SUSTAINABLE HARVEST
RELATIONSHIP COFFEE

EXTREME
design for extreme affordability

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# EXECUTIVE SUMMARY

## THE PROBLEM

Smallholder coffee farmers in Colombia are struggling to maintain their livelihood because of falling international coffee prices and high production costs. Coffee is one of Colombia's largest export goods, with more than 500,000 families reliant on the crop for their livelihoods. Drying coffee is one of the most important steps in the coffee production process because it is a significant driver of coffee quality, which determines farmers' income. In addition, it is highly sensitive to weather conditions and is extremely labor intensive. **Debt-constrained farmers need a way to dry coffee that requires low financial and physical investment because conventional methods are weather-dependent or too expensive to provide adequate drying capacity during the rainy peak harvest months**.

## SOLUTION

SecaCafé provides smallholder farmers in Colombia a controlled, reliable, and affordable way to dry coffee beans on the farm under any weather conditions. Designed to operate with both sunlight and electric energy, the SecaCafé hybrid device uses temperature and humidity sensors to control the environment to ensure optimal drying conditions. Priced at approximately $580 per unit, SecaCafé provides an affordable alternative to expensive mechanical dryers while offering improved performance compared to existing non-mechanized drying alternatives. SecaCafé will increase farmers' income and better their livelihood by improving the quality of the beans and the efficiency of the drying process.

## EXECUTION

The interdisciplinary team formed in Stanford's Design for Extreme Affordability course will work closely with its partner Sustainable Harvest, a relationship coffee importer, to deliver SecaCafé devices to smallholder farmers across Colombia and other parts Latin America. Through partnerships with local coffee cooperatives (COOPs), the devices will be sold to COOP general stores for retail to local farmers. The dryer will be marketed to farmers through COOP-led demonstrations, with the support of technical assistants. The devices will primarily be sourced, assembled, and distributed in Colombia for the first 18 months to optimized for cost of materials, logistics, and cultural preference for Colombian-made goods. From June – October 2013, the team will finalize the drying device and conduct a pilot test in Colombia to prepare for beta launch at the Let's Talk Coffee conference, a global collaboration and training conference for players across the specialty coffee value chain, taking place in early November.

The next 18 months startup phase will require approximately US$115,000 in capital, primarily for materials, production, and travel costs. To finance these needs, the team is targeting grants and incubator programs including Stanford's Social-E and SEED programs to supplement the early revenues expected in late 2013. In additional to financial return and adoption rates, the team will work with participating COOPs to track the increase in productivity and earnings of farmers using the SecaCafé dryers to validate the expected impact on farmers' livelihood.

# THE MARKET NEED

## THE USER

Meet Don Jairo, a smallholder Colombian farmer. He owns three hectares of land, which he bought with his life savings and takes great pride in. His primary use of this land is coffee farming, and represents the majority of his US$9,000 annual income. He works hard every day to make a living; from planting, fertilizing, picking, and finally washing and drying the coffee; each bean requires significant investment of time and money. Every part of process has costs associated with it, but Jairo only receives cash during a three-month harvest season, which means that he is living in debt for nine months of the year.

Jairo's precarious financial state puts him in difficult situations any time unplanned disruptions to his process arise; plant diseases, crop theft, equipment maintenance and unpredictable weather patterns can ruin his harvest. Compounding this problem is the fact that Jairo is facing a global economy for the first time. Because he is not a member of a price protected specialty coffee program, his coffee is sold on an unstable commodities market. This already volatile market has seen a drastic decrease in coffee prices due to the shift in global coffee production, and at the end of the day, Jairo is losing money with each crop he harvests. He depends on subsidies from the government to barely break-even at the end of each season.

He is representative of 540,000 Colombian coffee farmers and their families who produce 69% of Colombia's coffee production. In February 2013, thousands of these families went on strike to demand subsidies from the government to maintain the viability of coffee production as a livelihood in the future.

Jairo just wants to make it through this harvest season, which is determined by the price he receives when he sells his beans at a local point of purchase. There, his beans are physically inspected for quality, and he is paid a price accordingly. He has to produce as many beans as he can at the highest possible quality. The biggest challenge in the coffee process and one of the key determinants of quality is the drying process. Jairo, like most smallholder farmers, spreads his beans on a cement patio that is exposed to the sun, raking every hour to ensure even exposure.

Drying should take three days of constant sun exposure; however, the harvest season is also the rainy season, and unpredictable rain storms inhibit this drying process on an average of 22 days of each month. Jairo has a large metal sheet to cover his beans when it rains, but right now his cover is rotted and rusted, making it unusable. When the

beans can't dry quickly enough, they are at risk of growing fungi, which ruins the quality, and when there is sun to dry Jairo has to rake the beans once an hour, which is hard, hot work and means he cannot be in the field harvesting the rest of his ripening coffee.

## THE DRYING PROCESS

Drying is particularly important in the production process because it is one of the biggest determinants of coffee quality. Coffee must be dried from 50-55% moisture level to 10-12% moisture content in order to ensure optimal quality. If the beans are over-dried or dried too quickly, the bean's embryo is destroyed and the coffee can become "tired", meaning that the carbohydrates in the coffee will produce a wood-like taste. Temperatures for heating the beans should not exceed 45°C for cherries. If the beans are under-dried, the remaining moisture enables fungus and mold to grow, which destroys the quality and flavor of the beans. In addition, drying must occur as evenly as possible to prevent over- and under-drying within the same batch.

The drying process also indirectly affects the quality of the beans because it often creates a bottleneck in the production process in which farmers are forced to leave the beans fermenting for too long, which results in a vinegar-like taste, or fungal growth on washed coffee. The poor quality beans are sold for a low price to the COOP and used for low quality, generic coffee.

The quality of the coffee produced determines the price point a farmer can receive and it also determines the type of buyers the farmer has access to. Premium coffee buyers such as Blue Bottle, Green Mountain and Ben&Jerrys pay up to 25% more for high quality coffee. Additionally, premium coffee buyers often will guarantee purchase (if quality is guaranteed) as well as provide support further up the value chain, such as technical assistance or subsidizing the purchase of new equipment, in order to ensure a secure supply of high quality coffee.

The challenges of the farmer's life combined with the specific requirements for the drying process led the team to focus on the following user need (Point of View):

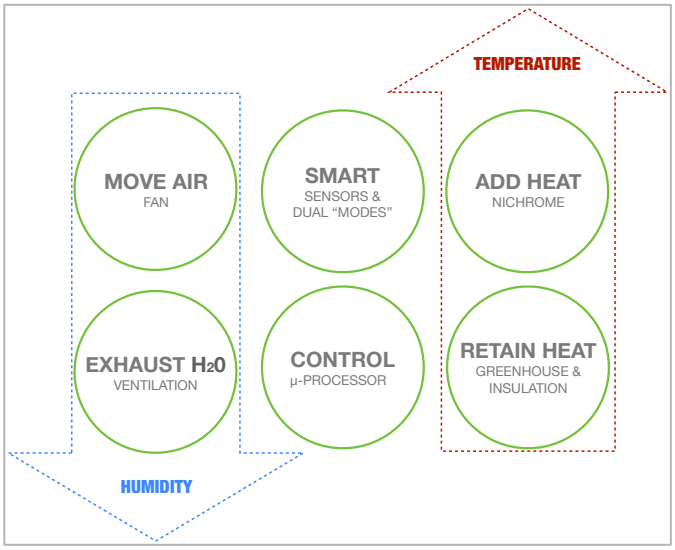
**A debt-constrained farmer needs a way to dry coffee that requires low financial and physical investment because conventional methods are weather-dependent or too expensive to provide adequate drying capacity during the rainy peak harvest months**

# THE PRODUCT

## THE DEVICE

SecaCafé is a coffee drying device that provides smallholder farmers a controlled, reliable, and affordable way to dry coffee beans under all weather conditions. It was designed with the aim of delivering four critical functions: (1) to dry 190kg of wet parchment (2) in 18 hours, (3) evenly, (4) under all weather conditions. At a base level, the device was designed to deliver the two key conditions required for drying: decreasing humidity and increasing temperature. Based on insights from the field visit to Colombia and the prototyping process, the team recognized that one of the most valuable features of the device is making it "smart," e.g. able to track and control the temperature and humidity levels. After extensive exploration of different approaches to achieve this functionality, the final features that were selected to achieve effective drying are found in Figure 1:

### Figure 1: DESIGN PRINCIPLES




## DEVICE COMPONENTS

- Coffee trays (wood frame and metal wire mesh)
- Nichrome wire heater
- Centrifugal High Pressure Fan
- Adjustable "Petals" (corrugated plastic, space blanket, straps and clasps)

- Moisture & temperature sensors
- Arduino (microprocessor)
- Door for loading/unloading
- Plastic casing
- Wood frame
- Rain protecting roof

## FORM

The device is a hexagon shape, chosen to promote optimal stability and airflow. The device stands 4 feet tall and each hexagon side is 2 feet wide. The device includes four layers – base, coffee tray level 1, coffee tray level 2, a top layer, and roof to protect against rain.

## HYBRID MODEL

The device uses a hybrid model in that it can use heat from sunlight when it is available (similar to a greenhouse) and use electric energy to pump hot air through the beans using nichrome wires and a fan (similar to a mechanical dryer). Additionally, the external petals can be manually adjusted to either reflect additional sunlight onto the beans during the day or to insulate the device to capture heat during the night.

| DAY MODE | NIGHT MODE |
|---|---|
| - Sun used as primary heat source<br>- "Petals" open to reflect sunlight onto beans | - Nichrome wire and fan powered by electricity to move hot air through beans<br>- "Petals" closed to insulate and capture heat |
| | |

## SMART SYSTEM

The device comes equipped with a "smart system" that includes four sensors that measure temperature and humidity levels of the air on each level and outside the device and a programmable microprocessor that controls the system. The microprocessor controls a series of electromagnetic relays to automatically turn on/off the heater and fan based on the readings from the sensors as temperature and humidity levels reach pre-programmed maximum and minimum levels. This automation and programming ensures that the device is never overheated or too humid while minimizing the energy

input to the system. The arduino allows the device to respond to changes in external environment, including fluctuating temperatures during the day and increasing humidity levels that occur at night. Refer to Appendix H for a schematic overview of the control mechanism.

## ECO-FRIENDLY ENERGY

The device enables the farmer to make use of sunlight when the opportunity presents itself. However, when it isn't available, electricity is used as the energy source because it offers a reliable, clean, and affordable energy source to power the device. Over 93% of Colombia access to electricity, which is high when compared to other Middle Income Countries, and Colombia experiences comparably very few grid disruptions. Even remote farms in the mountains have access to electricity and many farmers currently rely on electricity for parts of the coffee production process (e.g. depulping machines, fans in mechanical dryers). Colombia uses a subsidized model to price electricity based on income levels. SecaCafé's target users, the farmers, receive up to 60% subsidy on their electricity, giving them a rate of approximately US$.09 per kw/hr.[1] While in Colombia, the team found enthusiasm among Colombians for the growth of hydroelectric energy usage in the Antioquia region, SecaCafé's primary target market. SecaCafé's emphasis on eco-friendly, green energy is thus an attractive branding point for target consumers.

The SecaCafé device requires approximately 1700 watts per hour or 30 kWh of energy to operate.[2] Thus each load in the dryer would cost approximately US$2.30. Based on conservative assumptions, this could cost the farmer up to $150 in additional operating costs per year.

## AFFORDABLE

The device is currently priced around $400-$600, plus additional operating costs for use of electricity of approximately $150. Compared to the mechanical dryer costs of $3000 (not including operating costs), interviews suggests that farmers will be willing to pay this price point for the additional advantage of the controlled, smart, reliable system.

## FAST

SecaCafé enables farmers to sufficiently dry their beans within 18 hours. Compared to the 3-6 day timeframe required by traditional methods of Marquesinas (greenhouses) and Elbas (cement sun patios), this is a significant increase in efficiency. SecaCafé provides the performance speed of a mechanical dryer but with cleaner energy and reduced risk of overheating the beans.

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[1] Interview with Fernando Jaramillo and desk research indicates the base price of electricity is US$0.19 per kw/hr. It is charged on a tiered system based on income levels, with 60%, 50% and 15% subsidies for three group, the remaining tiers paying full price.

[2] With both the fan and heater on full mode, the device requires 1700 watts, which is a conservative number. Assuming a contribution of solar input during day mode, the average

[2] With both the fan and heater on full mode, the device requires 1700 watts, which is a conservative number. Assuming a contribution of solar input during day mode, the average energy requirement is likely to be 1200 watts, or 22 kWh. Both estimations are calculated for an 18 hour period.

### PORTABILITY

Each SecaCafé device will come disassembled in a box that contains all the pieces and equipment required to ensure easy transport to the remote farms (which are usually accessed via donkey or truck). Each piece will be pre-cut and partially assembled when possible and the kit will come with simple, visual instructions for do-it-yourself assembly. This model enables the device to be very portable, both from point of purchase to the farm as well as on the farm itself (e.g. impermanent structure). Additionally, the device takes up little space compared to alternatives, which is important on the commonly space-constrained farms. The legs of the device can also be adjusted if needed for placement on a hillside.

### CAPACITY

The device is currently designed to process approximately 35 kg of dry beans in an 18-hour period, which represents roughly 30% of daily production capacity for a farmer with three hectares. The device could be used to dry only the portion of the crop that will of the highest quality, i.e. the specialty batch. Alternatively, a farmer could purchase multiple units to dry the entire crop in the device. Further iterations will consider creating additional features to increase the processing capacity of a single device.

## PRODUCT TESTING

The device has been tested for both form and functionality and yielded positive results for both. Using the temperature and humidity sensors to capture data and microprocessors to regulate the system, the results from initial testing over a 24-hour period of soaked beans resulted in a weight loss of 60%, which is greater than the target weight loss for complete drying of 50%. Additionally, the smart system successfully regulated the temperature and humidity levels based on the pre-programmed optimal levels (maximum temperature 50°C; min temp 40°C; max humidity 70%). This regulation ensured the beans were not overheated or exposed to too much humidity. The results from the initial trials can be found in Appendix D.

For next steps on prototype development and additional features, refer to the "LEARNING PLAN".

## IMPACT POTENTIAL

SecaCafé will enable farmers to dry their crop in a controlled, consistent, and efficient way. The consistency of this drying method ensures that the farmer cannot over- or under-dry the coffee, enabling him to produce consistently high quality coffee (when quality is not lost at other steps). Farmers can then receive an increased price of up to 13% at the point of sales at the COOP (depending on the quality grade and daily price). The automated control of the system significantly reduces the labor requirement for drying, allowing the farmer to spend more time in the field picking crops or focused on other activities.  In addition, it provides psychological and cultural signals of upward mobility, which are crucial in retaining the next generation of farmers.

# BUSINESS MODEL

## VALUE PROPOSITION

Given the shared interest among different players along the value chain of quality and consistency, SecaCafé provides a compelling value proposition throughout the value chain. The team plans to engage players based on their respective value proposition in various roles within the business model. Players will be reached through direct and indirect channels. The value proposition and engagement approach for different players can be summarized in the following table:

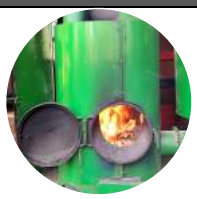
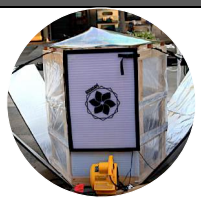
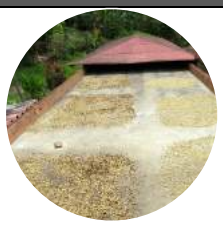
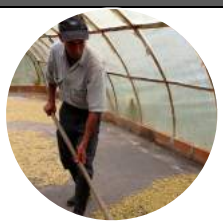
### TABLE 1: VALUE PROPOSITION SUMMARY AND ENGAGEMENT MODEL

| Player | SecaCafé Value Proposition | Channels | Role in Business Model |
|---|---|---|---|
| **Farmers** | - Reliable 24 hour drying capacity<br>- High quality production (fewer defects); access to higher prices<br>- Specialty grade processing<br>- Decreased labor<br>- Aspirational dignity | - Demonstrations (with COOPs) (direct)<br>- COOP technical assistants (indirect)<br>- Radio (direct)<br>- Facebook (direct)<br>- Conferences (indirect) | End-user |
| **COOPs / COOP General Stores (Almacen)** | - Reliable supply of high quality coffee<br>- Access to premium prices<br>- Mission alignment of improving farmer livelihoods | - Sustainable Harvest relationships (indirect)<br>- Conferences (direct) | - Customers (device buyers);<br>- Sales & Marketing partners<br>- Support in training and after-sale customer service |
| **Sustainable Harvest (importer)** | - Secure supply specialty coffee (taste, cupping score)<br>- Brand<br>- Mission alignment | - Direct high touch relationship | - Local & global partner<br>- Buyer |
| **Roasters** | - Access to consistent, traceable supply of specialty coffee (taste; cupping score)<br>- Brand | - Conferences (direct)<br>- SH relationships (indirect)<br>- Facebook (direct) | - Buyer<br>- Subsidize device purchase (to be tested) |

## COMPETITIVE LANDSCAPE

The primary competitors in the market include mechanical dryers, Marquesinas (greenhouse structures), and Elbas (cement sun patios with metal covers).

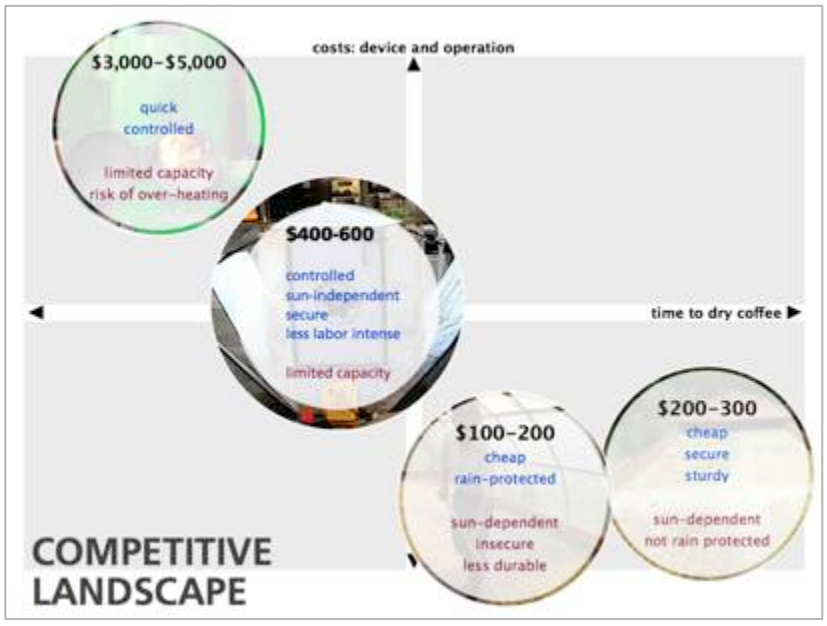
### TABLE 2: COMPETITIVE ANALYSIS

| Name | Mechanical Dryer | SecaCafé | Elba | Marquesina |
|---|---|---|---|---|
| Picture |  |  |  |  |
| Description | External heat source - wood, gas, coal, dry parchment; beans stacked in silos<br>Hot air flow | Hybrid model with sunlight and electric energy; automated temperature & humidity control | Cement flatbeds with retractable metal covers; usually located on roof of farmer's house | Greenhouse-like structures with patio |
| Advantages | Quick<br>Controlled<br>Volume | Quick<br>Controlled<br>Reliable<br>Clean energy | Affordable<br>Security (protect against theft) | Affordable<br>Rain protection<br>Heat retention |
| Disadvantages | Expensive<br>Inefficient (heat loss)<br>Labor intensive (fuel loading) | Capacity | Weather-dependent<br>Raking | Lack durability<br>Space<br>Security (theft)<br>Raking |
| Time to dry | 18 hours | 18 hours | 3-6 days | 3-6 days |
| Price | $3,000 - $5,000 | $580 | $200-$300 | $100-$200 |

Raking is disadvantage in Marquesinas and Elbas because time spent raking takes the farmer away from other productive activities or the farmer has to hire additional labor, which can cost up $13 per laborer per day.

The following figure summarizes SecaCafé's positioning in relation to its competitors along the dimensions of time-to-dry and cost.

## FIGURE 2: COMPETITIVE LANDSCAPE




## SALES AND MARKETING

SecaCafé will initially be sold through a business-to-business model in which COOP Almacens (general stores) are the initial target buyers of the device. These shops will then retail the product to farmers through their current B2C models, taking a margin (estimated between 1.5-3% based on initial conversations and current practices).[3] Today smallholder farmers buy all their materials and devices from their local Almacens; this business model was chosen to align with existing farmer behavior for equipment purchases.

Demand generation will be done initially through demonstrations facilitated by the COOPs and their technical assistants (tecnicos). The team will work through Sustainable Harvest's relationships with the COOPs to select early adopter farmers to participate in the demonstrations. Given the importance of assembly, the team will invest time and materials into training the local technical assistants who will then train the farmers on how to assemble and use the device. Working through the technical assistants is more effective than direct marketing because of the pre-existing trust relationships. SecaCafé will also contract tecnicos to provide after-sales services, including maintenance and repairs, and other technical related customer service questions. Farmers can contact SecaCafé team directly through Facebook, email, or phone. [4]

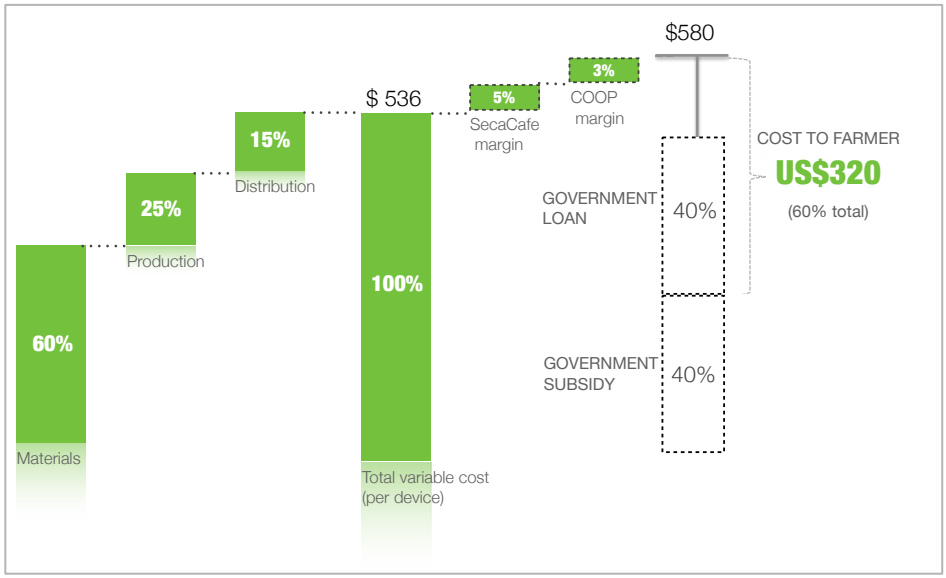
[3] Commercial retailers of dryers and other agriculture equipment typically take a 25-30% margin
[4] Interviews with farmers in Antioquia indicated that Facebook was a common and increasingly used platform for connectivity, particularly among the younger farmers.

## PRICE AND PAYMENT

The SecaCafé device is currently priced at US$580, which is based on a cost-based pricing strategy. FIGURE 3: SECACAFÉ COST BREAKDOWN breaks down the cost structure per device.[5] In the Antioquia region, the National Coffee Federation (FNC) offers support to farmers to purchase mechanical dryers, which includes a 40% subsidy as well as a 40% low-interest loan. Thus, the upfront cost to the farmer could be reduced to US$320. In order to obtain the subsidy, farmers must apply through their local COOP, which is an important factor in the decision to sell SecaCafé devices through COOP Almacens. One of the initial implementation steps will include negotiations with FNC to establish SecaCafé as qualified for the subsidy.

In addition, the team is exploring the possibility of buyers / roasters' willingness to pay a premium of a few cents for coffee that is guaranteed to be dried correctly, using a SecaCafé device. This additional premium could further help subsidize the cost of the device for the farmer. While this component is in very early stages and requires further exploration, preliminary conversations with buyers suggest willingness to pay and enthusiasm for the possibility to ensure the consistency and quality from the drying process.

### FIGURE 3: SECACAFÉ COST BREAKDOWN




## MARKET SIZE

The first two years (market validation and growth) will primarily target the COOP Andes in Antioquia, which includes 10,000 farmers, 60% of which do not currently own a mechanical dryer. The team aims to reach at least 13% of this market by the end of year 2 (based on conservative growth estimates). Growth will include targeting the other COOPs that partner with Sustainable Harvest across Colombia, beginning with the three COOPs in Antioquia, which combine with Andres includes 93,000 farmers. There

[5] Costs based on materials and production costs in Colombia, which is where devices will be produced for the market validation phase.

are 553,000 coffee farmers in Colombia, of which 95% produce on less than five hectares and account for 69% percent of Colombia's total coffee production. The global market for long-term growth is estimated around 50 million smallholder coffee farmers.

## PRODUCTION & DISTRIBUTION

The production and distribution plan evolves over time to align with pilot, market validation, and growth phases.

- **Pilot phase:** Prototypes will continue to be produced in California, transported by UPS to Colombia, and assembled by the SecaCafé team for testing on the ground. Locally sourced materials in California will be used as well as technical shops in the Bay area and available Stanford resources for prototype testing and assembly.
    - During this phase the team will begin to identify contacts and establish relationships with production, assembly, and logistics players on the ground in Colombia in preparation for market launch and local production.
- **Phase two (November 2013 – November 2014):** Most materials will be sourced locally from suppliers in Colombia in order to leverage up to 40% lower cost of materials as well as convenience of local shipping and logistics. The elements of the device that are not available locally will be imported from the US, including the space blanket insulators, the nichrome wire heaters, the microprocessor and the sensors. One individual on the ground will be contracted to oversee local sourcing and assembly. We will contract time with a local technical shop that the COOP Andes currently works with to assemble the devices and package them for distribution to the Andes Almacen for sale. Initial discussions with local contacts at COOP Andes are underway to facilitate this process. With growth, the team will contract a manufacturing / assembly facility, likely based in Medellin, to assemble and package the products. The team has made initial contacts with potential manufacturing and distributing partners, including an existing large agriculture equipment supplier and a green energy supplier.
- **Phase three (November 2014 – onward):** Once a sufficient volume of production is reached, sourcing materials and assembly will likely shift to China to leverage further cost savings (approximately 60% savings). However this plan will be tested in the market validation phase to determine feasibility of production and logistics as well as cultural perception of goods imported from China.

## GO TO MARKET PLAN

Introducing SecaCafé into the market and subsequent market expansion will occur in phases: Pilot and testing, Market validation, Expansion and growth.

1. **Pilot and testing** (June – September 2013).
    a. *Form finalization* – finalize prototype for farmer testing, optimizing form, function, and usability
    b. *Pilot test* – work with COOP Andes (who will identify farmers to test with) to conduct pilot test, comparing the quality output of SecaCafé device to other drying methods and a control group. Engage third party tester for

analytical testing results. Receive feedback on design, materials, and usability from farmers.

c. *Logistics research* **–** continue research on sourcing, production, and distribution partners in Colombia through phone calls and visits in country.
d. *Process patent / IP registration*
e. *Let's Talk Coffee* (October 30-November 3, 2013) – Beta Product Launch. Let's Talk Coffee is a conference held by Sustainable Harvest in which 500 global players from across the specialty coffee market gather for collaboration and training. [6]

2. **Market Validation** (October 2013 – November 2014). This phase will launch with the Let's Talk Coffee conference in El Salvador, where we aim to introduce the beta version of SecaCafé, with the aim of receiving the first rounds of orders. In this phase, the team will work with COOP Andes to identify potential early adopters (those who have exhibited behavior of adoption of new techniques) and influencers of the 6000 target farmers.

   The team will use a geographically localized market entrance strategy for several reasons: to leverage the cultural tendency to adopt based on examples of neighbors (social influence); to increase collective volume of improved quality beans for purchasing power (e.g. beans are aggregated before sold to roasters, so need high volume of quality beans from same region); to create regionalized reputation for high quality beans (increase potential for purchase guarantees from roasters).

3. **Expansion & growth (November 2014 - onward).** Based on results from the market validation period, the team will expand its efforts to the other COOPs that Sustainable Harvest works with in Antioquia, which hosts 96,000 farmers. Then the team will target Sustainable Harvest's other partnership COOPs in Colombia, prioritizing those with the strongest relationships and previous behavior of early technology adoption. The team will also begin to consider other markets, including Peru and Mexico, maintaining the strategy of first working with COOPs through the Sustainable Harvest relationship. The team will focus on countries that Sustainable Harvest operates in in order to leverage the existing relationships, which increases ease of establishing operations as well as facilitates farmer adoption.

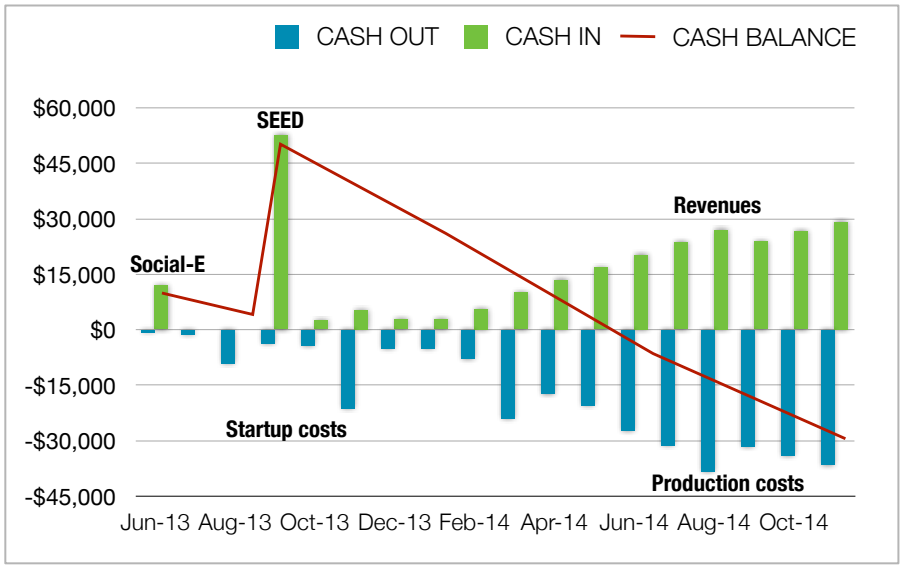
[6] Let's Talk Coffee is a specialty coffee conference and training event where 500 attendees from over 25 countries come together to openly and transparently discuss how to bring the sustainability of the industry to scale. Attendees include 250 producers, cooperative managers and exporters, 35 NGO representatives, 40+ roasters, 15+ financers, 10+ lending organizations, 15+ certifiers and numerous other industry exports

# FINANCIAL PLAN

## START-UP PHASE

The financial plan for SecaCafé entails initial funding from philanthropic and incubator programs to support the start-up phase of the social enterprise until becoming sustainable on revenues generated from sales of devices, which is estimated to occur between year 2 and year 3 of operating (2016). The first 18 months of operation will required approximately $115,000 (from June 2013 – November 2014). The primary drivers of costs include materials for production, travel to Colombia for testing and market introduction, office space for the team, and a modest living stipend for the full-time team members. For a detailed 18-month budget, refer to Appendix F.

### FIGURE 4: 18-MONTH CASH FLOW OVERVIEW



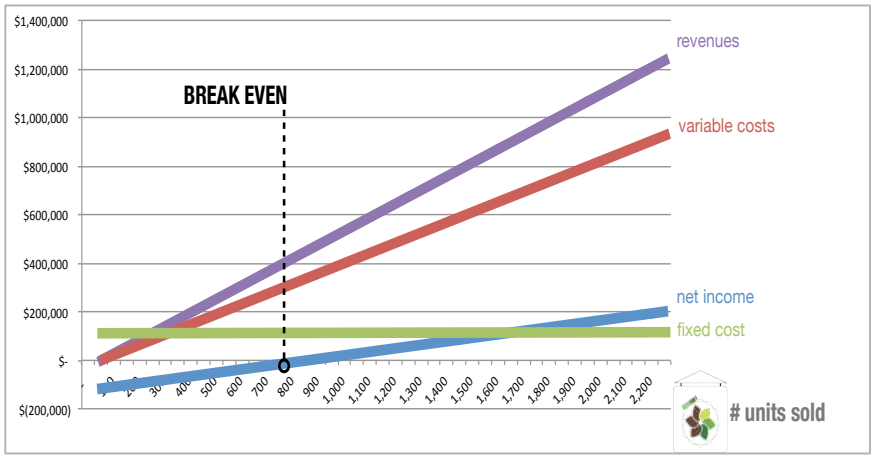

## GROWTH

SecaCafé aims to have strong and steady growth over the next three years. Based on a growth rate of 10% in Year 1 and 40% in Year 3, the team estimates it will generate positive net income beginning in Year 3 (2016). Based on these estimates, the SecaCafé will break even with sales of 813 devices. These estimates are based on an assumption of increased margins due to lower production costs from mass production; these margins fall slightly below the typical commercial margins of comparable agriculture equipment providers in Colombia, who typically charge 25-30%. FIGURE 5 provides the detailed estimates of SecaCafé's financial statements.

## FIGURE 5: SECACAFÉ THREE YEAR FINANCIAL ANALYSIS

| | Year One | % | Year Two | % | Year Three | % |
|---|---|---|---|---|---|---|
| **Total Income** | 192,546 | 100.00% | 428,002 | 100.00% | 557,740 | 100.00% |
| **Total Cost of Sales** | 143,640 | 74.60% | 319,291 | 74.60% | 416,076 | 74.60% |
| **Gross Margin** | 48,906 | 25.40% | 108,711 | 25.40% | 141,664 | 25.40% |
| **Total Salary and Wages** | 72,718 | 37.77% | 74,899 | 17.50% | 77,146 | 13.83% |
| **Total Fixed Business Expenses** | 44,040 | 22.87% | 45,361 | 10.60% | 46,722 | 8.38% |
| **Operating Income (before Other Expense [EBITDA]** | (67,852) | -35.24% | (11,549) | -2.70% | 17,796 | 3.19% |
| **Other Expenses** | | | | | | |
| **Amortized Start-up Expenses** | 3,500 | | 3,500 | | 3,500 | |
| **Taxes** | - | | - | | 3,559 | |
| **Total Other Expenses** | 3,500 | 1.82% | 3,500 | 0.82% | 7,059 | 1.27% |
| **Net Income** | (71,352) | -37.06% | (15,049) | -3.52% | 10,737 | 1.93% |

## FIGURE 6: BREAK-EVEN ANALYSIS




## FUNDRAISING STRATEGY

In order to finance the first 18 months of operation, the team will seek several sources of philanthropic and incubator program support. The team plans to apply for Stanford's Social-E program (for June – August) and to Stanford's SEED program (September 2013 – May 2014). These resources combine will meet the team's cash flow requirements until approximately March 2014. The team has identified additional target sources of funding based on initial research and conversations. Sources were selected for mission alignment and fit with SecaCafé's mission and stage of development. The second round of target funding sources include:

- **HCD Microgrants** (Human-Centered Design Connect) – Implementation grant (US$10,000 grant)
- **ACDI VOCA** - a Colombian based non-profit that supports economic development and social impact projects through grants.
- **Stanford's Morrison Institute for Population & Resources** – an academic

organization that provides grants for social and economic development projects
- **Echoing Green** – network, mentorship, and funding program for social enterprises

## MANAGEMENT PLAN

**Team:** The SecaCafé team will continue consist of the four members of the Design for Extreme Affordability class team – Jessika Adrian, Lukas Friedemann, Lily Lyman, and Scott MacDonald – as well as continue close collaboration with the primary partner, Sustainable Harvest. Over the summer, Lukas and Scott will work full-time, with Jessika and Lily supporting part-time. Members of the team will travel to Colombia in August to test the prototype with farmers and collect data on effectiveness and user experience. In September, Lukas will continue on full-time, Lily and Scott will continue on as part-time as they finish their degrees, and Jessika will continue to work part-time as she finishes her post-doc work. Refer to Appendix A for detailed team bios. Over the course of the summer, the team will explore options for the organizing structure of the team, considering social enterprise (for-profit), non-profit, and hybrid options.

**Partners:** The team will continue to work closely with Sustainable Harvest, specifically with David Griswold and Pam Kahl in Portland Oregon and with David Piza and Olga Cuellar and Claudia Rocio Gomez Ramos in Colombia. Refer to Appendix B for detailed Sustainable Harvest team bios.

**Collaboration and c.LAB:** Over the course of the class, the two teams working with Sustainable Harvest realized the important synergies across the groups and opportunity for collaboration. Given the aligned mission of improving the livelihood of coffee farmers in Colombia and the inter-connected of the products developed as solutions to improve coffee quality, members of two teams have decided to combine into one team going forward. Both teams plan to apply to Social-E funding separately to continue the development of the two devices.

In discussions with Sustainable Harvest's founder and CEO David Griswold, the collective group recognized the potential for an entity dedicated towards bringing human-centered design thinking and innovation to the coffee value chain. The team is referring to this idea as c.LAB (coffee lab). While the teams, in collaboration with Sustainable Harvest, are still in the process defining how this entity would operate and the role of the two devices (drying device and fermentation monitor), the team is excited about its potential.

## LEARNING PLAN

The SecaCafé team recognized the importance of tracking progress throughout every stage of growth. Building off of the progress achieved in the past five months, the team will continue to test and iterate the prototype as well as explore the market for SecaCafé. Specifically, the team will focus on the following questions over the next three months:

Prototype:

- What are the optimal materials to ensure durability, transportability, and affordability? What are the optimal materials to ensure no damage to bean flavor or quality? Which material are long lasting?
- What is best form for easy and safe loading and unloading?
- What is the best form to manage condensation on the upper level?
- How can we ensure even drying between levels, regardless of weather?
- How can we enclose and fix the sensors and microprocessors to ensure safety from potential damage?
- How should a read-out monitor and controls to adjust temperature/humidity be integrated?
- How sensitive is structure to wind?
- Is the coffee drying consistently within and across layers or is rotation or raking required?

Usability

- What are the existing strategies / lessons learned on best ways to design for self-assembly?
- What elements should come pre-assembled versus self-assemble on the farm?
- What are the most likely issues requiring later repairs and maintenance and how will they be serviced?
- What is the most effective channel to communicate assembly and use instructions?

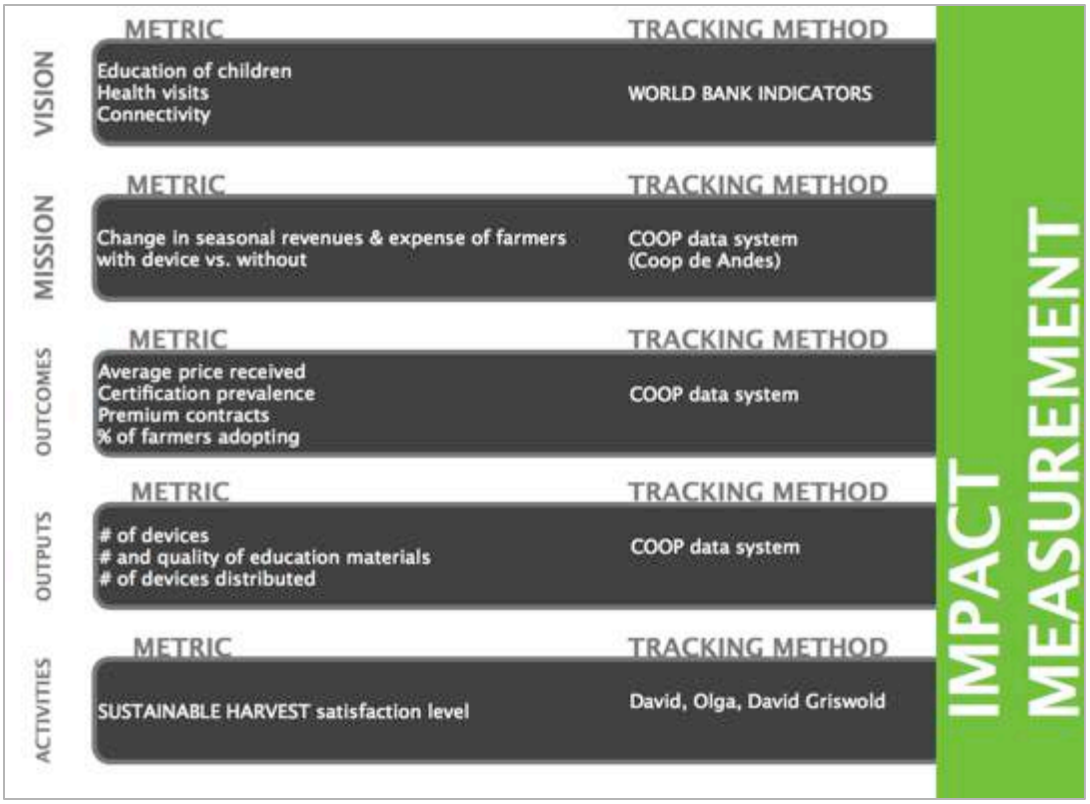
Business model

- What guarantee/benefits do farmers need to test the product?
- What exact information do buyers find valuable and would be willing to pay for and how can it be guaranteed?
- What are the most effective sales and distribution strategy beyond the COOP Andes, given different levels of resources and relationships across cooperatives?
- What are payment options and subsidy options outside of Antioquia and how can SecaCafé leverage them?

**Long term:** For the long-term steady state, in order to organize its activities and goals, the team created a Theory of Change and designed an Impact Measurement Plan against it. This framework will enable the team to remain connected to the end goal of improving livelihoods for smallholder coffee farmers. The details of the Theory of Change and Impact Measurement Plan are found in Figure 7 and Figure 8.

## FIGURE 7: THEORY OF CHANGE

## FIGURE 8: IMPACT MEASUREMENT PLAN



## RISK MANAGEMENT PLAN

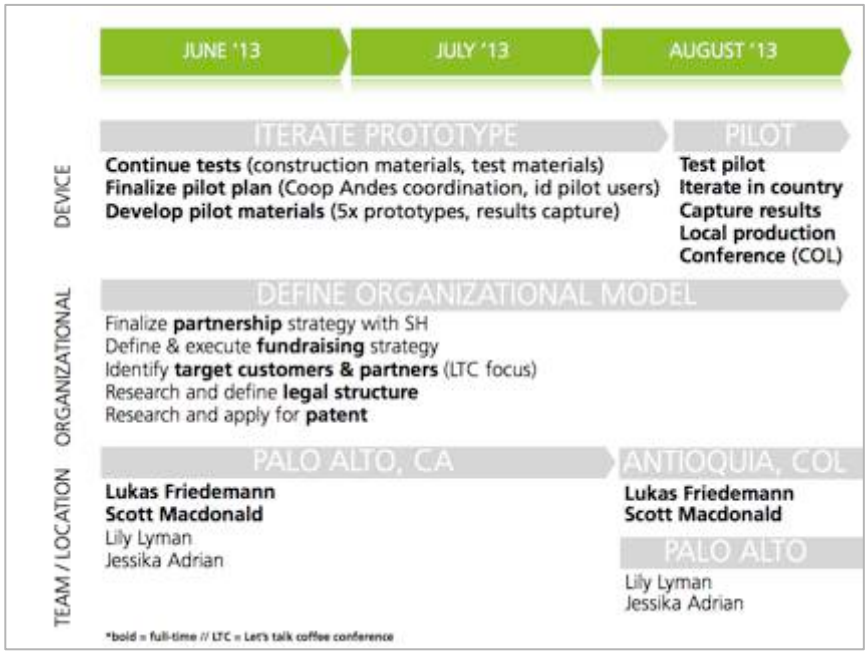
As with any endeavor, the SecaCafé plan entails certain risks that could inhibit or slow the growth plan. The team has identified some of these potential risks and is working to develop mitigation plans.

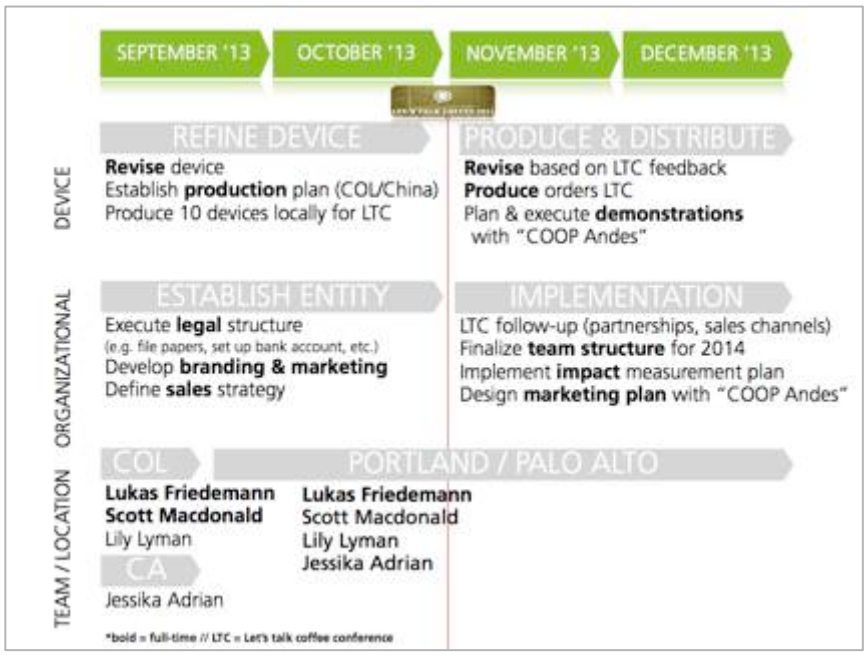
| Risk | Risk Mitigation Strategy |
|---|---|
| Competition – new market entrants | Patent design; move quickly for first mover advantage |
| Mechanical complexity of device – high maintenance and repair needs | Explore simplest, most durable mechanical pieces (sensor and arduino); train local tecnicos in repairs |
| Mechanical complexity of device – resistance in usability | Test different user interfaces and experience; adjust based on feedback; consider pre-program arduino settings |
| Reputation risk in product launch (if errors / failures occur) | Conduct rigorous product testing before launch; soft launch with Beta test with expectation setting for test (incentives and communication) |
| Expected funding not obtained | Approach friends & family; implement more conservative growth plan |
| Infrastructure and transportation – poor road quality disrupt timely product delivery | Package device to optimize for ease of transportation across many vehicles, including donkey, small truck, etc. |

# ACTION PLAN

In order to execute on this plan, the team has mapped out immediate next steps to transition to post-class operations. This plans includes immediate activities for the prototype, the organization, and the team locations. The details and resourcing is found in FIGURE 9:

### FIGURE 9: ACTION PLAN



# ACKNOWLEDGEMENTS

The SecaCafé team would like to thank all the people that helped make this project possible. Specifically we would like to thank the team from Sustainable Harvest – David Griswold, David Piza, Olga Cuellar-Gomez, Claudia Rocio Gomez Ramos, Pam Kahl, Bong Suh, Paul Gelburd. From the COOP Andes, we would like to thank Fernando Jaramillo.

We would like to thank our coaches, Dave Lyons, Bruce Corson, and Ximena Rueda. And we would like to thank the entire Design for Extreme Affordability teaching team.

For more information, please contact SecaCafe@gmail.com

# APPENDICES

## APPENDIX A: SECACAFÉ TEAM BIOS

**JESSIKA ADRIAN I PhD in Developmental Plant Biology**. As a postdoctoral research fellow at the Biology Department at Stanford University, Jessika manages all aspect of her research projects from the overarching concept to design and execution of experiments, to presenting and communicating results with colleagues as well non-biologist. Although Jessika is convinced that basic research of plants is fundamentally important and her research might eventually influence people's health by improving access to better food and cleaner air, she is more excited about applying her skills and knowledge in a more direct way.

**LUKAS FRIEDEMANN I M.A. in International Policy Studies** with a focus ondevelopment and social innovation. During his undergrad, he developed strong interest in and passion for Latin American political and economic development, strengthened by his work and academic experience in Bolivia and Argentina.His skill set in human-centered design, randomized controlled trials, and policywork come from working with the Peruvian Embassy, Innovations for Poverty Action, the United Nations High Commissioner for Refugees (UNHCR), and the Design for Extreme Affordability class at Stanford University. Lukas is fluent in German, Spanish, French, and English and is a passionate photographer and surfer.

**LILY LYMAN I MBA**. Lily holds a BA from Harvard where she focused on International Development, and is pursuing her MBA from Stanford GSB. Lily spent two years living and working in Chile with Endeavor, an organization that supports entrepreneurs in emerging and frontier markets. Through her work with Dalberg, an international development management consulting firm, she brings experience in strategy, business development, impact measurement across a variety of sectors, including agriculture, health, and economic empowerment. She brings experience in human-centered design through her work with the Nike Foundation and the Design for Extreme Affordability class at Stanford. Lily is fluent in Spanish.

**SCOTT MACDONALD I M.S. Mechanical and Design Engineer**. Scott's program emphasizes cross-functional, project based education in new product development. Core courses on design thinking and methodology are supplemented with courses in human factors, business, and engineering. Scott is trained as a mechanical engineer, and prior to attending Stanford, he spent time designing and developing products for international clients in medical, consumer, and industrial markets. Scott holds a Bachelor of Science in mechanical engineering from UC Boulder. He is fluent in Spanish.

## APPENDIX B: SUSTAINABLE HARVEST

### SUSTAINABLE HARVEST

Sustainable Harvest is an importer of high quality specialty-grade coffees from 15 countries around the world. Their unique Relationship Coffee model promotes investment in farmer training and development in coffee communities to bring a reliable, traceable, and premium product to the coffee roasters they work with. Founded in 1997, they now have a team of 38 staff across five offices worldwide that works day to day to create unprecedented connectivity among their supply chain, impacting the lives of 185,000 farmers.

### DAVID GRISWOLD // FOUNDER AND PRESIDENT

David's coffee career began in 1989, when he was helping organic coffee cooperatives in Mexico find new markets for their coffee. David and a group of farmers co-founded Aztec Harvest, the first coffee importing and marketing office owned by small-scale Mexican coffee growers. David directed Aztec Harvest from 1990 to 1995 and founded Sustainable Harvest in 1997. David had extensive experience in international development as a journalist in the developing world during his Thomas J. Watson Fellowship. He began his work in social enterprise under the mentorship of William Drayton at Ashoka as Communications Director, a position he held from 1987 to 1989. He also worked as Director of Coffee Programs for Conservation International.
David served as President of the Specialty Coffee Association (SCAA) from 2003 to 2004 and led the association in its first Sustainability Conference. In 2008, David received the SCAA's Outstanding Contribution Award in recognition for his contribution to the SCAA and the specialty coffee industry. In 2010, he was named one of America's Most Promising Social Entrepreneurs by Bloomberg Businessweek. He speaks English and Spanish

### OLGA CUELLAR-GOMEZ

Olga implements socioeconomic development and training programs for coffee suppliers in South America. She creates relationships with strategic partners for projects in coffee communities, and plays a key role planning the annual Let's Talk Coffee event and other meetings to promote training, education and marketing for smallholder coffee farmers. Olga was born in a coffee-growing region of Colombia to a family involved in specialty coffee and international development, and it was there that she began her lifelong involvement in coffee. She combined her interests in specialty coffee and gender studies in a master's degree in Latin American Studies at the University of Arizona with a thesis examining the empowerment of women coffee growers in Colombia. She is fluent in Spanish, English, and Portuguese and is a licensed Q-Grader. Coffee has filled Olga's life with wonderful experiences and an understanding of the socio-economic imbalances of the world, which have furthered her passion for the work that she does.

### CLAUDIA ROCIO GOMEZ

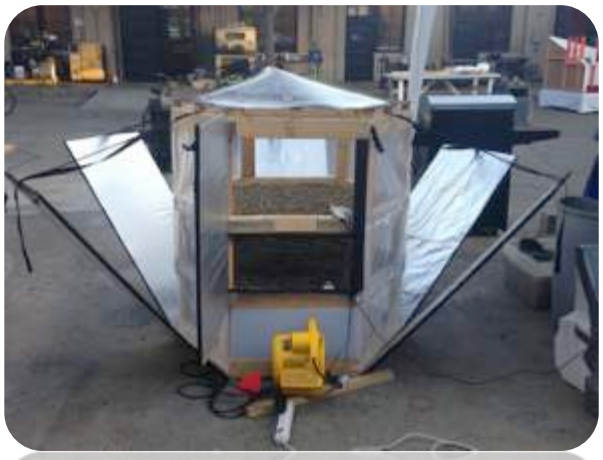
As our Coffee Quality Manager, Claudia works with coffee organizations in our supply chain to train cuppers and implement protocols that permit them to standardize their processes, offer better quality, provide a consistent product, and grow commercially. Since joining Sustainable Harvest, she has established quality training manuals,

cupping laboratory systems, and diagnostics on coffee processing plants. Claudia has 14 years of extensive and well-rounded background in the coffee industry, with specific expertise in quality assurance and sensorial analysis. Hailing from Bogota, Colombia, Claudia graduated as a food science engineer from Jorge Tadeo Lozano University and worked in the Specialty Coffee division of the National Federation of Coffee Growers of Colombia. A certified Q-grader and Instructor, Claudia has spent her entire career fostering relationships with members of all levels of the coffee supply chain.

**DAVID PIZA**

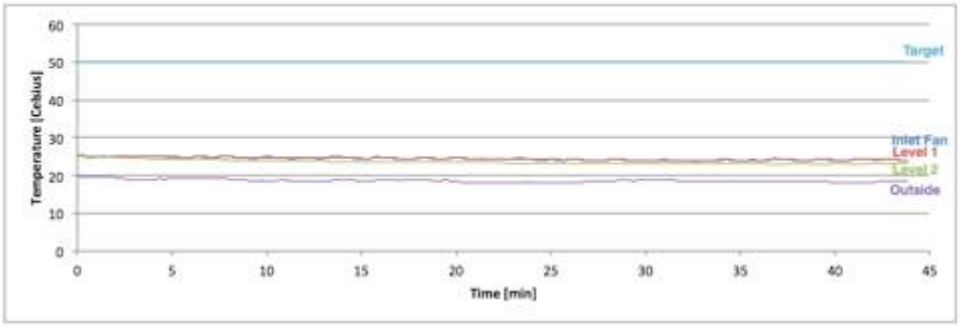
Raised in Medellin, Colombia, David brings expertise in value chain analysis and marketing strategies for international trade in the coffee sector. David previously worked at the Coffee Quality Institute and is a coffee cupper and barista competition judge. The best thing about his job, he says, is the opportunity to connect great coffee producers with buyers internationally–to serve as a link between the producer organizations and the market, understanding both side of the equation and harmonizing producers' interests with market needs. He recently ran the largest and most successful Let's Talk Coffee in 2012 for Sustainable Harvest and is an integral part in the establishment of our new office in Colombia. He speaks Spanish, English, Italian, French, and Portuguese.

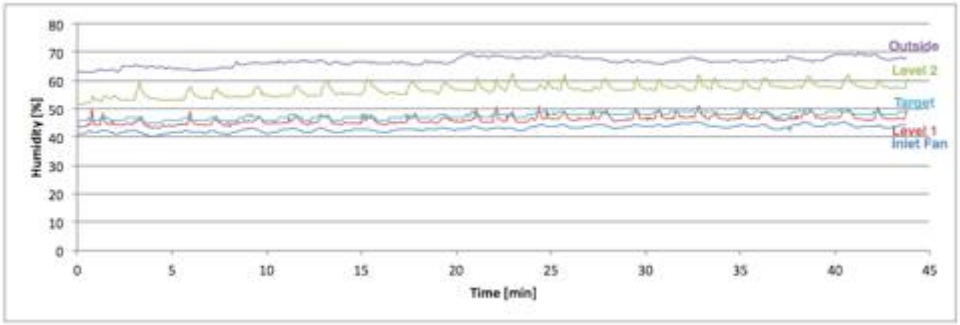
## APPENDIX C: PICTURES OF SECACAFÉ DEVICE



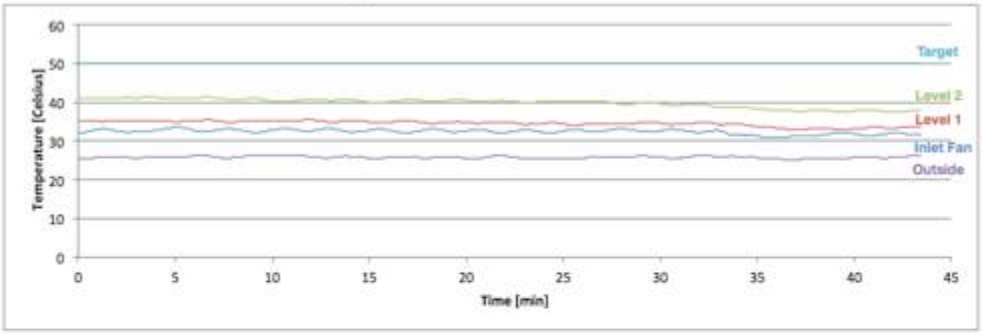
## APPENDIX D: TEST DATA FROM PROTOTYPE TESTING

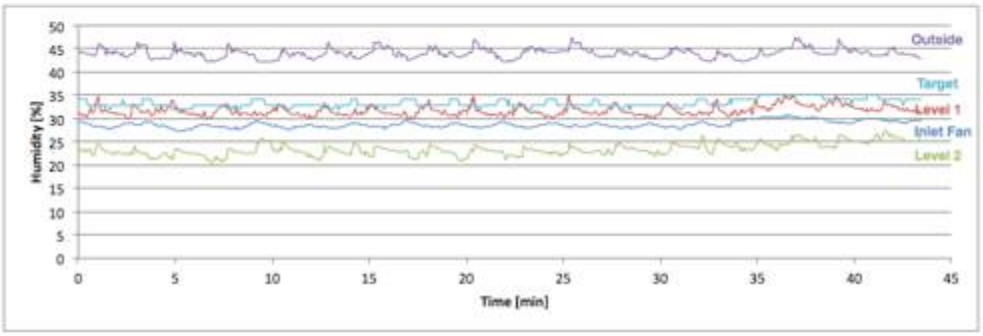
Night Mode Test Data




Day Mode Test Data



## APPENDIX E: BREAKDOWN OF DEVICE COSTS

*Phasing of production location includes 1-US, 2-Colombia, and 3-China

| Materials | | | Phase 1 (US) | Phase 2 (CO) | Phase 3 (China) |
|---|---|---|---|---|---|
| | Unit cost | # units | Total (US) | Total (CO) | Total (mass) |
| 2x4 wood (12') | $8.00 | 6 | $48 | $38 | $19 |
| tarp (outer) | $15.00 | 1 | $15 | $12 | $6 |
| wire screen | $30.00 | 2 | $60 | $48 | $24 |
| Arduino | $35.00 | 1 | $35 | $28 | $14 |
| Sensors | $10.00 | 4 | $40 | $32 | $16 |
| Nichrome wire heater | $25.00 | 1 | $25 | $20 | $10 |
| space blanket (base) | $15.00 | 3 | $45 | $36 | $18 |
| Fan | $60.00 | 1 | $60 | $48 | $24 |
| Corrogated plastic sheets | $10.00 | 2 | $20 | $16 | $8 |
| Straps and clasps | $4.00 | 7 | $28 | $22 | $11 |
| Misc | $30.00 | 1 | $30 | $24 | $12 |
| **Total device** | | | **$406** | **$325** | **$162** |
| | | | | | |
| **Production (per unit)** | | | | | |
| Manufacturing | | | $0* | $50 | $30 |
| Assembly | 25% | | $0* | $81.20 | $40.60 |
| | | | | | |
| **Distribution (per unit)** | | | | | |
| Shipping (per unit) | | | $200 | $50 | $150 |
| Logistics (assembly house - customer) (per unit) | | | $30 | $30 | $30 |
| Import costs | | | $20 | $0 | $8 |
| | | | | | |
| **Total costs** | | | **$656** | **$536** | **$421** |

| Margin assumptions | | | |
|---|---|---|---|
| SecaCafe Margin | 5.0% | 5.0% | 5.0% |
| Price to retailer | **$689** | **$563** | **$442** |
| COOP Margin | 3.0% | 3.0% | 3.0% |
| **Price to farmer** | **$676** | **$579** | **$455** |

*Assumption of 20% cheaper materials in Colombia and 60% cheaper in China. Assumptions based on interviews and desk research

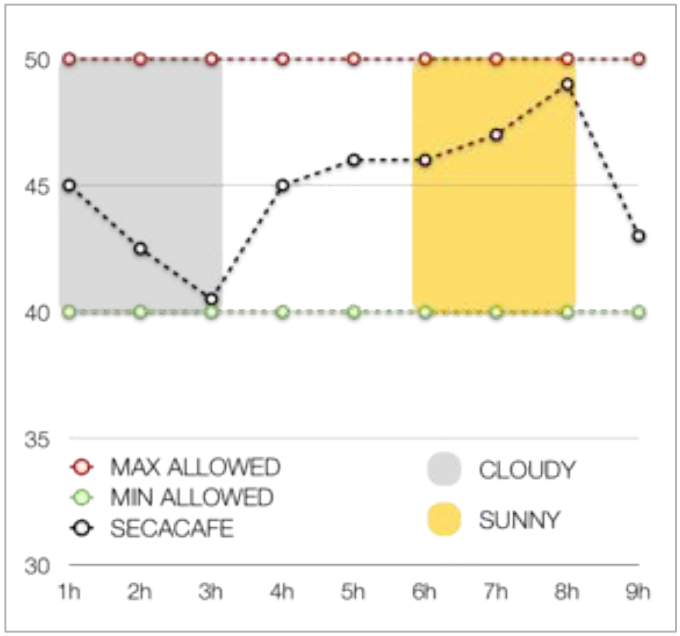
# APPENDIX F: SECACAFÉ DETAILED 18-MONTH BUDGET

| Cash flow | PROTOTYPE / TEST PHASE | | | | | REVISE & REFINE PHASE | | | FLY CROP (Colombia) | | | | | PEAK SEASON RAMP UP | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 13-Jun | 13-Jul | 13-Aug | 13-Sep | 13-Oct | 13-Nov | 13-Dec | 14-Jan | 14-Feb | 14-Mar | 14-Apr | 14-May | 14-Jun | 14-Jul | 14-Aug | 14-Sep | 14-Oct | 14-Nov |
| **Revenues** | | | | | | | | | | | | | | | | | | |
| % of target market | | | | | | | | | | 0.3% | 0.4% | 0.5% | 0.6% | 0.7% | 0.8% | 0.9% | 1.0% | 1.1% |
| Est # units sold | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 5 | 10 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 |
| Price / unit | $689 | $689 | $689 | $689 | $689 | $563 | $563 | $563 | $563 | $563 | $563 | $563 | $563 | $563 | $563 | $442 | $442 | $442 |
| **Total revenues** | $0 | $0 | $0 | $0 | $0 | $2,814 | $2,814 | $2,814 | $5,628 | $10,130 | $13,507 | $16,884 | $20,261 | $23,638 | $27,014 | $23,878 | $26,531 | $29,184 |
| **Variable costs** | | | | | | | | | | | | | | | | | | |
| COGS | $0 | $0 | $0 | $0 | $0 | $2,680 | $2,680 | $2,680 | $5,360 | $9,648 | $12,864 | $16,080 | $19,296 | $22,512 | $25,728 | $22,740 | $25,267 | $27,794 |
| **EBITA** | $0 | $0 | $0 | $0 | $0 | **$134** | **$134** | **$134** | **$268** | **$482** | **$643** | **$804** | **$965** | **$1,126** | **$1,286** | **$1,137** | **$1,263** | **$1,390** |
| Gross Margin | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% |
| **Fixed costs** | | | | | | | | | | | | | | | | | | |
| **PPE** | | | | | | | | | | | | | | | | | | |
| *Prototypes built (assumptions)* | 1 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | |
| Prototype materials | $406 | $812 | $812 | $812 | $812 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Prototyping lab equipment & tools | $400 | $400 | $400 | $400 | $400 | | | | | | | | | | | | | |
| Rent (office space) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $800 | $800 | $800 | $800 | $800 |
| **Human capital** | | | | | | | | | | | | | | | | | | |
| Living stipend (1 x FTE) | $0 | $0 | $0 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $2,500 | $6,000 | $6,000 | $6,000 | $6,000 | $6,000 | $6,000 |
| Contracted Col rep | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 | $2,000 |
| Part-time (3x) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| HR benefits | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Marketing costs** | | | | | | | | | | | | | | | | | | |
| Website | $0 | $0 | $350 | $12 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Training/demonstration materials | $0 | $0 | $300 | $0 | $500 | $0 | $0 | $0 | $0 | $500 | $0 | $0 | $0 | $0 | $500 | $0 | $0 | $0 |
| Fundraising materials | $0 | $0 | $100 | $0 | $0 | $200 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Free samples | $0 | $0 | $0 | $0 | $0 | $2,680 | $0 | $0 | $0 | $2,680 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Travel (prototype pilot) | $0 | $0 | $6,600 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Travel (LTC El Salvador) | $0 | $0 | $0 | $0 | $0 | $13,200 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Travel (demonstrations) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $6,600 | $0 | $0 | $0 | $0 | $3,300 | $0 | $0 | $0 |
| **Legal Costs** | | | | | | | | | | | | | | | | | | |
| Legal counsel | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Patent filing | $0 | | $500 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Trademark | $0 | $100 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Tax preparation | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Total operating costs** | **$806** | **$1,312** | **$9,062** | **$3,724** | **$4,212** | **$18,580** | **$2,500** | **$2,500** | **$2,500** | **$14,280** | **$4,500** | **$4,500** | **$8,000** | **$8,800** | **$12,600** | **$8,800** | **$8,800** | **$8,800** |
| **Net income** | **($806)** | **($1,312)** | **($9,062)** | **($3,724)** | **($4,212)** | **($18,446)** | **($2,366)** | **($2,366)** | **($2,232)** | **($13,798)** | **($3,857)** | **($3,696)** | **($7,035)** | **($7,674)** | **($11,314)** | **($7,663)** | **($7,537)** | **($7,410)** |
| **Potential funding sources** | | | | | | | | | | | | | | | | | | |
| SH summer stipend | $0 | $0 | $0 | $2,500 | $2,500 | $2,500 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Social E-lab funding | $12,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Seed lab funding | $0 | $0 | $0 | $50,000 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| **Cash balance** | **$11,194** | **$9,882** | **$820** | **$49,596** | **$47,884** | **$31,938** | **$29,572** | **$27,206** | **$24,974** | **$11,176** | **$7,320** | **$3,624** | **($3,412)** | **($11,086)** | **($22,400)** | **($30,063)** | **($37,599)** | **($45,010)** |

# APPENDIX G: DETAILED THREE YEAR FINANCIAL PLAN

| | Year One | % | Year Two | % | Year Three | % |
|---|---|---|---|---|---|---|
| **Income** | | | | | | |
| SecaCafe | 192,546 | | 428,002 | | 557,740 | |
| **Total Income** | 192,546 | 100.00% | 428,002 | 100.00% | 557,740 | 100.00% |
| **Cost of Sales** | | | | | | |
| SecaCafe | 143,640 | | 319,291 | | 416,076 | |
| **Total Cost of Sales** | 143,640 | 74.60% | 319,291 | 74.60% | 416,076 | 74.60% |
| **Gross Margin** | 48,906 | 25.40% | 108,711 | 25.40% | 141,664 | 25.40% |
| **Salaries and Wages** | | | | | | |
| Owner's Compensation | - | | - | | - | |
| Salaries | 24,000 | | 24,720 | | 25,462 | |
| Full-Time Employees | 41,600 | | 42,848 | | 44,133 | |
| Part-Time Employees | - | | - | | - | |
| Independent Contractors | - | | - | | - | |
| Payroll Taxes and Benefits | 7,118 | | 7,331 | | 7,551 | |
| **Total Salary and Wages** | 72,718 | 37.77% | 74,899 | 17.50% | 77,146 | 13.83% |
| **Fixed Business Expenses** | | | | | | |
| Advertising | 1,200 | | 1,236 | | 1,273 | |
| Car and Truck Expenses | - | | - | | - | |
| Bank & Merchant Fees | 120 | | 124 | | 127 | |
| Contract Labor | - | | - | | - | |
| Conferences & Seminars | 1,200 | | 1,236 | | 1,273 | |
| Customer Discounts and Refunds | 1,200 | | 1,236 | | 1,273 | |
| Dues and Subscriptions | - | | - | | - | |
| Miscellaneous | 600 | | 618 | | 637 | |
| Insurance (Liability and Property) | - | | - | | - | |
| Licenses/Fees/Permits | 120 | | 124 | | 127 | |
| Legal and Professional Fees | - | | - | | - | |
| Office Expenses & Supplies | 600 | | 618 | | 637 | |
| Postage and Delivery | 600 | | 618 | | 637 | |
| Rent (on business property) | 9,600 | | 9,888 | | 10,185 | |
| Rent of Vehicles and Equipment | - | | - | | - | |
| Sales & Marketing | 4,800 | | 4,944 | | 5,092 | |
| Taxes-Other | - | | - | | - | |
| Telephone and Communications | - | | - | | - | |
| Travel | 24,000 | | 24,720 | | 25,462 | |
| Utilities | - | | - | | - | |
| **Total Fixed Business Expenses** | 44,040 | 22.87% | 45,361 | 10.60% | 46,722 | 8.38% |
| **Operating Income (before Other Expenses) [EBITDA]** | (67,852) | -35.24% | (11,549) | -2.70% | 17,796 | 3.19% |
| **Other Expenses** | | | | | | |
| Amortized Start-up Expenses | 3,500 | | 3,500 | | 3,500 | |
| Depreciation | - | | - | | - | |
| Interest | | | | | | |
| Commercial Loan | - | | - | | - | |
| Commercial Mortgage | - | | - | | - | |
| Line of Credit | - | | - | - | - | |
| Credit Card Debt | - | | - | | - | |
| Vehicle Loans | - | | - | | - | |
| Other Bank Debt | - | | - | | - | |
| Taxes | - | | - | | 3,559 | |
| **Total Other Expenses** | 3,500 | 1.82% | 3,500 | 0.82% | 7,059 | 1.27% |
| **Net Income** | (71,352) | -37.06% | (15,049) | -3.52% | 10,737 | 1.93% |

## APPENDIX H: ARDUINO TEMPERATURE CONTROL FUNCTIONALITY




## APPENDIX I: SECACAFÉ DEMONSTRATION EXAMPLE

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**INTERVIEWS**

- Natalia Alfonso, former staff at FNC
- Juan David, CEO COOP Andes
- Louis Guillermo Diaz, JM Estrada
- Kevin Fine, Tesla
- Professor Flavio, coffee drying expert
- Camilio Jaramillo, Hybretec
- Fernando Jaramillo, COOP Andes
- Todd Johnson, Lawyer Jones Day
- Sevan Istanboulian, MystiqueCoffee
- Ted Lingle, Coffee Quality Institute
- Ximena Rueda, Colombia Coffee expert; former staff at FNC
- Nena Sanderson, African coffee supply chain expert
- Stephen Vick, Blue Bottle
- **Farmers in Colombia:** Don Mario, Don Ruben, Don Jairo, Don Rigoberto, Don Carlos, Don Umberto