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Environmentally Conscientious Orchards Connection

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ECO Connection
Solutions for Thirsty Orchards

Will Burgess, Sarah Schomp, Mike Iwata, and Andrew Wooldridge
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Executive Summary

California’s almond industry uses over 1.2 trillion gallons of freshwater annually, more water than is used by almost any other crop. Although California is in a severe drought, its almond industry is expanding because the crop is a valuable commodity, providing California with more than $11 billion to its gross state product each year. While almond production is inherently water intensive, current agricultural processes in the San Joaquin Valley waste almost 50% of the freshwater it uses each year from over-watering, runoff, evaporation, and contamination.

Much of this waste can be eliminated if various California stakeholders work together to address the sources of these inefficiencies. Fixing all sources of water waste associated with almond production would save California 600 billion gallons of freshwater each year.

To help conserve freshwater in California, ECO Connection facilitates cooperation between these relevant stakeholders in order to solve the problems within the almond industry. Our mission at ECO Connection is to sustain environmental, economic, and social growth in California through water-waste reduction. By partnering with farmers and other local stakeholders, we design and manufacture irrigation systems reusing end-of-life and recyclable materials that bolster fresh water-use efficiency and foster healthy and responsible agricultural nut production.

Our services come in three stages. The first step is to install drip irrigation systems on our clients’ almond orchards to reduce the amount of water that they use to produce their almonds. These irrigation systems will be produced with minimal negative ecological impacts (see Product section for details).

The second step in our services is to protect the freshwater that our clients use by applying organic pesticides and fertilizers to their orchards. Standard agricultural practices use inorganic pesticides and fertilizers, which degrade the freshwater quality downstream from orchards. This leads to freshwater reserves exceeding maximum contaminant levels from nitrates (see California Almond Industry Trends for details). Providing our clients with organic alternatives will remove their contributions to agriculture’s water contamination, while still protecting their trees from pests.

Finally, we will arrange for bees to go to our clients’ orchards to help pollinate the trees. Effective pollination from bees will maximize almond output per water input. This will allow our clients to satisfy the world’s demand for almonds without increasing the amount of freshwater they apply to their orchards.

Although some of our clients may not be equipped financially to pay for our services, ECO Connection lobbies for its farmers to be subsidized by the California Almond Board. This, in addition to donations to our nonprofit organization, will help our clients invest in systems that conserve California’s freshwater.

Our team is passionate, and committed to preserving California’s freshwater while also sustaining our clients’ livelihoods.
Situational Assessment

**Macro Environmental Trends**

**Demographic Trends**

**Overview**

The US population is growing, with close to 320 million people living in the United States today. The average age of Americans is increasing as the baby-boomer generation approaches retirement. The general population is also becoming more highly educated as more people attain college degrees than they have in the past. Unfortunately, the increasing demand for university degrees has lead to unprecedented rises in tuition cost. Consequently, there are higher rates of debt in the younger generations than there have been in the past.

**Race**

The United States is becoming increasingly diverse. The population’s overall makeup is transitioning towards larger minority groups, and the white population is decreasing with time. The Hispanic population segment, in particular, has grown, rising 12% in the past fifty years.

**Location**

Most of the US population, about 82.4%, resides in urban areas. This percentage has increased steadily, rising approximately 1.14% each year. The East and West Coasts in particular are densely populated, while the expansive farmlands, deserts, and pastures in between the two coasts are more sparsely populated.

**Economic**

**Dow Jones**

The US economy has been steadily recovering since its severe 2009 recession caused by the 2008 stock market crash. The market has since improved, and is trending upward. The figure to the right illustrates the Dow Jones Industrial Level rising since 2010, doubling in value during that five year span.

**Wealth Distribution**

Despite the improving economy, a negative economic trend is the ever increasing parity between the rich and the poor, and the deepening income inequalities. Today, the richest 10% of Americans owns
75% of the country’s total wealth. The bottom 90% of US families owns the remaining 25% of the country’s wealth. This disparity between the upper class and the lower class is larger in the US than in any other developed country. Consequently, the improving economy does not accurately reflect benefits seen by all demographics, particularly not the low income Americans or those in poverty.

The difference between the mean income in the US and the median income further demonstrates the degree of inequality in terms of distribution of wealth. The median income in the US in 2014 was $51,939. This contrasts sharply with the mean income of $72,641, indicating that there are several wealthy outliers who are skewing the results and shifting the mean income almost 40% higher than the median income.

**Unemployment**

Although there is an increasing gap between the rich and the poor, a positive byproduct of the improving economy is the consistent decrease in unemployment. After rising dramatically between 2008 and 2009, the unemployment rate has leveled off and then declined. There is a strong negative correlation between the Dow Jones line and the line that reflects the unemployment rate.

**Environmental**

**Overview**

Greenhouse gas emissions resulting from cattle production, deforestation, and fossil fuel combustion has led to anthropogenic climate change and global warming. Agriculture and food production has led to soil degradation and desertification. Pesticides and other harmful chemicals are used regularly. This results in rain runoff draining vast amounts of pollutants into the oceans, degrading their ecosystems. Water is becoming increasingly scarce. Regions of the US are seeing prolonged droughts. California, for example, is struggling through a five year drought. They are now in a state of emergency from water shortages. Solid waste is frequently dumped into landfills, where it will sit for hundreds of years.

**Green Solutions**

Green solutions are becoming increasingly commonplace. For example, there has been a dramatic rise in the use of solar panels. These solar panels allow for renewable energy use, reducing greenhouse gas emissions. The United States accounts for 11% of the world's solar panel use. The graph to the right displays the number of solar panel installations per quarter of
the last five years. There were 2,191 solar panel installations at the end of 2014, the greatest number of installations to date.\textsuperscript{27}

**Organic Industry**

In 2002, the USDA established standards and guidelines for the organic production and processing industries. These standards that organic farmers must adhere to include “preserv[ing] natural resources and biodiversity, support[ing] animal health and welfare, provid[ing] access to the outdoors so that animals can exercise their natural behaviors, only us[ing] approved materials, not us[ing] genetically modified ingredients, receiv[ing] annual onsite inspections, and separat[ing] organic food from non-organic food”\textsuperscript{40}.

The figure to the left shows that since 2002, the amount of domestic certified organic operations has increased by 250%. Nearly all organic sales occur in conventional and natural food supermarkets, with only 7% of organic food sales occurring at farmers markets. Organic food sales reached an all time high of $35.9 billion in 2014. Organic non-food sales increased by 14% since 2002, resulting in $43.2 billion in revenue. The chart above shows that organic fruits and vegetables are the most highly demanded organic food category, accounting for over $30 billion in sales in 2014. The chart to the left illustrates the steady growth in organic agriculture from 1997 to 2011. The overall increase of land devoted to organic farming expanded two million acres, bringing the total amount of land devoted to organic agricultural three million acres in 2011.

**Toxin Reduction**

In the past few years, consumers have become increasingly aware of the harmful toxins and chemicals in everyday products such as shampoo, lotion, soap, clothing, and processed foods. Organizations such as Green America, the Breast Cancer Fund, and MASSPIRG have been educating and empowering consumers to reduce or eliminate use of products that contain chemicals that are harmful to the environment and humans. Companies have also been under pressure to reduce the amount of toxins in their products and packaging as well as the chemicals emitted in the transportation segment of their supply chains.\textsuperscript{33}

**Political**

According to the Pew Research Center, the United States’ political sphere has become greatly polarized.\textsuperscript{1} This polarization has stunted social progress, and has left many political goals unachieved. Despite this stratification,
Moody’s election model predicts that the Democratic Party will win the 2016 presidential election by a landslide. This outcome will likely allow the democratic side to have more clout, and achieve greater results while facing less resistance.

In recent years, immigration has become a major political issue. Specifically, politicians debate immigrants’ roles in the labor force. The number of unauthorized immigrants working in the US has levelled off after rising continually for the past two decades. Currently 5.1% of the U.S. labor force is made up of illegal immigrants.

The political atmosphere dictates how the government deals with businesses. Forty-nine percent of Americans believe that the US government regulates business too much. This number has been steadily rising over the past decade. On the other hand, the number of people who want the government to regulate more heavily has remained fairly constant in the past decade.

Societal

Motivation to Consume Sustainably

Nielsen is a global research company that studies consumer behavior and how it affects businesses. In June 2014, Nielsen conducted an online survey to assess the effect that sustainability labels on products have on buying patterns. Around 52% of global consumers study products before purchasing them in order “to ensure the brand is committed to positive social and environmental impact.” Further studies indicate that millennials are most motivated to purchasing sustainable products, even if they cost more than conventional products. Millennials have grown up in a culture of increasing knowledge and environmental awareness. Their purchasing behavior reflects that, which should spark further progress towards sustainability.

Motivation to be Healthy

Over the years, Americans also have increasingly become more health conscious. Corporate wellness centers earn annual revenues of $7.2 billion, and grow nearly 8% each year. This indicates that consumers strive to increase their overall health. Nutrition and weight management centers command 17.4% of the industry market share. This is second only to health risk assessment, which holds 17.7% of the industry market share. This that more people are health conscious, eating nutritionally and exercising regularly. Thus, Americans have demanded that firms create healthier options for conventional snacks, meals, and beverages.

Religion

Christianity is the most predominant religion in the US. However, the percentage of the population that identifies as christian has declined from 78.4% in 2007, to 70.6% in 2014. Another recent trend is the rise in the unaffiliated or non-religious groups, which has increased by 6.7% over the same period.

LGBTQAI/Gay Marriage

William Harms, a professor from the University of Chicago, claims his research shows that “public attitudes toward gays and lesbians are rapidly changing to reflect greater acceptance, with younger generations leading the way.”
He indicates that this trend is reflected by the changing regulations pertaining to same sex marriage. An increasing number of states recognize same sex marriages.

Additional, companies are integrating LGBT into their marketing strategies more frequently. Courtney Scharf, the Director of Research Operations at Trend Hunter, argues that this trend is not about companies targeting customers who identify as LGBT, necessarily. Rather, she argues that these companies are trying to portray themselves as supporting social equality.

Technological

Moore’s Law

Computers’ processing power doubles every eighteen months, according to Moore’s law. Ever improving computing power has resulted in increased productivity and efficiency in existing industries, as well as the creation of new technological industries. Consequently, these improvements have enabled millions of people to benefit from having affordable access to computers. They have also led to breakthroughs in communication, transportation, education, healthcare, and many other sectors.

E-Waste

However, there is a dark side to Moore’s law. A growing problem around the world, and in the US in particular, is the abundance of electronic waste, also known as e-waste. E-waste is electronic equipment that has reached the end of its useful life. As electronic equipment is continually upgraded, older generations of such equipment become obsolete and are disposed of. Although electronic equipment can be recycled, only 12% of it is currently recycled in the US. The other 88% of e-waste ends up in landfills. Although e-waste accounts for only 2% of the solid waste in landfills, it accounts for 70% of overall toxic chemicals that seep from landfills into the soil, harming the environment and affecting human health.

Social Media

Although electronics can have negative impacts on the environment when they become outdated, current technology allows people from all parts of the world to connect. Social media in particular, including Facebook, Instagram, Twitter, and Youtube, has led to an ever increasing online presence throughout all generations in the United States in the past fifteen years. These social media platforms, in addition to search engines such as Google, Bing, and Yahoo! have allowed extensive amounts of information and technological data to dissipate throughout the world over the internet.

Nanotechnology

According to Nancy Griges, a writer for the American Society of Mechanical Engineers, the use of nanotechnology is spreading. Creating nanotechnologies encompasses the engineering of functional systems at a molecular scale. As nanotechnology grows, virtually no aspect of life will not be affected by its use. This technology will increasingly be applied to medicine, electronics, food, fuel cells, fabric, cleaner water, strength composites, among others.

Genetically Modified Organisms

The global food and beverage market is valued at about $5 trillion. $4.4 trillion of that is made up of genetically modified food, while non-GMO food makes up the other $550 billion. However, Carolyn Heneghan, a writer for Loews Magazine, claims the the industry is growing fast. According to a Packaged Facts report, the global market for non-GMO foods will double by 2019.
Industry Trends

California Almond Industry

Financial
According to the California Almond Board, California’s almond industry is growing rapidly in response to the rising global demand for almonds, the increasing value of almonds, the expanding acreage devoted to almond production, and the improving yield of almonds generated per acre. These trends have all led to almonds being the top revenue crop for nuts in California for 2014. In fact, almonds account for 9.7% of the state’s agricultural production value. Almonds have sold for an average of $1.84 per pound since 2000. Today, farmers sell them for about $1.93 per pound. Almond farms in California are valued at $4.35 billion, second only to the value of grape farms in the state. In total, the almond industry adds about $11 billion, directly and indirectly, to California’s gross state product, and creates roughly 104,000 jobs. The USDA Foreign Agricultural Services says that there were 2.3 billion pounds of almonds produced globally in 2014. Of that sum, California produced just over 2 billion pounds. This means that California represents more than 86% of global almond production.

Almond Farms
Almond farms have become more abundant and have steadily improved their production efficiency in the past two decades. Even though California has seen a decline in crop farms in general recently, the number of almond farms has increased. In 2012, California had 6,841 almond farms. These farms are mainly in the Central Valley. Specifically, farms in the Fresno, Kern, Stanislaus, and Merced counties in the San Joaquin Valley account for about 64% of California almond farms.

In addition to the increasing number of almond farms in California, there has also been a steady increase in acreage devoted to producing almonds. Since 2000, there has been an average increase of 21,000 acres annually. In total, almond production in California extends over 900,000 acres. Each acre yields roughly 1900 pounds of almonds each year. This year, California’s almond farmers are projected to produce over 2 billion pounds of shelled almonds.

Types of Almonds
There are over two dozen varieties of almonds grown in California. The most abundant almond is the nonpareil variety, which accounts for 50% of almonds produced. The other major two types of almonds are called the California almond, and the Mission almond.

Pest Management
Currently, the University of California Agriculture and Natural Resources Department encourages farmers to utilize Integrated Pest Management (IPM) Strategies. This strategy consists of four areas of control: biological or the use of naturally occurring predators, cultural practices such as irrigation practices and patterns, chemical (pesticides), mechanical and physical control such as traps, barriers, or steam sterilization of the soil. However, chemical practices are heavily relied on which results in adverse effects on human and environmental health as a result of runoff, absorption, inhalation, or ingestion.

Ziram, which is produced by United Phosphorus Ltd. is frequently used to treat almond orchards for pests. The United States National Library of Medicine has cited Ziram for causing brain edemas and hemorrhages, muscle dystrophy, neural and visual disturbances, emphysema, liver and kidney problems, and skin, upper respiratory tract, and mucous membrane irritation.

High profile producers of conventional pesticides include Monsanto, UPL, and Bayer.

Production
In order to produce an almond tree, seeds must be planted in February. Farmers plant at least two or more varieties of almond trees in the same orchard to promote cross pollination. Additionally, almond farmers bring bees onto their farms in the Spring to boost pollination. Almond trees bear their first main crop harvest between three and four years after they are planted. Almonds are ready to be harvested when their shells crack open, usually between mid August and the end of October. When almonds are harvested, mechanical tree shakers rattle the trees so that the almonds fall out of the trees. These are picked up, sorted, and sold to various buyers. The economic lifespan of an almond orchard is about 20-25 years.

Hulling and Shelling Process
Once almonds are swept up and collected from the orchard they are brought to a handler. There are two types of almond post-harvesting facilities/handlers. There are those that produce hulled, in-shell almonds as the final product and those that produce hulled and shelled almonds, in which only the meat is left as the final product. These two types are referred to as hullers and hullers/shellers. Both types of facilities hull and clean the almonds. However, the huller/sheller takes a step further and extracts the almond meat entirely. There are approximately 100 almond handling facilities in California.

Distribution
Roughly two-thirds of the almonds produced in California are exported. In 2013, California exported 1.3 billion pounds of almonds for about $4.2 billion. This is the state’s most valuable export commodity. 12% of the exported almonds went to China and Hong Kong, 11% went to Spain, 10% to India, and 9% to Germany. The figure to the right shows California’s export volume trending upwards.
The remaining third of the almonds produced in California are distributed to buyers across the United states. Of the almonds that stay in America, 47% are sold as pure almonds in bulk through retail outlets. An example would be Whole Foods’ selection of almonds in its bulk department.

Another 47.5% of the California almonds sold in the US are processed in some way to be used as food ingredients. One third of these almonds are used in cereal, energy, or granola bars. 19% are included in chocolates and candy bars, and a further 16% enhance snack mixes, such as trail mix. Almond milk production claims 6.5% of the California almonds that are sold in the US. Interestingly, almond milk has increased its milk-substitute market share as of late. In 2010 almond milk accounted for only 21.2% of the milk-substitute market. Today, it makes up more than 62%.

Most of the value derived from almonds comes from selling the almond meat. However, almond farmers still find value in selling the shells from which the almonds are harvested. Almond shells are ground up and sold to be used in cattle feed.

Pests Risk Almond Harvests

The biggest risk that almond producers face with regards to their harvests are navel orangeworm moths. These insects are by far the most damaging pests in the California almond industry. The problems begin when female navel orangeworm moths lay their eggs on the exterior of the almonds’ husks. The husk is the protective casing around the almond. Inside the husk is the light brown skin covering the almond meat. These female moths are attracted to almond hulls that have splits in them because the splits will allow their newly hatched larvae to have easy access to food, the almond meat. Because almond hulls split naturally when they mature, almonds are most at risk when they are nearly ready to be harvested.

Furthermore, navel orangeworm moths inflict additional damage to almonds than just eating their meat. The pests enable a secondary parasite to wreak havoc on the almonds, causing them further harm. Oftentimes, when navel orangeworm moths enter almond hulls, they carry mold-forming Aspergillus flavus into the hulls with them. The almond hulls’ interior is the ideal environment for this fungi to prosper. The fungi is dangerous because it emits cancer causing compounds known as allatoxins. Almond farmers are forced to spend millions of dollars inspecting their harvests each year to monitor for dangerous levels of these toxins before they can distribute the almonds. Preventing navel orangeworms from invading the orchards would nullify the fungi problem.

To combat the navel orangeworm moths, almond producers install lures near their almond trees. These lures are typically comprised of almond meal to attract the female insects. The females are tricked into believing that the smell of almonds indicates a split hull, which is what the females are searching for. These lures lessen the number of moths that lay eggs on almond hulls. Additionally, almond farmers can monitor these lures in order to gauge the magnitude of the infestations. Highly infested lures indicate to the farmers that it is time to apply pesticides to the almonds.

Porter’s Five Forces Analysis - Almond Industry

Threat of Substitute Products

Among the multitude of types of nuts, there is a significant number of varieties that could be considered good substitutes for almonds. These viable substitutes have similar nutritional value and the environmentally friendly attribute of requiring substantially less water to produce. Commonly substituted nuts include pecans, walnuts, cashews, and peanuts.
**Bargaining Power of Buyers**

There are two segments in the distribution channel that have high bargaining power. Large firms that rely on almonds for ingredients in their processed food can leverage their clout to reduce profitability for the almond producers. Blue Diamond Growers is an example of such a firm. These firms order almonds in vast quantities, and have such strong brands that they command high bargaining power.

The second group of players with strong bargaining power is large retailers. Like the first group, their bargaining power stems from the large quantities of almonds that they purchase. Examples of these firms include large grocery chains like Whole Foods, and discount retailers such as Walmart.

**Threat of New Entrants**

The California almond industry is fairly saturated with almond producers. However, a viable threat of new entrants could exist in other counties. Because California produces more than 86% of the world’s almonds, its profitability could be threatened if another country starts to export more almonds. The top three almond producing countries in the world include the United States, Spain, and Iran. The U.S. is responsible for approximately 1.41 million tons while Spain comes in second producing .38 million tons of almonds.

**Bargaining Power of Suppliers**

Inputs that are vital to almond producers can be considered the industry's suppliers. Water, for instance, is a critical input for growing almonds, and there no substitutes for water. In that sense, those who supply water, usually municipalities, could have strong bargaining power. They could increase the price of water for almond producers, and the almond producers would have no choice but to fold, or pay the increased price for water. This is a significant threat to almond producers in California because the state is in its fifth year of a severe drought.

**Rivalry Among Existing Competitors**

The almond industry is a competitive market with over 6,000 growers. Despite the high amount of competitors, the profitability in the almond industry has been steadily increasing. This allows for higher growth potentials for all existing players. This also makes the industry more attractive to new entrants.

**Porter’s Five Forces - Drip Irrigation Industry**

The United States Water Supply and Irrigation Systems Industry, which consists of 3,028 companies, reported $69.2 billion in revenue in 2014. However, irrigations systems only account for 4.1% of the total industry, or $2.8 billion dollars in revenue. Concentration in this industry is low; therefore, competition is neither high nor aggressive.

**Threat of Substitute Products**

There is really no considerable and adequate substitute for drip irrigation systems as the other forms of irrigation have proven to be less efficient. Although a substitute product could be sprinkler irrigation systems which some orchards still utilize. With an efficiency of 90-95%, drip irrigation however proves to be the best form of efficiently and economically irrigating most crops.

**Bargaining Power of Buyers**

As the components for irrigation systems are standardized with little customization beyond sizing and type of system, the bargaining power of buyers is strong. There is a relatively low switching cost because a part or component can be easily found from multiple suppliers which gives the buyer a number of options and alternatives.
**Threat of New Entrants**

Because of the low level of concentration and competition, new entrants are a high possibility. However, these companies must differentiate themselves from other suppliers in service areas or innovative and sustainable processes as most irrigation systems require similar components. Recently, technological trends have motivated companies to create cloud-based platforms to monitor their products or services.

**Bargaining Power of Suppliers**

Because agriculture requires a vast amount of water and, due to government policies, an efficient system with which to supply water to crops, suppliers have a high bargaining power. In order to comply with government restrictions, farmers must have the newest technologies that ensure efficient water use.

**Rivalry Among Existing Competitors**

There is a low level of competition existing in the market. The global drip irrigation systems market is dominated by a variety of companies such as Netafim Limited (Israel), Jain Irrigation Systems Limited (India), Lindsay Corporation (U.S.), The Toro Company (U.S.), and Eurodrip S.A. (Greece) among others. In order to sustain competitive advantage, multiple competitors are working to create a larger global presence.

**AUDIO Analysis**

<table>
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<tr>
<th>Challenge</th>
<th>Aspects</th>
<th>Upstream</th>
<th>Downstream</th>
<th>Issues</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>California is in its fifth year of drought and first year of severe drought. The almond industry uses massive amounts of water annually. 10% of California’s yearly water supply to almond industry Agricultural water sells for up to $2,500 per acre-foot.</td>
<td>Substantial freshwater use for irrigation.</td>
<td>water contamination from pesticides and fertilizers.</td>
<td>Industry uses over 1.2 trillion gallons of water annually which is 10% of California’s water. 1 gallon of water to produces a single shelled almond. Due to drought there is less snowpack and groundwater available for irrigation. Almonds are often over watered</td>
<td>Drip feed/micro sprinkler systems are a more efficient way to irrigate crops. Real time monitoring systems can help farmers irrigate crops smarter and more efficiently (only 65% of farmers currently use such systems). Companion planting can help reduce pesticides and reduce water contamination.</td>
</tr>
<tr>
<td>Energy</td>
<td>Almond Industry is energy intensive. Much of the energy comes from transporting almonds to global buyers.</td>
<td>Fossil fuels associated with water and truck transportation.</td>
<td>Fuel use associated export to Asia and abroad</td>
<td>Every Kg of almonds consumes 35 megajoules of energy.</td>
<td>Creating hydro power while moving water through storage/reservoir systems to orchards for irrigation? Switching to biodiesels for transportation as well as farm operations. Use of bi-products such as tree-bark and clippings for energy generation.</td>
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</tr>
<tr>
<td>Chemicals/Toxins</td>
<td>Pesticides are commonly used to protect almonds from pests.</td>
<td>Chemicals used in the production of plastic tubes for drip irrigation. Toxic emissions due to the production of fertilizers and pesticides.</td>
<td>Emissions from exporting to Asia and abroad Water runoff contaminates fresh water supply Health concerns for growers who use pesticides and fertilizers.</td>
<td>Vast amounts of fresh water cannot be reused after irrigating almonds because of contamination from chemicals and toxins.</td>
<td>Reduce the use of chemicals and toxins necessary to produce almonds by leveraging organic alternatives for pest control.</td>
</tr>
</tbody>
</table>
### Climate Change

<table>
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<th>Emissions from production of petrochemical fertilizers that are used in the almond growing process.</th>
<th>Emissions due to the irrigation, pollination, and harvesting which account for 61% of emissions.</th>
<th>GHG emissions associated with exporting to China and European countries.</th>
<th>With GHG emissions from fossil fuel combustion associated with almond distribution within the US</th>
<th>Almond industry, along with other fruit and nut crops could sequester more carbon than it emits.</th>
</tr>
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</table>

Almond Board of California claims the industry could become carbon neutral in terms of greenhouse gasses by “reusing coproducts from production/harvesting.”

Almond production byproducts such as the shells/hulls and other biomass could be used for alternative energy.

### Air Pollution

<table>
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<th>GHG emissions associated with pollination.</th>
<th>Harvesting creates dust particulates.</th>
<th>GHG emissions associated with export to Asia and Europe.</th>
<th>Layers of Dust cover the region during harvest season.</th>
<th>Improvements in sweepers and pick up machines reduce the amount of PM10 dust.</th>
</tr>
</thead>
</table>

Nitrous Oxides and VOC’s associated with fuel consumption, pesticides, and fertilizers mix to create ground level ozone having adverse health effects.

Almond trees sequester carbon which help with GHG emissions and could lead to making the industry carbon neutral or even a carbon negative industry.

| Emissions due to the creation of plastic tubes for drip irrigation systems. | Honey bees for almond are shipped hundreds of miles from Montana or North Dakota in most cases. | Emissions due to the creation of plastic tubes for drip irrigation systems. | Companions planting can reduce pesticides (chemicals) brought into the orchards. | Almond trees sequester carbon which help with GHG emissions and could lead to making the industry carbon neutral or even a carbon negative industry. |
**Biodiversity**

Almonds are highly dependent on honeybee pollination. Almond orchards are grown in large monocultures. Pollination effectiveness is lower when just honey bees are used. Pesticides/adjuvants effects on bees are harmful and toxic. Using just honey bees isn’t efficient. Wild bees are able to sustain high winds and wider range of weather conditions. 95% of the endangered species of juvenile salmon died before the start of migration down the Sacramento River due to reduced flow for the purpose of irrigation water storage.

According to the Water Education Foundation, the Friant Dam relocates water for irrigation purposes but does so at the expense of the river flow and the salmon population, leading to public outcry and lawsuits.

The agricultural demand for pollination is growing faster than the supply of honey bees. Having a combination of both wild bees and honey bees creates a “bigger combination fruit set” and diversity of pollination service.

**Target Market**

While all almond growers in California could potentially be our clients, ECO Connection will focus primarily on almond orchards in Kern County initially. Kern County is considered the hub of the California almond industry with 147,000 producing acres, which accounts for 16% of the state’s almond production. There are 1,938 almond farms in Kern County. The average orchard size in the county is 1,200 acres. However, we will market our services to the 41% of the Kern County almond orchards that are 50 acres or less. These smaller, family-owned orchards tend to lack sophisticated irrigation systems. They would likely be most interested in hiring ECO Connection.

**Geographic**

There are over 6000 almond orchards, and 102 almond processing facilities in California. Most of these companies or cooperatives are located in central and northern California, with the largest majority located in Kern, Fresno, Madera, Stanislaus, Merced, and Colusa counties. Each of these counties produces more than 100 million pounds of almonds each year, making them some of the most agriculturally wealthy counties in the US. These areas are home to several large rivers including the San Joaquin, Kings River, Delta-Mendota Canal, Big Creek, Friant Kern Canal, Helm Canal, and Madera Canal. Roughly 75% of these orchards are 100 acres of less.

**Demographic**
According to the Almond Board of California, 91% of the almond orchards in California are owned and operated by farmers whose families have owned the orchards for three or four generations and seek to maintain the family business for future generations. These growers have personal stakes in the land; it is their livelihood, their home, and their future.

**Psychographic**

A high percentage of California voters are registered with the Democratic party which has a record of being progressive on environmental protection. Growers see firsthand how difficult it is to maintain high yields from their trees. They are challenged to maintain soil quality and almond quality to ensure human health and environmental wellness. These farmers value sustainability because they know that their future profits, health, and environment rely on meticulously ensuring that resources such as water and soil are utilized responsibly and not tainted with endocrine disruptors and soil disturbing pesticides.

**Behavioral**

Over the past two decades, California almond growers have been implementing new agricultural techniques to increase efficiency and ensure a good yield. California growers install and regularly service irrigation systems which “have helped almond growers reduce the amount of water they use per pound of almonds grown by 33 percent” (3). In order to determine a design that would best reduce water waste and still provide ample irrigation to plants, 62% of growers use soil maps to understand the soil characteristics in their orchards in order to determine the design of the irrigation systems” (3). The Almond Board of California reports that over 70% of these orchards use micro-irrigation systems which feed water directly into the roots of the tree via holes in the system of tubes, which reduces runoff, evaporation, and over-irrigation. Another 83% of growers water on-demand, or when the trees need water, rather than maintaining an irrigation schedule.

**Competitive & Collaborative Analysis**

Rain Bird

Rain Bird Agri-Products Co. 633 W. Foothill Blvd. Glendora, CA 91741, (800) 435-5624.

Clem and Mary LeFetra founded Rain Bird in the 1930s to improve water efficiency in the local citrus orchards, and have been promoting The Intelligent Use of Water™ since the beginning. Rain Bird currently boasts making high quality irrigation system components that have little environmental impact. The firm’s comprehensive education system seeks to aid Californian in its compliance with Governor Brown’s Executive Order Order B-29-15 to lower outdoor water use in the state (4). In order to monitor and adjust the amount of water crops receive, Rain Bird offers ClimateMinder as a service. This control system alerts growers when moisture levels change so that farmer can apply the right amount of water.

Price Point: Unpublished

www.rainbird.com
Hydratec
325 Road 192 Delano, CA 93215, (661) 725-6656
$9.80 Million in Revenue

Hydratec is located on the Kern County line in the San Joaquin Valley. This location is ideal for business as it places the company relatively close to small and large family farms as well as corporate farms; however, Hydratec also ships its irrigation systems to customers in Florida, Washington, Mexico, China, and Nicaragua. Each year Hydratec supplies systems that can service more than 25,000 acres a year to farms who care about water efficiency. After assessing the individual needs of a farm, Hydratec creates a tailor-made system that address the concerns unique to that particular client. The selling points HydraTec emphasizes are quality innovative and modern technology and highly trained micro-irrigation installation specialists.

Price point: Unpublished

www.hydratec.com

DripWorks
190 San Hedrin Circle, Willits, CA 95490, 707-459-6323
$4.5 Million in Revenue

DripWorks is located in Northern California and has been in business since 1992. The company sells drip irrigation systems and other components for mostly small scale operations and personal home gardens. DripWorks also provides a free catalog, one version for retailers and the other for wholesalers which helps consumers setup and install the systems as well as provide new products/techniques.

A big component of DripWorks is the customizable aspect to their product line. While they sell and produce their drip irrigation systems and parts, they also provide a free DIY planning guide which can assist consumers in starting their own projects without the direct onsite assistance other companies may offer.

Price point: Unpublished

www.dripworks.com

Netafim
38 Locations Worldwide
5470 E Home Ave, Fresno, CA 93727-2107
$67.28 Million in Revenue

Netafim was the first company to bring a drip irrigation system to the global market in 1966. Since then, Netafim has solidified its position in the global agricultural irrigation industry by making innovation a core value. Currently, Netafim boasts many different types of irrigation systems including “drippers” that are self-cleaning and provide a steady, unchanged flow.

Netafim trains employees to asses the needs of a wide variety of farms, to install efficient systems, and to train farmers on how to use the cloud-computing platform to control the drip irrigation system.

Price point: Unpublished

www.netafim.com
<table>
<thead>
<tr>
<th>About the company</th>
<th>ECO Connection</th>
<th>Rain Bird</th>
<th>Hydratec</th>
<th>DripWorks</th>
<th>Netafim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Started in Western Massachusetts by students passionate about reducing water waste in the agricultural industry.</td>
<td>Started in 1930s. Strong brand due to progressive environmental focus, 4,000 irrigation products/services, and 450 patents.</td>
<td>For over 35 years, Hydratec has been providing quality irrigation solutions to farms of all sizes in various countries around the world.</td>
<td>Based in California and has been producing/selling drip irrigation systems and supplies since 1992.</td>
<td>Netafim was started in 1965 and introduced the first drip irrigation system. Globally recognized as a provider of irrigation solutions.</td>
<td></td>
</tr>
</tbody>
</table>

| Is the product customizable to operations size or design preferences? | Yes | No, Rain Bird offers L-F series system for nut orchards. | Yes. Hydratec offers products and services to orchards of all sizes and will customize orders to fit particular needs. | Yes. DripWorks mostly caters to home projects and small scale operations but allows you to customize orders to fit your specific needs. | Yes, but through Netafim’s suppliers as Netafim does not offer drip irrigation components. |

| Does the company install the product? | Yes | No, but refers you to irrigation specialists trained to use Rain Bird products | Yes | No | Yes |

| Does the company service the product? | Yes | No | Yes | No | Yes |

| Does the company maintain competitive prices? | Yes | Unclear and unpublished | Unclear and unpublished | Yes | Unclear and unpublished |

| Provide organic solutions to pests? | Yes | No | No | No | No |

| Does the company connect farmers with local beekeepers? | Yes | No | No | No | No |

**Perceptual Map**

ECO Connection will offer sustainable agricultural support that is superior to its competitors’ services. The firm differentiates itself by producing low impact drip irrigation systems, and by providing organic pest control services. This combination of services is unique in the industry. Consequently, the firm appeals to any almond grower in...
California who values efficient and sustainable water-use. In addition to installing efficient systems, sustained maintenance thereafter allows ECO Connection to monitor its clients’ systems for ways to improve them and tackle any of their lingering inefficiencies.

Even though Hydratec and Netafim seem like close competitors, they have defining factors that reduce attractiveness to growers. Hydratec offer customizable packages of products which they install and maintain at the convenience of growers; however, this company only services one need of an orchard: drip irrigation systems. Netafim was started in Israel with the purpose of fulfilling agricultural needs; to do so, Netafim created the first drip irrigation system. This company assesses farmers’ irrigation needs, contacts suppliers of the irrigation systems products, installs and trains farmers on how to maintain the product via cloud-computing systems. In contrast to Netafim and Hydratec, ECO Connection equips farmers with services these firms cannot: repurposed and recycled products and a connection to local beekeepers and organic alternatives to conventional pesticides and fertilizers.

After eighty-two years of delivering durable drip irrigation products, Rain Bird is still the market leader in this industry. It owns over four hundred fifty patents and prides itself on its commitment to The Intelligent Use of Water™. Rain Bird may be the leader in water efficiency systems, but they do not provide installation, maintenance, easily customizable packages, or organic solutions to pesticides. Similarly, DripWorks does not install or service the standardized irrigation systems it’s selling; yet it provides “DIY” videos to aid in installation. This is less convenient for a busy grower who craves the simplicity of one company solving all her/his needs so she/he can spend less time researching solutions, less companies to pay, and more time to spend on leisurely activities.
# Market Analysis

## SWOT Analysis

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master's degree in sustainability science</td>
<td>Limited experience in finance</td>
<td>National focus on the water crisis - willingness to act/invest in efficiency</td>
<td>Decreasing bee population due to CCD</td>
</tr>
<tr>
<td>Dedicated and determined individuals who work well as a team</td>
<td>No experience as beekeepers</td>
<td>Expanding market for organic solutions and green businesses</td>
<td>Farmers already have irrigation systems, sunk costs</td>
</tr>
<tr>
<td>Strong writing skills</td>
<td>Limited financial resources</td>
<td>Governmental mandates to increase water efficiency (decrease water waste) in California</td>
<td>May be hard for farmers to change old agricultural habits</td>
</tr>
<tr>
<td>Experience on permaculture farm</td>
<td>Lack artistic resources</td>
<td>Increase of consumer awareness of environmental impacts and water scarcity</td>
<td>Jess Stryker (our expert consultant) might charge too much money, or may be unavailable</td>
</tr>
<tr>
<td>Connections to software and web developers</td>
<td>Lack engineering capabilities</td>
<td>Rise in motivation to be sustainable</td>
<td>Almond bloom typically only lasts a few weeks</td>
</tr>
<tr>
<td>Knowledge of</td>
<td></td>
<td>“Bigger combination fruit set” when both wild bees and honey bees are together 25</td>
<td>Harmful effects of insecticides on bees during bloom</td>
</tr>
<tr>
<td>- social media marketing</td>
<td></td>
<td>More effective crop pollination with combination bee sets.</td>
<td>California drought could worsen</td>
</tr>
<tr>
<td>- consumer behavior</td>
<td></td>
<td>Opportunity for growth into the wider nut and fruit orchard industry</td>
<td></td>
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<tr>
<td>- services marketing</td>
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<tr>
<td>- direct marketing (especially email marketing automation)</td>
<td></td>
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<tr>
<td>- press releases</td>
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## Mission Statement

Our mission at ECO Connection is to sustain environmental, economic, and social growth in California through water-waste reduction. By partnering with farmers and other local stakeholders, we design and manufacture irrigation systems reusing end-of-life and recyclable materials that bolster fresh water-use efficiency and foster healthy and responsible agricultural nut production.
**Business Philosophy**

Our business philosophy is one of sustainability, waste reduction, and water conservation. We are a non-profit consulting firm dedicated to helping California protect its freshwater supply. The severe drought in California means that people in the state, particularly almond farmers, need to be more conscientious about the amount of water that they use, how they use it, and how much they waste. Our goal is to improve almond production efficiency so that the industry puts less stress on California’s water reserves, while still allowing farmers to maintain their livelihoods.

**Vision**

We envision collaborative Californian communities, whose stakeholders work together to mitigate their freshwater shortages. Our role will be to facilitate cooperation and communication between California residents, local municipalities, government organizations, irrigation experts, beekeepers, local businesses, and almond farmers to implement solutions that will help conserve and preserve California’s freshwater supply.

**Objectives**

*Environmental* - Improve fresh-water use efficiency by 30% on all of our clients’ orchards within the first five years.

*Economic* - Provide our services to at least 30 orchards and pay off our building loan within our first five years.

*Social* - Provide steady, bi-monthly collaborative business to at least five different local companies throughout our first five years.

**Positioning**

ECO Connection markets its dedication to solving California’s water crisis while sustaining its almond industry. We reduce water use and water expenses for our clients, protecting their industry’s longevity by conserving water resources. Leveraging recycled and repurposed materials allows ECO Connection to create durable irrigation systems at minimal costs for both the farmers and the environment. The firm works directly with municipalities to collect materials and then repurposes them in-house to create long lasting and eco-friendly irrigation systems. We also help to protect communities’ drinking water from nitrogen contamination by replacing standard pesticide and fertilizers with organic alternatives. We position ourselves so that all aspects of our services protect freshwater in California.

**Brand Logo**

Brand image is important to acquire and maintain a large customer base. A factor that largely contributes to customer’s perceptions of a firm is the brand logo.

In order to communicate our dedication to reducing water waste and water contamination, we decided to use a modified water droplet as our logo. The main goal of ECO Connection is to conserve and preserve the integrity of California’s freshwater, hence the left side of the water droplet is a clear, bright blue.

Within the droplet is a garden hose that symbolizes our commitment to reusing end-of-life materials by repurposing old hoses to be components in our drip irrigation systems.
The last portion of water droplet is an almond to remind us of our roots in the almond farming industry. A major goal of ECO Connection is to empower almond farmers to make sustainable choices that protect their land, their family, their water, and their profits.
Strategies

**Services Overview:**

We are a non-profit organization whose goal is to minimize the environmental and social repercussions of the California almond industry. Our business strategy is to help California conserve its freshwater by targeting the Kern County almond industry and facilitating collaboration between various California stakeholders. These stakeholders include local municipalities, the California Almond Board, community members, bee facilitators, socially and environmentally responsible drip irrigation component suppliers, local organic pesticide and fertilizer suppliers, irrigation design experts, and almond growers.

We have identified three aspects of almond farming that we can address in order to improve efficiency in almond production and reduce the amount of water wasted. The first part of our services is to design durable drip irrigation systems that use the least amount of materials, maximize water pressure, and limit leaks. One of the facets of almond production that results in the most wasted water is inefficient irrigation systems. According to Jess Stryker, a California irrigation designer, these poor systems often have leaks that both reduce water pressure in the system, and disperse water in areas where water is not needed. Irrigation systems also often use more piping than is needed to irrigate orchards. We will hire consulting experts, like Jess Stryker, to assist us in designing the longest lasting and most efficient irrigation systems.

The second aspect of our value proposition is to help our clients maintain the quality of the freshwater after it is used to irrigate crops. Almond production inherently requires vast quantities of water. Short of downsizing almond production, there is no way to avoid that. However, many current farming practices utilize non-organic fertilizers and pesticides, especially when limiting the damages caused by navel orangeworm moths. Both of these artificial agricultural production enhancers contaminate and diminish groundwater quality. To help maintain the quality of our farmers’ groundwater reserves, our firm will partner with firms who can responsibly provide us with organic pesticides and fertilizers. This aspect of our service will not only help to sustain the quality freshwater supplies, but will allow our firm to incorporate our third offering.

The third step in our strategy is to provide our farmers with honey bees and wild bees to help pollinate their orchards. This tactic is paramount in maximizing crop yield. By enhancing the almond trees’ production rates, we will improve the amount of almonds that are produced per freshwater input. This will satisfy the world’s growing demand for almonds without using more water or altering land cover.

Using bees to pollinate the orchards would not be possible without first having our clients use organic pesticides and fertilizers. Honey bees often contract colony collapse disorder, or CCD, after coming into contact with standard pesticides and fertilizers. Using organic substitutes will protect the bees, allowing them to pollinate the orchards successfully and safely.

While we execute our three step strategy to help our clients conserve water in California and improve their production, we will limit our own ecological footprint as much as possible. This means that we will acquire end of life materials for reuse whenever we can, minimize our transportation impacts, partner with responsible third party suppliers, and design durable irrigation systems that can be reused or recycled. While we pursue these social and environmental goals, we will also achieve financial sustainability through our service revenues.
**Product**

**Drip Irrigation Components:**
Drip tubing, filters, valves, backflow preventers, pressure regulators, emitters, mainline, lateral/sub-main pipes, drip-tube fittings, air vents, and end caps.

-Drip Tubing:
Tubing is by far the largest component in drip irrigation systems. In almond orchards, tubing is laid on the ground’s surface next to the almond trees, snaking its way throughout the property to apply water wherever it is needed. Because many of our clients’ almond farms exceed 100 acres, providing enough tubing to satisfy such large areas requires huge amounts of tubing input. This contrasts with other components in our irrigation systems, which are both fewer in number, and smaller than the tubing. Also, to create highly efficient irrigation systems, components other than tubing need to be of the highest quality. Consequently, our firm focused on sourcing our drip tubing from cheap, end of life materials in order to minimize our ecological footprint.

Sourcing:
In California, old garden hoses that are no longer useful for their original purposes are almost always thrown into trash bins to be transported to landfills. This happens because garden hoses are typically made from reinforced PVC that can be difficult to separate for recycling. The snake-like shaped garden hoses tend to get tangled and damage the sorting equipment at recycling facilities.

Consequently, garden hoses are rarely accepted in California towns’ curbside recycling programs. Examples of towns that currently do not accept garden hoses for recycling are LA, Arcadia, Burbank, Culver City, Huntington Beach, Long Beach, Manhattan Beach, Santa Monica, and Torrance. In fact, the only town in Southern California that seems to recycle garden hoses is Ventura.

This presents ECO Connection with an opportunity to create shared value between our firm and the people of California. We can partner with various California municipalities and convince them to accept garden hoses in their curbside recycling programs. Once the old garden hoses are collected and separated at recycling facilities, ECO Connection can come and collect the garden hoses to be reused in our drip irrigation systems.

This relationship will benefit municipalities by limiting the amount of solid waste that ends up in their landfills. Also, our partnership will add value to the towns because community members will appreciate knowing that they can recycle their garden hoses for free. If providing ways to cut back on solid waste and enhance recycling efforts is not enough incentive for these municipalities, we will offer to pay them an annual fee to cover their waste management employees’ increase in work due to sorting hoses.

Either way, ECO Connection will acquire a significant portion of the inputs required to produce its irrigation systems at a fraction of the cost of virgin tubing. This will conserve more of our clients’ capital, allowing them to invest in sophisticated irrigation equipment like smart controllers, rain switches, and filters.
**End of Life:**

When sections of our clients’ drip tubing wears out over time, we will pick up the old tubing from them and bring it back to our warehouse facility. There, we will cut up the worn out tubing into little pieces so that it can be recycled without damaging the sorting equipment at recycling facilities. Our firm will then engage in reverse logistics when we dispose of the cut up pieces of old garden hoses. Meaning, we will take the little pieces of hose with us whenever we pick up our fresh supply of reusable garden hoses from municipality recycling facilities in greater Los Angeles. We will leave the cut up hoses at these recycling facilities, and drive away with our new stock of garden hoses. This will let us maximize our drives down to the recycling facilities, reducing our transportation costs and cutting back on our emissions.

**Filters:**

Filters are among the keystone components in our drip irrigation systems. According to Jess Stryker, most failures in irrigation systems result from rust or sand particles clogging the tiny passages in the control valves. We will install top quality filters at our clients’ water sources, protecting the control valves and pressure regulators from grit. Our filters will be between 150 and 200 mesh screens, the ideal size for commercial irrigation systems. They will also have maximum pressure ratings of at least 10.3 bars, which equates to 150 psi, or higher. Although the market’s top filters cost more investment upfront, they pay for themselves within five years by reducing the amount of needed repairs to the system.

**Sourcing:** We identified Rain Bird Corporation as a viable long term partner who can supply us with many of our high end drip irrigation components, including the filters that meet our high specification requirements. The firm describes itself as being “committed to the intelligent use of water” 2. Rain Bird has been a leader in manufacturing irrigation products since 1933.

While its reputation for manufacturing top quality drip irrigation components is part of why we decided to partner with Rain Bird, its relatively short distance to Kern County was the deciding factor. The firm is located in Azusa, CA, under 150 miles away from our warehouse in Kern County. This falls within our maximum range of 300 miles for sourcing our products’ components, helping us minimize our transportation costs and greenhouse gas emissions.

**Valves:**

Valves are used to turn the water flow off and on. We will use both insulation valves and control valves. An insulation valve is typically installed at the water source so that the entire irrigation system can be shut off if needed for repairs. For larger irrigation systems, like those of commercial almond growers, additional insulation valves are installed at various points in the system to allow for water to be shut off locally to make repairs without having to disrupt the entire system at the water source.

In addition to insulation valves, we will install several control valves, which control water flow to individual circuits. Groups of control valves will be installed close together so that farmers can conveniently alter water flow to various circuits from one location. Clustering control valves will help the farmers follow the best watering practices and conserve water. Keeping control valves together will also save the farmer money because he will need to buy fewer high end pressure regulators. Pressure regulators need to be installed before control valves, so having control valves close together will allow one pressure regulator to service all valves in the cluster.
Sourcing: Rain Bird Corporation will also source our high quality brass valves for $100 each. Sourcing as many of the high end components as possible from one key partner close by will help us avoid having more transportation costs than is necessary. This will also increase the number of components we receive per shipment, and cut back on greenhouse gas emissions that stem from our operations.

-Backflow Preventers:
The backflow preventers ensure the safety of our farmers and their families. The devices are installed directly after the control valves, and prevent unwanted particles such as dirt, salmonella, and dog pee from getting sucked back into drinking water supplies from the drip systems. Without exception, all drip irrigation systems need backflow preventers.

Sourcing: Rain Bird will also supply us with backflow preventers for $5.53 per piece.

-Pressure Regulators:
Pressure regulators regulate the water pressure in drip irrigation systems by first reducing the water pressure at the source, and then keeping that pressure constant throughout the system. Typical municipal water supplies have higher pressure than what is ideal for drip systems. Regulators protect irrigation systems from breaking down as a result of high, inconsistent, or pulsing water pressure. A smart, cost saving tactic is to install the pressure regulator on the main water line before the cluster of control valves. This results in only needing to buy one regulator for an entire drip system.

High end, adjustable pressure regulators are necessary for commercial drip irrigation systems. We will spare no expense on our clients’ regulators. Most regulators are either brass or bronze, and need to be slightly smaller than the pipes on which they are installed. 50 mm regulators work well for most systems.

Sourcing: Jess Stryker recommends buying pressure regulators from the plumbing departments in local hardware stores. There are several hardware stores to pick from in Shafter, California, the town we are based out of. For example, we could buy pressure regulators from Floyd’s General Store, or Ace Hardware, both of which are within a couple miles of our warehouse. Buying locally will minimize transportation costs, and help support the local economy and businesses.

-Emitters:
Emitters are small plastic pieces that either screw or snap into the drip tubing. These pieces control how fast the water drips out onto the soil. Emitters are the second most resource intensive components in our systems because they need to be installed along the entire drip tubing, spaced 18 to 24 inches apart from each other. This requires huge quantities of emitters because many of our clients’ orchards are about 100 acres.

Sourcing: Rain Bird will provide us with emitters as well. They are priced at $5.54 each, but the price per unit will drop when we buy in bulk. We will buy these in vast
quantities because they are a standard size and can be used in all of our drip systems. Because we are using old garden hoses for our drip tubing, we need to buy emitters independently and install them on the old garden hoses ourselves.

Afterlife: The old garden hoses will likely break down before the emitters do. If this is the case, we can reuse the emitters on drip tubing in the future. If the emitters break down, we can recycle them through Netafim Recycling. The firm is located in Fowler, CA, 90 miles away from our warehouse in Shafter. They will come to our facility and pick up the emitters for free.

- Mainline:
The mainline is the pipe that goes from the water source, through the pressure regulator, to the control valves. A mainline for a commercial irrigation system is typically made from galvanized steel, and is installed in a loop around the entire orchard.

Lateral Pipe:
The lateral pipes, also known as sub-main pipes, go between the control valves and the drip tubes. We can use more of our recovered garden hoses to serve as the lateral pipes in our irrigation systems.

-Drip-Tube Fittings:
Drip-tube fittings connect the drip tubes to the lateral pipes. This connection is often a source of unwanted leaking and water waste. To prevent this, we will use hose-to-pipe adapters to connect the PVC pipe threads to the drip tubing hose threads effectively. These adapters can be purchased in most hardware stores.

Sourcing: Rain Bird will supply all the ½ inch fittings that we need to effectively attach the garden hoses to the PVC lateral pipes. They come in an array of shapes that will accommodate any drip irrigation system that we design.

-Air Vent:
Air vents are critical components for more durable drip systems. They prevent air and grit from being sucked into irrigation systems through the emitters when the water is turned off. Air vents are installed at the highest point of the drip tubing, well away from areas where dirt or grit might have access to them.

Sourcing: Rain Bird will supply us with ½ inch air relief valves for $8.10 each.

-End Cap:
End caps prevent water from escaping out of the ends of the drip tubing. While we could buy end caps for our drip tubing, we have identified another cost-saving tactic that will serve the same purpose. Instead of using end caps, we will simply crimp the end of our drip tubing hoses by folding the end onto itself, and tying it together with zip ties. Whenever we need to flush the system, which should be done annually, we can remove the ties and let the water flush out.
Sourcing: We will buy zip ties from the same hardware store that we acquire our aluminum tape and our pressure regulators from.

Drip Irrigation System Afterlife
Every component in our drip irrigation system is recyclable. When the reused garden hoses can no longer serve as drip tubing, we will chop them up into tiny pieces at our warehouse and drive them back to the municipal recycling facilities around Los Angeles. This is an important aspect of our reverse logistics. When we return the chopped up garden hose pieces, we will restock on our fresh supply of old garden hoses.

Our other drip irrigation components can be recycled through our partner, Netafim Recycling. We store all of our clients’ end-of-life irrigation components at our warehouse. Once we have accumulated enough waste, Netafim Recycling will send a truck to our facility and it pick up for free. The firm will then transport it to their own base, and recycle it properly.

Bees:
To provide our clients with bee services that will help them pollinate their almond orchards, we have decided to partner with the Pollination Connection. The Pollination Connection is a platform that connects almond growers with quality beekeepers in California. The firm offers “honesty, reliability, and integrity” in all their services. They provide flexible plans that customize bee services for individual orchards. They also offer on-site supervision and support. According to its website, the firm takes pride in maximizing almond yields for its clients. This will help our clients produce almonds more efficiently with less water input per almond output.

The Pollination Connection has excellent online reviews, which is a testament to its high level of service. The firm will prove to be an excellent partner for our organization.

Organic Pesticides and Fertilizers

Traditional Practices
The University of California Agriculture and Natural Resources department has created a statewide Integrated Pest Management program to encourage a lesser reliance on pesticides. This comprehensive program allows the farmer to be proactive about preventing pests from damaging crops with minimal pesticide use. Pesticides have negative effects on air quality, groundwater, biodiversity, and human health. ECO Connection is encouraging farmers to use IPM strategies when paired with organic alternatives to conventional pesticides and fertilizers.

Potential Partners
To reduce the degradation of freshwater used in almond agriculture, ECO Connection will partner with the organic fertilizer and pesticide companies listed below. Supplying our clients with organic pesticides produced locally in California, we will simultaneously defend the integrity of our farmers’ water quality and minimize our transportation costs and emissions.

Ecostadt Technologies
Fertilizers and Pesticides
Located in Folsom, California (Sacramento County)
Distance from Kern County: 305-318 miles depending on route
Primarily, Ecostadt Technologies creates products made from GRAS (generally recognized as safe) materials to support the bio-nutritional health of plants. Fertilizers and amendments typically are either supplements which correct mineral deficiencies to increase yields or nutrients which add elements crucial to plant growth such as nitrogen; these products usually come in a variety of states including liquid and dry. Yet, Ecostadt has also engineered its own “protectant” or pesticide called EcoArmor, which protects plants from common pests such as mites, aphids, and caterpillars. It is important to note that Ecostadt encourages the use of their products along with practicing IPM procedures in order to ensure the greatest possible plant and soil health.

All of Ecostadt’s products are safe for use in almond orchards as they enhance the health of the soil, resulting in an increase in the yield without saturating the soil, the plant, and the farmer with toxic chemicals. For example Ecostadt’s Natural Dry Soil Amendments, which meets organic and vegan crop nutrition certifications, enhances soil health by introducing carbon and microbe populations into the earth and aiding in nitrogen absorption. Consisting of neem kernels manufactured in a rotary with no added chemicals or use of steam, this product is a viable fertilizer option for those motivated to reduce toxin use in agriculture and odors related to other organic fertilizer options such as manure. Because neem is derived from trees native to East Asia, Ecostadt works directly with rural communities in this region to produce neem in a socially responsible and sustainable manner and promote global development. Although importing neem from East Asia seems to add to energy inefficiencies and carbon emissions, neem trees aid in the reduction of atmospheric carbon, by supporting this industry, Ecostadt is working towards reducing global atmospheric carbon levels.

A typical problem that almond farmers have with pesticides is the effects they have on pollinating bees. Neem oil works as an insecticide only via consumption. As bees do not actively consume external plant matter such as leaves, they are safe from the effects of neem oil.

Plateau Pest Solutions
Located in Vista, California (San Diego County)
Distance from Kern County: 227-239 miles depending on route

Plateau Pest Solutions is a family owned and operated business with over thirty-five years of experience in the industry. Stressing IPM practices, customizable packages, and the health of their customers, Plateau Pest Solutions is a fantastic partner for ECO Connection. Providing alternatives to conventional structural, landscape, and aquatic pesticides at an affordable price and customizable schedule are key selling points for this health conscious company. Their applications, though not detailed on their websites, are “organic, botanical, and eco-friendly.”

Although they do not provide prices online, they provide information regarding maintenance contracts and pay-per-service options over the phone or via email.

In this age of information, reviews can make or break a business. Yelp!, CustomerLobby, and Plateau Pest Solutions websites offer in-depth descriptions of excellent service, comparable pricing, and impressive knowledge of pest-control procedures, effects on health, and sustainable solutions.
**Place**

**Base of Operations:**

Our firm will be based out of Shafter, California in Kern County. We found a perfect 20,000 square foot warehouse facility on 1.34 acres for $850,000 that will serve our needs nicely.

The warehouse is situated right in the heart of Kern County’s almond agricultural community. This makes visiting our clients’ orchards easy and cost effective. The facility is also located just off of interstate 5, north of Los Angeles. This gives us convenient access to a major highway that will take us to our various partners, many of whom are within 150 miles of our facility. This position is strategically located at the center of our suppliers and clients, minimizing our transportation costs and ecological footprint.

The ample space will allow us to store old garden hoses and other drip irrigation components. We will also have space to install the emitters onto our recently acquired reusable garden hoses, and space to cut up old pieces of garden hoses to allow for easy recycling.

In addition to storage space, the facility comes equipped with just over 1000 square feet of office space. This will allow us to strategize internally, as well as hold meetings with clients and suppliers at our facility. Our goal is to install enough solar panels on our warehouse’s roof to supply us with 100% renewable energy. This will reduce our ecological footprint. Any additional energy that our panels generate that we do not use will charge the local grid in Kern County, aiding our community and its energy use.
- ECO Connection
- Clients’ Farms
- Municipalities’ Recycling
- Rain Bird
- Netafim Recycling
- Bees
- Organic Pesticides and Fertilizers
Price

Since all orchards have different needs, ECO Connection offers a range of service packages. By offering a baseline assessment of the current system, we are able to customize our service to the individual orchard’s needs. The variety of services and packages allows us to provide the high-quality and comprehensive services while maintaining comparable and competitive pricing strategies. Because services are customizable, prices are based on individual needs and, therefore, vary from customer to customer.

Consultation

For farmers who are unsure if they want/need a new irrigation system ECO Connection provides a consultation service. This consultation service begins with an assessment of the current irrigation system on the orchard. Once this is done we can offer advice on ways to conserve water and how to make the current system more efficient.

Every year following the first consultation, there is an annual inspection in which ECO Connection checks for damage to the system in order to responsibly dispose of recyclable materials and provides maintenance for easily fixed issues.

Annual Price: $2,000

Basic Water System Package

ECO Connection creates state of the art efficient drip irrigation systems. Our most basic package includes an audit of you’re the almond orchard and its current water usage. After we get a baseline of the current situation we can design a custom drip irrigation system for the orchard. ECO Connection will design and install the irrigation system, reducing water use and increasing almond production.

Price: $300 per acre

Organic Pest Solutions Service Package

Our full service package includes everything offered in the basic package as well as a nutrient and fertilizer plan. ECO Connection provides biological and organic soil amendments that will decrease water contamination on the orchard. In addition to providing safe soil amendments this package includes visits from our experts to the orchard at various times throughout the growing season. They will re-audit the orchard, offer consultation, document necessary adjustments, and provide maintenance on the irrigation system.

Price: assessment fee of $1,000 in addition to $50 per acre for organic pesticide application

Bee Pollination and Organic Pest Solution Service

We partner with The Pollination Connection to foster relationships between our farmers and local beekeepers in order provide pollination services. Because bees pollination increases yields, farmers would be inclined to pay for this service. To qualify for the bee service an orchard must be GMO free and use organic fertilizers and pesticides; consequently, this package includes

Facilitation Price: assessment fee of $1,000 in addition to a $100 per acre bee facilitation and organic pesticide application

Premium Package

Our Premium package gives the farmer full access to all that ECO Connection has to offer. This is the best way to maximize production and make your orchard as efficient as possible. This package includes consultation, custom designed irrigation system, installation of the irrigation system, regular check ups and maintenance on the system, a nutrient and amendment plan, and bee pollination services.

Price: $5,000 (for consultation, installation, and maintenance) in addition to $100 per acre for organic pesticide applications and bee pollination services
We strive to develop personal connections with our customers through our website to leverage our credibility. Our Home Page is decorated with a large flowering almond orchard and highlights our environmental, economic, and social objectives (see image to the right). Clicking on any of the objectives directs the viewer to ECO Connection’s “About Us” page (see image below). Here, our story and mission show our customers that we are passionate about reducing water waste resulting from contamination and inefficient irrigation systems. We encourage and enable farmers to embrace sustainable farming practices. The “About Us” page also displays our Eco Labels, which will be discussed in the following section entitled Eco Labels.

To exhibit transparency, we designed our website so that our clients and communities could get to know us better. Our Team page includes our team members’ biographies, and highlights their experiences with sustainable projects (see image below). The page also describes their passions and values. We hope that this will create personal connections with our customers. Similarly, the Our Partner page shows our customers who ECO Connection collaborates with by sharing their stories (see image below). We also identify how our relationships improve our value to our clients.

**Eco Labels**

**LEED Certified**

The LEED Certification is a globally recognized system for rating buildings on environmental impacts. Efficiency and resource utilization are the system’s main focal areas. These are good for firms that want to improve their triple bottom lines.

ECO Connection’s facility will be LEED Certified. Our building meets benchmark standards for indoor air quality, water efficiency, renewable energy, and waste standards. We constantly look for ways to innovate our operational practices and lower our ecological footprint. This certification upholds our commitment to efficient, environmentally sustainable practices.

**Kern County Certified Green Business**

A company has to operate sustainably in order to be certified as a Kern County Green Business. Operating sustainably means having a fair and local supply chain, and using water and energy efficiently, among other things.
Our facility exceeds all of these requirements. Our use of solar panels and our local supply chains minimize our harmful impacts to the communities in which we operate. That, in addition to our mission to conserve California’s freshwater, allow us to create shared value with our stakeholders.

Social Media

When researching our competitors and potential partners, we found that none of them have active LinkedIn pages. For this reason, we chose to forgo spending time, effort, and money on maintaining a page on this social media platform.

However, we found that Facebook and Twitter are excellent platforms for marketing to our target clients. The percentage of active Facebook users vary with age. 82% of people between eighteen and twenty-nine use the site. Of those between thirty and forty-nine, 79% are active users. 64% of users between fifty to sixty-four use Facebook.

70% of all Facebook users check the site daily to connect with friends, family members, or companies. For this reason, ECO Connection will post information on Facebook at least three times a week for the first month. The frequency of our post will then increase to five times a week during the following month.

51% of Twitter users are between eighteen to forty-nine years old. However, only 38% of users check Twitter on a daily basis. Because tweets are shorter and simpler than Facebook posts, ECO Connection will be tweeting two to three times per week.

A sample social media calendar can be found below:
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