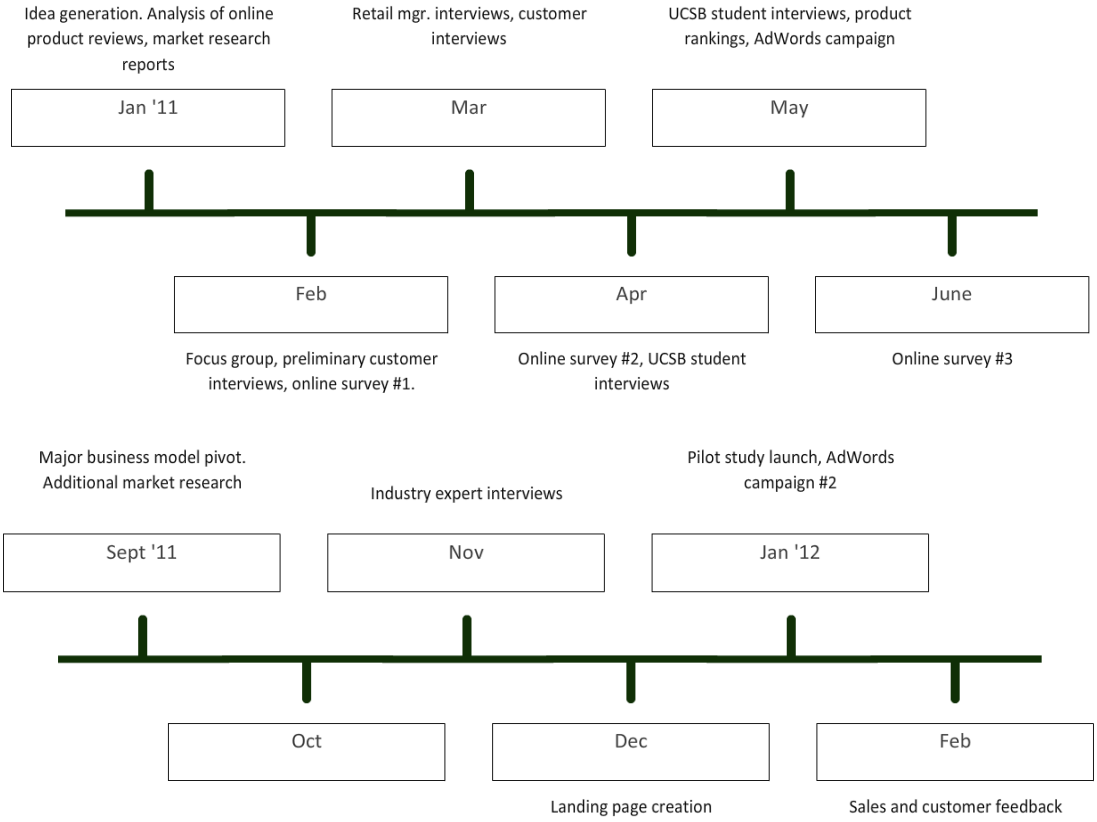
DROPcycle business model implication: Leverage existing, popular student communication channels like text messaging to facilitate simpler, faster, more convenient filter ordering.

Research Methods

In total, DROPcycle conducted the following customer research (see Appendix 2):

- **Secondary research**
  - Aggregated analysis of nearly 100 online consumer reviews of water filtration pitcher products
  - Review of more than a dozen market research reports focused on the bottled water and water filtration industries
  - Review of several market research reports detailing the trends, values, and spending habits of "conscious consumers" or "prosumers"
- **Primary research**
  - Focus group with five perceived target customers.
  - 17 in-depth interviews with target customers.
  - 35-question online survey on drinking water habits and product choices. Gathered 235 consumer responses from 24 states.
  - Seven conversations with Santa Barbara convenience, supermarket, and domestic merchandise store managers regarding retail product sale feasibility.
  - 17-question online survey targeting filtration pitcher owners. Garnered 64 responses detailing pitcher design preferences and filtration habits.
  - 16 in-depth (25-30 minute) interviews with UCSB undergraduate students. Conducted in Isla Vista, CA and focused on filtration pitcher use habits.
  - 63 consumer rankings of preferred filtration product features.
  - 18-question online survey, targeting college-age filtration pitcher owners and focused on filter replacement habits. Accumulated 68 consumer responses.
  - One full-scale company website, designed for "ghetto testing" product designs and marketing tactics
  - Two interviews with industry experts – a former Brita marketing representative and a manager for Preserve Products.
  - One pilot study, conducted in Isla Vista, CA and on the UCSB campus.
  - One online landing page, designed to attract pilot study participants.
  - Two Google AdWords campaigns to evaluate effective marketing messages and attract website click-throughs and conversions.

Customer Research Timeline



Proposed Business Model

DROPcycle will capture value by delivering replacement water filters to concentrated communities of water filtration pitcher owners. DROPcycle will expand by partnering with Brita to gain exclusive distribution rights to targeted populations of filtration owners, and franchising the DROPcycle brand to entrepreneurs capable of executing the model in those areas.

The Problem

People are driven to purchase water filters because they are not satisfied with the aesthetic qualities of tap water. The research presented in the preceding section revealed reasons why college students frequently seek filters for tap water. This problem also has a geographic component, and is particularly pronounced in areas where tap water quality is historically poor. For example, the Southwest is notorious for its sub-par water quality due to a variety of causes, namely chlorine additives[25], ageing infrastructure, and more recently, bacterial contamination at water sources[26]. As identified in research, consumers unsatisfied with tap water elect to purchase water filtration pitchers because they are compact, easy to use, and inexpensive compared to alternative sources of drinking water.[27] However, these pitchers still present challenges. The filter in each pitcher has a definitive lifespan, requiring it to be replaced, on average, every 2 months or 40 gallons.[28]

Problem – customers fail to replace and maintain filters due to a number of inhibitors

Research suggests that the replacement process is particularly painful for consumers, leading to infrequent replacement of filters (if at all) and therefore sub-par water quality for pitcher owners. Amongst collegiates, the major identified inhibitors to regular filter replacement are:

---

[25] "City of Santa Barbara Annual Water Quality Report," *City of Santa Barbara*, June 2011, http://santabarbaraca.gov/water.
[26] Pat Brennan, "Tap water tasting musty? Foul, but no harm," OC Science – The Orange County Register, 30 September 2011, http://sciencedude.ocregister.com/2011/09/30/tap-water-tasting-musty-foul-but-no-harm/141903/.
[27] Online survey, June 2011.
[28] As recommended by Brita. Poorer water quality can necessitate more frequent replacement.

1. Lack of knowledge about replacement timing.

   Many students were unaware of the need to replace the filter every 40 gallons. A majority "just remembered" or noticed a change in smell or taste before deciding it was time to change the filter.

2. Lack of time.

   Despite being dissatisfied with their water quality, students do not place a high priority on filter replacement compared to other college activities. Replacement filters are generally not available on campus; therefore the replacement process tends to require a time-consuming trip off campus. For example, at UCSB the closest identified retail location selling Brita filters was Costco, located 2.2 miles from the center of campus and 1 mile from the closest freshman dorms.[29]

   "I just don't have time to go get them." – *UCSB student interview (April 2012)*

3. Lack of transportation.

   Students don't have a vehicle, making it more difficult to reach a retail location selling replacement filters.

   "Getting off-campus to get a new one can be tough." - *UCSB student interview (April 2012)*

4. Collective action problems.

   One student frequently purchases replacement filters but becomes wary as roommates use the filter without ever contributing new filters. This discourages the filter owner from buying new filters.

[29] maps.google.com

"I'm the only one in my apartment who buys them." - *UCSB student interview (April 2012)*

5. Forgetfulness.

   Many students emphasized a desire to replace, but could never remember to buy filters when they were at the store. They would only remember again the next time they went to pour themselves some water from their pitcher.

   "Oh yeah, we always forget to buy those when we're out." - *UCSB student interview (April 2012)*

6. End-life of filters.

   Additionally, research found that many students placed a high value on products deemed environmentally responsible. Most students were unaware that Brita filters are recyclable. This suggests a large gap between a student's values and behavior.

   "I'd definitely pay more for a recyclable filter." - *UCSB student interview (April 2012)*

Solution

DROPcycle designed a business model to address the customer pain originating from the need to replace filters. The foundation of the model is that filters can be ordered via text message. Students send numerous text messages every day, so this method allows for a compulsive reaction to the realization that a filter is expired to remedy the pain of procuring a new filter. Text message ordering is enhanced by reminder messages that are sent to loyal customers. DROPcycle assumes the responsibility of ensuring its customers maintain high drinking water quality. DROPcycle addresses the second tier of replacement inhibitors associated with college life through weekly deliveries. Customers are liberated of the need to find transportation to retail outlets carrying replacement

filters, as well as the difficulty remembering to buy them while at the store. By delivering at a specific time, the collective action problem related to one roommate bearing the brunt of replacement filter costs is solved by allowing all roommates to pitch in at the point of purchase. DROPcycle will take both cash and credit payment, as facilitated through smart phone applications with low transaction costs.

Validated Business Model

Retail Delivery

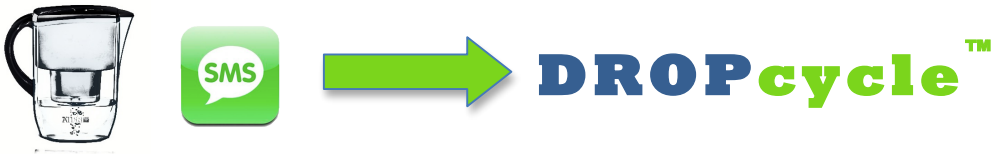
Entrepreneurs selected to execute the DROPcycle model will control operations and inventory. They will be supplied replacement filters and assigned a unique phone number and email address that can be monitored by DROPcycle. Customers request new filters by texting or emailing the DROPcycle franchise serving their neighborhood. Responses to both texts and emails are sent the same day, free of charge, using the company account. Deliveries are made weekly, when orders are compiled into a spreadsheet that is converted into a map using free software. The delivery route is planned and customers are sent a reminder message with the approximate delivery time. Deliveries are made on bicycle and payment is collected in cash or credit via smart phone. Old filters are collected and carried in a backpack until returning to the home location. They are then stored until the end of the quarter, when DROPcycle picks them up for disposal at a designated drop-off location. Text messages are sent as reminders when customer's filters are ready to be replaced (see Figure 7).

Figure 7 – DROPcycle business model – "How it works"

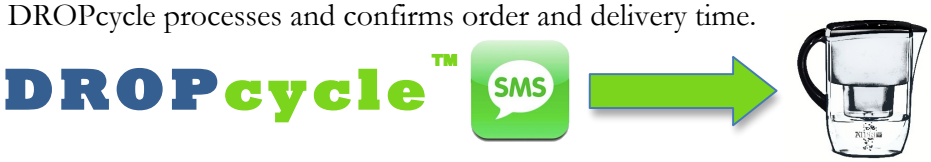
1) Brita manufactures replacement filters and ships them to wholesaler.

2) DROPcycle purchases filters from wholesaler.

3) Customer with Brita filtration pitcher texts DROPcycle to order new filter.



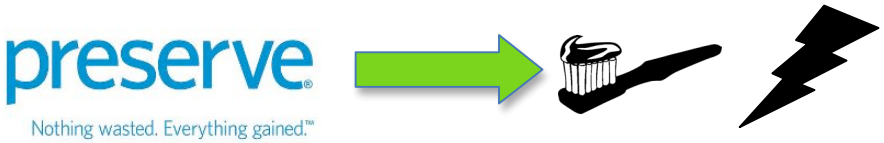
4) DROPcycle processes and confirms order and delivery time.



5) Filter delivered by bicycle the following Sunday. Payment completed. Customer provides DROPcycle with expired filter.

6) DROPcycle ships expired filters to Preserve Products.

7) Preserve uses filters to produce recycled polypropylene products and generate energy.



8) In two months, DROPcycle reminds customer of need to replace filter. Process repeats.

Opportunity to Scale - Franchise Business

The ability to expand operations into new communities will require a centralized organizational structure to manage areas where DROPcycle provides service. This will be

accomplished through franchising. DROPcycle will become a distributer to its franchises, which will be managed semi-autonomously by motivated entrepreneurs. DROPcycle will make money by being the exclusive distributer to its franchises.

Profit System

As explained in the business model section, profitability results from franchised retail distribution. Retail deliveries must provide adequate sales volume to make DROPcycle profitable. Successful retail outlets have their own set of assumptions and metrics to establish profitability, discussed in the Critical Metrics section.

DROPcycle Profitability – Individual School

The franchises that operate retail branches capture value from customers. The integrated wholesale structure requires a robust retail model that is profitable and low-maintenance. It begins with an entrepreneur who meets the following pre-requisites:

- Lives close to served population
- Has a bike
- Has a smart phone
- Has room for a box 3' x 2' x 2'

These students are provided filters, a business plan, communications infrastructure, and marketing materials. They will be responsible for the following activities necessary to run the operation. An individual week would involve the activities and time commitments displayed in Figure 8.

Figure 8 – Ongoing weekly time commitment

Text Response	7.50 mins
<u>Delivery Preparation</u>	
Reminder Text	1 min
Information to Spreadsheet	15 mins
Plan Route	5 mins
Accounting	15 mins
Customer Information/Planning	15 mins

Delivery	
Delivery/Transaction	100 mins
Marketing	
Cumulative Effort	75 mins
Total Commitment	4 hours

The above actions will create a weekly profit of $70 under a set of assumptions displayed in Figure 9a, with subsequent expenses broken down in Figure 9b and further described in the critical metrics section.

Figure 9a – Operating Assumptions

Price Sold (filters)	$7.35
Price Bought (filters)	$4.0
Deliveries/Hour	8
Labor cost @ $10/hr	1.25
Deliveries by owner	20

Figure 9b – Weekly Profitability

Calculated Income	
Number of Customers	45
Revenue	$334
Variable Expenses	
COGS	$182
Gross Profit	$152
Fixed Expenses	
Marketing	$45
Employee Hourly	$31.78
Fees/Taxes	$5.01
Profit	$70

These assumptions are maintained for the whole year to produce the projections below.

Figure 10 – Annual Profitability

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year 1	Margin
Number of Customers	225	378	580	180	1,363	
Revenue	1,654	2,778	4,265	1,323	10,020	
Variable Expenses						
COGS	900	1,512	2,321	720	5,453	
Gross Profit	754	1,266	1,944	603	4,567	46%
Fixed Expenses						
Marketing	315	437	557	557	1,866	
Employee Hourly	31	173	425	-	629	
Fees/Taxes	25	42	64	20	150	
Profit	383	616	897	26	1,922	19%

DROPcycle Profitability – Scaled to multiple college campuses

Revenue will be generated through the distribution of filters to retailers serving a specific area. Filters will be sold at a discount, yet a price that makes both DROPcycle and a franchise profitable. The number of water filters purchased will be a result of the number of locations served and the number of filters sold at each location. Initially, these locations will be communities surrounding universities. The price and volume of filters for a given university (or location) is displayed below.

Figure 11 – Gross profit to DROPcycle from single franchise location

Gross Profit per School			
	Price	**Number of Filters**	
Sales	$4	1000	$4,000
Cost of Filters	$2.50	1000	$2,500
Gross Profit			$1,500

However, DROPcycle must supply materials and training to franchises in order to produce sales. Franchises will request inventory shipments from DROPcycle. These requests will be processed and payment collected. The order will then be forwarded to the Brita supplier, who will be responsible for the delivery.

Figure 12 – Annual cost per school

	Money	Time
Marketing Materials***	$1,000	
Inventory (filters)***	$2,500	
Selection		12 hours
Training		12 hours
Local Licenses		
Business License	$250	5 hours
Sellers Permit	$0	6 hours
***Materials will be supplied by DROPcycle but cost covered by franchise.		

The profit for each franchise selling 1000 filters on average would be $1,250 and require a time investment of 35 hours. Each would require upfront capital = $333.33.

These profits would go towards covering the following annual fixed costs.

Figure 13 – Annual Fixed Costs

Web Hosting	$120
LLC Fees	$900
Insurance	$800
Accounting	$250

The profit from all 25 schools would be $31,500. Required upfront capital = $11,333.33.

Critical Metrics - Profitability

The above profit projections are subject to assumptions about the number of customers, operational efficiency, and marketing costs that will actually be incurred by DROPcycle and individual franchises. The following metrics must be monitored to evaluate success and ensure profitability. Goals provided represent the desired outcome in order to create a lucrative opportunity for a motivated entrepreneur.

Customers

Total Number of Deliveries	40/week
Customers – New	20/week
Customers – Returning	20/week

Number of times service used	4
Retention Rate	75%

Customer retention is a very important part of a recurring revenue business model. It will be important to track the number of customer that continue to use DROPcycle, as they will likely be less expensive to maintain than acquiring new customers.

Operational Efficiency

Accounting	1 min/customer
Delivery	
Route Planning	5 mins
Number of deliveries	8 per hour
Customer Relationship	
Response Text	1 min/customer
Reminder Text	1 min/customer
Customer Database	1 min/customer

Serving customers in as little time possible is important for this to be a tempting opportunity for entrepreneurs to pursue.

Operational Capacity

Delivery	
Maximum deliveries per employee	32
Delivery time	3 hours
Number completed by owner	20 deliveries

The number of deliveries made by individual employees will determine human resource requirements at various sales volumes.

Marketing

Customer Acquisition Cost	$1.50	5 mins
Customer Retention Cost	$1	0 mins
Online Marketing		
Number of impressions	100/month	
Clicks	10/month	
Conversions	1/month	

Reaching new customers and generating conversions with minimal time and effort is critical to profitability. Various techniques are currently being tested in the pilot study.

Critical Metrics – Franchisability

Ratios and Margins

Gross Margin	>50%
Net Margin	>20%

Individual franchise success will be evaluated based on their ability to turn a profit. Marketing campaigns offering discounts will decrease the gross margin, and any excessive expenses will decrease net profit.

Community Characteristics

Population	25
Number of Filter Owners	1000
Time to bike 3 miles	10 mins
Number of bad weather days	<50

The applicability of the DROPcycle model depends on bicycle accessibility and the popularity of water filtration systems. These metrics will help gauge whether new locations are worth pursuing.

Scale

Number of Locations	25
Deliveries per Location	1000

The success of new locations will be evaluated by the sales volume. The size and complexity of the operation will be related to the number of locations served by franchises.

Environmental

Recycling Rate	>95%
Number of Filters Recycled	24,000 per year

DROPcycle's environmental impact will be monitored by the recycling rate and overall number of filters recycled. This may create partnership opportunities in addition to Brita and Preserve.

Web Traffic

Unique Visitors	>500/month
Conversions	>1%

Generating sales from DROPcycle's online presence allows franchises to piggyback on the DROPcycle brand.

Minimum Viable Product

The minimum viable product (MVP) is meant to distinguish the limited set of features necessary to sell the proposed product or service. The MVP will confine operations to retail distribution in a specific market. DROPcycle will offer a limited selection of the potential water filter market, only delivering Brita filters to select locations during a specified time range.

Pilot Study

DROPcycle has launched a pilot study in Isla Vista, CA. Only residents of Isla Vista that own Brita filters are eligible to participate (see Figure 14).

Figure 14 – DROPcycle pilot study customer boundary

Source: Custom boundary designed using Google Maps.

A limited number of students have been informed about DROPcycle's service. The goals of the pilot study are as follows:

1) Ascertain the customer acquisition cost of various marketing strategies.
2) Determine customer retention rates.
3) Improve operational efficiency and develop reliable logistical processes.

Thus far, DROPcycle has experimented with the following marketing tactics (see Figure 16 for pilot study's chronology):

- Class room pitches to undergraduate and graduate students
- Social Media campaigns (Twitter and Facebook)
- Face-to-face pitches in Isla Vista
- Issuance of DROPcycle stickers with ordering information
- Google Adwords campaign
- Company landing page.

Pilot Study – Lessons Learned

Two weeks of deliveries have been completed as a part of DROPcycle's pilot study. The pilot study participants have been people referred through the Bren community. The deliveries have been very easy and fast; however, the majority have been to the graduate student dorms. This has not provided much valuable information to validate customer acquisition strategies or delivery efficiency. Passing out stickers around Isla Vista and giving pitches during classes has been met with modest success. DROPcycle needs to focus its customer acquisition strategies to low-cost strategies capable of being replicated at scale. This narrower range will allow a more concerted effort.

Pilot Study – Start-up Cost

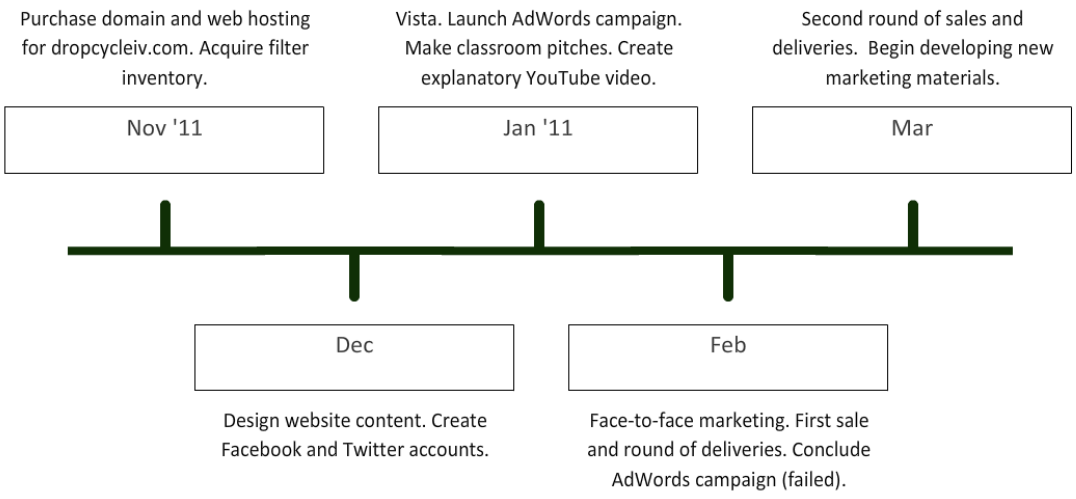
The costs incurred to launch DROPcycle's pilot study are summarized below.

Figure 15 – Pilot study start-up costs

Fictitious Business Name	$102.50
Web Hosting	$119.40
Web Development	$115.00
Marketing Materials	$75.37

Inventory	$367.14
Total	**$779.41**

Figure 16 – Pilot study timeline



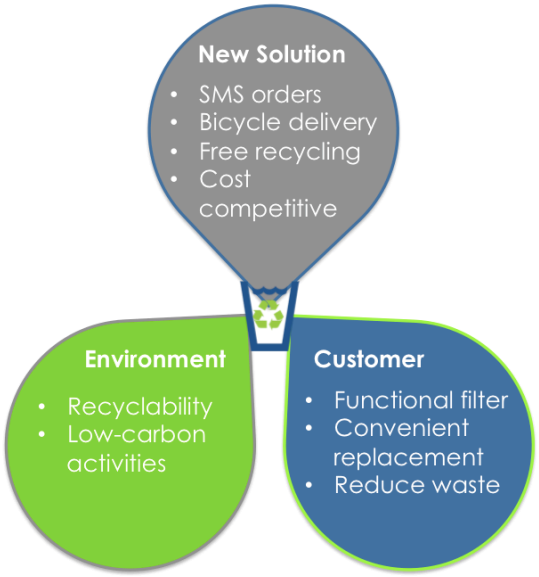
Environmental Benefit

DROPcycle is a brainchild of the Bren School of Environmental Science and Management's Eco-Entrepreneurship program. The program's over-arching objective is described on the school website:

> *"Eco- E promotes innovation of environmental products, services, and technology transfer. In this program, graduate students learn how to move environmental solutions from concepts to market for their personal and financial benefit, as well as for the betterment of the environment."*[30]

DROPcycle was created in line with this program's goal, aiming to address both a market need and a substantive environmental problem (see Figure 16). The company's innovative, franchisable filter delivery service represents a lasting business model that offers profitability to its owners and a simple, environmentally preferable purchase avenue for its customers.

Figure 16 – DROPcycle's Eco-Entrepreneurship opportunity



[30] "Eco-Entrepreneurship – Stimulating environmental solutions through strategic and technological innovation," *Bren School of Environmental Science & Management*, 2012, http://bren.ucsb.edu/academics/eco_entrepreneur.htm.

Benefit quantification

DROPcycle's business model offers several major environmental advantages over existing water filter replacement solutions for end consumers. However, it is not enough to simply qualitatively list these purported benefits. As a company genuinely invested in solving environmental problems, and one that places high value on corporate transparency and accountability, DROPcycle has an obligation to quantify its environmental superiority compared to competing products and services.

While important, this responsibility is no easy task. Much of the information needed to accurately calculate DROPcycle's environmental benefits is proprietary[31]; the acquisition of other data (e.g. a full life cycle assessment) proved cost-prohibitive for the scope of this project. Nonetheless, the company has aimed to assess its positive environmental impacts in an accurate and candid manner. Below is a quantified list of DROPcycle's primary environmental benefits, on a total market and per household basis, accompanied by any necessary assumptions and analysis (see Figures 17 and 18).

NOTE: All benefits are calculated for a single year, based on a customer base of 5,000 households. This number was selected because it is the estimated size of DROPcycle's apex market (6,500 households in Isla Vista, CA + 3,500 dorm rooms, with 50% using a water filtration pitcher), and therefore illustrates the maximum environmental opportunity for the company on its first college campus. Alternatively, this number of households could be reached with reduced market penetration but a greater number of campuses, which is in line with DROPcycle's growth model and vision of enfranchisement.

Figure 17 – Total Market Environmental Benefits

Environmental Benefit Category	Estimated Benefit	Advantages Over Existing Solution
Landfill diversion	7.5 tons of waste diverted/year[1]	DROPcycle's simple recycling methodology creates an opportunity to drastically increase the recycling rate for

[31] Although Preserve Products and Brita partnered with PE Americas to conduct a comprehensive Life Cycle Assessment of Brita's products and recycling program, the process, results, and analysis are not currently available for public viewing.

		water filters – from less than 1% to effectively 100% per served community.
Waste-to-Energy generation	4.3 MWh/year[2]	While not a major environmental benefit, the energy generated from recycled filters is comparable to the annual electricity consumption of two U.S. citizens.
Avoided virgin polypropylene production	**(Benefits over virgin polypropylene)[3] • 54% less water • 64% less GHGs • 46% less electricity • 77% less natural gas • 48% less coal • 75% less oil	Data available only allows for these benefits to be quantified on a relative basis (rather than for the total market). Nonetheless, this calculation illustrates that every filter recycled offers advantages over existing plastic production processes.
Reduced vehicle emissions	Varies	If consumers were previously making vehicle trips to purchase only replacement filters, then DROPcycle's system helps avoid a small amount of GHG emissions every year by delivering filters to consumers on bicycles. If consumers previously used a water delivery service or ordered filters online and had them delivered, then DROPcycle's system similarly avoids these added vehicle trips (and their associated emissions) – filters need only be transported by motor vehicle to a local distribution hub.
Bottled water avoided	7.68 million bottles/year[4]	This benefit is not directly attributable to DROPcycle but rather to the consumer's initial investment in a water filtration product. Nonetheless, DROPcycle's system makes it easier for consumers to maintain their pitchers, and thus also to sustain their avoidance of bottled water.

Notes & Calculations:

[1]0.5lb/filter * 6 filters/year/home * 5000 homes

[2]Typical energy content of coconut shells = 30,140 kj/kg * 30% burn efficiency (average for charcoal) * 30,000 filters/year * 0.057kg/filter = 15,461,820 kj * 0.000278 kwh/kj = 4,298 kwh/year = 4.3 MWh/year

[3]http://www.preserveproducts.com/ourprocess/index.html

[4]Assumes that customer transitioned from drinking only bottled water to only filtered water, at the same rate of eight 8 oz. glasses per day. 256 20 oz. bottles/filter * 6 filters/year/home * 5000 homes

Figure 18 – Environmental Benefits Per Household Served

Environmental Benefit Category	Estimated Benefit
Landfill diversion	3 lbs./year
Waste-to-energy generation	8.6 kWh/year
Bottles of water avoided	1536 bottles/year

Ultimately, it is important to remember that water straight from the tap is generally the most environmentally responsible source of drinking water for residential homeowners. But for consumers who are simply not content with the taste of their tap water, the enlistment of DROPcycle's service offers real and quantifiable environmental advantages over both existing water filter replacement methods and other tap water alternatives.

Next Steps

DROPcycle has reached a critical juncture in its development. Having already identified both a prominent pain and a practical solution for water filtration users, the company's sights are now focused on proving business model profitability and scalability. Below are the next steps DROPcycle envisions as critical to its success, both as a business and as a driver of environmental change:

1) **Progress with pilot study in Isla Vista, CA, with an aim of identifying effective marketing strategies and customer acquisition costs**. DROPcycle's success depends upon single campus profitability. With all other expenses already determined, it is truly marketing costs that could "make or break" the company's business model. Of critical importance is ensuring that DROPcycle's marketing tactics are not only efficient, but also consistent; future franchisees will be much more attracted to a business proposition with predictable expenses and proven methods for attracting customers. Operating under the assumption that the UCSB campus is a reliable sample population, DROPcycle must continue to systematize its processes and experiment with marketing approaches before even considering the prospect of expansion.
2) **Improve environmental benefit calculations**. DROPcycle was founded with an aim to offer a more sustainable water filtration solution when compared to existing systems. In the eyes of the company's owners, profitability and scalability at the expense of the environment is simply not an option. Thus, environmental impacts must be accurately understood prior to expansion. DROPcycle's literature review (see Appendix ___) serves as an excellent foundation for future research, and ideally would be supplemented with additional analyses and life cycle assessments (such as those already calculated by Brita and Preserve Products). This goal is not simply a matter of conscience, but also an opportunity for improved marketing fodder, increased transparency with customers, and a more attractive value proposition for future franchise owners and responsible investors.

3) **Leverage success toward exclusive partnerships and distribution rights**. Once profitability is proven on a single campus (or perhaps several), DROPcycle should aim to develop exclusive partnerships with Brita, Preserve, and other filtration companies. This tactic will provide a strong barrier to entry for other possible market players. DROPcycle will aim to secure sole delivery rights for Brita filters on major college campuses, and ultimately will attempt to expand to other locations (e.g. major urban areas) and offer products produced by other filtration companies (e.g. Pur). In addition to fortifying DROPcycle's position against competition, such partnerships could:
    a. Reduce the company's cost of goods sold through more direct wholesale purchases
    b. Allow access to proprietary environmental research, and
    c. Improve market penetration and brand recognition.

   DROPcycle anticipates that its desired partners will find the company attractive due to the opportunity for increased filter sales (i.e. a more reliable recurring revenue stream for Brita and other filtration firms) and recycled filters (i.e. a more reliable polypropylene source for Preserve).
4) **Expand to additional campuses and select urban areas**. DROPcycle ultimately aims to increase its profitability and positive environmental impact through expanded sales and filter reclamation. DROPcycle will aim for locations with:
    a. Proven demand for, and use of, water filtration products
    b. An environmentally minded consumer base
    c. Distribution areas conducive to efficient bicycle delivery, and
    d. Customers likely to be receptive to existing marketing strategies and price points.

DROPcycle has thus far proven to be an attractive, durable, and timely business model. It has satisfied both the requirements of the Bren School's Eco-Entrepreneurship program, and the expectations of its enthusiastic founders. As a low-maintenance

business, the company offers its owners and future franchisees an opportunity for profitability and impact without compromising other life ambitions or educational endeavors. And with environmentally conscious business objectives, DROPcycle is a "force for good" that encourages more sustainable consumer behaviors. The company looks forward to future opportunities for growth and positive change.

Bibliography

"Ban the bottle: A blog devoted to banning plastic water bottles and staying hydrated." March 2012. http://www.banthebottle.net.

Block, Ben. "Bottled water demand may be declining." *Worldwatch Institute*. March 2012. http://www.worldwatch.org/node/5878.

Brennan, Pat. "Tap water tasting musty? Foul, but no harm," *OC Science – The Orange County Register*. 30 September 2011. http://sciencedude.ocregister.com/2011/09/30/tap-water-tasting-musty-foul-but-no-harm/141903/.

Bren School of Environmental Science & Management. "Eco-Entrepreneurship – Stimulating environmental solutions through strategic and technological innovation." 2012. http://bren.ucsb.edu/academics/eco_entrepreneur.htm.

Brita Products. "Brita FilterForGood." March 2012. https://www.facebook.com/BritaFilterForGood.

"City of Santa Barbara Annual Water Quality Report." Online report. *City of Santa Barbara*. June 2011. http://santabarbaraca.gov/water.

The Clorox Company. "2011 Annual Report." Oakland, CA: The Clorox Co., 2011.

Environmental Protection Agency. "Municipal Solid Waste in the United States: Facts and Figures." *Office of Solid Waste – U.S. EPA*. November 2011. http://www.epa.gov/osw/nonhaz/municipal/msw99.htm.

Euro RSCG Worldwide. "Prosumer Report – Millenials: The Challenger Generation." Vol. 11, 2011. http://www.prosumer-report.com.

Euromonitor International. "Bottled Water – U.S." Report. London: Euromonitor International, 2011.

"Gimme 5 Locations," *Preserve Products*, 2011, http://www.preserveproducts.com/recycling/gimme5locations.html.

Olson, Eric D. "Bottled Water: Pure Drink or Pure Hype?" *Natural Resources Defense Council*. April 1999. http://www.nrdc.org/water/drinking/bw/bwinx.asp.

Preserve Products. "Recycling Brita Filters in the United States." *Recycline, Inc.* 2011. http://www.preserveproducts.com/recycling/britafilters.html.

Salina, Irena, Director. *Flow: For Love of Water* (Film). 2008.

SBI, *U.S. Market for Residential Water Treatment Products* (Rockville, MD: SBI, 2008).
McKeown, Alice. "Bottled water consumption growth slows." *Worldwatch Institute – Vital Signs*. 25 Feb 2010. http://vitalsigns.worldwatch.org/vs-trend/bottled-water-consumption-growth-slows.

Siegal, RP. "The Future of Drinking Water: A New 3P Series." *Triple Pundit*. 2 March 2011. http://www.triplepundit.com/2011/03/future-drinking-water/.

Soechtig, Stephanie, and Lindsey, Jason, Directors. *Tapped* (Film). 2009.

Focus Group
Andenert, Cooper; Burshienke, Kurt; Earnst, Will; Kaysen, Brandon; Ragland, Chris; and Roberts, Rudy. Focus group conducted in Isla Vista, CA. 23 February 2011.

Surveys
"Equal Water." Online survey (n = 235). *Survey Gizmo*. Conducted February 2011.
"Water filter replacement cartridges." Online survey (n = 68). *SurveyGizmo*. Conducted June 2011.
"Water filter survey." Online survey (n = 64). *Survey Gizmo*. Conducted April 2011.

Online Interviews
Bobbin, Maggie. Online response/follow-up emails. February 2011.
Franz, Brian. Online response/follow-up emails. February 2011.
Lamb, Annick. Online response/follow-up emails. February 2011.
Lamb, Erin. Online response/follow-up emails. February 2011.
Kellman, Adele. Online response/follow-up emails. February 2011.
Kellman, Lisa. Online response/follow-up emails. February 2011.
Nagler, Marissa. Online response/follow-up emails. February 2011.
Soulages, Christain. Online response/follow-up emails. February 2011.

Telephone Interviews
Director of Environment and Material Science, Preserve Products. Telephone interview. 1 November 2011.
Garcia, David. Telephone interview. 24 February 2011.
Harris, Matt. Telephone interview. 24 February 2011.
Shimamoto, Jason. Telephone interview. 24 February 2011.

In-person Interviews
Brtalik, Kiernan Interview, Goleta, CA. 26 February 2011.
Cesare, Joel. Interview, Goleta, CA. 19 February 2011.
Keller, Arturo. Interview, Santa Barbara, CA. 18 February 2011.
Kellman, Rachel. Interview, Los Altos, CA. 16 February 2011.

Mazzaroli, Niki. Interview, Goleta, CA. 26 February 2011.
Soulages, Kathleen. Interview, Santa Barbara, CA. 22 February 2011.
*Between April 1st, 2011 and May 15th, 2011, 16 additional in-person interviews were conducted with anonymous UCSB undergraduate students in Isla Vista, CA.

Retailer Interviews

Anonymous store manager, Bed Bath & Beyond. Interview, Goleta, CA. 1 March 2011.
Anonymous store manager, The Home Depot. Telephone interview, Santa Barbara, CA. 28 February 2011.
Anonymous store manager, Safeway. Interview, Goleta, CA. 28 February 2011.
Anonymous store manager, Trader Joe's. Telephone interview, Santa Barbara, CA. 28
Anonymous store manager, The Water Store. Interview, Goleta, CA. 1 March 2011.
February 2011.
Anonymous store manager, Whole Foods. Interview, Santa Barbara, CA. 28 February 2011.
Gonzalez, Manuel, store manager, Ralph's. Interview, Goleta, CA. 1 March 2011.

Appendix I – DROPcycle™ Literature Review

Overview

DROPcycle delivers replacement water filter cartridges to concentrated communities of filtration pitcher users and offers complimentary recycling of customers' expired cartridges. At this juncture, only Brita filter cartridges are capable of being efficiently recycled, thanks to the firm's partnership with Preserve Product Company. Filters collected by DROPcycle will be taken to existing Preserve drop-off locations, whereupon Preserve will complete the recycling process. Recognizing that a major part of our business model and future marketing campaigns will center on the benefits of recycling water filters, it would behoove us to ensure that we fully understand:

a) How our products are produced and the fate of these products once they reach the "end of life"
b) How this process differs when our products are recycled
c) The research and principles used to quantify the benefits of recycling water filters
d) The actual benefits of recycling water filter materials
e) Any existing literature and case studies detailing attempts to recycle water filters, and the lessons learned from these attempts.

Therefore, the goal of this literature review is to provide a brief but thorough overview of existing resources that can help us answer the above questions. This document should act as a resource to which DROPcycle can frequently turn when answering questions from clients, investors, and advisors; developing concrete, tangible and credible marketing materials; and brainstorming other opportunities related to our original recycling-centered business model.

Water Filter Cartridges: What's Inside

Water filtration cartridges are polypropylene shells filled with granulated activated carbon and ion exchange resin beads. Here we outline the function and production of these materials.

Polypropylene

Polypropylene is a synthetic material derived from petroleum. Production yields pellets that are melted and formed by injection molds to make filter cartridges – the external shells that contain the activated carbon and ion-exchange resin required to purify consumer tap water. Production involves a complex series of chemical reactions. Dow Chemical provides a reasonable overview of plastics production and usage on its website.[32]

Polypropylene can vary significantly in its morphology, additives, production techniques, and commercial forms.[33,34] Unfortunately, due to non-disclosure agreements it is unknown which procedure Brita uses in the manufacture of its filter cartridges. Once Brita's methodology is known, DROPcycle can revisit the production techniques cited in this section in order to more accurately understand the impacts of the production phase of its delivered product.

Activated Carbon

---

[32] "Product Safety Assessment: Polypropylene." May 2, 2006. Dow Chemical. <http://www.dow.com/productsafety/finder/pro.htm>

[33] Maier, Clive; Calafut, Teresa (1998). "Polypropylene: the definitive user's guide and databook." William Andrew. p. 14. ISBN 9781884207587.

[34] Moore, E.P. "Polypropylene Handbook. Polymerization, Characterization, Properties, Processing, Applications." Hanser Publishers: New York, 1996.

Granulated activated carbon (GAC) filters water by adsorbing contaminants as water percolates through its micro-pores. Organic materials are highly attracted to the carbonaceous structures, making these filters particularly effective in trapping organic contaminants broken apart by chlorine oxidation. Removing chlorine improves the aesthetic quality of tap water. The "Physical Characteristics and Use" section from the US International Trade Commission Report provides a comprehensive description of activated carbon properties and definitions.[35] The EPA and DOI provide factsheets about the efficacy, costs, pros, and cons of GAC for use in wastewater treatment facilities.[3637]

There are three main sources of carbon used in production: coal, coconut, and wood. To create activated carbon, the carbon materials are heated to extreme temperatures in an oxygen-free environment and injected with steam. Production of activated carbon increases the porosity, or surface area, of the carbon. This makes more space available to trap contaminants. The "Manufacturing Processes" section from the US International Trade Commission Report provides a comprehensive description of activated carbon properties and definitions[38]. Bayer et al. quantify input materials for comparison to alternative treatment strategies in *Water Research*.[39] Based on DROPcycle's preliminary research, it appears that most activated carbon used for point-of-use water filtration is derived from coconut-based carbon materials.

Ion Exchange Resin

Ion exchange resins are included in water filters to soften tap water (remove calcium carbonate) and remove metals. They improve water quality by swapping more desirable

[35] "Investigation No. 731-TA-1103" April 2007. US International Trade Commission. Publication 3913, Washington DC.
[36] US EPA 2000. Wastewater Technology Fact Sheet: Granular Activated Carbon Absorption and Regeneration. EPA 832-F-00-017. Office of Water. Washington DC.
[37] "Granular Activated Carbon (GAC)" Reclamation: Managing Water in the West. US Department of the Interior. Bureau of Reclamation. September 20, 2010.
[38] "Investigation No. 731-TA-1103" April 2007. US International Trade Commission. Publication 3913, Washington DC.
[39] Bayer, Peter. Heuer, Edda. Karl, Ute. Finkel, Michael. "Economical and ecological comparison of granular activated carbon (GAC) adsorber refill strategies" Water Research 39: 2005 (1719-1728)

ions (Potassium and Sodium) for those found in tap water (Calcium, Magnesium, Iron, or Manganese). The resins present ions of identical charge, positive anions or negative cations, in solution to facilitate the transfer. "The Basics of Ion Exchange and Water Chemistry" in *Water Conditioning & Purification* by C. F. Michaud provides an excellent primer to the chemistry behind ion exchange.[40] David Alchin also provides a comprehensive overview of the material.[41]

Surfaces considered flat on a micro scale, like some clays, hold ions particularly well. Naturally occurring clays are in short supply, but it is possible to create a synthetic polymer with similar properties. Concentrated solutions leave ions attached to these surfaces. "The Manufacturing Process" section in Basic Ion Exchange for Residential Water Treatment provides an atomic-level description of ion exchange resin production.[42]

Current Fate of Water Filters

The majority of replacement water filters are currently sent to landfills. In an interview with John Lively, Director of Environment and Material Science at the Preserve Products Company, he could not provide Brita's exact recycling rate but hinted, "You probably couldn't guess low enough".[43]

This is representative of the municipal waste stream. Polypropylene is one of the most difficult plastics to recycle. The EPA report on municipal solid waste (MSW) specifies that less than 1 percent of polypropylene is recycled once generated. This number is slightly higher for containers and packaging (approximately 3 to 5 percent).[44]

---

[40] Michaud, C. F. "The Basics of Ion Exchange and Water Chemistry" 2005 Water Conditioning & Purification.
[41] *Alchin, David. "Ion-Exchange Resins." New Zealand Institute of Chemistry (NZIC). nzic.org.nz/ChemProcesses/water/13D.pdf.*
[42] Keller, Michael. "Basic Ion Exchange for Residential Water Treatment" 2005 Water Conditioning & Purification.
[43] Lively, John. "Preserve Products - Brita Partnership." Telephone interview. 1 Nov. 2011.
[44] US EPA 2010. Municipal Solid Waste in the United States: 2009 Facts and Figures. Office of Solid Waste. EPA 530-R-10-012

Resource recovery is receiving significant attention from the EPA. The Wastes Division's Resource Conservation Division has a webpage dedicated to "Reduce, Reuse, Recycle," with information about the steps taken to recycle materials, policies, and success stories.[45]

The Recycling of Water Filter Materials

Polypropylene Recycling

Polypropylene (plastic #5) can be recycled back into new polypropylene (i.e. replacing virgin material), or repurposed into alternative materials. Recycled polypropylene is created by cleaning used PP materials, grinding the plastic into flakes, melting the flakes, and then using heat and pressure to form new polypropylene pellets. These pellets can then be remolded into new plastic products and materials.

Unfortunately, several characteristics of polypropylene tend to inhibit its recyclability. The plastic's high heat tolerance – ideal for food packaging – leads to more expensive melting procedures during the recycling process. Polypropylene can also degrade in the presence of light, oxygen, and humidity, compromising its durability and mechanical properties.[46] Oftentimes, poor sorting procedures in recycling facilities lead to contaminated polypropylene, further reducing its strength and performance. Consequently, additives like elastomers and calcium carbonate are often mixed with PP during the recycling process to improve its mechanical and chemical properties.[47] These polypropylene composites appear to be a more prominent recycling method than direct conversion back into polypropylene.

---

[45] "Reduce, Reuse, Recycle" Wastes – Resource Conservation. US EPA. Updated August 26, 2011. < http://www.epa.gov/osw/conserve/rrr/recycle.htm>

[46] Nasir, A., Yasin, T., and Islam, A. (2010). "Thermo-oxidative degradation behavior of recycled polypropylene." Journal of Applied Polymer Science. 119(6): 3315-3320.

[47] Brachet, P. et al. (2007). "Modification of mechanical properties of recycled polypropylene from post-consumer containers." Waste Management. 28(12): 2456-2464.

Due to the complicated nature and higher costs of polypropylene recycling – due to sorting difficulties, material breakdown, quality variations, and questionable durability, and other issues – only a limited number of U.S. municipalities and recycling facilities accept #5 plastics. Encouragingly, Brita's recycling partnership with Preserve Products allows for the conversion of each filter's polypropylene shell into new mixed plastic consumer products.[48]

Activated Carbon Recycling

Activated carbon can be regenerated and rid of contamination. The process by which this is done is very similar to its production. Used carbon is heated in an oxygen-free environment, releasing contaminants for capture. This process removes 5 to 15 percent of the capacity to filter contaminants because the pore structure is damaged. Bayer et al. provide an excellent overview of the process in *Water Research*.[49] The EPA provides a good overview of regeneration in its Wastewater Technology Fact Sheet: Granular Activated Carbon Absorption and Regeneration.[50]

Alternatively, activated carbon is effectively a charcoal that can be burned for energy. From our interview with John Lively, we determined that this is the current fate of activated carbon during Preserve's recycling process. Lively explained that there must be a net environmental benefit for Preserve to engage in filter recycling. We believe the energy density of activated carbon must be sufficiently high to justify shipping it from around the nation to a possessing facility on the East Coast.

Similarly, the State of Arizona recently declared it would be beneficial to construct a regeneration facility to process spent activated carbon from state wastewater treatment

---

[48] "Preserve's Plastic Process." (2010). Recycline, Inc. http://www.preserveproducts.com/ourprocess/plastics.html

[49] Bayer, Peter. Heuer, Edda. Karl, Ute. Finkel, Michael. "Economical and ecological comparison of granular activated carbon (GAC) adsorber refill strategies" Water Research. 39: 2005 (1719-1728)

[50] US EPA 2000. Wastewater Technology Fact Sheet: Granular Activated Carbon Absorption and Regeneration. EPA 832-F-00-017. Office of Water. Washington DC.

facilities. The analysis was based on the cost savings of localized regeneration relative to shipping to another facility.[51]

Ion-Exchange Resin Recycling

The capacity for beneficial ion exchange decreases as the more desirable ions are replaced. However, ion exchange resin can be re-used multiple times by backwashing the resin with a solution of desirable ions. The concentrated salt solution, brine, is harmful to the environment if not disposed properly. The New Hampshire Department of Environmental Services provides an excellent overview of the regeneration process.[52] Many companies that offer regeneration services create brochures with technical information about regeneration efficiency.[53]

However, the ability of the ion-adhering surfaces to retain ions decreases over time. This reduces the potential for ion exchange and leads to the abandonment of a set of resin beads. These spent materials can be burnt for energy. Once again, based on our interview with John Lively, we believe this is the current fate of ion exchange resins used in replacement filters.[12]

A System to Evaluate the Benefits of Recycling

DROPcycle hopes to ultimately calculate the concrete environmental benefits of its innovative service model for use in marketing toward consumers, investors, and other stakeholders. Consequently, it is critical that we understand the concepts and methodologies used to calculate the benefits of recycled products. Although numerous approaches exist for tackling such a challenging problem, it is generally agreed that Life Cycle Assessment (LCA) is the most thorough process for quantifying a product or service's environmental impacts. Additionally, the use of comparative LCAs – where one product's environmental impacts are compared to another's – may allow us to more

[51] "Pubic Services & Facilities" May 3, 2011. City Council Report.
[52] "Environmental Fact Sheet: Ion Exchange Treatment of Drinking Water" New Hampshire Department of Environmental Services. WD-DWGF-2-12. September 2009.
[53] "Ion exchange processes" Technifax. Nalco Chemical Company. Naperville, IL.1998.

accurately weigh the environmental value of water filters against bottled water, and of our delivery service against existing filter replacement methods. The resources included in this section are intended to provide DROPcycle with an overview of LCA best practices and LCAs performed on products and services relevant to our business model. The results of these tests can serve as surrogate data until DROPcycle is capable of performing a Life Cycle Assessment of its own.

How LCA Works

Life Cycle Assessment is a technique used to assess the environmental impacts across the life cycle of a product or service, from raw material extraction and processing, to manufacturing, to distribution, to consumer use, and finally to the its end-of-life fate (either disposal or recycling). A comprehensive LCA generally includes four main phases – goal and scope, life cycle inventory, life cycle impact assessment, and interpretation. By creating a comprehensive inventory of relevant inputs and outputs, calculating their respective environmental impacts, and interpreting these calculated results, LCAs can help scientists, product designers, corporations, consumers, and other constituents make more informed decisions about the products and services they produce and consume.

Although Life Cycle Assessments can vary in their breadth, completeness, analysis, and applicability, international efforts have been taken to standardize the procedure and provide a universal method for quantifying a product or service's environmental impacts. Rebitzer et al. and Pennington et al. (2004) offer a two-part article that adeptly explains the general concepts and framework of LCA, its applications, current use, and pros and cons.[54,55] The EPA's National Risk Management Research Laboratory also provides an LCA website with resources explaining the concept's principles and practice.[56] Although multiple entities have taken efforts to standardize LCA practices, the International

[54] Rebitzer, et al. (2004). "Life cycle assessment: Part 1: Framework, goal and scope definition, inventory analysis, and applications." *Environment International.* 30(5): 701-720.
[55] Pennington, et al. (2004). "Life cycle assessment Part 2: Current impact assessment practice." *Environment International.* 30(5): 721-739.
[56] EPA. (2011) "Life-Cycle Assessment (LCA)." http://www.epa.gov/nrmrl/lcaccess/index.html.

Organization for Standardization offers the most widely accepted guidelines for those interested in conducting a legitimate and verifiable LCA.[57,58]

POU Water Filtration Systems

Applying Life Cycle Assessment to various sources of drinking water offers us a means of evaluating the benefits of tap water relative to other water sources. Two studies have investigated the energy implications of drinking water sources, the Oregon Department of Environmental Quality[59] and the Pacific Institute.[60] Both studies report that for locally produced bottled water, the energy requirements to produce the plastic bottle are most significant. For long-range distribution, transportation costs are larger than producing the bottle. Oregon's DEQ reports that tap water has lower energy costs in all cases evaluated. However, this study does not include water filtered by a point-of-use water filtration pitcher. For our purposes, we must also evaluate the LCA of filtration products.

LCAs Focused on Relevant Materials

A comprehensive LCA of point-of-use replacement water filter cartridges has not been completed. The following research papers evaluate the resource implications of the various components of a replacement water filter in other contexts. For example, LCAs have been performed on various water treatment technologies that use activated carbon as a benchmark technology. These documents provide guidance and numerical information about data inputs for the production of granular activated carbon and the energy implications of regeneration versus disposal.

---

57 "ISO 14040 – Environmental Management – Life Cycle Assessment – Principles and Framework." (2006). International Organisation for Standardisation (ISO). Geneva, Switzerland.
58 "ISO 14044 – Environmental Management – Life Cycle Assessment – Requirements and Guidelines." (2006). International Organisation for Standardisation (ISO). Geneva, Switzerland.
59 Life Cycle Assessment of Drinking Water Systems: Bottled Water, Tap Water, and Home/Office Delivery Water. Prepared for DEQ by Franklin Associates. October 22, 2009.
60 Gleick, P.H. Cooley, H. S. "Energy implications of bottled water" Environmental Research Letters (4): 2009.

Environmental analysis of plastic production processes: Comparing petroleum-based polypropylene and polyethylene with biologically-based poly-beta-hydroxybutyric acid using life cycle analysis[61]:

This study uses LCA to compare polypropylene production with a biologically-based plastic. The study cites many papers that use LCA for conventional plastics production that can be found in the introduction. Here is an example of the type of information about polypropylene we can extract:

Table 8
LCIA of polymer production for 1000 kg of polymer product—CML 2 Baseline 2000 V2.03

		This study	Boustead (2000)		
Impact category	Unit	PHB	PP	HDPE	LDPE
Abiotic depletion	kg Sb_{eq}	**21.8**	41.4	35.3	39.4
Global warming (GWP100)	kg $CO_{2\ eq.}$	**1960**	3530	2510	3040
Ozone layer depletion (ODP)	kg CFC-11_{eq}	**0.00017**	0.000862	0.000766	0.0018
Human toxicity	kg 1,4-DB_{eq}	**857**	1870	2590	2890
Fresh water aquatic ecotoxicity	kg 1,4-DB_{eq}	**106**	234	176	210
Marine aquatic ecotoxicity	kg 1,4-DB_{eq}	**1,290,000**	1,850,000	**1,230,000**	**1,610,000**
Terrestrial ecotoxicity	kg 1,4-DB_{eq}	**8.98**	44	33.7	40.3
Photochemical oxidation	kg C_2H_2	**0.78**	1.7	17.5	3.92
Acidification	kg $SO_{2\ eq.}$	**24.9**	48.8	**22.5**	**27.4**
Eutrophication	kg $PO_4^{3-}{}_{eq.}$	5.19	5.84	**0.811**	**0.951**

Key: underlined bold values are the lowest values in each category.
Values in bold print are within 50% of the lowest value in each category.

Economical and ecological comparison of granular activated carbon (GAC) adsorber refill strategies[62]:

This study compares various strategies for regenerating activated carbon that is used for groundwater decontamination. Alternative strategies are combinations of larger GAC beds with infrequent refill, and smaller beds with more frequent refill. The conclusion is that strategies differ only slightly, and are sensitive to the relative valuation of virgin and recycled GAC. However, this quote could be useful for our campaign:

"Assuming contaminant concentrations of 1000 mg/m3, the calculated consumption of crude oil equivalents through production of GAC is three times higher than that by recycling" (page 1724).

[61] Harding, K.G. Dennis, J.S. von Blottnitz H. Harrison, S.T.L. "Environmental analysis of plastic production processes: Comparing petroleum-based polypropylene and polyethylene with biologically-based poly-beta-hydroxybutyric acid using life cycle analysis" Journal of Biotechnology 130: 57-66 (2007).
[62] Bayer, Peter. Heuer, Edda. Karl, Ute. Finkel, Michael. "Economical and ecological comparison of granular activated carbon (GAC) adsorber refill strategies" Water Research 39: 2005 (1719-1728)

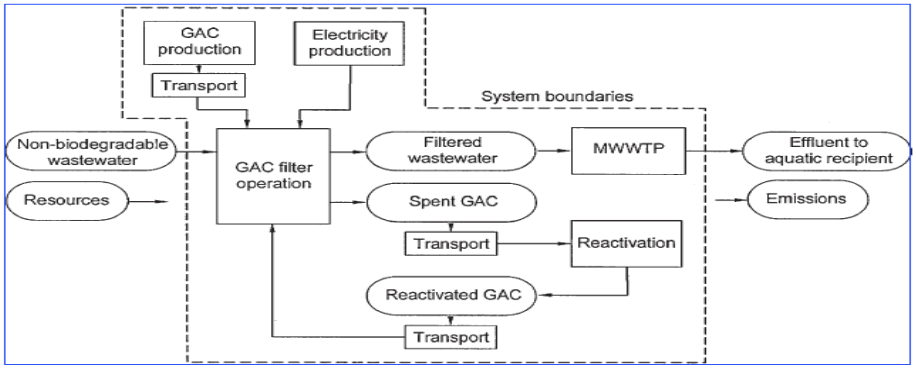
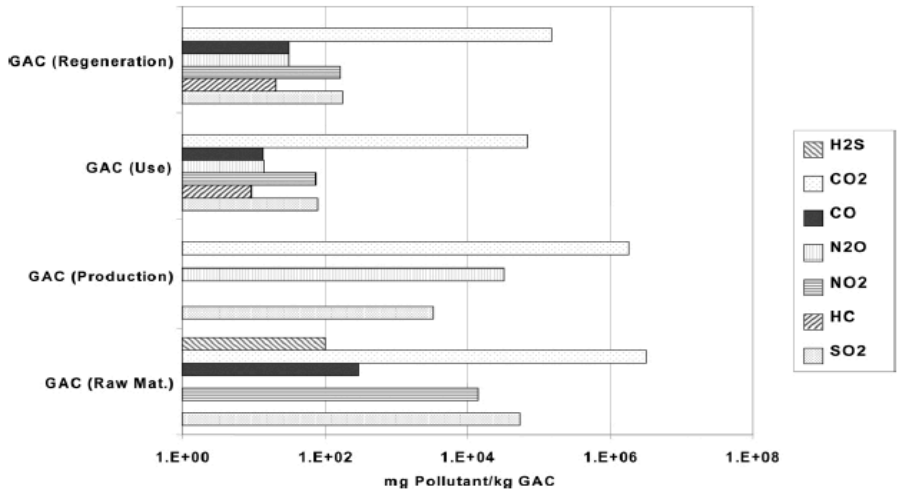


Figure 2. Flow diagram and system boundaries for GAC adsorption.

To treat or not to treat? Applying chemical engineering tools and a life cycle approach to assessing the level of sustainability of a clean-up technology[63]:

> This paper examines an approach to sustainability assessment using three points of view: economic, environmental, and social. The goal of the paper is to great an optimal granular activated carbon process, and compare the system to the result produced by a more traditional approach. The paper provides comprehensive information about GAC, such as the pollutant information described in the graph below:



[63] Romero-Hernandez, Omar. "To treat or not to treat? Applying chemical engineering tools and a life cycle approach to assessing the level of sustainability of a clean-up technology" Green Chemistry (6): 395-400 (2004).

A LCA Study of Activated Carbon Adsorption and Incineration in Pollution Control[64]:

> This paper compares three alternatives for treating air pollution: GAC, incineration, and non-treatment. The advantage of the LCA approach taken in this paper is that it is site-specific and includes very specific conditions of GAC usage.

Understanding the Benefits of DROPcycle's System –

The literature is rife with examples of Life Cycle Assessments successfully used to evaluate the environmental impacts and/or benefits of popular products and services. Indeed, LCA has even been used on water-related products. Unfortunately, we were unable to find any existing, publicly available Life Cycle Assessments detailing the impacts of point-of-use water filtration pitchers or their replacement cartridges. It therefore remains difficult to calculate both the exact benefits of water filtration vs. bottled water, *and* the benefits of DROPcycle's replacement methodology over current replacement strategies. Existing LCAs certainly provide DROPcycle with a framework for estimating the environmental impacts of various aspects of our product's life cycle (e.g. the impacts of shipping filters from a wholesaler and to a recycler, the impacts of various methods of polypropylene and AC production by weight, etc.). Nonetheless, accurately calculating our impacts would likely require a contracted LCA, which at this juncture is prohibitively expensive. Preserve Products has, in fact, conducted their own LCA in partnership with industry-leading consulting firm PE Americas to evaluate the benefits of using recycled polypropylene versus virgin material.[65] While the results are encouraging and indicate significant environmental benefits, the LCA was conducted using yogurt cartons from Stonyfield Farms and the methodology is proprietary. Thus, this qualitative data is also only marginally useful for DROPcycle's business objectives.

---

[64] Saffarian, Saman. "A LCA Study of Activated Carbon Adsorption and Incineration in Pollution Control" Masters Thesis University of Boras, School of Engineering. December 2009.
[65] "Preserve: Our Process." 2010. Recycline, Inc.
http://www.preserveproducts.com/ourprocess/index.html.

If DROPcycle aims to use LCA concepts and calculations in any of its marketing materials, we must be cautious about the scope of our claims and meticulous about detailing the assumptions used to reach our conclusions. Although we have not yet delved deeply into any calculations, the results of this literature review and associated interviews are promising. The significant environmental benefits of tap water over bottled water and limited materials required to filter tap water (compared to a constant stream of bottles) suggest that POU systems offer benefits over bottled water in multiple impact categories.

Additionally, John Lively from Preserve Products explained that a limited-factor LCA had been conducted on Brita's filter cartridges to confirm that the environmental benefits of recycling these cartridges would outweigh the impacts of shipping them across the country (unfortunately this LCA is protected by an NDA). Therefore, it is reasonable for DROPcycle to assume that its process – which eliminates consumer driving to purchase a filter and reduces the number of vehicle trips to recycle these filters at designated recycling stations – is also environmentally beneficial to existing methods of filter replacement and recycling.

Brita Products Company – A Recycling Case Study

At this point in our business model's development, DROPcycle only intends to sell and recycle Brita water filtration cartridges. Brita was selected both because of its market dominance, and because of the efforts the company has already taken to make its cartridges recyclable. However, Brita's filters have not always been recyclable. The articles and websites detailed below illustrate the steps taken to implement Brita's recycling plan. Although this section is not a true literature review, it was included to illustrate both the encouraging trend toward "environmental friendliness" in the point-of-use water filtration market, and the opportunity for small-scale efforts (such as DROPcycle's) to evolve into significant environmental initiatives.

The Brita Products Company's European arm offers a comprehensive recycling program for filter users.[66] However, prior to 2009, Brita's U.S. arm and its parent company, Clorox, offered no means of recycling their filter cartridges. But in 2007, Oakland-based blogger Beth Terry initiated a campaign to encourage Brita and Clorox to begin recycling these replacement cartridges. The campaign, titled "Take Back the Filter," featured its own website, online petition, and encouraged supporters to mail in their used filters to be sent onward to Clorox.[67] Impressively, the support generated by the campaign and its partner organizations resonated with Clorox, who in November of 2008 announced their intent to introduce a recycling system for Brita filter cartridges in partnership with Preserve Products.[68] The program officially began in January 2009 and is ongoing. According to Preserve, each Brita filter cartridge is completely recycled – the polypropylene shell replaces virgin PP in Preserve's 100% recycled products, and the activated carbon and ion-exchange resin are incinerated for energy production.[69]

Conclusion

A center-point of DROPcycle's business model is our ability to reduce each consumer's environmental impact through the use of water filters instead of bottled water, as well as through the recycling of each filter cartridge once its useful life has concluded. But as consumers grow more skeptical of green marketing claims and more discerning in their purchasing decisions, the onus is on us to assure our patrons that our service offers legitimate, quantifiable, and understandable environmental benefits.

This literature review is a major step toward upholding that responsibility. By delving into the production and disposal phases of our primary product – water filtration cartridges – we have improved our ability to adeptly and confidently discuss the finer

---

[66] Brita Great Britain – Recycling. http://www.brita.net/uk/promotion_recycling.html?&L=1.
[67] "Take Back the Filter." (2009). http://www.takebackthefilter.org/.
[68] "Brita and Preserve Announce Filter Recycling Program." Nov 18 2008. The Clorox Company. http://www.fakeplasticfish.com/takebackthefilter/BritaFilterRecycleReleaseFINAL.pdf.
[69] "Recycling Brita Filters in the United States." Preserve Products. (2011). http://www.preserveproducts.com/recycling/britafilters.html.

details of our product. This will prove valuable for future marketing materials, our website's FAQ section, and even conversations with investors and advisors.

Furthermore, by enhancing our understanding of the recyclability of filter cartridges we can begin to make assumptions about the concrete environmental benefits of our particular business model. Although the existing literature is not extensive enough to calculate the quantitative impacts and benefits of our model, it provides a framework we can use to create rough qualitative estimates, as well as a starting point for any future life cycle analysis undertaken by our company.

Lastly, it is important to emphasize that this literature review is by no means a complete and finalized document. As DROPcycle obtains additional information about the production, disposal, and recyclability of its product, this report should be updated and amended accordingly. In this manner, the document can continue to serve as reference for our company, directing us toward the accredited sources of information needed to address a wide range of business-related queries and conversations.

Appendix II – Summary of Quantitative Research

Online Survey (Winter 2011)

Using a Survey Gizmo template, a survey was administered through Craigslist to gain further insight into filtration owner use habits, reasons for purchase, and design and marketing preferences. Surveys strictly targeted filtration owners. Participants were further enticed by a $25 gift card raffle available to all respondents who completed the survey. The survey was administered in 8 major West Coast cities, which were selected based on their size, perceived eco/social awareness, and the presence of a major college community. This city selection was designed to acquire more student participants. Cities (and nearby universities) selected were Santa Barbara (UCSB), San Francisco (SFSU, USF), Los Angeles (numerous colleges), San Diego (USD, UCSD, Point Loma College), Eugene, OR (U of O), Corvalis, OR (OSU), Seattle (UW, SPU, Seattle U), and Pullman, WA (WSU). *(See Addendum 2 - Online Survey Format)*

To further investigate our hypotheses and substantiate our qualitative findings, we developed an online quantitative survey. This survey included 35 questions covering five broad categories – general drinking water habits, bottled water habits and preferences, filtered water habits and preferences, environmental issues, and demographics. The survey was created through surveygizmo.com, and requests to take the survey were posted to the "Volunteer" section of Craigslist. As of February 26th, our survey had been posted in 24 cities in 21 states, chosen to represent a wide variety of American households and watersheds (which could influence drinking water preferences). Particular attention was paid to California, where DROPcycle would likely launch its pilot products.

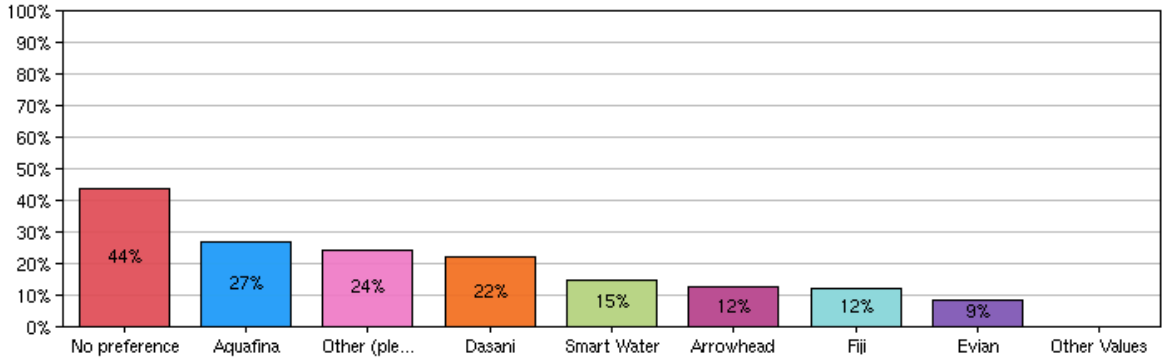
As of March 4th, DROPcycle's online survey had received 210 complete responses, as well as 21 partial responses from which useful data could still be extracted. While an exhaustive report is available upon request, this summary will only highlight the overarching trends gathered from our data. Potential confounding factors are in red.

<u>General trends:</u>

- Drinking water preferences

- Encouragingly, tap water proved to be the most popular source of drinking water, with over 60% of respondents saying they drink tap water. Bottled water was next with 51.4%, affirming its popularity and position as a competitor to our product.
- 42.9% of respondents said that they use a water filtration device. This number is significantly higher than that reported by some market research firms. It is believed that a true number lies somewhere in between. Confounding factors influencing our result include the fact that filter owners would likely be more attracted to a survey about water, and that only urban/suburban areas were polled, where filter use is likely more prevalent.

- Bottled water
  - Although over half of respondents reported that they drink bottled water, most don't drink much of it. 56% said they buy it once a month or less, with most (87.3%) spending $0-5 per week on the product.
  - Perhaps because most don't appear to drink bottled water often, there is also very low brand loyalty. 43.8% of respondents had "no preference" on brand, and brand and bottle design were the least important reasons for purchasing bottled water. This lack of devotion to a particular product presents a strong opportunity for DROPcycle to attract bottled water consumers.



Which brands of bottled water do you prefer? (Check all that apply)

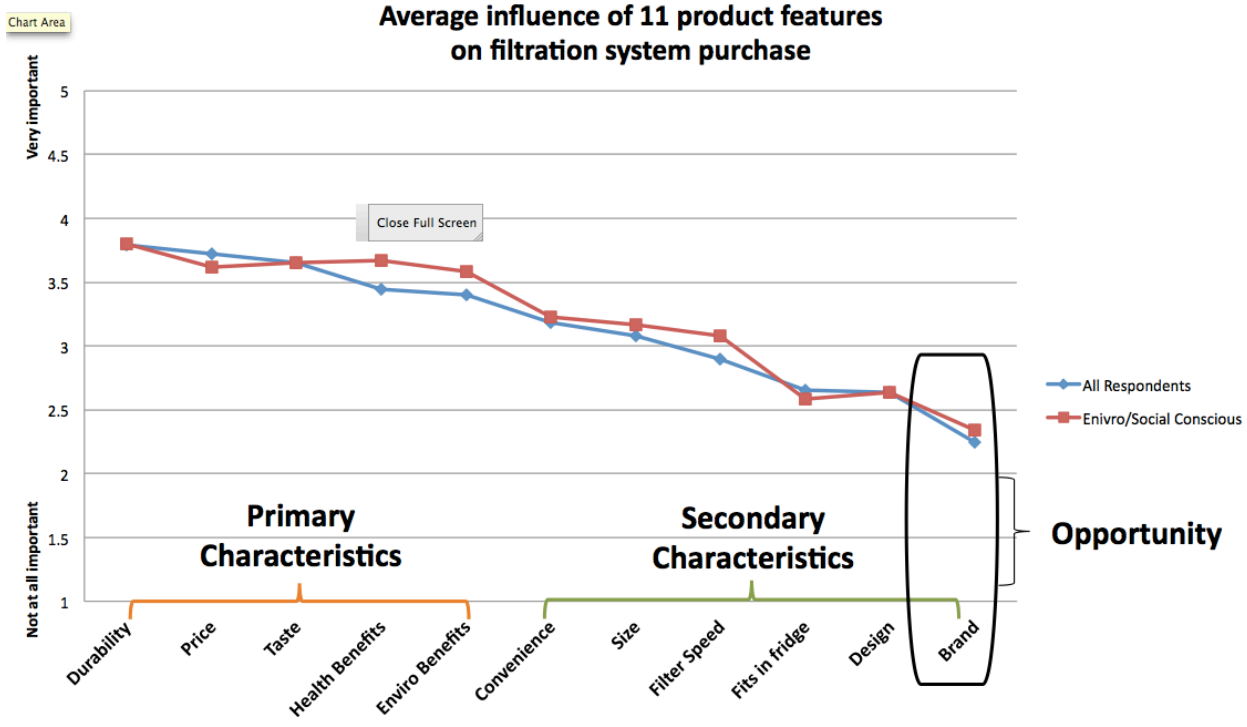
Value	Count	Percent %
Arrowhead	25	12.4%
Dasani	44	21.9%
Crystal Geyser	15	7.5%
Sparklettes	2	1%
Evian	17	8.5%
Smart Water	30	14.9%
Ethos	4	2%
Aquafina	54	26.9%
Fiji	24	11.9%
Other (please specify)	49	24.4%
No preference	88	43.8%

Statistics	
Total Responses	201

- Filtration products
    - About half of non-filter owners might buy one if product qualities were different. Only 56% of respondents replied that they believe their "tap water is fine without a filter." All other responses – "too expensive," "don't think they work," "too complicated," "haven't found a filter I like yet," and alternative taste preferences – represent areas where an innovative product design and stronger marketing could attract more consumers.
    - Replacement cartridges represent the largest potential source of revenue. Consumers keep their filtration systems for a long time (69% have had current filter for a year or more), use them frequently (75% use multiple

times a day), are generally satisfied with their product (86% "satisfied" or "very satisfied"), and replace cartridges regularly (55% every three months or sooner).

- Brand loyalty is also very low for filtration products. While 60% of filter owners use a Brita, brand loyalty was consistently the least important reason for purchase.
- People first and foremost want a product that works and is affordable. Among both environmentally conscious consumers and the general population, "improved taste," "product quality/durability," and "price" were the most important reasons for purchase. Health and environmental benefits follow. Design elements all fell well behind in their influence. This suggests that if DROPcycle can match its competitors on performance and cost, there is a significant opportunity for differentiation on enviro/social grounds.



- Environmental issues

- People are interesting in environmentally/socially conscious products. 80% of respondents said they're more likely to buy environmentally or socially certified products, and 75% or respondents said they'd be willing to pay more for a product whose company donated a portion of their profits to philanthropic causes. While secondary research shows that purchase behavior doesn't always mimic these intentions, the numbers are still encouraging and reinforce DROPcycle's business model.
- People think clean drinking water is important. Respondents ranked lack of clean drinking water as the most pressing global issue. Again, this response may be confounded by the fact that all other questions were about water, and thus respondents felt consciously/subconsciously compelled to rank this issue as most important.

Additional confounding factors:

- Most respondents were from the West Coast. Because people in this region tend to be more environmentally conscious, it is possible that environmental responses/purchase preferences don't mirror national averages. HOWEVER, the fact that DROPcycle intends to first release its product in this region makes the data more encouraging and applicable.
- 80% of respondents were female. Then again, it is possible that women are more likely to make the home product purchase decisions, and thus this is not a confounding factor.

Online Survey (Spring 2011)

Our online survey campaign resulted in 54 responses. Although this was fewer responses than last quarter, responses were more appropriate to DROPcycle's specific business model. Additionally, 26% of survey respondents were students, and therefore more likely to have answers relevant to our target market. The survey's open-ended questions lead to a wealth of qualitative information. Major results are highlighted and discussed below.

Purchase decisions

- Most respondents cited one or more of three major reasons for initially purchasing a filter:
  1) Tap water tasted bad
  2) Tap water is unhealthy
  3) Cheaper than bottled water

  Amongst students, avoiding the environmental and cost burdens of bottled water was a particularly common response. This affirms this age group's appropriateness as a target market, and suggests that marketing campaign should target these benefits.
- Among both the general population and students, most respondents purchased their filter at a warehouse store like Wal-Mart or Costco. While not encouraging for our entry strategy, this suggests a future distribution channel opportunity.
- 31% of shoppers performed online research on water filters prior to purchasing one. A strong marketing campaign/relevant Ad Words campaigns could potentially capture a significant portion of these researching customers.
- Brita's dominance of the marketplace was affirmed – 85.2% of respondents owned a Brita.
- When it came time to purchase a particular filter, Price and Convenience were far and away the most common justifications. This is encouraging because it affirms last quarter's suspicions of low brand loyalty, and because it suggests that a sales campaign targeting simpler distribution channels (e.g. campus bookstores, outside dorms during move-in) could be successful if price was competitive.

Filtration owner use habits

- Average filter cartridge replacement rates were confirmed, averaging around "every 3 months" for most consumers. Interestingly, most consumers cited "weird taste" or "I just remember" as the primary reason for replacing their filter. It is possible that email or paper replacement reminders could improve upon this replacement rate.

- Disappointingly, the vast majority of both students and the general population threw away their filter cartridge after use. Considering how many expressed an interest in recycling (see below), this could be an opportunity to capitalize on a trend consumers currently find undesirable but unavoidable (due to the difficulty of recycling Brita cartridges).

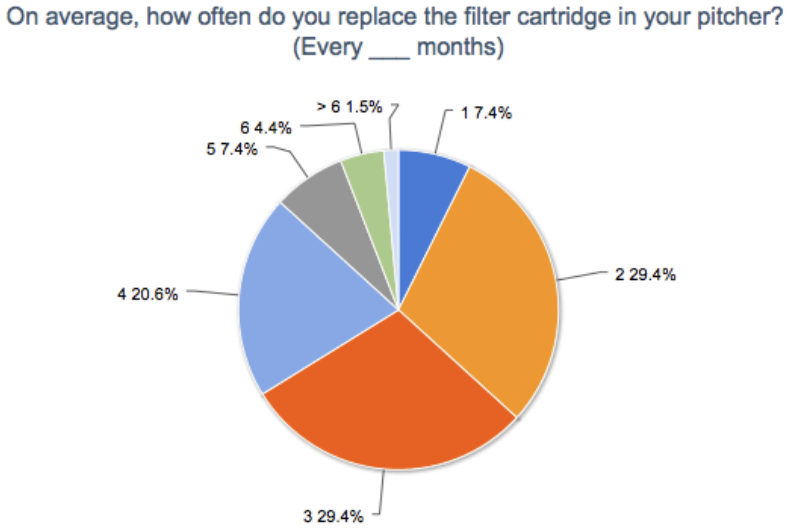
Design and marketing preferences

- Respondents were generally "very satisfied" or "satisfied" with their product's features and design. This suggests that DROPcycle need not "reinvent the wheel" when designing our own filters. However, numerous (14) respondents expressed a desire for an improved lid mechanism. It would behoove our group to further examine the feasibility of designing an improved system in this regard.
- When asked to rank filter designs, both students and the general public were most interested in a filter made from recycled plastic, and were willing to pay an extra $5 for this feature. Similarly, both groups were most interested in a cartridge that was 100% recyclable. Both groups were willing to pay $3 more for this feature. The importance of recycled materials was affirmed in the marketing rankings – respondents preferred a company with the phrase "All of our products are made with recycled, BPA-free plastics." However, second was "Every pitcher you purchase will provide a child in a developing country with access to a clean water project." This information illustrates to our group the importance of designing a pitcher that incorporates recycled materials. And because the social mission was also popular, it should also be marketed (these two preferences need not be mutually exclusive in our advertising)
- In the open-ended final question, several students expressed an interest in companies striving to aid in providing clean water access to developing nations. This bodes well for DROPcycle's socially minded marketing.

Online Survey (Summer 2011)

A third survey was distributed during the summer of 2011. This survey focused on establishing quantitative expectations for filter cartridge replacement rates and customer pain surrounding replacement filters. The survey included 68 participants accessed via an online survey distributed through Craigslist.

The survey was successful in illuminating the rates of filter replacement.



On average, how often do you replace the filter cartridge in your pitcher? (Every ___ months)

Value	Count	Percent %
1	5	7.4%
2	20	29.4%
3	20	29.4%
4	14	20.6%
5	5	7.4%
6	3	4.4%
> 6	1	1.5%

Statistics	
Total Responses	68
Sum	204.0
Average	3.0
StdDev	1.23
Max	6.0

The second important finding was the preference for recyclable filters above all other options.

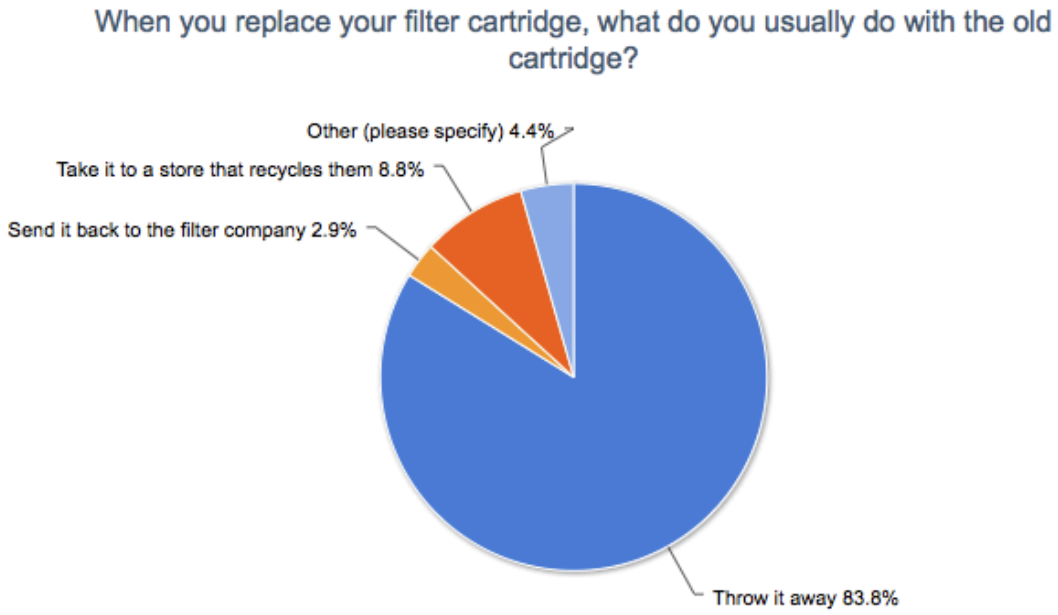
Based on their descriptions and prices, please rank these replacement filter cartridges in the order you'd be most likely to buy them. (1 = most likely, 5 = least likely)

Item	Total Score[1]	Overall Rank
Recyclable replacement filter; lasts 2 months - $7	229	1
Generic replacement filter; lasts 6 months - $20	190	2
Brita replacement water filter; lasts 2 months - $8	168	3
Recyclable replacement filter; lasts 1 month- $4	164	4
Generic replacement filter; lasts 2 months - $7	162	5

Total Respondents: 68

[1] Score is a weighted calculation. Items ranked first are valued higher than the following ranks, the score is the sum of all weighted rank counts.

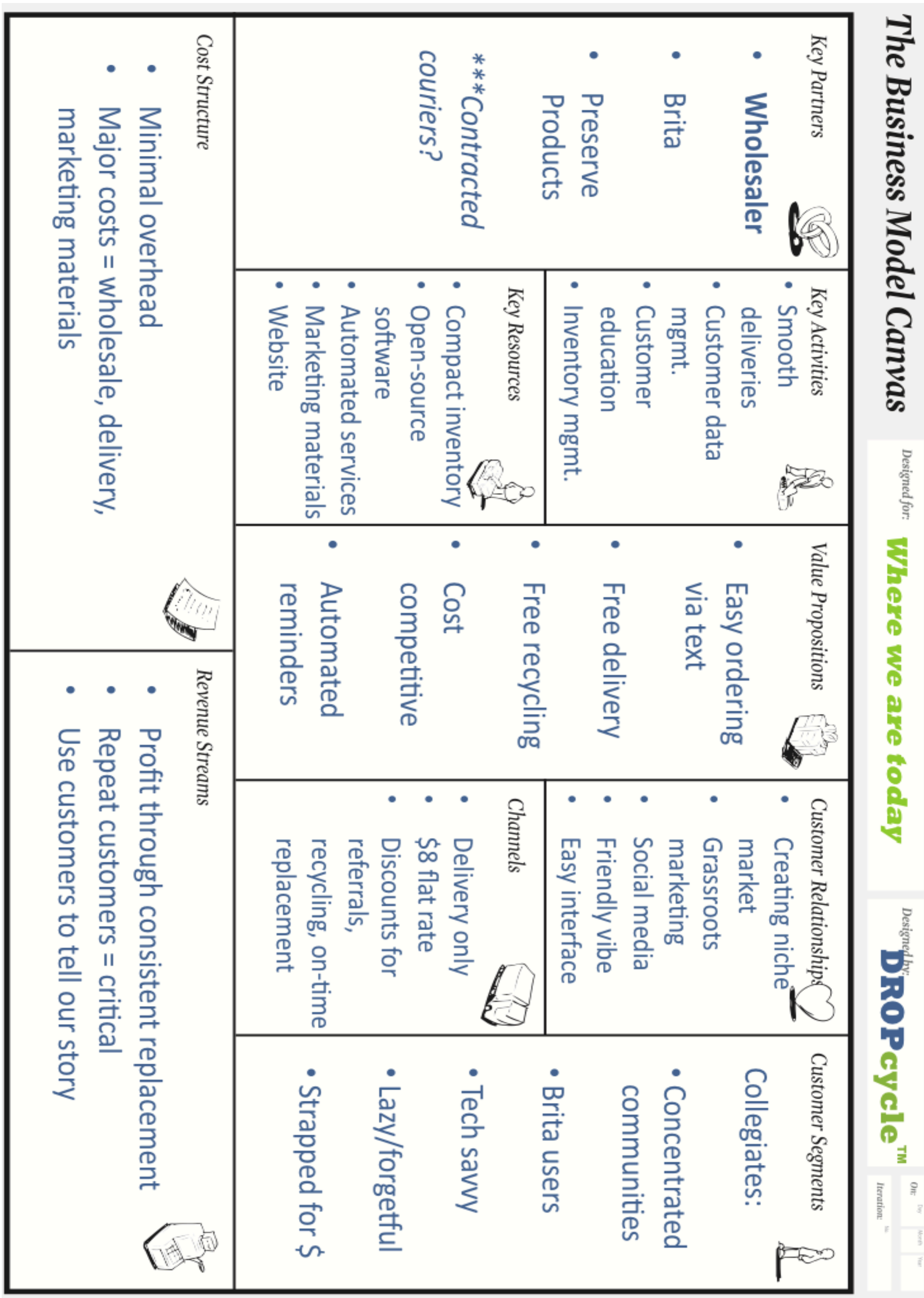
A third important finding was that the majority of filter owners threw expired filters away.



Appendix III – Summary of Qualitative Research

Topic	Response Consensus
Awareness of Global Water Issues	Strong understanding of water issues and how they relate to global problems. "How can you be rich if you don't have clean water"
Perceptions of Regional Water Quality	Varies by region. In Northern California and the Pacific Northwest, people were very satisfied with the quality of their tap water. In Southern California, people were generally not willing to drink tap water, mainly for aesthetic reasons (i.e. poor taste). Tap water is generally deemed to be safe to drink, however some people were concerned with the long-term effects of drinking tap water containing low levels of contaminants.
Knowledge of Filtration Technology	People were generally uneducated about how filters work, however a significant minority identified carbon as the filtration medium.
Factors influencing usage	Usage was generally determined by whether their tap water met their drinking standards and the availability of alternatives. People were annoyed with having to frequently refill filtration pitchers, though they generally valued having cold water. Some deemed faucet attachments to be unbearably slow.
Health Benefits	People thought that filters mainly protected against bacteria, though some very educated interviewees (Caltech PhDs) were aware of fluoride and heavy metals.
Environmental Benefits	People were concerned about plastic waste, and many had negative opinions towards using plastic at all.
Preferences for Environmental Goods	Most people preferred environmentally conscious products, however there was skepticism companies claims to be "environmentally friendly". Not all people were willing to pay more for environmentally friendly goods, however.
Ideas for Ongoing Engagement	Images on packaging, website with project updates, hand written letters and other deliverables.

Appendix IV - Business Model Canvases



The Business Model Canvas

Designed for: Equal Water – End of Spring

Designed by: K. Klein, G. Soulages, J. Litten, C. Wissel-Tyson

On: 26 May 201

Iteration: #4

Key Partners

Manufacturer
- -Own product
- -Existing product

3rd Party Certification
Distribution

Universities (partnership agreements, marketing, non competes, etc.)
Student groups/interns

NGO Partnerships with reputable charity

Key Activities

Develop functional design
Delivery of replacement filters
Strong branding/marketing
Maintain engagement
Trade show participation
School promotions and events

Key Resources

Design (industrial, graphic)
Website/online store
Social media
Student groups/reps

Value Propositions

Clean, healthy, great tasting water
Tangible and quantifiable contributions to society

Primary: Durable, functional, and competitively priced
Secondary: Environmental and health benefits
MVP = Pitcher only
- Fix the lid
- Recycled materials

Waste stream reduction
Flavor profiles and other value added offerings
Customized filter by region
~~Altruism~~
~~Customized pitcher design (decals)~~

Oligopoly Confirmed (Brita/PUR)
Allies = TOMS, Seventh Generation, Two Degrees Food, social entrepreneurs

Customer Relationships

Enduring demand
TELL A STORY
Create a community
Frequent consumer engagement/contact
Opportunities for consumer feedback

Channels

Online Sales
Back to school promotions
On-campus retail
Local delivery (by student reps)
Subscription service
Vending machines (TBD)
Discounts:
Recycling
Subscriptions

Customer Segments

~~High-end, socially- and environmentally-conscious Households~~
Cause consumers
College students
Customer desires:
- Tastier water
- To have their purchases mean something/make an impact
- To avoid bottled water waste

Entry strategy = 2 schools; target incoming freshmen/ moving to own apartments
Market:
Oligopoly confirmed
$550m (POU)
4-5% growth rate
Market driven by bottled water and new home sales

Cost Structure

Inventory
- Pitcher- $3-$5
- Filters- $0.3-$0.5

Resource Velocity limited by minimum pitcher order size and delivery time
- (10,000 units/1 month)

Web development
Marketing
Distribution
Employees
Social Mission
Breakeven: 15,000 units

Revenue Streams

Pitcher sales
- Unit Price: $20-$30

Recurring revenue from replacement filters
- Unit Price: $7-$8
- Replacement rates variable (average 3-4 months)

The Business Model Canvas

Designed for: Equal Water- Mid Spring Quarter

Designed by: Greg Soulages, Kellen Klein

On: Day / Month / Year

Iteration: No. #3

Key Partners

Manufacturers
- -Own product
- -Existing product

Distribution

NGO partnerships

3rd Party Certification

Key Activities

Develop functional design

Delivery of replacement filters

Maintain engagement

Trade show participation

Key Resources

Design (industrial, graphic)

Website/online store

Value Propositions

Clean, healthy, great tasting water

Primary: Durable, functional, and competitively priced
Secondary: Environmental and health benefits
Waste stream reduction
Altruism
Flavor profiles and other value added offerings
Customized filter by region
Customized pitcher design (decals)

Oligopoly confirmed (Brita/ PUR)

Customer Relationships

TELL A STORY
Create a community
Ongoing engagement with newsletter

Channels

Online Sales

Customer Segments

High-end, socially and environmentally conscious Households
~~Mostly women~~
Cause consumers
College students

Need for convenient access to great tasting water in a more sustainable platform

Existing competitors emphasize eco-friendly differentiation

Market:
$550m (POU)
4-5% growth rate
Market driven by bottled water and new home sales

Cost Structure

Inventory
- Pitcher- $3-$5
- Filters- $0.3-$0.5

Resource Velocity limited by minimum pitcher order size and delivery time
- (10,000 units/1 month)

Web development
Marketing
Distribution
Employees
Social Mission

Revenue Streams

Pitcher sales
- Unit Price: $20-$30

Recurring revenue from replacement filters
- Unit Price: $7-$8
- Replacement rates variable (average 3-4 months)

The Business Model Canvas

Designed for: Equal Water-End of Winter Quarter

Designed by: Greg Soulages, Kellen Klein

On:

Iteration: #2

Key Partners

Manufacturers
- Own product
-Existing product

~~Retailers~~

Distribution

NGO partnerships

Key Activities

~~Develop refillable cartridge technology~~
Develop ~~elegant~~ functional pitcher design
~~Develop range of products (dispenser, faucet, fridge)~~
Delivery of replacement filters
Trade show participation

Key Resources

Design (industrial, graphic)

Website/online store

Value Propositions

Clean, healthy, great tasting water

~~Convenient, design oriented receptacles~~
Pitcher Only
Primary: Durable, functional, and competitively priced
Secondary: Environmental and health benefits
Waste stream reduction
Altruism
Flavor profiles and other value added offerings
Customized filter by region

Oligopoly confirmed (Brita/PUR)

Customer Relationships

Ongoing engagement with newsletter

~~Interactive design to encourage recurring revenue~~

Channels

~~High-end grocery stores~~

~~Traditional Retail~~
~~-Bed Bath and Beyond~~
~~-Target~~

Online Sales

Customer Segments

High-end, socially and environmentally conscious Households
Mostly women
Cause consumers

Need for convenient access to great tasting water in a more sustainable platform

Existing competitors emphasize eco-friendly differentiation

Market:
$550m (POU)
4-5% growth rate
Market driven by bottled water and new home sales

Cost Structure

Inventory
- Pitcher- $3-$5
- Filters- $0.3-$0.5

Resource Velocity limited by minimum pitcher order size and delivery time
- (10,000 units/1 month)

Web development
Marketing
Distribution
Employees
Social Mission

Revenue Streams

Pitcher sales
- Unit price: $20-$30

Recurring revenue from replacement filters
- Unit Price: $7-$8
- Replacement rates variable (average 3-4 months)

The Business Model Canvas

Designed for: Equal Water-Original Idea (Start of Winter Quarter)

Designed by: Greg Soulages, Kellen Klein

On: Day Month Year

Iteration: No. #1

Key Partners

Manufacturers
- Own product
-Existing product

Retailers

Distribution

NGO partnerships

Key Activities

Develop refillable cartridge technology
Develop elegant pitcher design
Develop range of products (dispenser, faucet, fridge)
Delivery of replacement filters

Key Resources

Design (industrial, graphic)

Website/online store

Value Propositions

Clean, healthy, great tasting water

Convenient, design-oriented receptacles

Waste stream reduction

Altruism

Flavor profiles and other value added offerings

Customized filter by region

Competition:
Possible oligopoly

Customer Relationships

Ongoing engagement with newsletter

Interactive design to encourage recurring revenue

Channels

High end grocery stores

Traditional Retail
-Bed Bath and Beyond
-Target

Online Sales

Customer Segments

High-end, socially and environmentally conscious Households

Need for convenient access to great tasting water in a more sustainable platform

Room for differentiation through a premium industrial design, eco-friendly product and overt social mission

Market Size Unknown
-Lack of innovation

Cost Structure

Inventory

Web development

Marketing

Distribution

Employees

Social Mission

Revenue Streams

Pitcher sales

Recurring revenue from replacement filters