Clever Raven, LLC

Makers of the *X-Lint*, "the Dryer CFL"
Feasibility Analysis

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Company and Product Overview

Clever Raven, LLC

In the spring of 2011, while doing laundry in his apartment complex in Longmont, Colorado, Justin Lowell-Bellew had an epiphany. After removing excessive dryer lint, he realized that cleaning the filter shortened the drying time, which begged the question, "Why isn't there a widget that can clean the lint filter during the cycle?" This innovation had the potential to reduce drying time and the cooling load where dryers operate, by reducing the amount of time necessary to fully dry a load of clothing.

Subsequent patent searches revealed that the filter portion of the dryer system was being neglected as an opportunity for efficiency gains. As a result, Justin created Clever Raven, LLC to house the intellectual property of this idea and serve as a structure through which to provide equity. With the help of two engineers from the University of Colorado, Justin began to develop the idea to add a propeller mechanism to existing dryer filters which, driven by the force of air through the filter, would help push lint into a grooved ring around the area swept by the propeller. Seizing on opportunities to apply lessons from business school coursework, Justin galvanized two MBA teams and offered equity stakes to team members to help build the business.

The goal of the Clever Raven team is to find the fastest way to get the product, the "X-Lint", into consumers' dryers. In its latest incarnation, the overall company strategy is to produce a working prototype of the X-Lint and license the patent (issued in October 2011) to a major dryer manufacturer. In order to succeed with this strategy, the company must first develop a product that offers verifiable energy efficiency gains and then target a customer segment that is willing to purchase the product. The company is currently on a trajectory to outsource the manufacture of the X-Lint and sell it to residential and commercial customers. These segments possess significant overlap in dryer filter configurations, and consequently, less R&D is needed to develop a product that can address both segments.

The X-Lint Product

The X-Lint is a mechanism that attaches to a dryer lint filter (*Appendix A*). During the cycle, the X-Lint scrapes the surface of the filter, removing lint that would otherwise collect on the filter. The principle is simple: a clogged filter provides resistance to the flow of air and reduces efficiency. Ensuring adequate airflow decreases the amount of energy required to dry the clothes inside. The single propeller design clears a 50-inch square area on the filter, facilitates greater airflow in the dryer, and creates shorter drying cycles and overall energy savings on the order of 20-30%[1]. The double propeller model under development is being designed to clear twice the area on the filter (*Appendix B*). It also incorporates a ring around the cleared areas to catch the lint, reducing the amount of lint that clogs the filter. A 20% gain in dryer efficiency alone contributes to saving roughly 1.2 billion kilowatt-hours each year across the 93.6 million dryers in US households (*Appendix C*).

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[1] This is a rough estimate, as a working prototype is currently under development. Sensitivity analyses are being utilized to value a range of savings until actual data is gathered. Energy savings of 20% is the conservative estimate explored in this analysis.

Industry Analysis

Clever Raven plans to (eventually) serve several market segments with the X-Lint product. However, some segments are more accessible than others. As a capital-constrained venture, a laser focus on the addressable segment is required to avoid cost overruns, namely those associated with developing workable prototypes for the vast disparity of filter types. To that point, prototypes are already beyond the initial stages for an X-Lint that will fit the "A-type" filter. This filter type represents more than 90% of new dryers available at Home Depot and Best Buy.

According to experts in the field, recent attention has focused on reducing the water consumption of washing machines and the moisture content of laundry after the wash cycle. This second end is achieved by increasing the RPM of the washing machine drum during the final spin cycle. By contrast, dryer technology has remained relatively stagnant in the context of efficiency, focusing more on user interface developments. While some attention has been focused on technological advancements in humidity sensors, with benefit of cycle efficiency gains, there has been no focus on the filter and its associated lint build-up as a source of efficiency potential.

Currently, the dryer market is served by equipment manufacturers and their service agreements. This market is also served by specialized companies that service machines. The dryer industry is dominated by several large appliance manufacturers, chief among them Whirlpool-Maytag & GE (products: LG, Kenmore, Samsung, Amana, Electrolux, Bosch, Frigidaire and Roper). While these are the primary players in the dryer industry, the filter industry is also of interest with respect to potential partnerships and potential exit strategies on the aftermarket or retrofit side.

An interesting facet of the Clever Raven plan to approach both the commercial and household segments is that each is eligible for energy efficiency rebates from major utilities. Although it is unclear how this might affect each segment, it seems likely that it will motivate the purchase decision by reducing the price to the consumer, whether through post-purchase rebate programs or through partnership with the utility and retail channels. The analog for this process is well-established with CFLs; recently, these bulbs were seen on sale at a local hardware store for $1.18, with the partner utility, Xcel, making up the price difference (nearly $10). By internalizing any negative externality of the decision to upgrade to an energy efficiency model (in this case, the price externality), customers experience the benefit of home energy cost savings and utilities can better manage end-user energy loads.

Market Analysis

Recognizing that people utilize clothes dryers based on their living situation, Clever Raven divided X-Lint's potential customer base into three distinct categories. The first category is single-family houses, which have a clothes washer and dryer within the unit. The second category is multi-family units (condominiums, apartments, and townhouses), in which 66% of habitants share common clothes washers and dryers (i.e. common area laundry room),

with the remaining 33% utilizing in-unit machines. The final category of potential customer base consists of people who use off-site laundry services.

Employing the three categories of dryer users, Clever Raven ascertained the drying habits of each one of these user categories, the ultimate goal being to compile information regarding the financial and environmental costs associated with each of the three demographic categories. Clever Raven used demographic information, utility rates, and other data for Colorado in its assessment of clothes dryer costs.

Single Family Housing

Most single-family units enjoy the ease of a washer and dryer within their homes. With this added convenience, it would appear that users are more likely to do laundry more often compared to people who have to haul their laundry outside of their dwelling. Clever Raven has discovered that, in fact, there is data regarding single-family washer and dryer use (*Appendix D*). In the state of Colorado alone, there are over 1.69 million single family housing units. Using statistical information garnered from Project Laundry List, 91.8% of these units use a washing machine, with nearly 84.5% of households doing two or more loads of laundry every week. While these figures only represent washing machine use, only 3.9% of US households that have a washing machine elect to dry clothes without a dryer.

Thus, there are just over 1.55 million single-family homes in Colorado that use a clothes dryer on a regular basis, doing an estimated 466 million dryer cycles every year. When estimating the amount of energy used to dry clothing, the average dryer uses 3.3kWh for a 45-minute dryer cycle, or 0.0733kWh per minute of use. Consequently, single-family housing units in Colorado are using over 1.5 billion kWh (1.5 terawatt hours) to dry clothes each year, costing $169 million dollars (based on a $0.11/kWh rate) and emitting 1.009 million tons of CO_2 into the atmosphere (based on 1.31 pounds of CO_2 per kWh produced).

Sensitivity analyses were employed to better understand the potential cost and environmental savings of the X-Lint (*Appendix E*). Full payback of the $45 X-Lint is best achieved by heavy dryer users. If X-Lint is proven to produce 20% energy savings, as projected, heavy users (13+ cycles a week) will see payback in a year or less. With these energy savings, even moderate dryer users will see payback within two years. Thus, Clever Raven believes that it is best to target these modest and heavy users, who are designated as families with children. When compared to the other two categories of users, single family housing units consume over 95% of the energy and financial costs devoted to dryer usage in Colorado.

Multi-Family Housing

Multi-family households comprised 26.1% of all households in Colorado in 2010 with 483,000 units. The multi-family housing dryer market is defined by two distinct categories: those with dryers in their individual units (In-Unit) and those who share dryers with other residents in a complex (Common Area). Clearly, the decision-makers for laundry appliances and accessories for in-unit are the residents themselves, while common area appliances are managed by group decision-makers from the property management. Roughly two-thirds of multi-family households in Colorado use common area facilities. While this may seem like a lot of the dryer use, the numbers tell a different story.

In-unit dryers tend to use electricity (75%) and common area dryers tend to use gas (75%). Residents with in-unit laundry machines more frequently run smaller, and less-efficient, loads of laundry than residents utilizing a common area laundry facility. In fact, electricity usage of in-unit dryers is close to five times higher compared to common area laundry rooms, while in-unit gas-fueled dryers also see usage 5.2 times higher than the common area equivalent.[2] Since multi-family households with in-unit, electric dryers are the largest segment, and use the most energy, this segment is where the most efficiency can be gained in terms of energy, cost, and time savings. Considering costs alone, this segment accounts for roughly 75% of the total drying costs in multi-family households.

The multi-family, in-unit electric dryer is also the only category in that segment that will experience cost savings by utilizing the X-Lint. With sensitivity ranging between, 10, 20 and 30%, this category receives potential annual savings of $6.39, $12.78, and $19.16, respectively. By contrast, it is difficult to assess cost savings in the other potential customer segments, due to the limited savings from lower load amounts (per household) and inexpensive fuel (gas). Accordingly, multi-family housing units use approximately 4.5% of dryer energy in the state of Colorado.

Off-Site

Users who do not employ in-unit or common area dryers fall into the category of off-site users. These are users who use Laundromats for washing and drying, or pay for service through wash-and-fold service and/or dry cleaning. Moreover, this category comprises only 0.1% of financial and energy costs when factoring usage at Laundromats. Clever Raven will not be targeting the off-site segment at the launch of the X-Lint product.

Sales and Marketing Strategy

Target Market

At its launch, Clever Raven plans to target the single family customer segment, specifically the customer that has in-unit washing and drying equipment. This segment has the potential to benefit the most in terms of financial and time savings, and therefore will accomplish the greatest positive environmental impact through more efficient energy use. To take it a step further, with only a 20% gain in drying efficiency, those households which are moderate to heavy users of their dryers can see significant savings within a one to two year horizon.

In addition to single family dryers being within the addressable market, Clever Raven will also target those multi-family households with in-unit dryers. Households that are deemed moderate to heavy dryer users will also fit the target segment. Within this segment, moderate usage is defined as six to nine dryer loads per week, while heavy usage is ten or more loads per week. While Clever Raven plans to expand beyond its initial target customer focus of Front Range Colorado residents, the initial X-Lint target market is comprised of approximately 843,883 Colorado households (*Appendix F*).

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[2] Source: LaundryWise 2002 Study: A National Study of Water and Energy Consumption in Multifamily Housing http://www.laundrywise.com/downloads/Water_Energy%20Survey.pdf

The target X-Lint customer segment shops, at least occasionally, at bulk centers to satisfy the needs of their larger-size families. These individuals do not necessarily have to be environmentally conscientious, but might look to the X-Lint for cost savings on energy. The target customer is going to be attracted to the X-Lint for its financial and time savings potential, and possibly, the allure of the product's positive environmental impact. The time savings alone may prove to be of equal or greater value to the target customer as the financial savings associated with using the X-Lint (*Appendix G*).

A high level strategy to market and sell the X-Lint product revolves around the plan to drive all customer traffic and product sales through the company's custom website, at least during the product launch year. The prospect of marketing and selling the X-Lint through hardware or bulk goods retail channels is prohibitive at this initial juncture, due to high retail markup costs and the challenge of establishing a presence on the shelf.

Sales Strategy

Clever Raven will employ a tiered sales strategy that will target local utility companies, home and dryer equipment service providers, and other case-by-case partnerships to drive all sales to the company's website.

The fact that X-Lint represents an energy efficiency gain puts it in an interesting category, eligible for the support of the utility industry. Utilities also provide an effective channel partner through which to reach the end customer. As well, working with utilities that have incentive programs in place will help focus initial target markets where incentives pull down price barriers. For these reasons, sales for the X-Lint are primarily forecasted to be driven through partnership with major utilities, specifically Xcel. Aligning with utilities' incentives to reduce energy consumption, Clever Raven will co-develop promotional inserts for utility customers' bills and online ads embedded in the electronic bills of the target segment. These inserts and ads will drive a percentage of Xcel's customer base to the X-Lint website, where they will be eligible for a rebate on their purchase of the X-Lint. In addition, X-Lint will advertise through the Coin Laundry Association in order to drive commercial sales while the company develops utility partnerships, which are expected to involve a longer business development cycle.

Clever Raven also plans to target home contracting and service companies, such as dryer service masters, home energy efficiency consultants, and home builders to help market and sell the X-Lint product along the Front Range of Colorado. These partners will receive a commission for each product recommendation that results in an X-Lint sale on the company's website.

Other strategic partnerships may include laundry facility management companies, like Mac Gray and Coinmatch, who consolidate numerous multi-unit customers. For example, Mac Gray serves the facility management needs of 550 colleges and universities in the US.

Marketing Strategy

The US market for clothes dryers is large and part of a larger appliance landscape that is trending toward energy and resource efficiency, as demonstrated by the emergence of a portfolio of Energy Star appliances and associated rebates. Given this trend, it is possible to delineate between target customer segments. The primary target customer is a "green"

homeowner who is interested in combining lower energy costs with the intrinsic environmental ethos to have a positive impact. The commercial customer is less likely to be green and more likely to be swayed by the combination of reducing energy costs, improving operating margins, and taking advantage of utility rebate programs. Decision-makers in either group may also be strongly influenced by the opportunity to save time and achieve more drying power in non-automated (humidity sensor) contexts.

Clever Raven plans to invest in a robust and creatively engaging online platform (website with product(s) for purchase and efficiency resources) that will benefit from invested capital into SEO, partnerships with such resources as 'Microsoft Hohm', environmental websites like 'green home', 'inhabitant', and 'tree hugger', and the 'US EPA'. Moreover, the company will selectively utilize guerrilla marketing tactics and strategic direct mail campaigns along the Front Range of Colorado during the launch phase of the X-Lint.

Operations and Development Plan

Operations Plan

When a potential customer learns about the X-Lint product from promotional material (utility), a direct recommendation (service provider), or through online research (online marketing strategy), that individual is directed to the X-Lint website. At the site, the potential customer is requested to input dryer model type and serial number, at which point the appropriate filter type and available utility rebates are presented. Once the order is complete, X-Lint submits it to the company's warehouse, where the product is packaged and sent to the customer through on-ground transport. The customer will have the option to offset all emissions associated with shipping, and will additionally be provided with a shipping box at the time of product delivery in which to return the used dryer filter.

In order to produce the X-Lint, 'stock' filters are first fitted with an X-Lint mold that is compatible with the filter's configuration. Designed for the most dominant filter configurations, X-Lint mechanisms are attached to stock filters, which are then stored in a warehouse prior to shipment. These mechanisms are created by injection molding plastic at the contract manufacturer in Denver, CO, near the warehouse where the stock filters are also kept to handle demand from the injection molding facility.

Development Plan

Going to market is contingent upon successful prototyping, as defined by demonstrated energy and time savings. As X-Lint adds additional SKUs (molds) after initial product development, rigorous testing will be required for each SKU, with third party verification a necessity for developing strategic sales partnerships. In terms of the company's roll-out strategy, assumptions for the X-Lint product at the launch year are based on creating two product molds, 'landing' a deal with Xcel in Colorado, and slowly developing a market test customer base. After the first year, the company plans to expand into states that represent the best opportunity to continue targeting single family housing with in-unit clothes dryers. As evidenced by trends in energy costs, Clever Raven plans to leverage customer sensitivity factors—cost per kWh and percent of coal power sector generation—and target states that rank high on both levels, such as California, Texas, Nevada, Florida, and much of the

Northeast (*Appendix H*). By establishing partnerships with service providers and utilities, such as Southern California Edison, the assumption is that target customers will be even more likely to purchase the X-Lint to help combat comparably high energy costs.

Financial Plan

Price

The price of $45 per unit is set to reflect three main drivers of value: cost savings, energy efficiency (eco-friendliness), and discounts. Since discounts, promotions, economies of scale and rebate offers are not accounted for in other parts of the financial analysis, and thus are built those into the X-Lint retail price.

Revenue

As the driving force behind the company's revenue projections, each customer type has a different sales multiple. Universities represent 200 units per 'sale', coin-up laundry facilities represent 20 units, apartment buildings (multi-unit housing) represent 10 units, and single-family housing represents one unit, all with a usable life of at least five years. For simplicity, the financial plan forecast period is five years and does not include predictions around resale or reorder, as true mean time between failures (MBTF), or the effective lifespan of the product, is unknown and will remain unknown until prototyping is complete and product testing begins. As a conservative measure, the plan does not build in large scale sales that would come from contracts with national retailers or major utilities, the top dozen of which represent over 40 million customers.

Estimating a six month period to make the first sale, the company can realistically expect healthy growth over the remaining four years of the financial plan horizon (*Appendix I*). While the portion of the market that moves the needle in dryer usage and environmental impact has been identified—the single family housing customer—the company must still complete more rigorous market research to see where the X-Lint would succeed most efficiently, in terms of lowest customer acquisition cost. For now, the product launch entry point is expected to be the single family housing unit. Please see *Appendix J* for the company's full preliminary financial analysis.

Cost of Goods Sold

Taking into account manufacturing costs, labor costs, and the cost of procuring the replacement filters, to which the X-Lint mechanisms will be affixed, the cost to sell the product will be $7.50 per unit. This does not take into account salaries or depreciation.

Working Capital and Start-Up Funds

Prior to a product launch, Clever Raven will need at least $50,000 in start-up capital, which will cover product design, prototype, materials, creation of an injection mold, legal fees related to patent and intellectual property protection, and incorporation. In the first year, working capital will be primarily focused on marketing campaigns that educate the target customer segment about the product and sales strategies related to rebate programs and commissions. In future years, new molds and patents will be needed as the company designs, prototypes, and produces X-Lint for different configurations of dryer lint filters.

Further market research targeted at the specific dryers used in certain geographical areas will help to determine the scope of direct-to-consumer sales opportunities and to predict the working capital required.

Since up-front start-up costs of $50,000 are relatively low, the company will look to an initial capital call to friends and family, and possibly to angel investors. As the company continues to grow, and especially if a contract with a national retailer or multi-state utility partnerships materializes, venture capital will be necessary to provide the means by which to scale quickly. By taking a conservative stance on sales growth and operating margins, the company will get a sound sense of the true feasibility of the X-Lint. In this, the "worst case" scenario, the company is still profitable and cash positive by year two. Lucrative contracts with national retailers, OEMs, laundry service providers, and utilities would spike sales and spur a rapid growth phase or even an exit event.

Alternative Business Model

While assessing the feasibility of the X-Lint product as explored in this plan, the Clever Raven team begged the question: "what strategy will produce the greatest positive environmental impact?" In the context of the course, an environmental entrepreneur must inherently question, and possibly be at odds with, how a company's focus on financial viability may compromise environmental well-being. Whether the result of increased use of energy and raw materials for production, or a fixation on cutting costs to the point of wreaking environmental havoc—at the extreme, dumping toxic industrial waste into a river system—companies must recognize that by steadfastly focusing on profitability, the industrial economy continues to win the financial battle, while we all lose the environmental war. To produce the X-Lint, Clever Raven relies on an industrial process, one that will undoubtedly require energy and raw materials. It also plans to 'offset' these negative environmental externalities by drastically changing the landscape of energy awareness and bringing energy efficiency to every home in America.

The Clever Raven team continues to debate its strategy to produce X-Lint widgets and sell them to individual customers. There is nothing (environmentally) novel about that strategy, even if the end result is a positive effect on the environment. To that end, from the onset, the team embraced an ongoing dialogue about the virtues of creating a *Clever Raven Incubator*: a group of experienced, environmentally passionate professionals developing concepts, business models, and legal rights to products that will positively impact the environment. Referring to iDE and SaaS as inspiration, Clever Raven discussed the prospect of creating open source technology rights to its X-Lint patent and allowing the behemoth manufacturers to incorporate the product's efficiency gains into their dryers.

Questions abound as to whether these traditional corporations would follow the 'traditional' course—steal the technology and develop stringent patents to prevent others from replicating it—but the hope is that they would recognize the tide of environmental change and decide to be on the side of the good guys. After all, it is about time that Jeremy Bentham's notion of the "greatest good for the greatest number" is applied to *environmental* utilitarianism.

Concept Description

Clever Raven, a registered LLC in Colorado, is an entity of professionals working to find the fastest way to sell its product, the "X-Lint", a dryer filter widget that improves dryer efficiency. The overall company strategy is to produce a working prototype that offers verifiable energy efficiency gains, and then license the product patent to a major dryer manufacturer. With this goal in mind, Clever Raven must demonstrate the need for the product, identify an addressable market, and sell the product to target customers prior to realizing the end goal 'exit strategy'.

Opportunity

There are strong trends towards energy and resource efficiency in the washer/dryer space; though most advancement focuses on washing machines (e.g. there is no Energy Star dryer). The Laundromat and Industrial customer segments provide the heaviest dryer use of the identified segments, yet require significant R&D costs given vast disparity of filter configuration. With a US Household dryer market size of 93 million units, and less discrepancy between residential dryer filter configurations, Clever Raven plans to initially launch with 'standardized' filter SKUs targeted at the Household customer segment.

Product

The X-Lint is a mechanism that attaches to a dryer lint filter. During the cycle, the X-Lint propeller is put into motion from the dryer's natural air flow through the lint filter, and removes lint build-up by scraping the surface of the filter. The single propeller design, in current product development, clears a 50-inch square area on the filter, facilitates greater airflow in the dryer, and creates shorter drying cycles and overall energy savings on the order of 20-30% (speculative). A 20% gain in dryer efficiency alone contributes to saving roughly 1.2 billion kilowatt-hours each year across the 93 million dryers in US households.

Marketing Strategy

Clever Raven plans to drive all sales through the company's website, and will be developing a marketing strategy that coincides with this singular point-of-sale. As such, the company will invest in a robust and creatively engaging online platform that will benefit from invested capital into SEO, advertising partnerships with energy efficiency websites, and a connection to online resources developed at the US EPA website. In partnership with utility companies, the company will develop promotional inserts for utility customers' bills and online ads embedded in electronic bills of the target segment. Lastly, the company will selectively utilize guerrilla marketing tactics and strategic direct mail campaigns along the Front Range of Colorado during the launch phase of the X-Lint.

Process

Clever Raven plans to maintain its managerial, production and distribution processes in Colorado. From a production standpoint, the company will forge a partnership with an industrial tooling company to develop more than one SKU of the X-Lint prototype for distribution throughout the state (year one) and then regionally (post-launch year). The high level process can be loosely defined by producing the proprietary X-Lint mold, affixing

it to a 'stock' filter, sending it to the warehouse for packaging and storage, and then distributing the product via major ground courier transport. Shipping and handling will be charged to the customer.

Competitive Advantage

At present, by nature of defining a new product in a new category, Clever Raven does not compete with any established companies. However, there is the distinct possibility that established dryer manufacturers will leverage operational and financial capabilities to replicate the product if it proves to have the energy efficiency gains specified in this analysis. Fortunately, Clever Raven currently benefits from a competitive advantage, as it possesses a provisional patent[3], filed in October 2011, which provides some protection for 12 months. There is some risk that the intellectual property will be stolen or that an entity involved with the development will reverse engineer the product and develop a product that delivers similar results. While some recourse is possible via litigation, it is questionable the extent to which Clever Raven will be able to fight, especially relative to a large, multinational corporation.

Risks

The biggest risk is that the technology must deliver on stated claims with respect to percentage of energy efficiency gained through use of the product. While it is logical that less energy is required to push air through a filter with a cleared portion (path of least resistance for the air) relative to a clogged filter, data collection that clearly verifies this energy efficiency gain will be fundamental to the success of the venture. Overcoming lack of consumer knowledge of the dryer filter as a possible avenue for energy efficiency may also prove challenging. This may be mitigated by the simple, accessible logic of the process of pushing fluids through clogged filters, as evidenced by general consumer understanding of air conditioners, oil filters, pool filters, and coffee filters, among others.

Financial Outlook

With an initial target retail price point of $45 per unit, and an associated $7.50 per unit in cost of goods sold (manufacturing, labor, and materials costs only), the company expects gross margins of $37.50 per unit and a preliminary year three contribution margin of $125,000 (on year three revenue of $236,000). The company is confident that the $45 per unit price point correctly reflects perception of the product being a durable source of cost savings and energy efficiency (eco-friendliness) in the home.

Clever Raven will need at least $50,000 in start-up capital, which will cover product design, prototype, materials, creation of an injection mold, legal fees related to patent and intellectual property protection, and incorporation. In the first year, working capital will be used to fund marketing campaigns that educate the target customer segment about the product and sales strategies related to rebate programs and commissions. In years two and three, new molds and patents will be needed as the company expands its product offerings.

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[3] "Debris removal device and method," Registration number 58062

Appendix A: The X-Lint Product, Single Blade
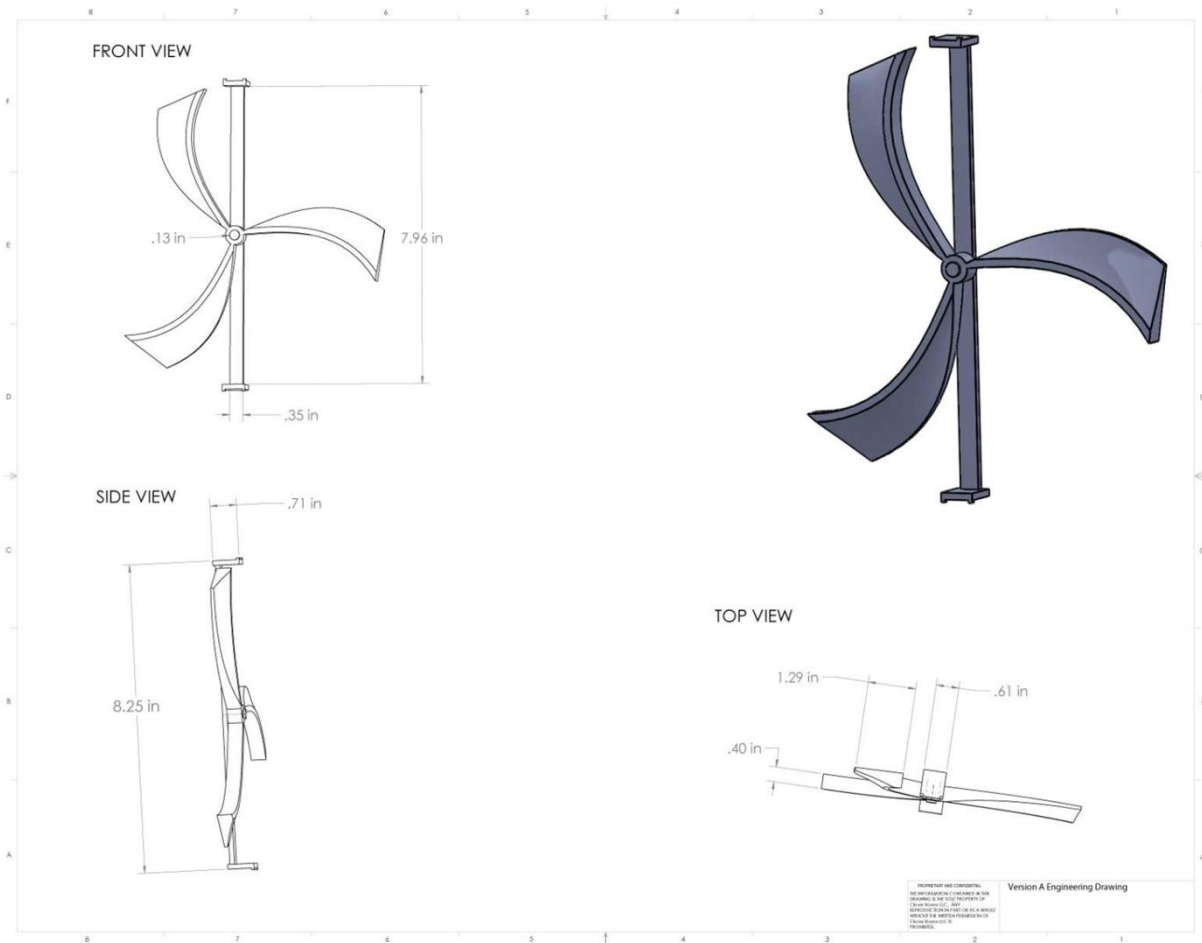
Appendix B: The X-Lint Product, Double Blade

.38

Ø 6.00

.21

12.25

.35

Ø .20

Ø .50

Ø 6.00

Ø 5.25

.13

University Of Colorado, Boulder

All dimensions are inches and degrees

Default Tolerances:
.1   +/-.050
.12   +/-.02
.123 +/-.005
Angles +/-2

Drawn by: Alex Demarais

Scale: 1:4   Date:

Appendix C: Potential X-Lint Energy and Cost Savings

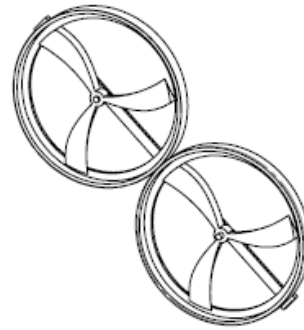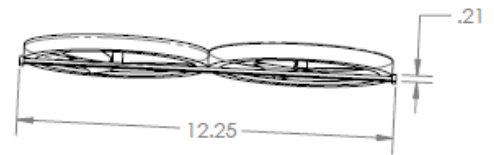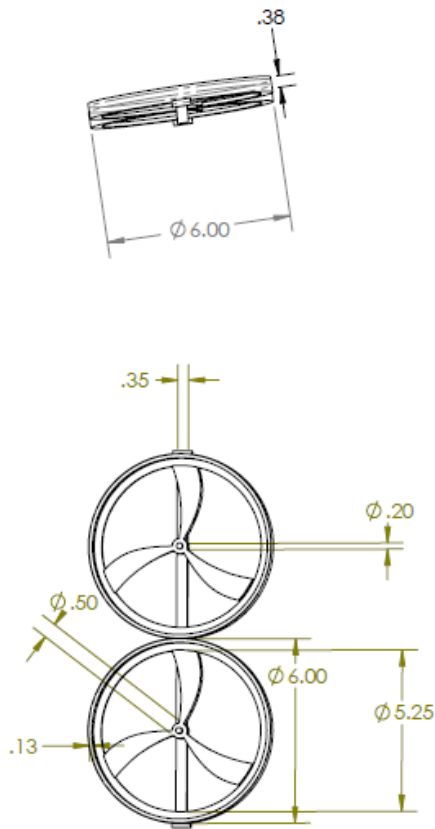| Figure	Description	Source
5.80%	Dryer share of HH electricity use	Laundrylist
307,000,000	US Population	Google
80%	Percent of US HH w dryer	UL
93,600,000	Dryers in US HH	Laundrylist - projected
11,040	(x) Annual kWh use per HH	Michael Bluejay
640	(=) Annual kWh dryer use	calculated
59,933,952,000	Total annual US dryer kWh	calculated
20%	**Dryer efficiency gain (X-Lint Projected)**	Projected
11,986,790,400	**Potential kWh savings from efficiency gain**	calculated
$ 0.107	US average price per kWh	TopTen USA
$1,282,586,573	**Potential $ savings from efficiency gain**	calculated

Appendix D: Washer and Dryer Use Habits

Clothes Washers and Dryers

Clothes Washer
Use a Clothes Washer in the Home......................	91.8
1 Load Each Week..	7.3
2 to 5 Loads Each Week....................................	39.0
6 to 9 Loads Each Week....................................	33.8
10 to 15 Loads Each Week................................	9.3
More than 15 Loads Each Week........................	2.4
Do Not Use a Clothes Washer in the Home..........	19.3

Usual Water Temperature Setting
Wash Cycle
Hot...	6.7
Warm..	50.5
Cold...	34.6

Rinse Cycle
Hot...	1.6
Warm..	18.2
Cold...	72.0

***Energy Star* Clothes Washer**
Yes...	21.7
No..	10.4
Don't Know...	4.5
Unit is More Than 4 Years Old............................	55.1

Loads of Clothes Dried
Use a Clothes Dryer in the Home........................	87.5
Every Time Clothes are Washed......................	72.4
Some, but Not All, Loads................................	12.4
Used Infrequently...	2.7
Do Not Use a Clothes Dryer in the Home.............	23.6

Source: Project Laundry List. http://www.laundrylist.org/en/faq/35-general-laundry-questions/51--how-much-energy-is-actually-used-by-the-clothes-dryer

Appendix E: Cost Savings Sensitivity Analysis

1-Year Potential Savings of X-lint

Dryer Cycles Per Week

X-Lint % of Energy Savings	1	3	7	10	13	16	19	22	25	28	31	35	40
5%	$1	$3	$7	$9	$12	$15	$18	$21	$24	$26	$29	$33	$38
10%	$2	$6	$13	$19	$25	$30	$36	$42	$47	$53	$59	$66	$76
15%	$3	$8	$20	$28	$37	$45	$54	$62	$71	$79	$88	$99	$113
20%	$4	$11	$26	$38	$49	$60	$72	$83	$94	$106	$117	$132	$151
25%	$5	$14	$33	$47	$61	$76	$90	$104	$118	$132	$146	$165	$189
30%	$6	$17	$40	$57	$74	$91	$108	$125	$142	$159	$176	$198	$227
35%	$7	$20	$46	$66	$86	$106	$126	$145	$165	$185	$205	$231	$264
40%	$8	$23	$53	$76	$98	$121	$143	$166	$189	$211	$234	$264	$302
45%	$8	$25	$59	$85	$110	$136	$161	$187	$212	$238	$263	$297	$340
50%	$9	$28	$66	$94	$123	$151	$179	$208	$236	$264	$293	$330	$378

*Based on 45 minute dryer cycles using 3.3kWh at $.11/kWh. X-lint is estimated to cost $45 retail.

Red = X-lint does not pay for itself within 1-year
Yellow = Full payback of the X-lint within 1-year
Green = Substantial savings within 1-year

Appendix F: Target Market - Launch

Single Family Dryers	1,691,988
	+
Multi-Family In-Unit Dryers	162,699
Total Target Population	**1,854,687**
	x
Moderate to Heavy Users	45.5%
Total Target Market	**843,883**

Appendix G: Target Market Demographics and Environmental Impact

Single Family Housing

Segment	Annual Loads (Avg.)	% of HH	Households w/ Dryer	Total Loads Annually*	kWh Per Load	Baseline Energy Use (kWh)	X-lint Savings	Energy Saved (kWh)	CO2 Saved (tons)
Single Family Housing - In Unit Dryer			1,691,988						
1 Load Each Week	52	7.3%	123,515	6,172,298	3.3	20,368,583	20%	4,073,717	2,668
2 to 5 Loads Each Week	182	39.0%	659,875	115,413,516	3.3	380,864,602	20%	76,172,920	49,893
6 to 9 Loads Each Week**	390	33.8%	571,892	214,339,386	3.3	707,319,975	20%	141,463,995	92,659
10 to 15 Loads Each Week**	650	9.3%	157,355	98,291,730	3.3	324,362,710	20%	64,872,542	42,492
More than 15 Loads Each Week**	832	2.4%	40,608	32,467,978	3.3	107,144,328	20%	21,428,866	14,036
TOTAL		91.8%	**1,553,245**	**466,684,908**		**1,540,060,197**		**308,012,039**	**201,748**

* Accounts for 3.9% of consumers who have a dryer, yet choose to air dry.   25,054,194
** **Targeted Demographic**

Multi-Family Housing

Segment	Loads Annually (Avg.)	% of HH	Households w/ Dryer	Total Loads Annually*	kWh Per Load	Baseline Energy Use (kWh)	X-lint Savings	Energy Saved (kWh)	CO2 Saved (tons)
Multi-Family - In Unit Dryer									
1 Load Each Week	52	7.3%	11,877	593,519	3.3	1,958,614	20%	391,723	257
2 to 5 Loads Each Week	182	39.0%	63,453	11,097,999	3.3	36,623,396	20%	7,324,679	4,798
6 to 9 Loads Each Week**	390	33.8%	54,992	20,610,569	3.3	68,014,877	20%	13,602,975	8,910
10 to 15 Loads Each Week**	650	9.3%	15,131	9,451,592	3.3	31,190,254	20%	6,238,051	4,086
More than 15 Loads Each Week**	832	2.4%	3,905	3,122,074	3.3	10,302,845	20%	2,060,569	1,350
TOTAL		91.8%	**149,358**	**44,875,753**		**148,089,987**		**29,617,997**	**19,400**

* Accounts for 3.9% of consumers who have a dryer, yet choose to air dry.
** **Targeted Demographic**

Appendix H: Cost of Electricity and Coal Power Generation by State

Cost Per kWh & Percent of Coal Power Sector Generation

¢ = average retail price per kilowatt hour, 2009

% = percent of total generation from coal, 2009

U.S. Average – 9.9¢/kWh 46% of generation

CT	18.2¢	8%
MA	15.5¢	25%
RI	14.2¢	0%
NJ	14.8¢	9%
NH	15.2¢	15%
MD	13.1¢	55%
DC	13.8¢	0%
VT	12.8¢	0%
DE	12.2¢	64%

Legend:
- <= 9.0¢
- 9.1¢ - 10.0¢
- > 10.0¢
- Hydro
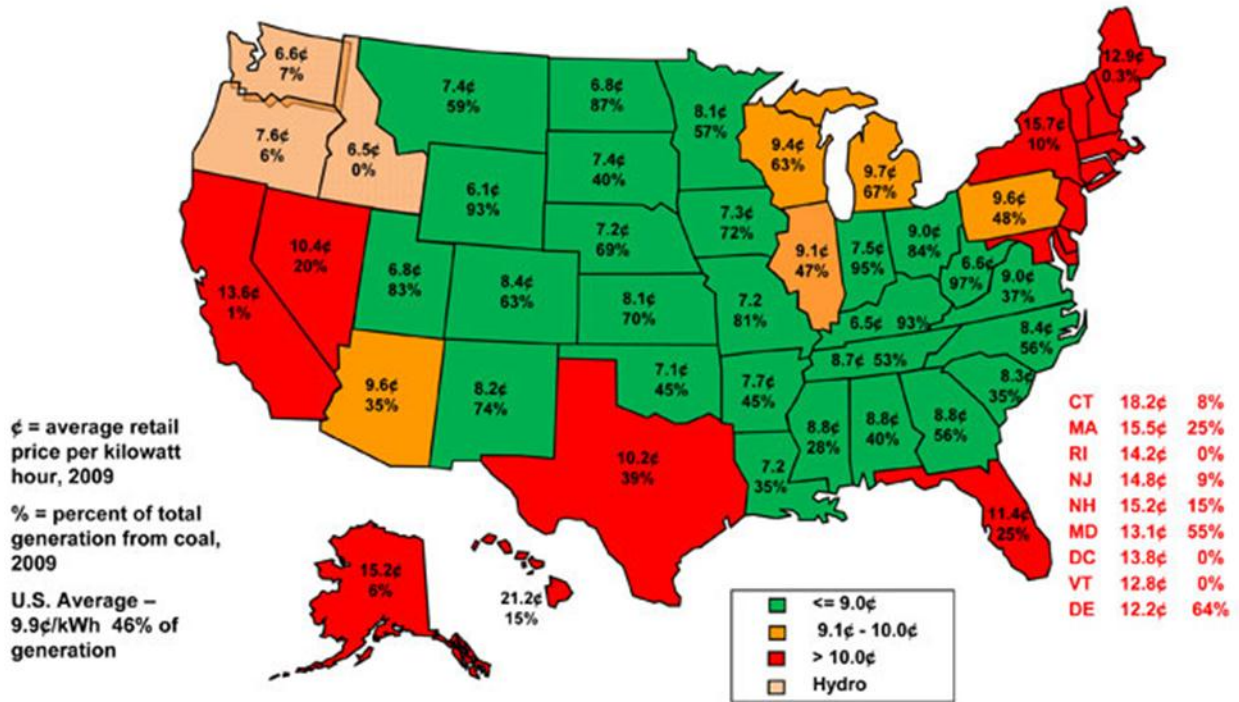
Source: Energy Information Administration, Electric Power Monthly, March 2010

Appendix I: Sales Assumptions and Projections

Sales	Year 1	Year 2	Year 3	Year 4	Year 5
Percent of Market Acquired					
Coin-Op Laundry	5.00%	8.00%	8.00%	8.00%	8.00%
Website (Utility)	0.00%	0.00%	0.50%	1.00%	1.50%
Website (Non-Utility)	0.50%	1.00%	1.00%	1.00%	1.00%
Total Market (in Units)					
Coin-Op Laundry [20x]	3300	2600	2600	2600	2600
Website (Utility) [1x]	844000	844000	844000	844000	844000
Website (Non-Utility) [20x]	140000	140000	140000	140000	140000
Unit Sales*					
Coin-Op Laundry	148.5	187.2	187.2	187.2	187.2
Website (Utility)	0	0	3798	7596	11394
Website (Non-Utility)	630	1260	1260	1260	1260
Total Unit Sales	778.5	1447.2	5245.2	9043.2	12841.2
					29355.3
Working Capital					
Coin-Op Marketing	3,660	3,660	3,660	3,660	3,660
Other Costs (Distcounts, Promotions, etc.)	1,752	3,256	11,802	20,347	28,893
	5,412	6,916	15,462	24,007	32,553
Fixed Costs					
Salaries (36K per Rep)	36000	36000	72000	72000	108000
Variable Costs					
Material Costs	5.50				
Filter Costs	1.00				
Other Costs	1.00				
Total	7.50				

* Unit Sales are discounted by 10% to incorporate dryers that will not have a compatable lint filter.

Appendix J: Preliminary Financial Analysis

		Year 1	Year 2	Year 3	Year 4	Year 5	CAGR
A	Annual Unit Sales	779	1,447	5,245	9,043	12,841	101.53%
B	Price	$ 45.00	$ 45.00	$ 45.00	$ 45.00	$ 45.00	
C	Variable Cost Per Unit	$ 7.50	$ 7.50	$ 7.50	$ 7.50	$ 7.50	
D	Fixed Costs	$ 36,000.00	$ 36,000.00	$ 72,000.00	$ 72,000.00	$ 108,000.00	
E	Start-Up Costs	$ 50,000.00	$ -	$ -	$ -	$ -	
F	Working Capital Required	$ 5,411.63	$ 6,916.20	$ 15,461.70	$ 24,007.20	$ 32,552.70	
G	Estimated Annual Revenue	$ 35,032.50	$ 65,124.00	$ 236,034.00	$ 406,944.00	$ 577,854.00	
H	Estimated Annual Variable Costs	$ 5,838.75	$ 10,854.00	$ 39,339.00	$ 67,824.00	$ 96,309.00	
I	Estimated Annual Contribution Margin	$ (6,806.25)	$ 18,270.00	$ 124,695.00	$ 267,120.00	$ 373,545.00	
J	Contribution Margin Per Unit	$ 37.50	$ 37.50	$ 37.50	$ 37.50	$ 37.50	
K	Annual Break-Even Quantity	960	960	1,920	1,920	2,880	
L	Ratio of Break-Even to Expected Quantities	1.23	0.66	0.37	0.21	0.22	
M	Total Up-Front Funds Required	$ 55,411.63	$ 6,916.20	$ 15,461.70	$ 24,007.20	$ 32,552.70	
N	Additional Units to Cover Up-Front Funds	1,478	184	412	640	868	
O	Break-Even Quantity with Up-Front Funds	2,438	1,144	2,332	2,560	3,748	
P	Payback Period for Startup Funds	(8.14)	0.38	0.12	0.09	0.09	
Q	Annual Return on Start-Up Investment	-112%	164%	706%	1013%	1048%	
R	Variable Cost to Price Ratio	0.17	0.17	0.17	0.17	0.17	
S	Contribution Margin Ratio	(0.19)	0.28	0.53	0.66	0.65	