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Ecofiltro: Delivering Clean Water in Guatemala... and Beyond?

Philip Wilson sat in his office in Guatemala City with his mother and sister on May 15, 2023. He took a sip of water – clean, healthy water - from the big glass placed on his desk. He summarized the 2022 business results for Ecofiltro, the water filter manufacturing and distribution company he had founded with his family. As he presented the results, Philip considered how far the operation had come since his sister Dominique had launched it in 1990.

The original Ecofiltro operation had been set up as a not-for-profit endeavor to address the fact that unsafe drinking water in Guatemala was a serious health concern. Originally it was part of the Fundación Familia Guatemalteca de las Américas (AFA), a foundation begun by the Wilson family. Philip learned about the water filters from his sister and his mother. Once he was introduced to the products, Philip “grew excited with its potential to bring safe water to everyone in Guatemala.” In the mid-2000’s when Philip first became involved, the AFA had been making and distributing 2000 filters annually. He recalled “feeling strongly that to have a chance to really change the health of the population, the model had to be a sustainable for-profit enterprise.”

Philip had “observed what rural families had in their homes, I would often see a flat screen TV in the middle of the room, mobile phones and sometimes a satellite dish, to watch the final of the World Cup. There was clearly an issue of prioritization in how these rural families were spending the little income they had in their pockets.”¹ By 2009, Philip had convinced his family the way to solve the problem of safe drinking water for all in Guatemala was to set up a for-profit company that would manufacture and sell water filters across the country. Thus, Ecofiltro was re-launched in 2010 as a for-profit social enterprise.

¹ <https://nextbillion.net/why-social-business-is-better-than-charity/>, accessed July 31, 2023.

The teaching case was prepared by Michael Bush, Case Writing Fellow, and Patricia Márquez, Professor, Joan B. Kroc School of Peace Studies and Knauss School of Business, University of San Diego, as part of the USD Teaching Cases on Social Impact. USD Teaching Cases on Social Impact are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

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Philip explained that “with increases in production and sales, Ecofiltro became consistently profitable by 2012.” In 2012 the company won the Sustainable Brands Innovation Open in San Diego and the IMF-sponsored G20 Social Business Challenge in Los Cabos, Mexico. New Ventures Mexico named Ecofiltro one of ten organizations in Latin America achieving high social impact.² By 2023, they had expanded to supply customers in 18 countries beyond Guatemala. In 2022, the enterprise had grown to sell 219,793 filters.

Nevertheless, as production and demand for water filters grew, Ecofiltro’s original goal of distributing filters to one million Guatemalan families was pushed back from 2020 to 2025. Philip was concerned that increasing demand from larger countries like Venezuela and Mexico was negatively impacting Ecofiltro’s ability to reach its stated primary goal in Guatemala. He pondered:

Have we lost sight of our original focus? Should we scale back internationally until we reach our goal in Guatemala? Or, should we double down by growing bigger with much greater manufacturing capacity and bigger sales operations to tackle both Guatemala and larger international markets? And if we were to do that, does Ecofiltro have the management team and the capital base to carry that off successfully? What are the implications of being a B-Corp on these decisions?

Philip took a bigger gulp of water as he thought about Ecofiltro’s future.

The Need for Clean Water

Guatemala was filled with lakes, volcanoes, Mayan temples and colonial architecture. It was also the most populous country in Central America with over 17 million people. Nearly 3 million people lived in Guatemala City, the country’s capital city, while approximately 50% of the total population lived in rural areas. With an estimated GDP of US\$77.6 billion in 2020, Guatemala was the largest economy in Central America and an upper middle-income country, measured by its GDP per capita of US\$4,603.³ However, in spite of GDP and political stability, approximately 50% of the population lived in deep poverty. Government revenues at 11% of GDP contributed to poor basic services from education to access to water. The country had the fourth highest rate of chronic malnutrition in the world, with Indigenous and rural populations disproportionately affected. Chronic childhood malnutrition (and stunting) affects 47% of all children under the age of five, 58% of indigenous children, and 66% of children in the lowest income quintile.⁴ And a significant number of Guatemalan households were using water from precarious or unimproved sources such as unprotected wells, rivers, or lakes.⁵

This was also true in other parts of the world. In Mexico, for example, according to Water.org, 73 million people lacked consistent access to safe, reliable water.⁶ A report from Universidad Nacional Autónoma de México, noted that official data report 6 million people without access to drinkable water.⁷

² <https://www.linkedin.com/in/philipwilsonarzu/?originalSubdomain=gt>, accessed April 1, 2022.

³ <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=GT-PA-HN-CR-SV-NI>, accessed April 1, 2023.

⁴ [Guatemala Overview: Development news, research, data | World Bank](#), accessed April 1, 2023

⁵ [What does it take to achieve universal and equitable access to water and sanitation in Guatemala?](#) Accessed April 1, 2023.

⁶ <https://water.org/our-impact/where-we-work/mexico/>, accessed October 30, 2023.

⁷ González Villareal, F.J., Vázquez Herrera, E., Aguilar Ampila, E., and Arriaga Medina, J. A. (2022). “Perspectivas del Agua en México: Propuestas Hacia la Seguridad Jurídica,” http://www.agua.unam.mx/assets/pdfs/Perspectivas_AguaenMexico2022.pdf, accessed November 1, 2023.

The Wilson Family

Philip's father was British and worked in Central America and around the world as a leading oil geologist.⁸ His mother, Maria Mercedes Arzú was a member of a leading political family. Alvaro Arzú Irigoyen, Philip's uncle, had been President of Guatemala in the late 1990's. Philip's sister, Dominique, was married to Ricardo Quiñonez, who was elected Mayor of Guatemala City in 2017.

According to Philip, his sister Dominique was "the mother" of Ecofiltro. Dominique met José Fernando Mazariegos, a Guatemalan scientist supported by the Central American Institute of Industrial Research, in a conference where he discussed his invention of the clay water filter system and water issues, which was among AFA's biggest concerns. She quickly saw the potential for the filters and the foundation, along with a group of third-party health scientists, produced a study on the acceptability and impact of the filters in people's homes. Based on work with over 500 Guatemalan families, the research results demonstrated using the water filter led to a 55% reduction in diarrhea and other gastrointestinal diseases. This included a 50% reduction among children under the age of five who were especially susceptible to death from dehydration.⁹

Dominique explained in a 1999 article in Potters for Peace News:¹⁰

We did a study that found that people don't use chlorine tablets [to clean their drinking water]. They don't like the way it tastes and I think they are right. I mean, it's like drinking pool water. And the other problem we found was that people, when they boiled their water sometimes weren't boiling it enough.... we did a one-year study and the results basically say it cuts the incidence of diarrhea in half.

Philip had been raised in Guatemala, but went to the University of Notre Dame in the United States for college and then obtained an MBA at UPenn Wharton in Philadelphia. After Wharton, Philip became a serial entrepreneur including being a founding investor in a successful bank in California which was sold to Wells Fargo. By age 40, Philip had a wife and children and had accumulated capital of his own. In 2000, after arriving in Guatemala from the United States, Philip founded Solución Web, a Guatemala-based web services marketing company in which he was still involved. In 2021 he was involved in creating an innovation center outside Antigua, Guatemala called El Cubo. Previously, the Schwab Foundation named him "Social Entrepreneur of the Year" for Central America.

As Philip looked back at what he started he noted, "Guatemala is in my blood and in my heart. It is inspiring to wake up every day and feel I am doing something positive and important for my country. I am especially interested in reaching rural families because they confront more hurdles in accessing safe drinking water and have less viable options. Urban middle class families need clean water as well, but they have many more options available to them. Helping those who need it the most, is what it is all about."

⁸ <https://vdocuments.mx/henry-hugh-wilson-19252007.html?page=1>, accessed April 1, 2023.

⁹ Harvey, R., Rivera R., Rogers, J. and Yetter, L. 2000. "A Sustainable Ceramic Filter for Household Purification" <http://musicandes.com/NSF.html>, accessed April 1, 2023.

¹⁰ Potters for Peace News, August 1999, Issue IX

Developing Clay Water Filter Technology

In 1980 José Fernando Mazariegos was tasked by the Central American Institute for Research and Industrial Technology and the InterAmerican Development Bank with creating a solution for clean water in poor communities. Working with a team, Mazariegos learned people were boiling water - which was expensive due to the cost of heating energy - or using chlorine to purify the water - which resulted in a flavor that people disliked. Mazariegos was looking for a solution that was not only technically effective but also something everyone would adopt.

Mazariegos created a low-cost filtering system using basic raw material and local technology. The core of the technology was pinewood sawdust mixed with porous clay (readily available in Guatemala) to create a ceramic filter. Colloidal silver, which had antibacterial properties, was also mixed with these materials. Pinewood sawdust worked because it did not change the taste of the water and, when heated in the kilns with the clay, it transformed into carbon which worked to further eliminate odors and turbidity from the water. An Ecofiltro unit was created when these materials were shaped into a pot, fired in a kiln and placed within a plastic, pewter, ceramic or clay dispenser. This filter was able to remove parasites and bacteria and, depending on the size, generate approximately 4 gallons of clean water per day.

Mazariegos decided to forgo getting a patent for his invention. He made the technology freely available to serve the broader global population. In June of 2011, the Center for Disease Control (CDC) wrote a white paper on the best practices for local manufacturing of ceramic pot filters.¹¹ The filtration technology won numerous awards and international honors over the years like the Energy Globe Award (with Climate Impact Partners) in 2022.

Factories around the world have been established to make water filters based on this technology (Exhibit A). As of 2017, 59 factories had been established in 38 countries to make filters similar to Ecofiltro. To establish these factories, companies often contacted Ecofiltro to arrange a visit in order to learn its production process. During these visits the Ecofiltro team assisted other socially oriented enterprises with know-how and information. However to protect the name, the company asked them not to use the Ecofiltro brand.

Growing Filter Production and Capital Investment Requirements

In 2010 Ecofiltro became a social for-profit enterprise to accomplish its mission of providing safe water for those without access to it through a ceramic filtering system. The initial business goal was to impact 1 million Guatemalans by 2020. To reach their goal, Ecofiltro needed to increase its capacity to produce and distribute thousands upon thousands of filters each year.

Starting in 2009 production capacity steadily ramped up from 15,000 filters annually to 350,000 in 2022. This had involved consistent on-going investment in additional plant and equipment in the production facility outside of Antigua, Guatemala. In 2021, Ecofiltro spent US\$300,000 on additional production capacity and then US\$380,000 in 2022. Plans called for an investment of US\$500,000 in 2023. These ongoing capital investments focused on increasing production capacity and increasing storage capacity. According to Philip, this effort “reduced the unit cost of production and it became a competitive product with international quality.” In 2021 Ecofiltro was ISO 9001 Certified indicating

¹¹ The Ceramics Manufacturing Working Group (2011). Best Practice Recommendations for Local Manufacturing of Ceramic Pot Filters for Household Water Treatment, Ed. 1. Atlanta, GA, USA: CDC.

“the provision by an independent body of written assurance (a certificate) that the product, service or system in question meets specific requirements.”¹²

The Ecofiltro production considered its process of production to be “complex and multi-stage” including multiple quality checks along each step. Overall, this quality control checking process resulted in an 18 – 26% rejection rate (Exhibit A).

As Daniel de la Cruz, the Operations Manager and head of manufacturing at Ecofiltro commented,

Making high quality filters is not an easy or straightforward process. It takes a lot of know-how, especially as you scale up the daily production of filters to thousands per day. That is why we still have such a low yield on our production. And this whole process is as complex on the people management side of production as it is on the industrial side.

Ecofiltro Product Line and Product Features

Ecofiltro’s products consisted of different sizes of filters and different styles of dispensers in which the filters sat (Exhibit B). The price depended on the type and style of the receptacle and the size of the filter itself. Prices also varied depending on the channel of distribution and the local markets. According to Philip, “*an important key insight early in the commercialization process was the importance of stylish, well-designed containers for the filters.*” As he saw it, “*no matter people’s economic circumstances, if this was going to go into their home, they wanted something that looked good.*” Philip added, “*the superior taste of water to be an important component to its success and a key driver for adoption among customers who do not enjoy chlorinated water’s taste.*”

Ecofiltro priced its products relative to alternative sources of potable water available to its customers. On its web site there was a savings comparison calculator based on a household’s monthly water spending. For the more well-to-do urban customers, Ecofiltro prices compared its prices to the alternative of filtered bottled water delivered to their homes. For the rural poor, the costs were compared with the cost of firewood and the time to boil or treat water with chemicals. The filter unit should be replaced every two years depending on the usage, a pace of replacement that Philip explained “many customers did not maintain.”

Ecofiltro Sales and Distribution Channels

Sales through Guatemalan distributors represented 30% of total unit sales in 2022, followed by rural direct sales at 20%. The balance of the sales was for export, sold to corporate accounts or through retailers who served a middle-class clientele or distributed through a number of smaller channels. Since distributors were focused on sales to the rural poor in Guatemala, this implied that 50% of sales were aimed at directly addressing the clean water access problem in rural Guatemala (Exhibit C).

The Guatemalan sales effort was supported by a strategy of on-line marketing using primarily Facebook and Instagram. Ads were meant to get consumers to visit the Ecofiltro website as well as attracting more distributors into the network.

¹² <https://www.iso.org/certification.htm> accessed November 13, 2023.

Domestic Guatemalan Distributors and Rural Direct

The company's initial sales and distribution effort was a "Community of Entrepreneurs Network" that employed motivated local individuals to sell the Ecofiltro products with a 10% commission. While some participants did well, the "community entrepreneurs model ultimately failed" because as Wilson saw it "the sales by the broad base of individuals were not sufficient to make it worthwhile for them." Initially the average entrepreneur was selling 3.3 units per month. Even after increasing the incentives for higher sales and providing training to participants in the network, average unit sales increased to 4.6 filters per month. Philip commented "churn among the entrepreneurs is a problem with people constantly dropping out and Ecofiltro not reaching its rural market penetration goals."

The lessons learned from this initial effort led the company to switch to a local distributors network. Ecofiltro started this model in 2013, by engaging existing retail store owners in rural areas to sell Ecofiltro products in their stores. These stores were already in high traffic areas of their communities, had some pre-existing level of business and financial capacity and most did not sell competing products such as bottled water. To become a local distributor the business had to purchase 20 initial units up front (about a US\$500 investment) and would earn about a 20% margin on these sales. According to Philip "this up-front investment gives the local business people an incentive to sell the filters." The company went from a little over 20,000 units sold in 2010 to selling over 150,000 in 2020 (Exhibits C and D). By the end of 2022 Ecofiltro had signed up 1,198 local distributors which on average were selling 5 units per month. This network was overseen by a team of 5 regional managers and 26 Field Representatives.

Their goal was that by the end of 2026 they would have more than 1,500 distributors in Guatemala. Another goal was to increase market penetration among lower-income customers, (known as C and D segments) by doubling sales in the coming five years. In 2022, Ecofiltro also began planning to improve re-purchases by the 400K previous buyers with a goal to achieve an 80% repurchase rate by 2026.

Hector Cardona, a strategy executive at Ecofiltro, believed "the Local Distributor program was more important to the company than any other initiative." According to Hector, "Growth was a good thing. But it has also brought challenges. The risks of rapid business growth are well documented, yet it isn't always easy to anticipate them." To this, Philip added: "Ecofiltro's rural distribution model, combined with urban distribution, and overall business success, required increases in production, expanded factory capacity and several upgrades."

Export Markets

In 2022 exports represented 18% of unit sales. Among the countries to which Ecofiltro exported, three nations – Mexico, Haiti and Venezuela – represented 75% of the export volume (Exhibit E).

Beyond supplying products, Ecofiltro committed to provide support and training for the distributors' sales force team once a month. Training included: technical training about the Ecofiltro Technology and the sales process. Additionally, Ecofiltro provided a goal planning method for the sales team. The Ecofiltro sales manager provided monitoring and a follow-up meeting in support of the commercial Staff for our international distributors. They also shared information related to the strategic plan that is being implemented in Guatemala.

The distributor was in charge of the export logistics, both transport and freight insurance. Ecofiltro provided a 25% price discount for the international distributors. The discount helped protect the price of the Ecofiltro in the international market and gave competitive benefits for export to each country. Local consumer pricing was the responsibility of each distributor. All the sales for export would be paid in cash.

Ecofiltro Management

In Philip's view,

Ecofiltro is committed to management systems and best practices on multiple fronts of the company, intending to create conditions to support sustainable growth, while staying true to its standards, mission, and values.

To make this commitment explicit, the company held these certifications: ISO 9001:2015, for its Quality Management System; B-Corporation, related to its social and environmental performance; and, the Gold Standard, based on maximizing positive impact in climate and development.

Since its inception, Ecofiltro pledged to acknowledge and include human values in their way of doing business. Philip noted "This was done by embracing attitudes, like collaboration, responsiveness, leadership, and meritocracy, to name a few." A core tenet in the company, was to "adopt a giver mindset - as opposed to a taker one" - reflected in a frequently used quote within the company's culture: "our nature, like that of fruit trees, is to be givers after all. Trees do not eat their own fruit." Top management and key collaborators noted how this stance sprang from what Philip called a "Philosophy of Abundance."

But Philip went on, "These aspirations and goals, as genuine and as visible as they were within the company, did not always provide clear guidelines, or a systematic methodology, to make sure that the company's culture and structure remained true to its values as it grew and scaled.

For Cristian Chacaj, Ecofiltro Human Resources Specialist,

The real challenge for the organization becomes having a committed leadership that articulates and provides the necessary guidelines for all employees to achieve economic prosperity. When the purpose of economic prosperity for all is not clear, concepts and the nature of the actions undertaken by the leadership are lost.

Cyndy de León, Administrative Leader, explained:

The training and coaching of key positions in the organization was decisive for the achievement of the planned goals. It is not possible to achieve the goals individually; it is part of the commitment of the team to save lives and, in that way, by fulfilling the purpose of Ecofiltro, achieving economic prosperity for all.

For Hector Cardona developing the right leadership team (Exhibit F) was essential to executing a growth strategy, highlighting:

One issue is the management team so we can produce not just at our current capacity but to grow. There is a cultural issue. In Guatemala we are risk averse. Philip is the opposite case. He takes risks not typical for our culture. We need to be able to take risks to be able to grow, not to stay the same.

B-Corp Certified

The concept of the certified B-Corp was developed in 2006 by a group of philanthropists, academics and foundations as a method of identifying for-profit companies which formally recognized their broader obligations beyond financial profit for shareholders.¹³ B-Corp's stated goal was to make businesses a force for good. The certification was a process for companies to demonstrate social, environmental and governance commitments and their impact among diverse stakeholders.

In 2020, Ecofiltro qualified as a B-Corp. The certification process for B-Corp status required: achieving a B Impact Assessment score above 80, demonstrating a high level of social and environmental performance across a multitude of factors. In 2022 Ecofiltro earned an overall score across the metrics of 97.3 versus a median score for ordinary businesses of 50.9. This score measured performance on Governance (14.9), Workers (16.8), Community (18.2), Environment (13.5) and Customers (33.7).¹⁴ Ecofiltro was recertified as a B-Corp in August 2023 with an overall B Impact Score of 125.7.

The Future of Ecofiltro

Since its founding, Philip had tried to build a management team that ran the business on a daily basis. Philip described his role as,

I'm the founder; I set the overall direction but the daily operation of the company is handled by the leadership team. That said, I want to get out of bed every morning with energy to make something truly impactful happen at Ecofiltro. I am motivated by doing something beneficial for people who need it most.

Beyond the family there were a small group of advisors who formed the Board of Ecofiltro: Hector Cardona (Strategy Executive), Nalu Tamayac (Marketing Consultant), Higinio López (Financial Consultant) and Benignio Orozco (Tax Advisor and External Auditor).

Hector Cardona pointed out,

A key point for us is sustainability. We have discovered there are banks that will lend to us at lower interest rates. It is a type of loan for companies focused on sustainability. That helps us. The general rate is 13 - 14% and the type of loan we are trying to obtain is 6%. Today our investment comes from carbon credits. With a sustainability focus, we have a competitive advantage. It opens doors to loans with lower rates so we can invest.

Additionally, he said,

¹³ <https://www.bcorporation.net/en-us/> accessed May 1., 2023.

¹⁴ <https://www.bcorporation.net/en-us/find-a-b-corp/company/ecofiltro/> , accessed May 1, 2023.

The future has several paths ... entering Mexico, where distribution will be mostly in the cities, will demand a lot from us because we face limitations in production... In the case of Mexico we need at least US\$4 million. Clients from places like Mexico keep asking for our products, but we need more capital if we grow beyond Guatemala. And we need to make that decision in 2023, we cannot wait until 2025. If we wait, we will probably only be in Guatemala in 2025. Although that might mean reaching our goal, some of us feel that we can also serve the Central American markets. That's not the same as Mexico which is much bigger. Mexico represents a real jump. We also require human capital to be able to sustain our commitments, especially quality. We have to do it professionally. We must have data that demonstrates our results, our impact.

Philip got ready to leave his office, continuing to think about setting the course for the next few years at Ecofiltro:

What path should Ecofiltro pursue in the next 3 - 5 years: focus solely on Guatemala, expand further internationally, or try to do both simultaneously?

Given his experience as a serial entrepreneur and his knowledge of both his country and his company he wondered:

Do we possess the leadership and management capabilities, financial resources, and the operational capacity to successfully achieve our goal in Guatemala of distributing filters to one million families while trying to respond to growing demands elsewhere? How does our status as a B-Corp influence this journey--does it facilitate or hinder our progress?

EXHIBIT A: The Ceramic Water Filter Production Process¹⁵

The production process used pulverized clay mud, dry sawdust and pulverized reprocessed material as its base raw materials. These materials were mixed with water in a specific formula to create a mixture with a specific consistency. This mixture was then put into an extruder tank which fed the mixture into a press mold to create the clay filter. The buckets were then removed from the molds and were stored until they had the proper humidity levels of 20% – 32% to avoid cracking.

After molding, the filters were put onto transport carts, which were then put into drying ovens that fired the clay at a maximum of 100 degrees Celsius. That brought the humidity level down to 15% - 18%. After the drying oven, the filters had their initial quality check for cracks or gaps. Filters that were not acceptable were transferred to a waste area. Once the filters passed the initial review, they were put into a second kiln for 3 hours until they reached a temperature of 500 degrees Celsius. Then the burners were turned off for 90 minutes to stabilize the temperatures. After this the burners were re-lighted and were kept on for 3 more hours at a temperature of 730 degrees Celsius. Once they reached this temperature the burners were turned off, the kiln doors were opened and the filters were cooled for approximately 4 hours.

After cooling there was a second quality check for cracks or gaps before the filters were transferred to the water saturation storage area. In the water saturation process the filters were submerged under water for 6 to 12 hours until the filter was completely saturated with water. Once this has happened the filters were removed and checked a third time to verify the proper filtration rate through the filter.

The filters that pass the testing level were transferred to the impregnation area where they were stored for up to 24 hours in a drying tunnel or up to 21 days if the tunnel was not available. After this there was a fourth visual and sound check before a mixture of colloidal silver and demineralized water was brushed over the entire surface area of the filter. After 3 days and having been checked for a fifth time the filters were completely dry, the filters were packed in sealed plastic bags for transfer to the finished goods warehouse.

¹⁵ The production process for ceramic water filters has been detailed by the CDC in a paper entitled: The Ceramics Manufacturing Working Group (2011). Best Practice Recommendations for Local Manufacturing of Ceramic Pot Filters for Household Water Treatment, Ed. 1. Atlanta, GA, USA: CDC.

EXHIBIT B: Ecofiltro Products



PLÁSTICO BLANCO

Cantidad:
6 - 7 miembros de la familia

Capacidad:
22 lts.

Material:
Plástico

Cantidad

- 1 +

Q 375.00

Agregar al carrito

<p>Available</p>  <p>Price: Q 220.00</p> <p>WATER PURIFIER Material: Clay Capacity: 10 L Quantity: 2-year lifespan</p>	<p>Available</p>  <p>Price: Q 375.00</p> <p>PLASTIC Material: Plastic Capacity: 22 L Quantity: 6 - 7 family members</p>	<p>Available</p>  <p>Price: Q 450.00</p> <p>PLASTIC - SKY-BLUE Material: Plastic Capacity: 22 L Quantity: 6 - 7 family members</p>
<p>Available</p>  <p>Price: Q 850.00</p> <p>PEWTER - MATTE BLUE Material: Pewter Capacity: 27 L Quantity: 6 - 7 family members</p>	<p>Available</p>  <p>Price: Q 500.00</p> <p>Mud Mini Material: Clay Capacity: 6 L Quantity:</p>	<p>Available</p>  <p>Price: Q 1,750.00</p> <p>CERAMIC - MOUSE TAIL Material: Ceramic Capacity: 22 L Quantity: 6 - 7 family members</p>

Prices quoted in Guatemalan Quetzals. \$1 USD ~ 7.8 Q as of April 11, 2023

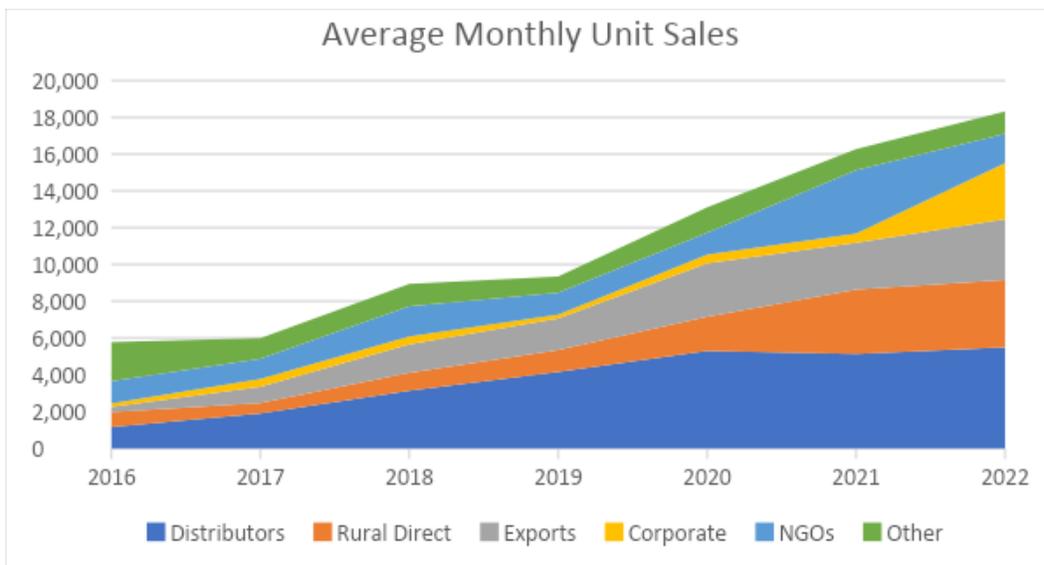
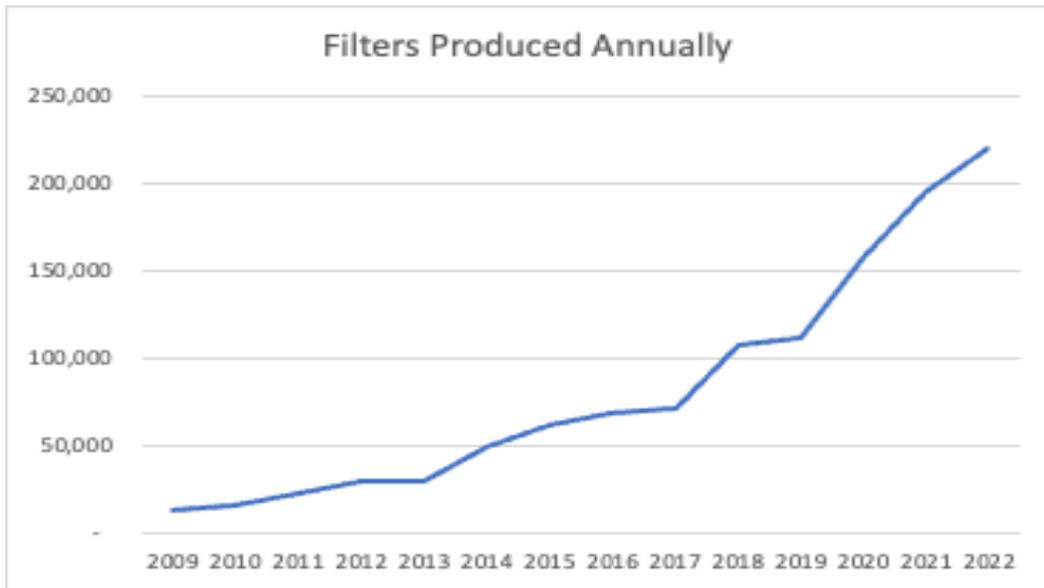
Source: Ecofiltro Website: <https://ecofiltro.com.gt/en/products> accessed on 10 April, 2023

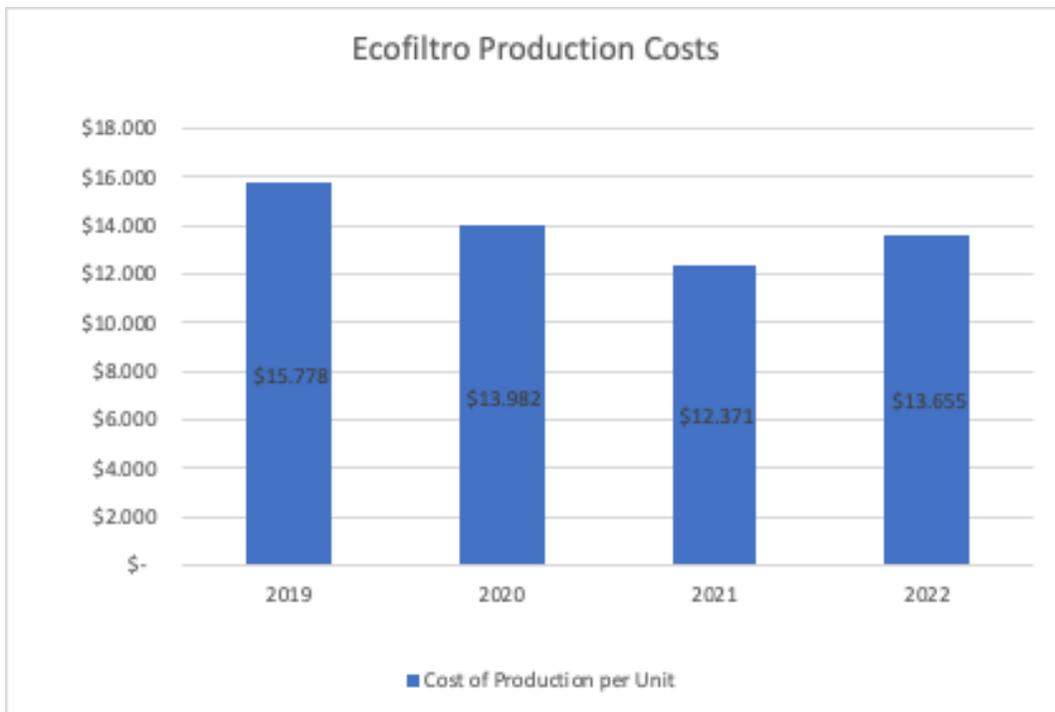
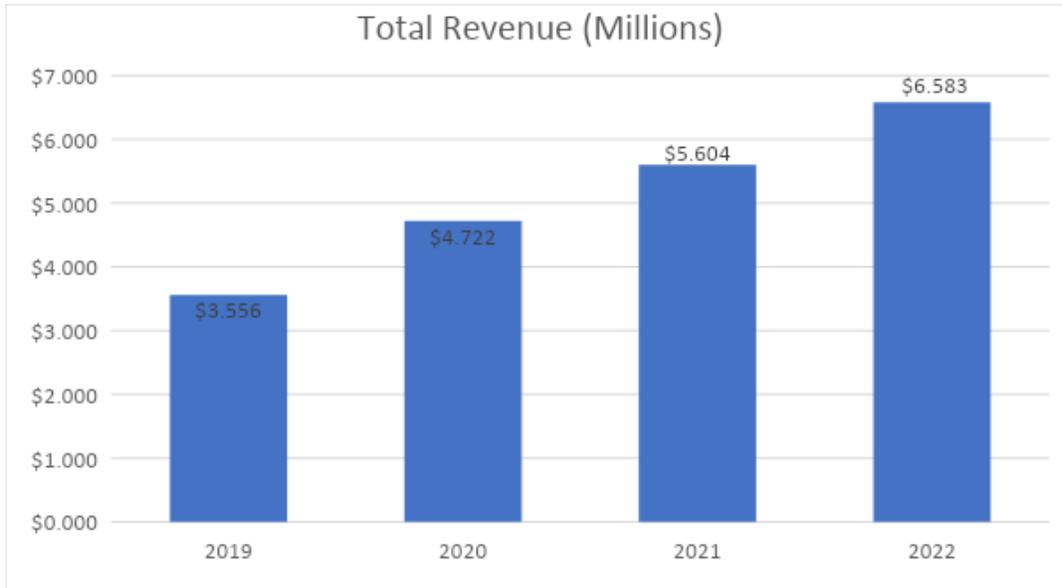
EXHIBIT C: Ecofiltro Production and Capacity

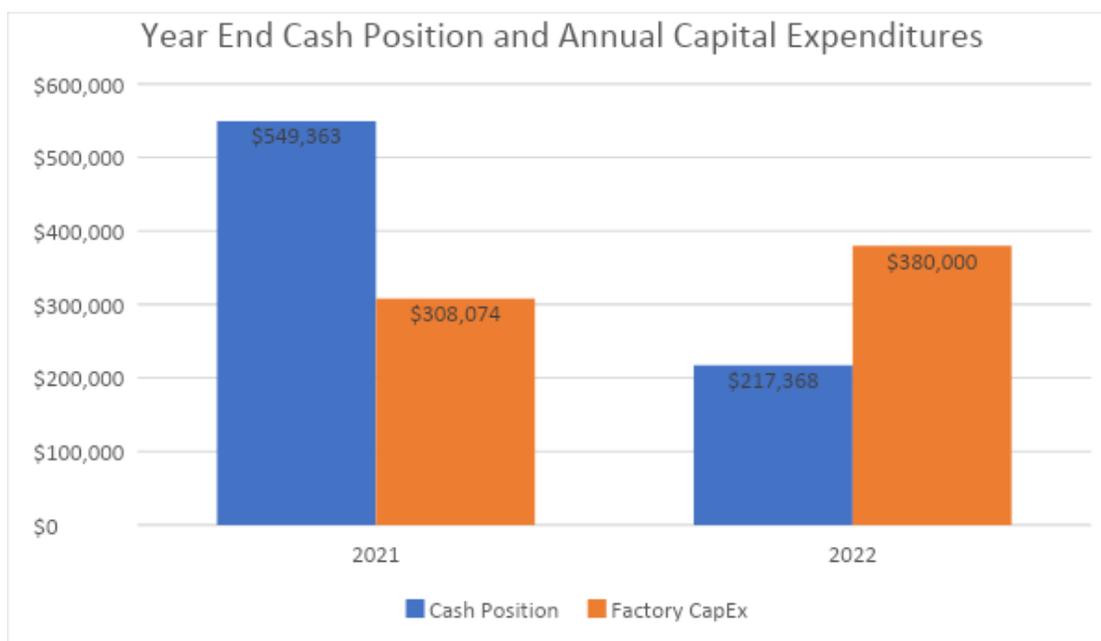
Ecofiltro Sales, Impact and Capacity Timeline				
	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>
Filters Produced	15,657	23,811	30,206	29,972
% Sold to Rural Customers	78%	73%	68%	65%
Year End Production Capacity	20,000	25,000	35,000	35,000
	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>
Filters Produced	61,493	69,342	71,755	107,167
% Sold to Rural Customers	56%	63%	60%	60%
Year End Production Capacity	70,000	70,000	100,000	125,000
	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>
Filters Produced	112,252	157,125	195,359	219,782
% Sold to Rural Customers	60%	60%	60%	60%
Year End Production Capacity	175,000	200,000	250,000	350,000

Source: Ecofiltro Documents

EXHIBIT D: Ecofiltro Financial and Operating Trends







Source: Ecofiltro Documents

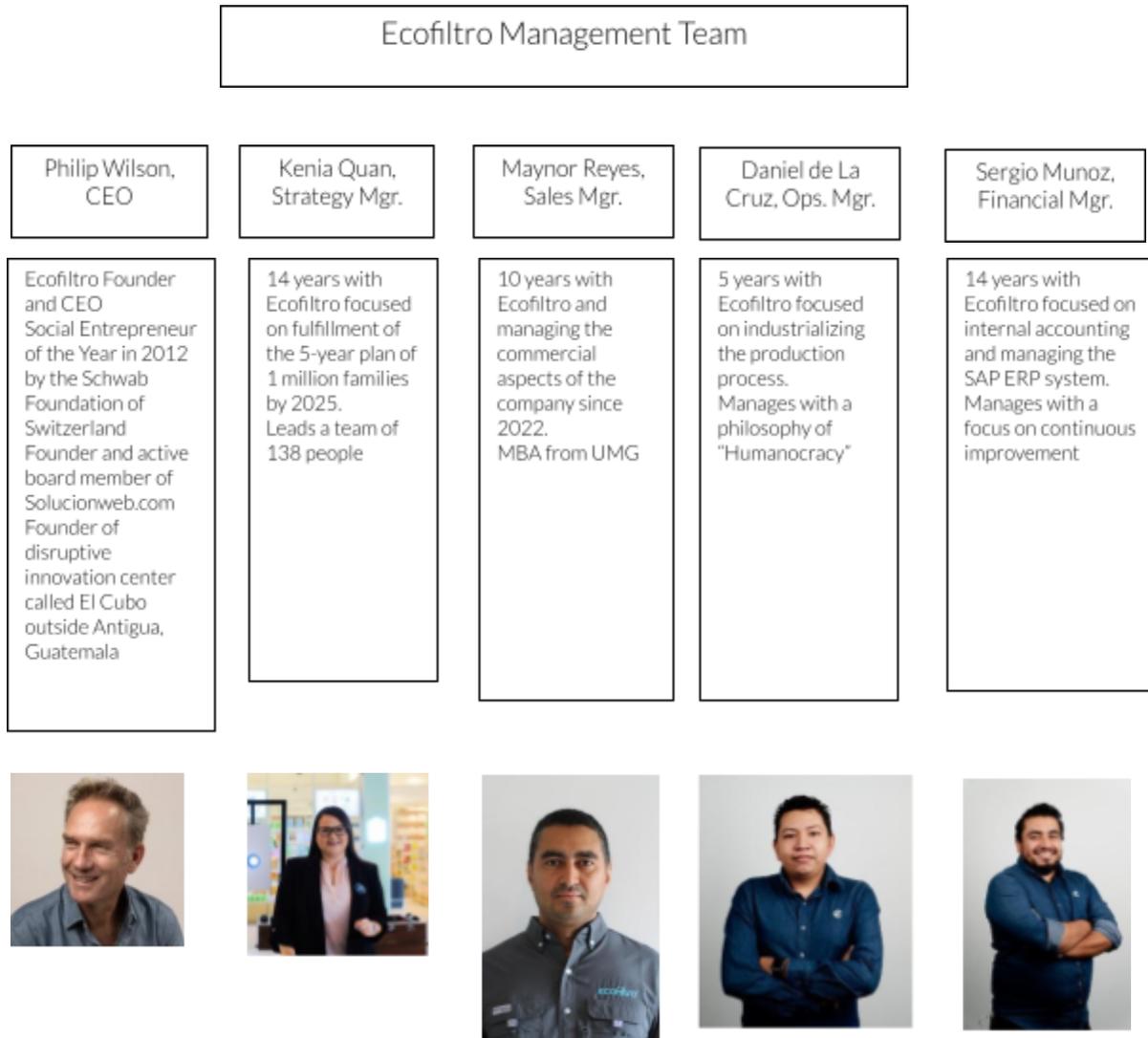
Exhibit E: Sales by Country

SALES BY COUNTRY

COUNTRY	2019	2020	2021	2022
HONDURAS	4702	3152	910	654
EL SALVADOR	1896	5210	732	770
MÉXICO	9568	12807	17440	21621
NICARAGUA	697	2664	514	757
COSTA RICA	901	1691	1514	2463
SPAIN	1250	1540	2442	2370
VENEZUELA	570	1402	4102	4062
PANAMÁ	294	3407	333	594
PERU	818	710	787	1882
HAITI	0	1440	960	4200
JAMAICA	0	393	537	0
BELIZE	0	135	132	80
DUBAI	0	412	218	0
CHILE	0	0	26	0
USA	0	0	33	0
ARGENTINA	0	0	0	3
TOTAL	20696	34963	30680	39456
GROWTH	BASE *	69%	-12%	29%

Source: Ecofiltro documents

EXHIBIT F: Management Team



Source: Ecofiltro

EXHIBIT G: Images of Ecofiltro Factory





Source: Ecofiltro

References and Notes

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