Improving Energy Efficiency in Central America and the Caribbean through the Expansion of Ener-G Tech Investment

December 14th, 2012

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An Interactive Qualifying Project submitted to the faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirements for the
Degree of Bachelor of Science

Sponsoring Agency: Ener-G Tech Investment, S.A.

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December 14, 2012

Abstract

Central America and the Caribbean face many problems that stem from high energy consumption, which can be reduced through energy efficiency improvements. This project supports this effort by assisting in the expansion of Ener-G Tech Investment, a Costa Rican energy service contractor. This was accomplished by investigating Ener-G's current performance, evaluating the company's environmental impact, and creating a franchising business plan. Utilizing client survey results, research, and information from Ener-G executives, the team designed a franchise structure, analyzed potential markets, identified financing sources, and made improvements recommendations. The business plan deliverable will guide the company in expansion, thereby facilitating energy efficiency improvements in the region.

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Executive Summary

Reducing energy consumption through energy efficiency improvements is an effective approach to lowering energy costs and reducing carbon emissions. In the U.S. and Europe, the energy service company (ESCO) industry has been the dominant model for the delivery of energy efficiency services since the 1980s (Goldman et.al, 2008). Ener-G Tech Investment is an ESCO in San Jose, Costa Rica, whose customers are typically commercial and industrial companies with high energy usage. Ener-G operates using performance-based contracting, meaning that over the life of the contract, they receive periodic payments for energy efficiency projects based on the cost savings created.

Ener-G has been in business in Costa Rica for over twelve years, and they are interested in expanding to other countries in Central America and the Caribbean through franchising. Franchising is a business practice in which a company can quickly expand into different locations by allowing individuals, called franchisees, to use the company's brand name and open a new branch. In order to prepare for this process, Ener-G requires a written plan for the expansion.

The goal of this project is to support energy efficiency efforts in Central America by designing a business plan for Ener-G Tech Investment, which we accomplished through three main objectives. In the first objective, the team investigated Ener-G's current business model, creating a baseline and identifying portions of the current model that can be used in the new business plan. The next objective was to evaluate and quantify the company's current environmental impact as well as the projected impact of franchising the company. The final objective was to create a franchise business plan for Ener-G to aid the company's expansion to other Central America and Caribbean nations.

In order to complete these objectives and achieve our overall goal, the team surveyed Ener-G's clients, held interviews and meetings with Ener-G executives and conducted extensive archival and online research. All objectives are intertwined, and as such much of these methods were conducted in such a way that they aided in completing multiple goals.

To address the first objective, the team analyzed the details of Ener-G's structure and operations. The team met with executives at Ener-G in order to develop an understanding of how the business functions and to gather data about the company's finances and project history. The team determined Ener-G's process for completing a project and compiled project financial data.

The team also surveyed a selection of Ener-G's clients to examine their partnership with Ener-G, which was useful in identifying potential opportunities for improvement. This information was then used to make suggestions to Ener-G for adapting their current model to a franchise model. For the second objective, the team used emissions factors for electricity generation, found through research, to relate the amount of energy saved to the amount of carbon dioxide emissions saved. This analysis was performed both for real impacts in Costa Rica, as well as potential impacts in the other nations considered for franchising locations. Our evaluation served to validate the environmental benefit of the company's work and to supplement the market analysis in consideration of potential franchise locations.

Finally, to address our third objective, we identified four major necessary components of the business plan through meetings with executives and online research. These were the franchise structure, a market analysis, improved communications practices, and financial options. In designing the franchise structure, the team adapted Ener-G's current business model by detailing the division of responsibilities and contributions between the franchisees and the parent company. For the market analysis, we researched the market for energy efficiency projects in each of the countries targeted for expansion, collecting data on market factors that we identified as important for the performance of an Ener-G franchise. After surveying Ener-G's clients about communications practices, the team made recommendations for communications improvements including the conceptual design for a mobile application to convey energy savings information to customers. For the fourth major component of the business plan, the team investigated potential financing options for funding this franchise expansion. Finally, the team researched further into the structure of a business plan, and then synthesized all the results gathered into a comprehensive business plan document for Ener-G.

The results of our environmental impact analysis showed that expanding Ener-G's business to Central America and the Caribbean would have a much more substantial impact on the environment, because the carbon emissions from electricity generation are much higher in most of the target countries than in Costa Rica. In general, the Caribbean countries we investigated have the highest emissions factors, so Ener-G would have the greatest impact in these countries.

In the final business plan, the team designed a centralized franchise system model, meaning the majority of the responsibilities are designated to the parent company. We created

descriptions of each responsibility and the reasoning behind our decisions, as well as a "value map" graphic showing the division of responsibilities and how each party adds value to the franchise system. Our market analysis identified a number of potential nations for early expansion targets, and we recommended that Ener-G consider either Panama or Jamaica as a location for the initial franchise operation. The high electricity price, high emissions factor and governmental support of energy efficiency initiatives make Jamaica a promising location. Panama should also be considered as an initial location, because of the industrial and commercial sector surrounding the Panamá Canal, the similarity between the market analysis of Costa Rica and Panamá, and low tariffs. Furthermore, our client surveys and research indicated that conveying energy savings and other benefits to the customer would increase customer satisfaction. An optimal communications strategy involves updating customers about their energy savings information using e-mail updates and a mobile application for on-demand use. Lastly, the team identified potential financial sources for funding Ener-G's expansion initiative. These potential finance sources are the European Investment Bank, through their investment programs in Central America and the Caribbean, and Banco de Costa Rica.

The final business plan synthesizes all these findings and recommendations into a formal document intended to guide the company in its expansion endeavor. We hope that our recommendations will enable Ener-G to take advantage of the promising opportunity for ESCO success that Central America and the Caribbean present, due to high electricity costs. Increasing energy efficiency in the region would have significant positive impacts, and Ener-G Tech Investments has the power to accomplish this by franchising its ESCO model.

Chapter 1: Introduction

Over the last twenty years, Costa Rican public policy has increasingly focused on an environmental agenda. The Costa Rican government has set an initiative for the country to become carbon neutral by the year 2021, meaning that the country as a whole will produce net-zero carbon emissions. A major objective in obtaining carbon neutrality is to reduce the amount of carbon-emitting fuels burned for power generation. Renewable energy sources such as hydroelectric, biomass, wind, and solar power are often seen as the primary solution to this problem. However, another very effective approach to reducing the carbon footprint is reducing energy consumption through energy efficiency projects, commonly undertaken by private energy service companies (Byer et.al, 2009). In the U.S. and Europe, the energy service company (ESCO) industry has been the dominant model for the delivery of energy efficiency services since the 1980s (Goldman et.al, 2008).

In Costa Rica and most of Central America, the ESCO industry is less established than it is in the United States. Ener-G Technology Investments is one of the only energy service companies in Costa Rica. Founded in San Jose in 2000, the company concentrates on energy service performance contracts (ESPCs), meaning that its clients contract with Ener-G to undertake all aspects of an energy-efficiency upgrade for the client's facilities. Ener-G provides the initial energy audit and installation of energy saving technology, and the client pays the investment back over a specified period of time. The payments are based on the energy bill savings resulting from Ener-G's implemented changes. Once the agreement is terminated and the investment is returned, the clients gain ownership of all of the installed equipment. The typical technologies installed include lighting, air conditioning, water heating, heat exchangers, and appliances. In order to be eligible for Ener-G's services, a client must consume more than 30,000 kWh (kilowatt-hours) of energy per month or 7,200 gallons of hydrocarbons annually. These guidelines result in maximum savings for the clients and shorten the payback period to Ener-G.

Ener-G is still a relatively new company with a small clientele, but its intention is to expand within Costa Rica as well as to nearby Central American and Caribbean nations (C. Music, H. Friedlander, personal communication, September 5, 2012). Ener-G aims to restructure its business model to facilitate expansion through franchising, a common business practice that

allows a proven model to expand quickly by operating from several locations, owned by different franchisees (Hillstrom & Hillstrom, 2002).

In order to help Ener-G achieve this restructuring, the team assessed its current and projected environmental impact and created a franchise plan for the company. The team researched energy service companies, Ener-G's current business model and operations history, franchising plan creation, financing options, energy sectors in other Central American and Caribbean countries, and environmental standards and impact indicators. In addition, we surveyed Ener-G's clients to assess current opinions on their relationship with the company and to gather information about potential methods for communication. To ensure that the business plan reflected the company's goals, the team also held meetings and interviews with the executives at Ener-G.

A substantial reduction in energy use can have a positive environmental impact. Reducing energy usage by using more efficient technology decreases the atmospheric emissions released from electricity generation. This can have a significant environmental impact, especially when large amounts of energy are saved or when the electricity is generated by a particularly harmful source. Helping a company to become more environmentally friendly has social benefits as well. This can lead to a more pleasant work environment for employees, positive perceptions from consumers, and increased overall awareness of energy efficiency in the community. While these effects can be much more difficult to measure than energy bill savings, they should be considered, in addition to the monetary effects, when assessing the effects of an ESCO.

Using the analysis of Ener-G through archival research and the information the team gathered from interviews and meetings, the team designed a business plan outlining the new business model and the steps required to implement the expansion. This investigation also added value to the company by helping them prototype a marketing and communications tool that conveys the importance of its impact to its current clients. In addition, the team investigated financial options for start-up funding required in the steps defined in the business plan.

We also researched the various benefits of marketing a company as environmentally friendly and identified strategies for Ener-G and its clients to use this corporate image to their advantage. Investigation into franchising and business planning led us to form a scalable model for expansion. Detailed descriptions of the common components of a business plan are essential to produce a thorough plan. In order to provide Ener-G with the knowledge necessary to make

wise expansion decisions, the team gathered information for comparison on several nations into which the company could expand. This includes an analysis of the energy sectors in these countries as well as several other social and economic factors that could impact the success of an ESCO. The team then chose the top four countries that would be best for the initial franchise location and conducted a more in depth market analysis of these countries.

The relatively uncharted landscape of the ESCO industry in Central America and the Caribbean could be advantageous because of the lack of well-established competition. However, clients' limited knowledge and trust regarding energy service companies may prove to be an obstacle. A challenge in designing the business plan was establishing appropriate sites for the new franchises. The locations had to be chosen carefully to maximize potential profit, taking into account the average energy costs, the public's knowledge and interest in energy saving, and other factors that contribute to the success of the franchise.

Another major barrier in this franchising effort is the investment financing, thus, the team investigated available funding opportunities. Some larger investment companies, especially in Europe, have been investing in the Latin American electricity sector since the late 1990s, and these companies have seen profits and growth. In addition, funding opportunities for small and medium enterprise (SME) expansion that are available for Costa Rican companies proved to be a valuable research topic. Because the company's energy efficiency work is relevant to Costa Rican environmental policy, they have access to loans that are primarily for environmental companies (Krupp & Horn, 2008). These loans are available from the European Investment bank, and applying for such a loan would be beneficial for the company. There are also other smaller loan options available on a location by location basis.

In sum, the goal of this project was to support regional energy efficiency efforts in Central America by designing a business plan for Ener-G, a successful Costa Rican energy service contractor. The three major objectives required to accomplish this goal were to examine Ener-G's current performance, to evaluate and convey the environmental and financial impacts of the company's energy efficiency efforts, and to outline the components of an Ener-G franchise system.

Chapter 2: Background

In order to set the background for the project, the team researched key concepts and information pertaining to our goal. To establish an understanding of Ener-G's work, the team investigated the operations of the company as well as the energy service company industry as a whole. For information about business expansion, we reviewed business strategies for franchising service companies and researched the components of a business plan. The financing options for energy projects are also important research areas, since upfront capital investment will be needed to begin the expansion process. Relatedly, an investigation into various environmental and social standards and certifications in industry that can aid in communications and marketing was conducted. Lastly, since Ener-G plans to expand to other nations in Central America and the Caribbean, team members gathered general information about the market for energy efficiency projects in these areas based on several key factors.

2.1 Energy Service Companies

A key factor in reducing fossil fuel consumption is reducing electricity consumption through energy efficiency upgrades. As a result, entrepreneurs have found potential for profit in the ESCO industry. Generally, an ESCO is a private service company that implements a broad range of energy solutions. Most commonly, and in the case of Ener-G, this takes the form of reducing customer energy consumption and costs by installing and maintaining energy-efficient technology. Project financing is determined by ESPCs, agreements with customers in which the ESCO's investment in the project is returned from the savings generated for each customer over a 6-10 year time period. Although each ESCO operates differently, in general, ESCOs are in charge of arranging the finances, installing and maintaining the energy efficient equipment, and monitoring and confirming the generated energy savings (NAESCO, 2011).

Businesses that wish to perform efficiency upgrades have several options, including forming a partnership with an ESCO or completing the project with their own investment. Executives at Ener-G indicated that past marketing efforts show that the main reason that customers decline contracts with Ener-G is that they opt to take a more involved role to their energy efficiency solution, rather than leaving the entire project to an ESCO. Most often, these companies choose to work with providers, contractors, or consultants, who offer specialized services rather than a comprehensive, turnkey solution. The services provided by these

companies are shown in Table 1.

Services	Providers	Contractors	Consultants	Ener-G
Energy Audits		●	●	●
Engineering and Design		●	●	●
Installation	●	●		●
Construction and Project Management		●		●
Performance Monitoring and Verification			●	●
Financing	●			●
Maintenance		●		●
Customer Ownership of Equipment		●	●	●
Total Savings Kept Exclusively by Customer	Sometimes	Always	Sometimes	After contract period

Table 1: Services provided by Ener-G compared to its competition. From Ener-G's marketing presentation (Christopher Music, personal contact, 2012)

Consultants conduct energy audits to identify areas for possible energy efficiency upgrades. The customer can then hire a contractor for the design, procurement, installation, and maintenance of energy efficient technology, leaving the customer to provide the initial investment. Alternatively, the customer can go to a provider, who essentially installs and rents energy efficient systems to the customer. These alternative options can be less expensive in the long run than working with Ener-G, but they require a significant amount of initial investment by the customer.

What makes ESCOs different from energy efficiency firms is the idea of performance based contracting. The amount of money that each ESCO makes from its clients depends directly on the amount of energy the client saves, which is a positive driving force for both the client and the ESCO. This type of performance based contracting forces the ESCO to accurately determine the energy savings for each project, correctly install equipment, and make sure the equipment continues to function. Along with reduced maintenance during the contract period, training is also included for the customers to ensure proper equipment maintenance after the contract

expires (NAESCO, 2011).

Before beginning a project, the ESCO performs a site analysis to discover the best areas for improvement and to collect background research on the client. The changes ESCOs make are generally in lighting alternatives, heating and air conditioning, improved motors, and energy management systems. Once the company analyzes the site, a contract is made between the client and the company that accounts for the return of investment through monetary savings. For this reason, the contract that ESCOs create must be accurate so the company can have a high expectation of profiting from the investment. Contracts run for a fixed amount of time and tend to account for a grace period, in case their prediction for energy savings are lower than anticipated due to unforeseen circumstances; this ensures that the company has enough time to gain back the initial costs.

In the U.S. ESCO revenues were estimated at about $4.1 billion in 2008 and were projected to increase to $7.2 billion by 2011 (Goldman et.al, 2008). ESCOs tend to be small to medium-sized companies. Small companies have between one to five employees and generate $1-5 million annual sales, while medium companies have between 20-50 employees and generate $5-30 million annual sales. Most ESCOs focus on medium- to large-sized clients, in order to make each project worth the investment. Around 60% of sales tend to come from local governments, schools, and universities. The typical initial investment from each US ESCO for a project is around $350,000, so large clients are the main target of ESCOs (Vine, 1999).

Few studies have been done on the international ESCO industry, but a notable study comes from Edward Vine at the Berkeley Laboratory (Vine, 2005). In 2002, a questionnaire for 38 countries was created and sent to experts on ESCO activity. The questionnaire addressed many topics including the introduction of ESCOs to each country, the number of active companies, the existence of ESCO associations, and the sectors on which the ESCOs focus. Of the countries included, many came from Europe and the rest came from Asia, Africa and South America. Although not all countries were included in this survey, the results of this study give an approximate view of the ESCO industry worldwide.

Part of the survey included questions about ESCO development, which involved project value, number of companies and when the first ESCO was created in each country. From the results, it is clear that the ESCO industry is still in early stages in many countries. The general trend in the data was that most countries reported ESCOs created in the 1990s, although a few

were created in the early 1980s. The data show that there are many ESCOs in countries other than the U.S. with considerable activity. The results show that in 2001, the estimated total amount of ESCO activity outside of the U.S. was between $560 and $620 million. This amount of activity corresponded to approximately half of the revenues in the U.S. (Vine, 2005).

Expanding a small energy service company can be a difficult process due to many barriers, and one of these is the difficulty of obtaining financing for projects. Small ESCOs face the problem of limited access to capital and high cost when looking for financing options. Although project cost varies depending on the client, a typical up-front cost is between $0.5 and $1 million (Goldman et.al, 2008). Smaller enterprises are at a disadvantage in obtaining financing compared to larger enterprises, which is reflected in increased interest rates for smaller enterprises. Projects compete for limited capital with more traditional investments like power plants and industrial expansion. Lack of understanding and interest in energy performance contracting often results in investments with unclear risk involved (Vine, 2005). Another barrier to company growth is access to the energy efficiency equipment. In some regions, the appropriate technology may not be available. Additionally, energy efficient technology may not be as affordable for the company in the new location. Often the technology must be imported, resulting in additional taxes for the company (Vine, 2005).

2.2 Corporate Responsibility in the Environmental Sector

Even though there are many obstacles in any expansion process, there are a few factors that do aid in the expansion of a company such as an ESCO. Most notably is the environmental aspect that encompasses much of the ESCO industry. In their nature, ESCO projects are directly related to the environment, and can have many positive social and environmental impacts. Community perception of environmental practices has increased recently, and as Cetindamar and Husoy (2007) have found, “companies have more than one reason for adopting environmentally responsible behavior and that ethical and economic reasons co-exist”. Ener-G already has this environmental responsibility aspect because of the nature of their work, but in order to receive the economic benefits they must market these aspects. And if they are successful at marketing them, they have a greater chance of receiving the economic support they need from investors.

Corporate responsibility is the idea that companies that are making a lot of money should also be using this money for philanthropic efforts; and that these philanthropic efforts create a

competitive edge for the company. And "increasingly, philanthropy is used as a form of public relations or advertising, promoting a company's image or brand" (Porter & Kramer, 2002). The idea behind corporate responsibility is that if a company invests some of their profits into charitable foundations, they will receive a larger return on investment because of the public's new perception of the company. As Lacoma states "The goodwill that a company can generate through corporate philanthropy can increase customers' interest and favorable opinions of the company" (2012). These favorable opinions can create marketing opportunities for the company.

As previously stated, Costa Rica has in recent years begun to work towards environmental sustainability. This trend can also be seen in many other parts of Central America and the rest of the world, in fact "demand for green development projects is growing rapidly" (Acuff et. al, 2005). Because of this demand, it can often be in a company's best interest to advertise any positive environmental effects their products have. Increasingly, companies have begun using 'eco-friendly' advertising to strengthen the company's image and improve sales. Sometimes this strategy fails because of the skepticism of the consumer, and it becomes a deterrent. Conversely, this strategy has often helped companies because "more Americans than ever say that environmental considerations factor in to what they buy" (Fair, N.D.). Because of the positive associations of being environmentally friendly, many people will be more likely to support the vendor and buy the products.

One of the biggest perceived drawbacks for a company considering installing energy saving technology is the upfront monetary cost and lost time. Many companies look at environmentally sustainable projects, such as energy efficiency, as an "additional time and expense" (Acuff et. al, 2005). This perception is not entirely incorrect. The upfront cost and time is great, and companies that are looking at the short-term will often overlook these projects because of these costs. However, in the long term, these environmentally friendly projects and practices can end up making the company more money than they initially invested. Some of these results are very tangible, such as saving money by saving energy or an increase in sales, while others are not as easy to relate to the environmental projects. In fact, as Greening and Turban (1997) found, potential employees' perception of a company can greatly impact their decision to apply for a position. Not only does being socially and environmentally conscious gain employees, but also it "increase[s] employee engagement, customer loyalty, reputational capital, and market opportunities" (Lim, 2010).

2.3 Business Expansion through Franchising

Franchising is a common business practice that allows a proven model to expand quickly by operating from several locations, owned by different franchisees. Central oversight comes from the original franchisor, who makes decisions about how the individual franchisees operate. Hillstrom and Hillstrom (2002) define franchising as "a kind of licensing arrangement wherein a business owner, known as the 'franchisor,' distributes or markets a trademarked product or service through affiliated dealers, who are known as 'franchisees'". The franchisees own their establishments, but certain operational responsibilities are shared with the franchisor depending on the terms of the agreement.

There are three slightly different types of franchising. The most common is business-format franchising, where the franchisee pays an initial franchise fee to the franchisor and then inherits a proven business model. This franchise fee includes "the cost of training and assistance in setting up the business including recruitment, territory analysis, site identification, stationary, franchisee launch, etc." (WhichFranchise Australia, 2012). The franchisee then continues to pay royalties to the franchisor. For these two fees, the "average royalty is 5.39% … average [upfront] fee is $20,924" (Brickley, 2002). Another type, trade-name franchising, involves the franchisee becoming part of the franchisor's distribution network. A third type occurs when several small businesses pool their resources to form a single operating network, enabling them to collaborate on purchasing, advertising, and marketing (Hillstrom & Hillstrom, 2002).

Potential business owners tend to become franchisees for various reasons. Buying into a franchise with a proven track record and good corporate image gives the advantage of instant recognition and a good reputation. Advertising is often done by the franchisor, but some franchisees do have this responsibility. Franchisors will occasionally provide advertising materials such as posters and brochures. A large franchise will often have the ability to purchase inventory and supplies in bulk at discounted prices, so these reduced prices are available to franchisees as well, which provides an immediate financial advantage (Hillstrom & Hillstrom, 2002).

A notable reason that expanding businesses enter into a franchise system is that franchising, while not cheap, is still the most cost-effective strategy for expansion. This is due

mostly to the additional resources provided by the franchisees (Watson, 2008). Requiring a franchisee to pay an initial fee counteracts the cost that a business would have to pay in order to expand by itself. The ongoing royalties paid to the franchisor also help to cover any long-term costs of maintaining the franchise system. This gives franchising an economic advantage over company-owned growth.

When a business attempts to expand by setting up a franchise, they must overcome several challenges. The planning phase is often quite complicated, and the cost of planning and managing growth can put the business in danger. Particularly when the business is expanding geographically, it takes a significant investment of time and capital to successfully select a site and set up communication between the head office and the new expansion sites. Before beginning the process of franchising, a business should carefully determine where the resources will come from to fund the initial set-up stage of creating a franchise system. If a company attempts to expand faster than its resources allow, it can cause the company to become unstable or even collapse (Watson, 2008).

Employees of the central company must take on new roles in order to communicate to the franchisee exactly what must be done during the start-up process. In the early stages of creating a franchise system, the central company is often responsible for developing two business models at once, both the original and the new franchised model. To ensure the success of franchisees, it is critical that appropriate infrastructure, including communication and transportation, be developed early to fully support new sites (Floyd & Fenwick, 1999).

Recruiting qualified personnel is also a crucial part of the process. Often, the success of a franchise depends on the experience and capability of the franchisees themselves. Particularly with young franchises without an extensive track record or a widely established name, lack of information about the quality of the new franchise system can make it difficult to attract the most promising franchisees (Watson, 2008). Nevertheless, it is important to establish franchisees with capable and committed oversight. Extensive recruiting will pay off after a new site is established; and more selectivity in the recruitment process will lead to a more self-sufficient franchisee and diminish the necessity of subsequent monitoring.

When franchises expand internationally, they face other concerns. Markets in other countries can be different than the market in which the original company existed. In some cases, only some of a company's products will do well in a new and unfamiliar market. It has been

suggested that expanding franchises should consider the breadth of their product offerings. Companies can choose to either release their entire product line in a new market, or only a subset of their product line. This forces a company to choose whether it will focus on standardization and operate in the same manner in all areas, or adapt to individual markets. The same choice applies to marketing strategies. If a new location is established in a country that is culturally very different, new marketing strategies and techniques may be necessary (Gabrielsson & Seppäl, 2012).

Gabrielsson and Seppäl (2012) analyzed the effects of "degree of standardization of marketing" (how consistent the advertising methods of a company are when it expands to new markets) and other contextual factors on the performance of companies that expanded either internationally or globally. The study collected data from ICT (Information and Communication Technology) franchises in Sweden and Finland as well as global corporations. All companies involved originated in small open economies (SMOPECs). The study found that "superior financial performance results from the fit between the degree of standardization of marketing strategy and the contextual factors" (Gabrielsson & Seppäl, 2012). While somewhat vague, this conclusion does indicate that marketing strategies must adapt greatly to the atmosphere of individual markets based on the most influential factors in those markets. This can vary greatly between different cultures and geographical locations.

Many countries have their own laws and regulations surrounding franchising practices. These can govern any franchises that are based in the given country, as well as any franchisee activity in the country. Often, franchises are required to use a franchisor's disclosure document (for example, a Uniform Franchise Offering Circular in the United States). This is a legal contract between the franchisor and a new franchisee, which details all of the obligations of both parties. Franchisees will sometimes enlist the help of an attorney while going through this process (Hillstrom & Hillstrom, 2002).

International franchising is one of multiple options for a business that wants to expand. Under the right circumstances, it can be an efficient and profitable growth plan. However, there are many factors that must be considered before the company can implement a franchising plan. It is important to have a source of funding for the expansion, a detailed plan for adaptable advertising in the new market, and a complete understanding of any legal restrictions on such an expansion. When the company takes precautionary steps to ensure that the whole process goes

smoothly, a franchise can expand rapidly to multiple locations without putting the company in danger.

2.4 Components of a Business Plan

A business plan is a written document that details a business's future plans for success, commonly projecting three to five years ahead (US Small Business Administration (SBA), 2012). For many reasons, creating a business plan is a standard practice for any kind of growth initiative. First, investors require a written plan before a business can be taken seriously as an investment opportunity. A firm plan shows that the details of the business have been carefully thought through, indicating to the investors a greater likelihood for success. For the owners of the prospective business, a written plan gives insight into the flaws of the concept and allows for fine tuning ahead of time (McKeever, 2011). There are many different formats used for the business plan document; a general outline of key components from the US Small Business Administration (2012) is listed below.

1. Executive Summary
2. Market Analysis
3. Company Description
4. Organization & Management
5. Marketing & Sales Management
6. Service or Product Line
7. Funding Request
8. Financial Projections

These components are general guidelines; the layout and content of a business plan are largely dependent on the industry and type of business. The business plan for Ener-G will have to be highly customized due to the unique energy service industry and Ener-G's contract-based business model. Additionally, this business plan will be made for the executives at Ener-G and not an investor, so sections that would normally be major selling points for an investor are unnecessary in this plan. Following are descriptions of the pertinent components.

2.4.1 Market Analysis

The market analysis describes the industry and market and can include research findings

as well. This section covers industry description and outlook, information about the target market, competitive analysis, and regulatory restrictions. The industry section should give general information on the industry size, historic growth, and customers in the industry. The information in the target market section includes the needs of customers, where those customers are located, and the size of the target market. A market analysis also includes information about the competition market share, strengths and weaknesses, barriers to entering the market, and the importance of the target market to the competition.

2.4.2 Company Description

The company description provides an understanding of the company's work and the goal of the business. This section includes a description of the nature of the business and the needs that the business is trying to satisfy. The description explains how the company's products or services meet the needs of customers. It lists the types of consumers or businesses that the company serves, and explains the company's competitive advantages. For a business that has undergone franchising, this section will not only include a description of the company headquarters, but also a description of the franchise system.

2.4.3 Organization & Management

This section describes the organizational structure of the business. There should be a description of who is in charge of each position in the business, and descriptions of the responsibilities. Another important part of the organization and management section is the ownership information. This section includes names of owners, percentage of ownership, and their backgrounds.

2.4.4 Marketing & Sales Management

The marketing and sales section of the business plan details the strategy for obtaining new customers. It outlines a communication strategy for reaching out to the customers as well as an approach for securing business. In addition, this section can include details about growth strategy, such as plans for franchising.

2.4.5 Service Line

The service line is a description of the services offered and the benefits to clients. The life cycle of products and a maintenance plan is also documented. This section also describes any

proprietary information the service may involve, especially if this information provides an advantage over a competitor.

2.5 Communicating Social and Environmental Benefits to Clients

Because of the benefits of being perceived as an environmentally responsible company, potential clients may have other incentives to partner with an ESCO like Ener-G. To work toward generating a greener corporate image, it will be important for Ener-G's clients to find an effective method to advertise its progress toward increased energy efficiency. Ener-G has an important role to play in this process. A significant step is to begin to measure and document the environmental impact of its work so that this information can be passed on to the clients. Determining a company's carbon footprint is a good baseline for assessing its environmental impact, so this will be a valuable instrument. In terms of Ener-G, this would include the carbon savings of entire clientele.

2.5.1 Carbon Footprint

According to the EPA, carbon footprint is defined as "the amount of greenhouse gases emitted into the atmosphere each year by an individual, household, building, organization or country" (Hermes, 2010). Footprints are usually measured in pounds of CO_2 equivalents and include direct and indirect emissions. Direct emissions are emissions that a person can control and indirect emissions are caused by activities that individuals cannot control. Calculating the carbon footprint is a good representation of the impact a business has on the environment. A useful strategy for calculating carbon footprints is through the use of emission factors.

2.5.2 Emission Factors

An emission factor is a value that relates the amount of a released pollutant to an activity that releases that pollutant. These values help to estimate the emissions of different sources of energy. Typically, electricity emission factors are expressed in terms of the average weight of the released pollutant divided by the unit of electrical energy produced in the generation process.

Emission factors are useful in determining the environmental impact of the expansion of an ESCO into a different country. The emission factors of the power generation methods used in a country can be used to calculate an average emission factor for that country. Lower emission factors correspond to countries that produce energy in a more environmentally friendly manner,

while higher emission factors mean the opposite. Some companies will generate electricity from certain sources more, or less, than the countries total, which will slightly change the emissions factors; however the emissions factors are still close enough estimates to provide acceptable figures. Another metric for describing environmental impact is by relating energy use to kilograms of oil equivalent.

2.5.3 Kilograms of Oil Equivalent

A useful figure when analyzing energy usage is kilograms of oil equivalent. In this situation, one kilogram of oil represents the amount of energy that is extracted from that amount of crude oil using average electricity generation techniques. A normalized unit of energy like this is useful in cases where both electricity and other forms of power are involved. It allows for the comparison of different energy consumers even when they consume energy from different sources.

2.5.4 Certifications

Another approach to add value to a business, other than directly communicating the energy savings through these indicators, is by obtaining certifications. LEED (Leadership in Energy and Environmental Design) is a third party certification program that aims to improve environmental and human health. Buildings that are certified under LEED apply different strategies that reduce operating costs, consumption, water, and energy use. LEED buildings are constructed with the goal of reducing CO_2 emissions and creating a healthier indoor quality. LEED certifies existing buildings as well as new construction (NDRC, 2012). LEED certification has spread internationally and inspired many other environmental design certifications in different locations. In Costa Rica, two other environmental design programs are ISO and Premio de la Excelencia (Music, C. Personal Contact, 2012).

In order to become LEED certified, a flexible set of guidelines must be followed that determines the sustainable strategies to use based on the specific project. The LEED accreditation system has a set of prerequisites and credit points (USGBC, 2009). LEED requires organizations to meet all prerequisites for certification. In addition to meeting the prerequisites, for base level certification an organization must obtain at least 40 out of the 100 options for credit (USGBC, 2009). The applicant can choose which conditions their company will meet for credit points towards certification. This base level will allow the company to obtain a bronze

level certification. The more points they obtain, the greater certification the buildings can receive, in order are: silver, gold, and platinum. These certifications are very marketable, because they concretely show customers that the company is being environmentally conscious. It is also a competitive advantage over other competitors that are not certified and will add value to the company. ISO and Premio de la Excelencia are very similar to LEED in their certification guidelines, with some minor changes. All are incentive programs are meant to both improve the environment and spread awareness.

The up-front cost of retrofitting or constructing a building to be certified may be expensive. Much like the work that Ener-G does, this is an investment that will pay off in the long term. In many cases, businesses are reluctant to begin the process because it is seen as a gamble. Working with an ESCO that absorbs the risk involved may help get more businesses on board. After entering into a contract with Ener-G, a company is already on its way toward success if they choose to pursue certifications.

2.6 Financing Options for Sustainability Companies

In order to franchise, a company must invest money upfront. However, because Ener-G is still a relatively small company, they do not have adequate funds to franchise without monetary support from an outside source. Thus Ener-G either has to find a larger company to invest in them, or apply for loans and grants. The executives of Ener-G have expressed interest in receiving loans, or grants if they qualify (C. Music, D. Friedlander, H Friedlander, personal communication, September 5, 2012). However, as Costa Rica is a small country, there are few local opportunities to receive the full funding required for the entire franchise system. Therefore the company will have to find outside sources to obtain the bulk of the funding.

The European Union (EU) has loans for companies that are expanding internationally, some specifically for energy saving companies. The European Investment Banks, Council of Europe Development Bank, European Bank for Reconstruction and Development, Nordic Environment Finance Corporation, and Nordic Investment Bank are all working towards a shared goal, which is articulated in the European Principles for the Environment (EIB, 2006). The goal of this initiative, which the five banks have pledged to uphold, is to provide companies incentives to improve their socioeconomic and environmental impacts. Companies who apply for loans will have a much greater chance of receiving the loan if their project is eco-friendly. Eco-

friendly can mean a variety of things; for example, it can describe projects in the areas of energy efficiency, clean energy, environmental protection, pollution reduction, or carbon neutrality. In addition, there are many other factors that can qualify, or disqualify, a project from receiving funding (Official Journal of the European Union, 2012).

In order for any project proposal to receive funding from the European Investment Bank, or one of the other four banks in the treaty, the project must go through a series of stages. The first stage is the Pre-Appraisal Stage, in which the company presents their project proposal to the potential investors and the investment company checks for the following: environmental impact, legality, social issues, labor standards, and health and safety of both community and laborers. The next stage is the Appraisal Stage, in which the project must go through the Environmental Impact Assessment and Strategic Environmental Assessment. Social standards will also be appraised, as will labor standards. Public consultation is also required so that any public grievances may be voiced and considered by the appraisal committee. The final stage is the Monitoring Stage. Once the project has received funding and is being implemented, the investors monitor the project to ensure that all the standards are being upheld (EIB, 2010). This process becomes even more tedious and involved when there is an international barrier for countries outside the European Union. The loan process is a long one, and it could take years before all the proper steps, evaluations, and paperwork can be processed and finally accepted.

Central America is a new area of investment for the European Union; the first projects in the area were suggested earlier this year, and are currently waiting appraisal (EIB, 2012d). As this is a relatively new lending region, it is more difficult for a Central American company to receive funding because there is currently only one financial intermediary, the Central American Bank for Economic Integration (EIB, 2012e). In order for a company not in the European Union to receive EU funding, they must go through a financial intermediary – a local bank or local agency that acts as a middleman, allocating funds and collecting payments. This presents a large setback for Ener-G as they are a Central American company looking to expand to other Central American countries. Because only one other project has applied for this loan, and this project has not yet received its financing, the feasibility of this option is unknown. However, this is not the only option available to Central American countries to receive funding.

For more than a decade, there have been programs in Costa Rica and other Latin American countries that assist local businesses in expanding or franchising internationally

through business deals and partnerships with international companies. One of the most prominent aid programs available for Latin American businesses is the Al-Invest Regional Aid Programme. Currently in its fourth phase, Al-Invest has grown steadily since it began in 1995 (European Commission, 2012). This program sets up business events for Latin American and European companies to meet and broker international business agreements. This program does not produce the large loans that the EIB can grant, but it does provide the businesses with global industry information and viable business opportunities and partnerships (Al-Invest III Consortium, 2008). This program is slowly evolving, and in recent years the consortium has started to provide funding to some of the member companies, although on a smaller scale than the EU loans. The Al-Invest IV program ends in 2012, at which point the program will either be renewed or not based on how successful the program was at aiding in the growth of Costa Rican companies. If renewed, the program could be a useful source for partnerships and funding.

Financing options for a small business franchise are growing worldwide. Many countries and investment companies have found that small and medium sized enterprises can greatly boost the economy. As such, the opportunities are slowly growing, especially in the area of environmental sustainability. Some companies do well making business agreements with larger international companies who help provide funding. Others apply for loans from big investment banks to fund the franchising process. Both are suitable routes for SMEs; which route a company takes depends on how independent they want to remain and how well they qualify for loans or partnerships (European Commission, 2011).

2.7 Energy Sector in Central America and the Caribbean

Central America and the Caribbean are regions in a phase of rapid economic growth and increasing electricity usage. This growth creates energy-related problems such as high electricity costs and limited generation capacity. There are a variety of solutions to these problems, one of which is energy efficiency improvements. According to a study by the World Bank, energy efficiency is “the most cost-effective way of meeting future energy demand, with significant potential on both the supply and demand sides” (Yépez-García, 2011, p.20). In addition, the electricity costs in many Central American and Caribbean nations are high compared to the United States and Europe. In the Caribbean islands especially, many power plants burn expensive imported petroleum. Continental countries such as Costa Rica often utilize alternatives

to petroleum such as hydroelectric dams, which are inexpensive power sources that result in lower electricity prices.

As higher electricity prices yield faster returns on energy efficiency investments, they are a key factor to consider when planning franchise locations. Some experts predict, based on historical trends, that the energy usage of Latin America and the Caribbean in the year 2030 will be almost 2500 Terawatt-hours (TWh), which is double the 2008 level. This will only exacerbate problems with limited energy supply and high cost, making energy efficiency efforts even more necessary (Yépez-García, 2011).

The energy supply profiles of selected nations are shown in Appendix H. As previously stated, many nations in Central America and the Caribbean are heavily reliant on petroleum for electricity generation. Other common sources of energy are coal, biomass, hydroelectric, and other renewables such as geothermal, solar, and wind (IEA, 2011). The breakdown of energy sources that each country uses for power generation is relevant to the success of energy efficiency projects. More expensive energy sources correlate to higher end user energy costs, and therefore greater opportunity for cost savings through efficiency upgrades. In addition, nations that use a large amount of hydrocarbon fuels may have environmental policies that support ESCOs. A study by the World Bank specifically called for ESCOs as a solution in Central American countries, and many governments are aware of the success of energy efficiency initiatives in the United States and Europe (Yépez-García, 2011). In terms of environmental impact, the source of electricity is important because various forms of power generation produce different amounts of carbon dioxide and other emissions. This amount of exhaust relative to energy generated is called an emission factor.

2.8 Case Studies

To learn about ESCO expansion and franchising, we present two case studies of ESCO expansion in the Republic of Georgia and Jamaica.

2.8.1 Case Study: Republic of Georgia ESPC

A significant source of knowledge on the expansion of ESCOs comes from the work of the US Agency for International Development (USAID). In 2002, the USAID established an energy savings performance contract (ESPC) between a company located in the Republic of Georgia and an ESCO based in the United States. The association of energy engineers also aided

in this project by providing assistant project managers (APMs). The company is located in an undeveloped Georgian economy and the contract was for less than $100,000. Considering these project constraints, much can be learned about ESCO expansion and the steps the USAID took to succeed as it pertains to our project (Good, 2004).

The assistant project managers were charged with identifying the organization that would be involved in the energy savings project, and to do this, they had to consider many factors. One of the many considerations was financial history of the business. There are many businesses that do not have a solid energy payment history in the Republic of Georgia and the APMs took careful note to avoid these businesses in their selection process. Another consideration was the strength of the market in which the organization was involved. In the end the APMs chose Tolia Ice Cream, Inc. for their consistent payment history and stable market (Good, 2004).

Throughout the process, Tolia Ice Cream was hesitant to agree to a contract that would require them to make payments without having tangible results. As a response, the U.S.-based ESCO, SBRD Inc., agreed to install measurement and verification equipment for the customer. Another relief for Tolia was the guaranteed equipment maintenance provided by SBRD. These benefits also confirm work by Vine that states "customers are seeking not just energy efficiency but comprehensive solutions to issues" (Vine, 1999).

As with most larger expansion projects, financing was a major issue for the USAID project. Much of the commercial financing in Georgia has high interest rates, and little has been done to show commercial banks the need for effective lending procedures to support energy-efficiency projects (Hansen, 2011). In addition to high commercial bank interest rates, there are few in-country banks that have experience financing energy-efficiency projects (Vine, 2005). The problem of financing the project was finally resolved by starting a revolving fund and using funding from the USAID and other efficiency project recipients.

Although the business model of our sponsor, Ener-G, is different from that of energy efficiency contractors, the methods used by USAID to expand an ESCO into a developing country are important to note. Care was taken to select a strong business in a stable market, and other ESCOs looking towards expansion should look for strong companies as well. The ESCO and the company held a strong relationship that enabled the project to proceed because there was a mutual trust between the ESCO and the company that came from the performance based contract (Good, 2004). The project is a suitable model for expansion and many of its challenges

and eventual solutions are similar those that Ener-G will face.

2.8.2 Case Study: Jamaica

The country of Jamaica is a prime example of a location where an Ener-G franchise could flourish. In fact, a study by the Jamaica Productivity Centre about the nation's electricity performance explicitly called for the development of an ESCO industry (Jamaica Productivity Center, 2010). High energy consumption is a significant problem financially, since 95% of the nation's energy is supplied by the burning of imported petroleum, an expensive and relatively inefficient power source. The end-user price of electricity in Jamaica was about 24 US cents/kWh in 2006, which was double the Latin American/Caribbean average of 12 cents/kWh. In July 2008, prices reached a record high of 38 cents/kWh. It is interesting to note that the GDP per capita of Jamaica is significantly lower than many countries that use less energy per capita, as illustrated in Figure 1.

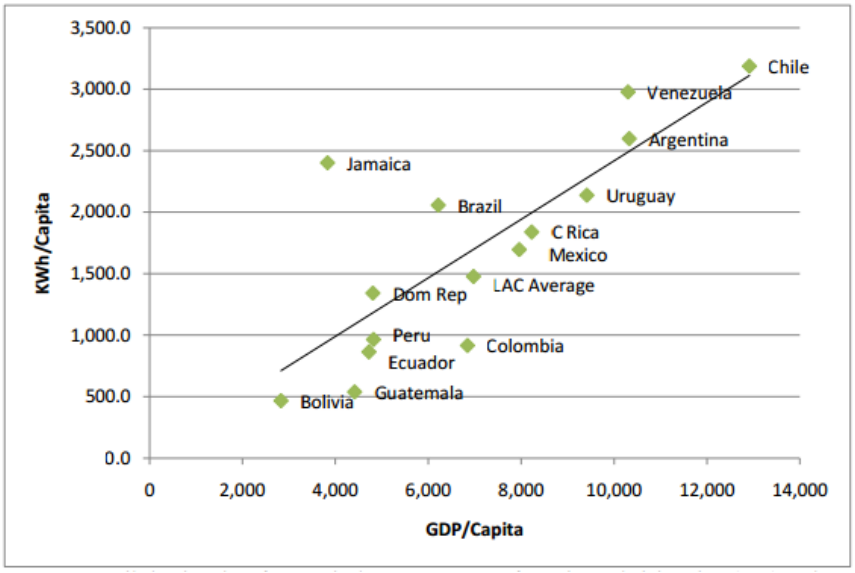

Figure 1: Electricity Consumption (kWh/ capita) compared to GDP per capita (US$). (Jamaica Productivity Center, 2010)

The explanation for this is that in the late 20th century, energy usage increased much quicker than economic expansion in Jamaica. Some believe much of the electricity is used in residential activity rather than supporting business and industrial efforts (Jamaica Productivity Centre, 2010). The Jamaica Productivity Center believes that the high energy prices also have

stunted the growth of the economy, and cheaper energy would encourage productivity. In any case, it is clear that there is a serious energy problem in Jamaica, and one part of the solution is increasing energy efficiency. The study also found that there are significant barriers hindering energy efficiency projects, such as "lack of customer awareness, lack of confidence and trust in energy efficiency savings, low priority placed on energy efficiency, limited technical and management capabilities and inadequate legal and regulatory frameworks to protect stakeholders" (Jamaica Productivity Centre, 2010). These are challenges that Ener-G will face if the company is to franchise in Jamaica, but overall the Jamaican energy situation seems to provide a promising opportunity for expansion.

2.9 Summary

International franchising is no easy task, especially for a small or medium sized enterprise. Many factors must be considered before any plans are made. Franchising companies must find business partners, or franchisees, who would be interested in working with them, and they need to find a supply chain for resources in the new franchisees country. Once they have found these partners, the franchising company must make arrangements to properly fund the start-up of the new locations. Because many places around the world are becoming more environmentally conscious, ESCOs would have a slight advantage over other companies. If the company is able to find a franchisee and receive the proper financing, it is not guaranteed that their business will flourish as well in its new location as the base location. The process is definitely difficult, but the environmental, social, and financial rewards to all the stakeholders can greatly outweigh the risk if all is done properly and the business model is sound.

Chapter 3: Methodology

The goal of our project was to advance environmental initiatives in Central America by aiding in the international expansion of a Costa Rican energy service company, Ener-G Tech Investment. The major objectives in completing this goal and creating the business plan were examining Ener-G's current performance and possibilities for improvement, evaluating their environmental impact, conducting a market analysis of the potential expansion countries, researching the components of a business plan and suggesting financial options. All of these components aided us in creating a franchise business plan for Ener-G; they also aided us in assessing Ener-G's current impact as well as a projected impact for their expansion. Some of the required information came from preliminary research, but the majority was collected in Costa Rica. The main methods we used to achieve our goal were archival research of Ener-G's company and their projects, meetings and interviews with executives and employees at Ener-G, surveys of Ener-G's current clients, and extensive online research.

3.1 Examining Ener-G Tech Investment' s Current Business Model

The first step in planning Ener-G's expansion was assessing the company's current business model and service provided. In order to do this, the team analyzed archival research for information on the company and its projects, and conducted meetings with Ener-G employees to obtain operations details. We assessed the financing plan for each project Ener-G completes, the nature of the client partnerships, the energy saving performance, and the company's standard process for each project. For specifics about the Ener-G service, we met with Christopher Music, the General Manager, and Daniel Friedlander, Head of Project Development.

In order to analyze the breakdown of costs for the company's project financing strategy, the team asked the company's financial advisor Eduardo Gomez to separate the company's income into categories including profit and costs with their corresponding percentages of the total income. These categories are defined in Table 2.

Direct Material Costs	The upfront price paid for energy efficient equipment for projects
Financial Costs	The interest paid on loans
Operations Expenses	Labor costs involved with completing a project (engineering, maintenance, installation, audits, and development)
Administrative Expenses	Costs involved with management, security, accounting and collections
Marketing Expenses	Costs for activities related to establishing or maintaining client relationships
Profit	Overall financial gain from start to end of project

Table 2: Definitions of project cost categories

The archival research, as well as our contact with the financial advisor, gave us a better idea of the company's current operations and performance, which is essential information to begin planning an expansion. The percentage of profit is especially important since in the new franchise system the profit will be divided between the franchisor and the franchisee.

To learn more about Ener-G's client partnerships and to find areas of improvement, we conducted surveys with selected clients. We surveyed clients that were currently under contract and whose representatives knew about their company's projects with Ener-G, since the installed systems often run unnoticed in the background. After developing the survey, we presented it to Christopher Music, the general manager at Ener-G, who then chose 15 representative clients to receive the survey via email. After initially struggling with receiving responses, Management Secretary Paula Waltzing aided the team by personally contacting companies to complete the surveys, and the team received seven responses. To ensure the responses could be easily compared and contrasted, we conducted standardized surveys, keeping the questions relatively short and mainly in multiple choice format. The surveys were designed to take about five to ten minutes to complete, and were conducted in Spanish, the primary language of almost all Ener-G customers. Images of the full surveys can be found in Appendix D, and translations can be seen in Appendix E.

The questions in this survey addressed multiple objectives. The survey questions were intended to gather insight into customer satisfaction and communication improvements. These questions were mainly multiple-choice so that the team could easily identify trends in Ener-G's performance, and to encourage clients to respond. The team chose these questions in order to learn about the strengths and shortcomings of Ener-G's current service in the areas of system performance, savings, and maintenance. Some questions were also intended to discover the ideal communication method with Ener-G's clients.

In our analysis, we compiled the quantitative answers into different categories of performance satisfaction, from greatly satisfied to unsatisfied. The open-ended answers could not be sorted effectively, so these answers were analyzed for major patterns or apparent themes. The first analysis of this data that the team conducted was to see if there could be any improvements made to the service Ener-G provides. This analysis of performance included responses from questions 1, 5, 13 and 14.

These meetings, surveys and research were conducted to provide the team with information and insight into the current workings of Ener-G's company. This baseline, along with any improvement opportunities uncovered, was essential to our main goal of creating a franchise business plan for Ener-G.

3.2 Evaluating Ener-G's Current and Projected Environmental Impacts

As mentioned in the background, almost all Central American and the Caribbean nations struggle with high carbon emissions from electricity generation. The team assessed how Ener-G's energy efficiency improvements impact electricity usage and carbon emissions in Costa Rica, as well as the projected impact in other countries. To accomplish this, the team researched carbon emission factors for electricity generation and calculated total carbon emission reductions based on the average energy saved by Ener-G's business. Ultimately, we commented on the effectiveness of Ener-G's performance-based energy efficiency contracting as a solution to energy problems in Central America and the Caribbean.

The basis of our evaluation was on Ener-G's historical data on energy savings created by new installations. Essentially, we had to determine the rate at which the company implements energy savings solutions, so that we could calculate yearly impact as well as the cumulative impact over Ener-G's history. Archival research provided us with the average energy saved per

project per year and the average number of new projects per year. Thus, we calculated the increase in energy savings rate created by new installations.

$$Average\ Energy\ Saved\ \left(\frac{MWh}{project * year}\right) * Rate\ of\ New\ Projects\ \left(\frac{projects}{year}\right)$$
$$= \boldsymbol{Energy\ Savings\ Rate\ Increase\ Created\ by\ New\ Installations\ \left(\frac{MWh}{year^2}\right)}$$

Equation 1: Annual Energy Savings Rate Increase Created by New Installations

We also needed an equation for the total energy savings that have resulted from Ener-G's work over a span of years in order to evaluate cumulative impact. To obtain this, we derived an equation for the rate of savings by multiplying the rate of change by years of operation. The cumulative savings could then be calculated by taking the indefinite integral of the rate of savings. Essentially, the cumulative savings amount is a quadratic function, of which the first and second derivatives are the rate of savings and the increase in rate of savings, respectively.

$$Energy\ Savings\ Rate\ Increase\ Created\ by\ New\ Installations\ \left(\frac{MWh}{year^2}\right)$$
$$* Years\ of\ Operation = \boldsymbol{Rate\ of\ Savings\ \left(\frac{MWh}{year}\right)}$$

Equation 2: Rate of Energy Savings

$$\int Rate\ of\ Savings$$
$$= \left(\frac{Energy\ Savings\ Rate\ Increase\ \left(\frac{MWh}{year^2}\right)}{2}\right) * (Years\ of\ Operation)^2$$
$$= \boldsymbol{Cumulative\ Savings\ (MWh)}$$

Equation 3: Cumulative Energy Savings

Energy efficiency projects not only create economic benefits for the end user, they also

reduce the amount of power that needs to be generated. This has environmental implications, since the majority of Central American power plants generate electricity through combustion of fossil fuels, processes which are known to create atmospheric pollutants such as CO_2. We conducted research into the breakdown of electricity supply by generation type (petroleum, coal, hydroelectric, etc.) for selected countries. The countries the team selected, which were held constant for all aspects of this project, were identified based on many meetings and interviews with Ener-G executives. Since Ener-G's major environmental impact is in carbon emissions reduction, we researched the average carbon dioxide emission factors for electricity generation in each of the selected countries. Care was taken to ensure the most appropriate and consistent emissions factors were used. There are many available sources for emissions factors, but few incorporate only electricity generation. Others account for other emissions sources such as transportation and heating, which are not part of our analysis. Ultimately, we used a report from Union Post Universal which contained the emissions factors for electricity generation for most of our prospective countries. All of the countries we investigated, except for the small Caribbean nations, had specific recent emission factor data.

Using the CO_2 emission factors for each nation's electricity generation, located in Tables 6 and 7 in the Results chapter, we calculated the total carbon emissions saved so that the reduction in cumulative electricity usage can be directly correlated to emissions reduction. The equation for the calculation of carbon emissions is:

$$Cumulative\ Energy\ Savings\ (MWh) * \ Emissions\ Factor\ \left(\frac{Metric\ Tons\ of\ CO_2}{MWh}\right) = \boldsymbol{Total\ Carbon\ Emissions\ Reduction\ (Metric\ Tons\ of\ CO_2)}$$

Equation 4: Total Carbon Emissions Reduction

Our comparison of emissions reduction potentials between prospective franchise locations was based on calculations of energy savings from Equations 1 through 3. These equations use Ener-G's average annual energy savings created as a fixed control variable. This value will inevitably vary by country and by franchise, but we assume it is constant in order to effectively compare the potential environmental impact in different countries. The factors that will cause this value to vary are shown in Equation 1: the number of projects per year and average project savings per year. Especially in the beginnings of a franchise, these numbers may

be lower than Ener-G's current averages, but eventually they should reach this level of operations. Because of the requirements that every company must have in order to qualify for an Ener-G partnership, energy savings per project should be fairly comparable.

Our results will contain the projected carbon emissions reductions in selected countries calculated using Equations 1 – 4, as well as the percentages of the total national emissions these reductions represent. Two figures will be calculated: the percentage of emissions reduction from electricity generation and the percentage of total emissions reduction, which includes other emissions sources such as transportation. The statistics for total annual emissions were found through research, and the emissions from electricity generations were calculated by multiplying the emission factor by the total energy usage of the nation, which was also found through research.

3.3 Creating a Franchising Business Plan

Business plans contain many components, and the content of each section depends on the individual needs of the company. We knew the Ener-G executives' long-term goal of franchising internationally, but further input from them was needed to aid us in the creation of a business plan that fit their specific objectives. We worked closely with the company to determine the most important factors of the business plan design and to identify possible methods for solving the problems that they could face when expanding into other countries. In order to learn more about Ener-G's goals and concerns, we held meetings and interviews with the company's executives and anyone involved in planning the franchising process. Additionally, the business plan contains an analysis of the markets for energy efficiency projects in Central American and Caribbean nations, which will serve as a guide for the establishment of franchises. To gather this information, extensive quantitative research was conducted into the energy sectors of each country, information was extracted from online databases and governmental energy agencies were contacted for up-to-date statistics. We also developed an improved strategy for customer communications based on responses to some of our survey questions. Lastly, we investigated financial options for the expansion process.

3.3.1 Determining Ener-G's Vision for Expansion

The interviews with executives at Ener-G were in-depth qualitative discussions; one such interview is outlined in Appendix B. The objective for these interviews was to understand what Ener-G envisions for its future and its current plans for achieving these goals. An in-depth qualitative format for an interview facilitated follow-up questions and personalized accounts of the company's intentions. According to Doyle (N.D.), there are two significant disadvantages to this type of interview. First, since they are very time consuming, we would not be able to conduct a large number of these interviews. Second, the high level of involvement of the interviewer raises the risk that the questions asked would unintentionally bias the information that we receive. However, these concerns were not problematic in this case. The time consuming nature of in-depth qualitative interviews was not an issue since we only interviewed four executives. To solve the potential interviewer bias problem, we had to be sure to let the interviewee lead the discussion as much as possible; this method allowed for some interviewee bias, but limited the degree to which the team's questions would influence responses. Though we ultimately designed the business plan based on our own background research and market analyses, this approach ensured that we incorporated the intentions and needs of the company.

In order for these in-depth qualitative interviews to be successful, we took several steps to prepare for them. We used a format recommended by Doyle (N.D.) for an in-depth qualitative interview by first gathering information on the subject's background, their current circumstances and concerns, and finally their view of the implications of the situation. While conducting interviews, we followed a few common operational guidelines as well. Specifically, though the entire team was present, one person focused on interacting with the interviewee and another person was designated to take detailed notes.

Through these interviews, we learned more about the priorities and goals of Ener-G's franchising project. Ultimately, the team made suggestions to the company based on what we discovered to be the best course of action, but we also wanted to incorporate the company's intentions into the franchise plan. These interviews also gave the team insight into areas of the business plan that we might not have previously considered. A thorough understanding of the factors that contribute to these decisions was necessary to generate a business plan that incorporates all of the company's wishes and provides solutions to some of the problems that they are most likely to encounter. These interviews, combined with our own research, resulted in

an expansion plan uniquely tailored to Ener-G's current circumstances and goals.

In order to identify an appropriate outline for the contents of the business plan, the team asked Christopher Music questions about what type of information he expected to find in the business plan. Using this backbone structure, the team researched further into these areas and cut down on redundant or unnecessary sections and filled in all the sections.

A major section of the business plan was a detailed description of the structure of the Ener-G franchise system. This involved a breakdown of responsibilities for the franchisee and the central company. In order to do this, the team spoke extensively with Ener-G's executives in order to understand their current ideas on this matter. Many of their concerns were related to the fact that Ener-G's model is highly confidential, and provides them with an advantage over the competition. As such, we identified the sensitive aspects of the business' operation and decided to retain them centrally in our business plan. Other aspects of daily operation were divided between the original company and its franchisees. By speaking with executives, the team compiled a list of the various responsibilities currently involved in Ener-G's operation. The different tasks to be considered include project financing, design, research and development, supply chain management, business practices, marketing and sales, audits, and installation and maintenance of technology. For each of these tasks, the team decided which part of the company (the central company in Costa Rica or the franchisee) is best suited to perform that role. Our decisions were based on which tasks could be optimized by centralization, which ones require on-site customer visits, and which ones require the most experience. In addition, we identified training for the franchisee as an additional service to be performed by Ener-G.

This breakdown of responsibilities is sometimes called a Value Map in business terms, because it outlines the value that each party adds to the business. In order to clearly show this information, we created a graphic to represent the tasks performed by each entity. This gives an overview of the structure of the franchise system in a way that is easy to visualize. We then wrote detailed descriptions of each responsibility along with a justification of why it should be performed by one piece of the company or the other.

3.3.2 Market Analysis of Central American and Caribbean Nations

As part of the business plan, the team had to evaluate potential franchise locations and select the most profitable locations. In order to do this the team identified many factors to be

considered in final recommendations to the company. The team first collected quantitative data for certain market factors in each potential franchise nation, as outlined in Table 3 below.

Market Factor	Reasoning and Importance
Electricity Cost in kWh	Directly affects how much money the company will save per kWh of electricity saved.
Annual Electricity Consumption in TWh	Ener-G's business depends on saving energy, so low energy usage in a country suggests that there may not be ample potential for savings. There needs to be substantial supply of energy efficiency project opportunities in order for the business to be financially sustainable.
Electricity Emission Factor in tCO_2 per MWh (metric tons of CO_2 per Megawatt-hour)	Used in determining Ener-G's potential impact on carbon emissions, which impact the environment and the local community. Reductions in environmental impacts are useful marketing tools for companies.
Annual Emissions in Mt CO_2 (metric Megatons of CO_2)	Similar to the emission factors, the annual emissions were found to provide the company with projected impacts of how great the environmental impact would be.
Appropriate Urban Areas for Franchise Locations	Ener-G partners with larger corporations for their energy efficiency projects. A large city that houses many large industrial, commercial, or agricultural buildings will be the best place to find partners.
Distance from San Jose in km (kilometers)	Shipping costs are often related to distance of travel, among other influences. As technology will be sent from the central company, this information was gathered to aid the company in projecting financial costs of projects in each location.
Gross Domestic Product (Purchasing Power Parity)	A large consideration when starting a company is the economy of the region, the strength of which is indicated by the Gross Domestic Product.
Population	Population is a rough indication of the relative number of potential customers. Ideally, the number of large energy consumers would be determined, but this information is rarely publicly available.

Table 3: Market factors and their importance

The main market factors were found through various sources, predominantly from reports by governmental and environmental agencies. The team conducted extensive online research which led us to many governmental sources for this information. The main sources were the CIA World Factbook and the World Bank Group, which includes information about the GDP (PPP), electricity consumption, population, and major cities. The distances from San Jose were determined using GoogleEarth and the emissions factors were found in a document published by Unión Postal Universal. The electricity costs were found from various governmental agencies in the perspective countries. Some of this data was available to the public via the agencies websites,

while others required the team to personally contact various officials via email.

The electricity prices were the most difficult component to find because these figures are not as well-documented as the others. The team searched for reports from major electricity suppliers in each country, which were written in Spanish for the most part, and extracted the electricity rates for large commercial and industrial consumers, which often differ from residential rates. The team carefully considered each source, and ultimately decided on the most reputable, up-to-date, and appropriate sources. From Christopher Music, the team knew that the electricity price for Costa Rica was about $0.14 per kilowatt-hour. The team also discovered that other Central American and Caribbean countries use electricity sources that are more expensive than those of Costa Rica, which can be seen in Appendix H.

The other parameters were much easier to find and compile. All information for annual electricity usage, prospective city, GDP (PPP), and population came from the same two sources. Because these two sites were governmental agencies, the data was very reliable and consistent. The team made sure to select the most recent statistics, while making sure all the data is from the same year. After looking at both sites for comparison, the team added values to the Market Analysis table found in the results section.

After this data was compiled into a table, the team compared the countries against each other to pick the four that the team found to be promising for expansion. Each country was chosen for a different reason, based on these categories. These reasons are explained further in the results, but the four countries selected were Panamá, Jamaica, Guatemala and the Dominican Republic. Then further research was conducted in order to create complete analysis of these countries' markets. Some of the more qualitative factors required the team to look at academic or news sources for information. We researched such aspects as: international tax laws, free trade agreements, local economy, local government, competition, foreseeable roadblocks and ease of access. From all of this data, we made final recommendations to the company on where and how to begin franchising. A complete listing of the sources used for this section is shown in Appendix G.

3.3.3 Client Communication Practices

A key area of improvement for Ener-G is in client communication practices, and we incorporated this into the business plan. A strong communication medium will be even more

necessary as the company expands, since the customer base will increase. Currently, the company's only communications with customers currently under contract are the short newsletter and information regarding project logistics such as maintenance, installation, or financing. A worthwhile addition to Ener-G's service would be conveying the amount of energy saved as well as the resulting environmental impact to each customer.

Determining Optimal Strategy for Client Communications

Survey questions, 7, 8, and 9 were intended to gauge the most effective method of communicating energy savings, cost savings, and environmental impact information to the customer. We first inquired about the customers' satisfaction with current communication practices, and then determined whether they are interested in increased updates containing information on energy saving performance and environmental impact. Next, the team identified the optimal method of communication based on both its effectiveness and the client's preference. The communication methods the team investigated were e-mail, a mobile application, SMS messaging, social media, or regular mail. The team then isolated the medium that most companies preferred, and outlined the details of the communication strategy, such as specific information that needs to be conveyed and the communication medium.

The executives at Ener-G strongly favor a mobile application to communicate project updates to customers. As Christopher Music of Ener-G stated in a meeting, many people do not know what they want until they have it. This implies that customers may not express interest in new forms of communication such as a mobile application, since they rely primarily on e-mail and telephone communication. In terms of communication methods, Costa Rica is not as advanced as other regions, such as the United States, but certain media are slowly gaining more popularity. For this reason the team's recommendation of an ideal communications strategy was influenced by both customer survey responses and current trends in communications efforts.

Regardless of the communication medium, a key aspect of the information conveyed will be the environmental impact of each project. The team used survey questions 2, 3, 4, 6, 10, and 11 to determine customer interest in the environmental implications of their energy efficiency projects. The impact of each project was calculated in a similar manner as in our objective analyzing Ener-G's total environmental impact, but on an individual project basis. Additionally, since kilograms of carbon emissions reduction is not necessarily the most intuitive measure, we

determined a few equivalent metrics to make the information more tangible for the average customer.

Equivalent Measure	Description	Factor
Cars Eliminated	Number of cars taken off the road	0.19608 cars / metric tons of CO_2
Trees Planted	Number of trees that need to be planted to absorb the amount of CO_2 in 10 years	.025641 trees / kg CO_2
Gallons of Gasoline Saved	Number of gallons of gasoline saved	0.112 gallons / kg CO_2
Barrels of Oil Saved	Number of barrels of oil saved	0.002326 barrels / kg CO_2

Table 4: CO_2 emissions as they relate to cars, trees, gallons of gasoline, and barrels of oil (EPA, 2012)

These measures are estimates, since they are based on EPA averages. The measures of passenger car emissions and tree CO_2 absorption are especially prone to regional discrepancies, since fuel efficiency and tree growth are independent variables. These amounts will vary by region, but using a fixed average is acceptable for this application, since the goal is to intuitively communicate the rough environmental impact to people.

Evaluation of Energy Saving and Carbon Emissions Mobile Applications

Ultimately, the team chose to recommend a mobile application, or "app", for client communication, a decision that is documented in Results Section 4.3.3. In order to lay the ground work for a proper app for Ener-G, the team investigated other similar applications and rated them in terms of specific criteria. Using the Apple App Store, we selected apps related to energy savings and carbon emissions tracking for review. The two main criteria used to rate the apps were user friendliness and practical value. User friendliness is a category that encompasses three different factors including ease of navigation, straightforward user interface, and aesthetic appearance. The practical value rating represents the usefulness of the information that the app provides. For example, if an app provides the user statistics or figures that lead to better understanding of energy usage or well-informed business decisions, it received a high score. Apps that provided less useful services received lower scores for practical value regardless of their user friendliness. Each app was assigned a rating from 1 to 5 in each category, where 1 is

poor, 3 is acceptable, and 5 is good.

The team evaluated the apps based on our own opinions, since the results were ultimately contributed to our own recommendations for Ener-G's app. Each criterion is subject to interpretation, but our ratings were decided after extensive research into available mobile applications. Some apps were restricted due to user logins, so the aspects of their Apple App Store descriptions that seemed useful were incorporated into our suggestions. The team then created screenshots of our suggested app using what we learned from the other apps that we assessed. Using GIMP 2.8, a graphics editing software, the team was able to create mock-ups of the suggested sections for the app as well as how the app should be structured.

3.3.4 Financial Options

One of the major components of a business plan is the description of options for financing a new project. Even though franchising is one of the least costly methods to expand internationally, it still requires significant startup funding. As such, the team investigated funding sources that are available to Central American companies. The other components of the business plan gave us a better understanding of the financial cost of this expansion.

To assess the financial options available to Ener-G, the team conducted extensive online research and contacted investment companies via email when necessary. These emails were simple questions about loan interest and loan amounts, the only responses we received were links to helpful pages on the Banks' websites. This investigation of large global lenders led us to the European Investment Bank's website (EIB, 2012a) and many of their linked pages and publications. The team also researched potential large investment banks in Central America, which provided us with four potential small investment bank results; additionally it did lead us to options we had not previously considered. The Costa Rican banks that the team was directed to most during these searches were CitiBank Costa Rica (CitiBank, 2009), Banco Nacional, (Banco Nacional, 2012), and Banco BAC (Banco BAC, 2010). We chose to investigate the loan opportunities of these banks. All of the other banks we found were small personal banks, not business banks, and were not considered for Ener-G's use.

The two alternative options that the group researched further were advisory service companies and local investment and partnership programs. The Alternative Capital Group of Panamá City (AGC Panamá, 2012), and CAOBA Capital of Costa Rica and El Salvador

(CAOBA Capital, 2011) were the two advisory service companies. These companies were found accidentally while searching for investment banks, and were investigated further because they presented opportunities we had not considered before. Additionally, the business partnership program we researched heavily was the EIB's ALA IV invest program.

In investigating these loan sources, EIB and the ALA IV invest program, CitiBank Costa Rica, Banco Nacional, and Banco BAC, the team searched for a couple of major criteria for deciding on which loan would be the best option for Ener-G. We encountered problems with the Costa Rican banks because they mainly deal with and advertise personal accounts and personal loans because they are smaller banks. The EIB website proved to be a very valuable resource for the team's investigation.

Chapter 4: Results and Analysis

Our analysis led us to the results and recommendations outlined below. The first section contains the data collected about Ener-G's operations, which was then used in the following two sections: evaluating the company's environmental impact and designing the business plan.

4.1 Examination of Ener-G's Current Business Model

From our archival research and meetings with executives at Ener-G, we established an understanding of the company's operations and project statistics. We then evaluated the effectiveness of Ener-G's service relative to other energy efficiency project strategies and projected its success in greater Central America and the Caribbean.

In order to estimate what Ener-G's performance would look like in other countries, we examined the breakdown of costs for the company's operations in Costa Rica. Based on previous work with clients, the average cost of completing a project from start to finish is $[redacted], and the average total monetary savings that the project generates is $[redacted] per year (E. Gomez, personal contact, 2012). These financial savings are shared between the client and Ener-G during the contract period; often Ener-G keeps [redacted]% and the customer keeps [redacted]%. This split is constant for the life of the contract, which is [redacted] years on average. As a result, the client receives savings of $[redacted] per year and the company receives $[redacted] per year to pay for the financial cost of borrowing money, administrative expenses, and profit.

Over the course of an average [redacted] year contract Ener-G receives $[redacted] from its share of the energy savings. Taking into account the cost of completing a project, the company is left with $[redacted] to cover administrative expenses, marketing, and profit. Ener-G has an average of [redacted] projects under contract at a given time, so the net income over [redacted] years is $[redacted], or $[redacted] annually. Most of this income pays for company operations, but [redacted]% is kept as profit. From calculation, the company's annual average profit is $[redacted]. The full breakdown of the company's finances is shown in Figure 2.

Figure 2: Average Distribution of finances per project for Ener-G Tech. Definitions of terms can be found in section 3.1 (Eduardo Gomez, personal contact, 2012)

4.2 Evaluating Ener-G's Current and Projected Environmental Impact

Since Ener-G's clients are large commercial and industrial energy users, the overall consumption reduction caused by their services has an impact on electricity generation. Although in Costa Rica most electricity generation is hydroelectric, many other countries utilize mostly fossil fuel combustion power plants to generate electricity. A reduction in the required supply for these countries reduces the amount of carbon dioxide and other pollutants released into the atmosphere. In order to analyze the impact this company has on the environment, the amount of energy savings was related to the reduction in carbon emissions through the use of emissions factors. Since reliance on fossil fuels for electricity generation varies by country, the carbon emissions factor differs in each country.

Table 5 shows Ener-G's impact in Costa Rica. The average savings per project is [redacted] kWh per year, and the company initiates an average of [redacted] projects per year. Using Equation 1, the increase in energy savings rate created by new installations is calculated to be [redacted] MWh per year. This figure is the rate of energy savings that is *added* every year through new projects. The rate of energy savings increases over time as more projects are completed. The total energy saved is the accumulation of all previous years, making it a quadratic function. Over the company's 14 year history, the cumulative savings was calculated to be [redacted] MWh using Equation 3. The current rate of energy savings is [redacted] MWh per year, calculated using Equation 2.

Ener-G Statistic	Calculated Value
Annual Energy Savings Rate Increase Created by New Installations	[redacted] MWh
Current Annual Rate of Savings (after 14 years)	[redacted] MWh
Cumulative Savings over Entire 14-Year History	[redacted] MWh

Table 5: Calculations used for evaluation of Ener-G's impact. Source: (Eduardo Gomez, personal contact, 2012)

	Costa Rica	Belize	Nicaragua	Guatemala	Panama	El Salvador	Honduras
Emission Factor (metric tons $C0_2$/MWh)	0.0269	0.455	0.539	0.384	0.279	0.263	0.411
Annual Electricity Usage (TWh)	7.718	0.2857	2.646	8.711	5.805	5.76	4.8
Annual Emissions from Electricity Generation (metric tons of CO2)	207,614	129,994	1,426,194	3,345,024	1,619,595	1,514,880	1,972,800
Total Annual Emissions (metric tons of CO2)	8,317,000	414,000	4,463,000	15,203,000	7,844,000	6,300,000	7,704,000
	Actual	**Projected averages for franchises established in the select locations**					
Annual Energy Savings Rate Increase Created by New Installations (MWh/year)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Cumulative Electricity Savings Created over 10 Years (MWh)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Annual Increase in Rate of Emissions Savings (metric tons $C0_2$/ year)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Cumulative Emissions Savings (metric tons C02)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Percentage of Electricity Generation Emissions Savings over 10 Years	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Percentage Overall Emissions Savings over 10 Years	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 6: Electricity emission factors of selected Central American countries, as well as the projected total annual electricity savings and carbon emissions for each country. The resulting percentage of emissions reduction on a nationwide scale is also included. Sources: (Eduardo Gomez, personal contact, 2012), (EPA, 2012), (Millenium Development Goals Indicators, 2012), sources for emissions factors and electricity usage listed in Appendix H.

	Costa Rica	Dom. Republic	Jamaica	Virgin Islands	Trinidad & Tobago	Bermuda	Haiti	Bahamas
Emission Factor (metric tons $C0_2$/MWh)	0.0269	0.574	0.713	0.685	0.709	0.455	0.307	0.76
Annual Electricity Usage (TWh)	7.718	9.881	4.801	0.811	7.774	0.645	0.309	1.91
Annual Emissions from Electricity Generation (metric tons of CO2)	207,614	5,671,694	3,423,113	555,535	5,511,766	293,475	94,863	1,451,600
Total Annual Emissions (metric tons of CO2)	8,317,000	20,334,000	8,573,000	11,950,000	47,781,000	466,000	2,270,000	2,285,000
	Actual	**Projected averages for franchises established in the select locations**						
Annual Energy Savings Rate Increase Created by New Installations (MWh/year)	[redacted]							
Cumulative Electricity Savings Created over 10 Years (MWh)	[redacted]							
Annual Increase in Rate of Emissions Savings (metric tons $C0_2$/ year)	[redacted]							
Cumulative Emissions Savings (metric tons C02)	[redacted]							
Percentage of Electricity Generation Emissions Savings over 10 Years	[redacted]							
Percentage Overall Emissions Savings over 10 Years	[redacted]							

Table 7: Electricity emission factors of selected Caribbean countries, as well as the projected total annual electricity savings and carbon emissions for each country. The resulting percentage of emissions reduction on a nationwide scale is also included. Sources: (Eduardo Gomez, personal contact, 2012), (EPA, 2012), (Millenium Development Goals Indicators, 2012), sources for emissions factors and electricity usage listed in Appendix H.

In addition to assessing Ener-G's impact in Costa Rica, we calculated the prospective

environmental impact of Ener-G franchises in other countries, assuming similar energy savings performance. As described in the methodology, both the annual increase in rate of emissions savings and the cumulative emissions savings over 10 years were calculated. As expected, the prospective emissions reductions are greater in other nations than in Costa Rica, due to its low emission factor. The cumulative savings were then used to calculate the percentage of the total electricity generation emissions over 10 years. For the most part, the reductions were well below 1% of the nation's emissions from electricity generation. The reductions are even smaller when calculated as a percentage of the total emissions, including other emissions sources such as transportation.

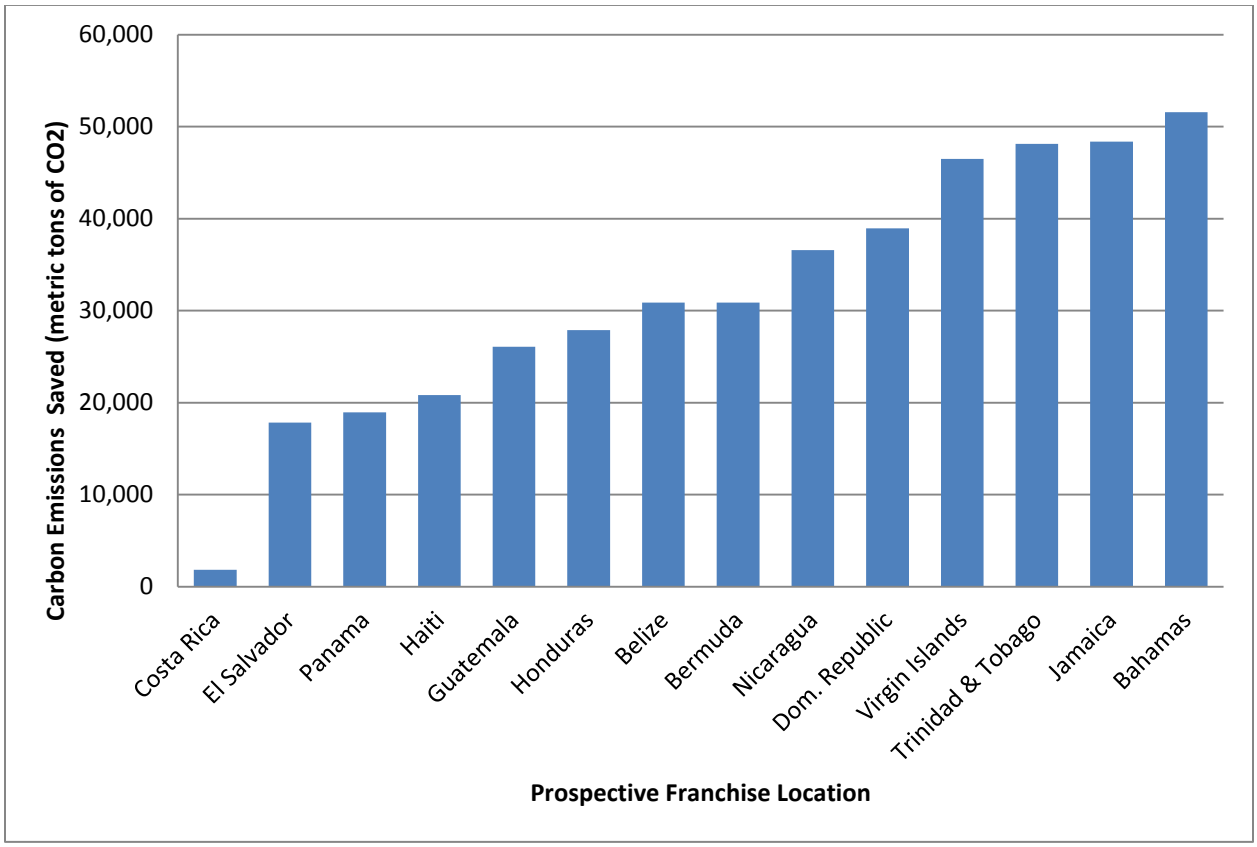

Figure 3: Chart of projected cumulative carbon emissions saved over 10 years for franchises in each country. Data from Table 6 and Table 7.

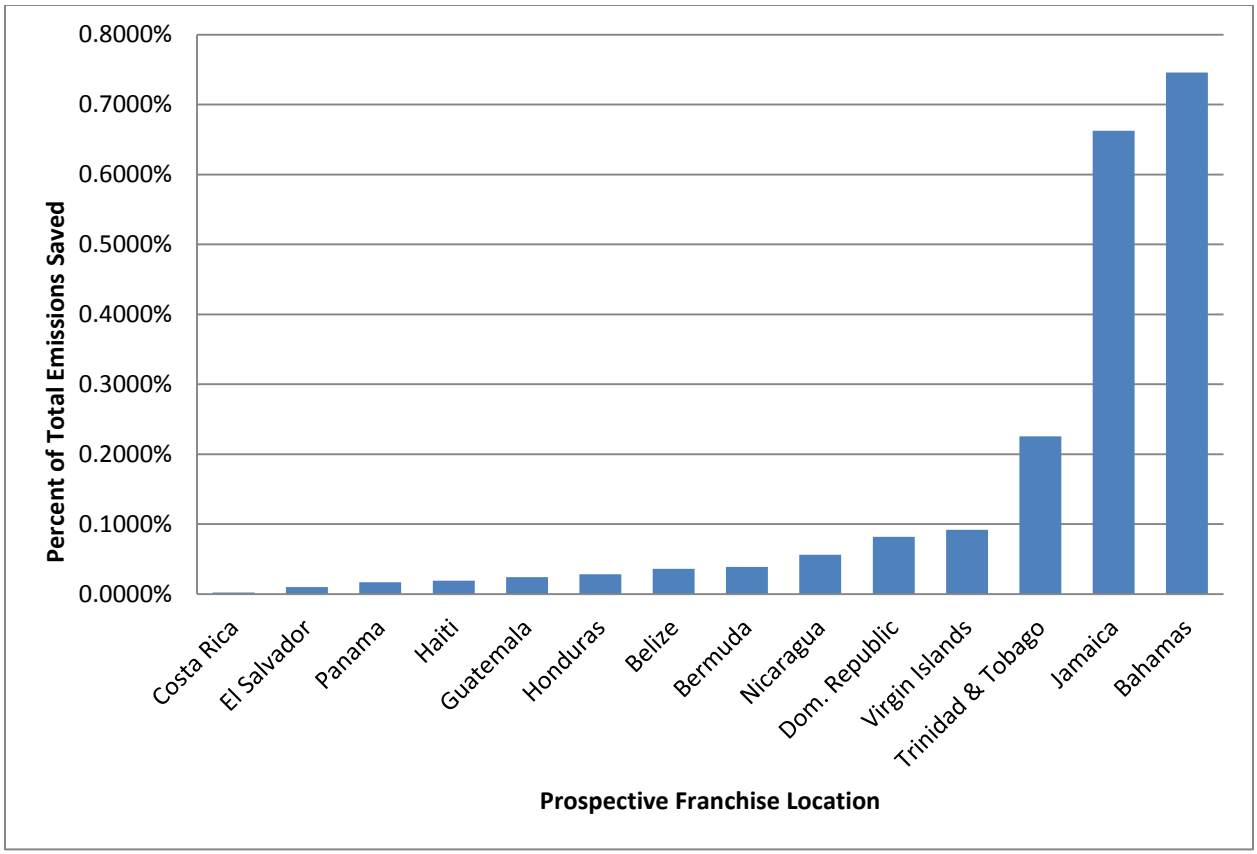

Figure 4: Chart of projected overall carbon emissions reduction percentage over 10 years for franchises in each country. Data from Table 6 and Table 7.

Based on these calculations, the potential for carbon emissions reduction is greatest for Jamaica, the Bahamas, and Trinidad & Tobago, but the information presented here is based on several key assumptions. First, we performed all calculations for projected savings using the average energy savings per project in Costa Rica. While this may not be the case, especially while franchisees are still developing and finding clients, we chose to use these numbers in order to more easily compare potential locations to Costa Rica. In general, we expect that the equipment that Ener-G will install in other nations will be comparable to equipment in Costa Rica because all procurement of equipment will be governed and shipped through the central company. As long as this is the case, the energy savings should be similar.

However, a factor that detracts from energy savings potential is low electricity usage in certain small countries, since this implies that there are less prospective customers for large-scale energy efficiency upgrades. The tables show that Jamaica, the Bahamas, and Trinidad & Tobago, and the Virgin Islands have the highest potential cumulative emissions savings over a 10-year

span. However, electricity usage in the Bahamas and the Virgin Islands is significantly lower than in Costa Rica, so it can be inferred that the average amount of energy savings created will be less, since there are fewer potential customers. There are many other variables that could affect the performance of franchisees, and they are discussed in the market analysis section of this chapter.

4.3 Creating a Franchising Business Plan

The main deliverable of this project was a draft of a franchising business plan for Ener-G. We have determined that Ener-G's shared savings model is an effective approach to reducing energy usage in other Central American and Caribbean countries, but the expansion process must be well planned and monitored to ensure success. As the team has found through archival research and working with the company, Ener-G is a smaller enterprise that would not have the funds to expand autonomously. For this reason, franchising will be the best method for Ener-G to expand their business beyond Costa Rica. The full business plan is shown in Appendix A for reference, but this section provides ample descriptions and analyses of the most important sections of the plan. First, we present the results of our analysis of the franchise structure from interviews and meetings with executives and from online research. The emphasis of this section is the division of responsibilities between central company and franchisee. Next we provide the market analysis that the team created. Then we present our results of the client communication survey as well as our suggestions for how the mobile application should look and be structured. We then present our findings on funding options for the company. Finally, we present our results regarding the structure of the franchise business plan the team created.

4.3.1 Franchise Structure

Based on archival research and meetings with Ener-G's executives, we designed a new franchise business model for the company. The main changes to the current business model are the division of responsibilities between the franchisee and the franchisor. Additionally, there are certain added components inherent in a franchise system, such as the process of acquiring franchisees and the provision of hiring and training support. The service to the customer will essentially remain the same. Based on company requests, and research on franchise structure, we created a value map to be added to Ener-G's business plan. A value map is a graphic that

represents the responsibilities of the central company, the franchisee, and the clients. This visual will help potential franchisees understand the value that the Ener-G Tech Investments franchise system provides.

Figure 5: Value Map graphic depicting the distribution of responsibilities between Ener-G and its franchises

The intention is to convey the advantage of starting an Ener-G franchise over an independent energy service company. However, as Shane et.al (2006) states, "franchisors cannot easily demonstrate the value of their assets because the major asset that they offer the franchisees – the business format – is intangible". For Ener-G, in addition to this business format, also known as business practices, the company will also add value through various other responsibilities they will maintain. They also contribute most of the higher level engineering and management aspects as discussed below.

In the value map representing the company structure, the majority of the responsibilities are held by Ener-G. We chose to implement a highly centralized business model that will allow

the central company to maintain control of the majority of services. The executives at Ener-G wanted to maintain control of the brand and the service. As Storholm & Scheuing (1994) have discovered, the franchisors are often concerned that the franchisees will violate agreements, while the franchisees are concerned about an unequal distribution of power. The team also had to consider the possibilities that if given too many responsibilities a franchisee would either choose not to buy into the company, or if they did buy in, would eventually break off from the main company and use the information they gathered to start their own company. For these reasons, the team chose responsibilities that would both attract a potential franchisee to join the company and allocate them adequate power and some level of autonomy but not so much that they could become competition if they ceased working for the company.

Responsibilities of Ener-G

The value map shows that the responsibilities of the central company include [redacted]. We have assigned the central company these responsibilities because all responsibilities and transactions should be "governed by the institutional arrangement that is most efficient" (Bradach & Eccles, 1989). The company has had over twelve years of experience in the business, and therefore maintaining these duties is the most efficient model. A key consideration for an expanding business is keeping the franchisee dependent on the headquarters for resources and expertise.

[redacted]

[redacted]

Responsibilities of Franchise

The responsibilities of each franchisee include [redacted] These duties were chosen because they involve on-site work without requiring advanced expertise.

[redacted]

[redacted]

This value map should be clearly spelled out for the franchisee before they enter into a franchise agreement. It is critical that both parties fully understand their responsibilities so that the franchise system runs smoothly. This franchise structure seems to be the best path for Ener-G to gain franchisees, to sustain these partnerships with franchisees, and to prosper. The team also had to consider the franchisee when making recommendations, since the plan has to be appealing from the point of view of an entrepreneur as well.

4.3.2 Market Analysis of Central American and Caribbean Nations

A key element of planning the expansion was gathering information about the energy sectors in each potential franchise location. By far the most significant statistic to be determined was each country's electricity price for large energy consumers. The majority of Ener-G's efficiency upgrades involve electricity savings, so higher electricity prices will yield greater cost savings and higher overall profitability for the franchise. Tables 8 and 9 below show our research findings for market factors we identified as important for the success of a franchise.

Central American Nation	Electricity Cost (USD/kWh) [1]	Annual Electricity Consumption (TWh) [1]	Electricity Emission Factor (t CO_2 / MWh) [2]	Annual Emissions from Electricity (Mt CO_2) [2]	Prospective City	Distance from San Jose (km)	GDP (PPP) (Billions US$) [1]	Population [1]
Belize	$0.235	0.2857	0.455	0.130	Belmopan	957	2.786	327,719
Nicaragua	$0.196	2.646	0.539	1.426	Managua	343	18.377	5,743,000
Guatemala	$0.184	8.711	0.384	3.343	Guatemala City	872	75.262	14,757,316
Panamá	$0.180	5.805	0.279	1.607	Panama City	510	48.773	3,410,676
El Salvador	$0.176	5.76	0.263	1.517	Tegucigalpa	573	46.145	6,071,774
Honduras	$0.153	4.8	0.411	1.971	San Salvador	697	34.289	7,792,854
Costa Rica	$0.143	7.718	0.0269	0.208	--	N/A	51.472	4,253,877

Table 8: Market analysis, as it pertains to energy efficiency projects, of all Central American countries. Sources can be found in Appendix G.
[1] Information based on 2012 or 2011 data
[2] Information based on 2008 data

Caribbean Nation	Electricity Cost (USD/kWh) [1]	Annual Electricity Consumption (TWh)	Electricity Emission Factor (t CO_2 / MWh) [3]	Annual Emissions from Electricity (Mt CO_2) [3]	Prospective City	Distance from San Jose	GDP (PPP) (Billions US$) [1,2,3]	Population [1]
Jamaica	$0.32	4.801	0.713	3.425	Kingston	1191	21.851	2,709,300
Virgin Islands	$0.30	0.811	0.685	0.556	Charlotte Amalie	2278	1.577	105,275
Dominican Republic	$0.280	9.881	0.574	5.672	Santo Domingo	1759	90.711	9,650,054
Trinidad & Tobago	$0.23	7.774	0.709	5.512	Port-of-Spain	2490	34.939	1,346,350
Bermuda	$0.20 - $0.22	0.645	0.455	0.293	Hamilton	3178	5.765	69,080
Haiti	$0.17	0.309	0.307	0.095	Port-Au-Prince	1585	11.940	9,801,664
Bahamas	$0.15	1.91	0.760	1.452	Nassau	1863	11.178	347,176
Barbados	--	0.955	--	--	Bridgetown	2686	5.256	287,733
Cayman Islands	--	0.5556	--	--	George Town	1080	2.250	52,560
Puerto Rico	--	20.71	--	--	San Juan	2155	64.840	3,690,923
St. Vincent & The Grenadines	--	0.1228	--	--	Kingstown	2514	1.182	103,537
Turks & Caicos	--	0.186	--	--	Grand Turk	1885	0.216	46,335

Table 9: Market analysis, as it pertains to energy efficiency projects, of selected Caribbean countries. Missing data is unavailable online. Sources can be found in Appendix G.

[1] *Information based on 2012 or 2011 data*
[2] *Information based on 2010 or 2009 data*
[3] *Information based on data prior to 2009*

Based on the information in Tables 8 and 9, several possible countries present themselves as promising targets. However, the team decided to further investigate four countries we found to be optimal for Ener-G's business. Based on our market analysis, many countries would make promising franchise locations once Ener-G establishes itself internationally, but the team chose two from Central America and two from the Caribbean to focus on for initial franchise options. The team investigated Panama, Jamaica, Guatemala and the Dominican Republic. Panama was chosen because of its proximity to Costa Rica and its relatively high electricity prices, GDP, and electricity usage. Jamaica was chosen because it had the highest electricity cost and highest

emission factor. Guatemala was chosen because of its urban population, proximity, and electricity consumption. The Dominican Republic was chosen because it has the highest GDP and one of the highest electricity costs in Central America.

Other locations that seem superior in electricity price fall short in some other aspect. For example, the Virgin Islands, Bermuda, and Belize have high electricity prices but very low electricity consumption. Low consumption implies that the potential for efficiency improvements is also low; a franchise will likely either have difficulty targeting eligible customers, or exhaust the supply of eligible customers over time. Nicaragua has a notoriously bad economy; its GDP is well under half of Costa Rica's, though its population is greater. Trinidad and Tobago has a high electricity price and a prosperous economy, but the fact that it is almost 2500 kilometers from Costa Rica would create a challenge. After the franchise system is well-established and functioning, Trinidad and Tobago would be an excellent choice for a location, but in the beginning stages of the expansion it is best to stay relatively local.

Another consideration is the potential for marketing and sales success in a nation; this factor is much harder to quantify. In some cases, the country that looks best in terms of electricity price, emission factors, and electricity consumption may not be the best nations to franchise into because of market factors specific to the country or other unforeseen obstacles. This is why we decided to conduct further analysis of these selected countries.

Panamá

Panamá City, the major industrial sector of Panamá, lies just 510 km from San José. This would be an ideal location for an initial franchise, since transportation would be easy and equipment could be shipped inexpensively by truck. Panama City houses the majority of the most profitable and wealthy companies and contributes most to the country's GDP of nearly $50 billion. The energy price is $0.18/kWh. Based on data from 2010, the average person consumed about 1702 kWh per year, and the country as a whole consumed more than 3 billion kilograms of oil equivalent. Most of the people and companies in the city will consume much more than this average and the people in the outskirts will be consuming much less. Because there are already many well-established foreign franchises, and trade agreements, there is no franchising fee for franchising into Panamá (The Economist, 2011). A franchised company will simply pay the business fees and taxes that any other comparable company from Panamá would pay (Jones, 2007). Without applying to start a business, it is unknown how these taxes compare to Costa

Rica's business taxes. There has been a great amount of success with franchised companies in Panama. There are also many large business associations in Panama that would be good places to start looking for clients (The Heritage Foundation, 2012).

One significant advantage of franchising an ESCO into Panamá is that there is no well-established competition in the country. The biggest competition comes from suppliers who sell energy efficient equipment, instead of providing funding, installation and maintenance. The majority of these suppliers and distributors work predominantly in solar energy as well, leaving a gap in energy efficiency that can be filled by an ESCO (Posharp, 2012). Another advantage to an ESCO company franchising in Panamá is the governmental support. There are many environmental threats in Panamá, such as air pollution and water runoff, which have gained the attention of the government (IndexMundi, 2012). The government has already begun establishing energy efficiency programs in the public sector; and though the government is not working to establish such programs in the private sector, they are aware of the benefits of energy efficiency and will be more likely to endorse such a program. Taxes on businesses have also been reduced in recent years. In fact, "Panama [has] the lowest average tariff rate in Latin America" (U.S. Department of Commerce, 2012). One major disadvantage to doing business in Panamá is its reputation for corruption within the government (The Heritage Foundation, 2012). The country is working to strengthen their government, but with such a history of corruption it is difficult to gauge how much they can improve.

Jamaica

Jamaica currently has the highest electricity price of any country that we have considered. At 32 cents per kilowatt-hour in 2012, electricity savings there would be particularly lucrative. This high energy price is due in part to the fact that about 90% of the total energy usage comes from imported oil (European Union, 2012). The lack of significant clean energy production also means that saving electricity in Jamaica would have a larger environmental impact compared to a country like Costa Rica, where a smaller portion of the energy comes from oil. Despite the high price, the average electricity consumption was 1698.9 kWh per person in 2009, comparable to the consumption rates in Costa Rica and Panama (this calculation is described in the Methodology section). Since electricity prices are a significant factor for so much of the country, it is likely that there would be a great deal of interest in saving electricity. About 65% of Jamaica's GDP is made up by services, which can be attributed to the nation's strong tourism

industry (Central Intelligence Agency, 2012). Most likely, many target customers would be businesses in the tourism industry such as resorts and hotels. One major downside to Jamaica however is the crime and corruption. Many areas of Jamaica, such as Kingston and Montego Bay are filled with crime (U.S. Department of State, 2011).

The Development Bank of Jamaica has recently partnered with Fundación Chile, a pioneer of the ESCO industry in Chile, in order to promote energy efficient businesses in Jamaica. The $184,000 project in 2012 involves meeting with SME's and potential ESCOs in Jamaica in order to "strengthen the technical capacity of DBJ and its key stakeholders that is necessary to design and implement a nationwide ESCO market development program in Jamaica" (Fundación Chile, 2012). This initiative to promote an ESCO industry also makes Jamaica a good opportunity for a growing ESCO.

Guatemala

Guatemala City is located 870 km from San Jose and the country is home to almost 15 million residents. The most recent energy cost for Guatemala is around $ 0.184 per kWh, slightly higher than that of Costa Rica. The country as a whole consumes about 10 billion kilograms of oil equivalent, and about 8 billion kWh of electricity. The total energy use is split relatively evenly from oil and natural gas, with a small amount coming from coal and hydropower. Like many Central American countries that have a large number of foreign franchises, Guatemala has no franchise fee; franchises are simply required to follow regular commercial laws, and there is no tax beyond the regular commercial tax imposed on all Guatemalan companies.

One great advantage that Guatemala has over many Central American countries is that it has an incredibly strong financial system. Additionally, there are no extra taxes for foreign versus national investments, which means that the investments of Ener-G will be treated the same as if they came from in-country (The Bromchil Group, 2006). The biggest disadvantage of Guatemala is that a larger percent of their economy is agricultural. The Guatemalan industrial sector is not as large as many other Central American countries. In fact, "The agricultural sector accounts for about one fourth of GDP, two-thirds of exports and half of the labor force" (Deloitte Touche Tohmatsu, 2009). However, there are still large factories associated with the production and distribution of agriculture that could be promising clients for Ener-G.

Dominican Republic

The Dominican Republic is another potentially interesting opportunity for a growing

ESCO. With an electricity cost of $0.28, energy is more expensive compared to most other Central American and Caribbean countries. The average electricity consumption was 1023.9 kWh per person in 2009. This is lower than the rates in Costa Rica and Panama, but about twice that of Nicaragua and Guatemala. The GDP, $9400 per person in 2011, is slightly above average for Latin America.

Economic stability in the Dominican Republic may be a concern for businesses. Following a major incident of fraud on the part of Baninter, a large commercial bank, inflation rose by over 27% in 2003. This incident roughly doubled the number of poor in the country (Dominican Today, 2007). The United States 2012 Investment Climate Statement indicates that corruption is the primary concern for businesses, especially foreign firms. The Dominican Republic represents an unfamiliar climate because a relatively high proportion of the population believes that paying bribes is acceptable. As of December 2011, the country has implemented 28 anti-corruption reforms, however enforcement of corruption law remains an issue. Governmental commissions have been established to fight corruption, but they are little known to the general public (Bureau of Economic and Business Affairs, 2012). These corruption issues, combined with general economic instability, may cause problems for firms in the Dominican Republic. However, it is unclear whether these issues would impact an ESCO, and the high electricity price and GDP per capita could provide ample opportunity for growth.

Location Recommendations

The team's recommendation to the company is that each of these four countries, Panama, Jamaica, Guatemala, and the Dominican Republic, should be considered for initial franchise locations. Our suggestion for the first franchise location is either Panama or Jamaica. While Jamaica's very high electricity price would yield the greatest investment returns, logistically it would be easier to stay within Central America. The ease of shipping and transportation to Panama would simplify the initial expansion process considerably. Creating an initial franchise in Jamaica is the risky option with the higher potential for reward, and Panama is the safer option.

4.3.3 Client Communications Practices

The team analyzed survey responses to determine the most effective method of communication as well as the information that customers are most interested in receiving. Next,

the team evaluated a handful of mobile applications that are related to communicating energy savings and carbon emissions. The successful aspects of these applications were then incorporated into our final recommendation.

Determining an Optimal Strategy for Client Communications

Though the team did not receive as many survey responses as was hoped, the seven responses were still useful in determining communications preferences. The team used question 2 to survey customers' interests in different aspects of the Ener-G project; the responses are listed below in Table 10. From the responses, we made decisions about the type of information communicated to customers.

What are your motivations for doing the energy saving project? Indicate the importance of each on a scale of 1 to 7 (7 is the highest importance).			
Respondent	**Environmental Impact**	**Financial Savings**	**Public Relations**
1	6	7	6
2	7	7	5
3	6	7	--
4	7	7	5
5	5	7	2
6	6	7	6
7	7	7	7
Averages	6.29	7.00	5.17

Table 10: Responses to question 2, ratings of the importance of the different benefits of the Ener-G project. Customers were asked to rate each aspect from 1 to 7; 7 being the most important.

The respondents rated of the importance of the environmental, financial, and public relations aspect of their Ener-G partnership on a scale of one to seven, with seven being the highest. All of the respondents gave the financial savings aspect the highest rating of 7, and the environmental aspect was close behind with an average rating of 6.29 (Table 10). The public relations benefit was rated less important; one respondent failed to rate that aspect at all. The seventh respondent indicated the highest level of importance for all three aspects, an unusable answer which skews the averages to be higher. From the results of the survey, we decided that the information communicated should focus on financial savings and environmental impact.

Survey question 6 provided additional input for the communication recommendation,

including interest in updates and preferred frequency. Table 11 below shows the responses to question 6.

Would you be interested in receiving energy savings and environmental impact updates? If so, how often?				
Respondent	Yes			No
	Annually	Quarterly	Monthly	
1			♦	
2		♦		
3			♦	
4			♦	
5		♦		
6			♦	
7			♦	

Table 11: Survey question 6, showing interest in and desired frequency of financial, energy, and emissions savings updates, asked in a multiple-choice, single answer question.

The survey responses for interest in energy savings and environmental impact updates showed unanimous interest; all respondents answered "yes" (Table 11). Five out of seven respondents preferred monthly updates, and the other two preferred to be updated every three months. The results show that the respondents prefer monthly updates, though the e-mail updates could conceivably be customizable in frequency.

The team then surveyed the customers to determine the most effective and preferred communication means. Question 7 asked each customer respondent which forms of communication they use most frequently, in a multiple-choice format allowing multiple answers. Table 12 shows the responses to this question.

What forms of communication do you use the most?						
Respondent	**Email**	**Phone**	**Social Media**	**Text Messages**	**Mobile Applications**	**Mail**
1	♦	♦			♦	
2	♦					
3	♦					
4	♦					
5	♦		♦			
6	♦					
7	♦	♦		♦		

Table 12: Responses to survey question 7, in which each Ener-G customer was asked to provide the communications media they use frequently in a multiple-choice, multiple-response format

All of the respondents indicated that they use e-mail frequently, and three indicated that they use other methods as well. In addition, question 9 asked customers: "What would be the best way to receive information about the environmental impact and energy savings of the company?" This question included the same possible answers as question 7, but only one answer was permitted. All seven respondents indicated e-mail as their top choice. Thus, though the executives at Ener-G indicated to us that they strongly favor a mobile application to communicate savings, the survey results show that this would not necessarily be effective. Since e-mail is preferred by all respondents, it is clear that e-mail is the most effective method to reach all customers.

Question 8 was a yes-or-no question that asked whether the customer has a smart phone or smart mobile device. Six out of the seven respondents answered "yes" to this question. Though only one respondent indicated mobile application usage in question 7, this does not necessarily mean the rest would not use an application if Ener-G provided one. Ultimately, we decided to recommend a two-pronged communications solution, utilizing both e-mail and a free mobile application.

Evaluation of Energy Saving and Carbon Emissions Mobile Applications

The team identified a small number of mobile apps that are relevant to Ener-G's needs and analyzed which aspects of these apps were useful, which were redundant, and how the apps could be modified to be more useful. We downloaded several mobile applications; many of them

are very similar carbon footprint calculators or environmental impact calculators. The Siemens Environmental Impact Calculator app (Siemens, 2012), the Circuito Be+Green app (aPlicativa, 2012), the SAP CarbonTrack app (SAP, 2010) and Humlegarden Mestro Lite (Flexolvit, 2011) represented much of the information we found. These are all free, publicly available apps found on the Apple App Store (Apple, 2012). We chose these apps because they all have elements that are informative and useful for clients.

After evaluating each of the apps based on the criteria described in Section 3.3.3 of the Methodology chapter, the group compiled the results into Table 13 below. Because the Mestro Lite app required the user to be a client of Humlegarden and have login credentials, we were not able to access the app itself; instead, we simply gave it a rating for practical value based on the company's description of the functionality of the app.

Criteria	Circuito Be+Green	Siemens Environmental Impact Calculator	SAP CarbonTrack	Humlegarden Mestro Lite
Ease of Navigation	4	4	5	N/A
Straightforward User Interface	4	4	3	N/A
Aesthetic Appearance	5	5	5	5
User Friendliness Average	**4.33**	**4.33**	**4.33**	**N/A**
Practical Value	**2**	**4**	**1**	**5**

Table 13: Ratings for selected mobile applications. Each rating is on a scale of 1 to 5, with 5 being the highest score.

In addition to assigning overall ratings to each app, the team considered the individual features that contributed to these ratings. Some of the major trends we found were that the information was very basic and sometimes required too much work on the part of the user. The research team noted aspects of each app that were particularly helpful or problematic, and considered these carefully when designing the final app for Ener-G.

Be+Green app by Circuito (aPlicativa, 2012) is very straightforward. It gives a monetary value to the energy savings generated from switching lighting. This information is good for an

app for Ener-G because it provides clients with constant reminders of their energy savings. As Figure 6 shows, the user has to plug in all the information about how many bulbs are being switched. This app also projects savings over time. This is a good way to show users that even if there is only a small amount of savings every month, their to-date savings as well as their eventual yearly savings are tremendous. Similar to the Circuito app, the Ener-G app will provide the user with data on money saved because of the upgrades. However, this information is already available in Ener-G's records. In order to make the experience more user-friendly, Ener-G's app would not require the manual input of information. The user would sign in, and then be taken directly to the page showing the savings information. Data on savings over time will help the company to maintain and re-contract current clients and gain new clients. It is also a convenient method for the clients to promote their energy savings.

Figure 6: Circuito Be+Green energy and money saving mobile application. Found on the Apple App Store.

Another application, the Siemens Environmental Impact Calculator app (Siemens, 2012) relates carbon emissions to tangible factors. Screenshots of the app are shown in Figure 7. This app also has several areas where the user can input data on usage of different types of fuel and electricity, and location. The location information is then used to determine the emission factor. The app also provides the option to track usage of various sources of energy over time, so that the user can see any changes in consumption. The most positive feature of this app was the form

in which it presented savings data in terms of raw emissions as well as more intuitive measures such as trees saved, cars taken off the road, and railcars of coal consumed. As previously mentioned in the environmental impact results section, the team has found relations of carbon emissions to cars off the road and to number of trees planted per year. Similar to what Siemens has done, Ener-G can use these emissions factors, along with archival data on each country, to show their clients what kind of impact they are making. This equivalent impact feature of the app can be used for marketing for both the client and Ener-G. This aspect will help the clients so that they can take the environmental information directly from Ener-G and publish it on their own personal websites as marketing. As all seven of the survey results have indicated, email is the best method of communication for clients to receive information. If possible, the same program that updates the app can also send emails to the clients.

Figure 7: Siemens Environmental Impact Calculator mobile application. Found on the Apple App Store.

One of the apps the team found to be useless in execution was the SAP CarbonTrack mobile app (SAP, 2010), shown in Figure 8. The idea of showing the clients their total carbon usage is good, but this app broke that number down into carbon emissions per employee without giving the whole number. The cost is also redundant because if the company knows their usage from their electric bills they already know the cost. However, a monthly comparison of cost savings based on emissions saved is a feature that the team liked in other applications.

Figure 8: SAP CarbonTrack mobile application. Found on the Apple App Store.

The Mestro Lite Humlegarden app (Flexolvit, 2011) was hard to analyze because it had a log-in that required the user to have an account with the company, but we were able to locate a sample electricity usage graph (shown in Figure 9). Much like the graphs found from the OECD and IEA, this app shows the companies electricity usage per month. The graph itself is not explained well; it is hard to tell what exactly the axes represent and what the different colored lines represent. Although Mestro Lite's graphs were lacking in clarity, this will be something that Ener-G can improve upon and use to display a client's energy savings. Ener-G's graph could be used to show the current energy usage compared to the energy usage that the client would have seen had they chosen not to partner with Ener-G.

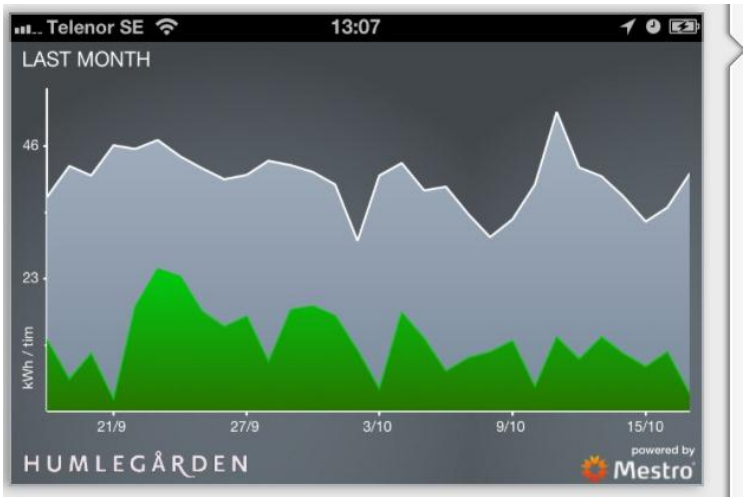

Figure 9: Humlegarden Mestro Lite mobile application, representation of total energy use over time. Found on the Apple App Store.

Conceptual Design of Mobile Application

We used our findings from preexisting mobile apps for energy savings to identify characteristics of an app that would be particularly useful for Ener-G's needs. Since creating an actual mobile application would be beyond the scope of our project, we created a conceptual design for the mobile application based on our analysis of existing apps. This design is intended to show the content provided to users, the layout of each page, and the user interface. We created the screenshots shown below in Figure 11 - 15 using GIMP 2.8, a graphics editing software. To implement our design into an actual Apple or Android app, the company should contract a software developer.

The Ener-G app should begin with a prompt for user credentials, since each Ener-G project will have its own secure profile. The app should then offer four different pages for user interaction that can be navigated, in no particular order, using the icon bar at the bottom of the screen. Figure 10 shows a simple block diagram of the page navigation. Below, we describe in more detail our recommended content for each of the project-specific pages in the app.

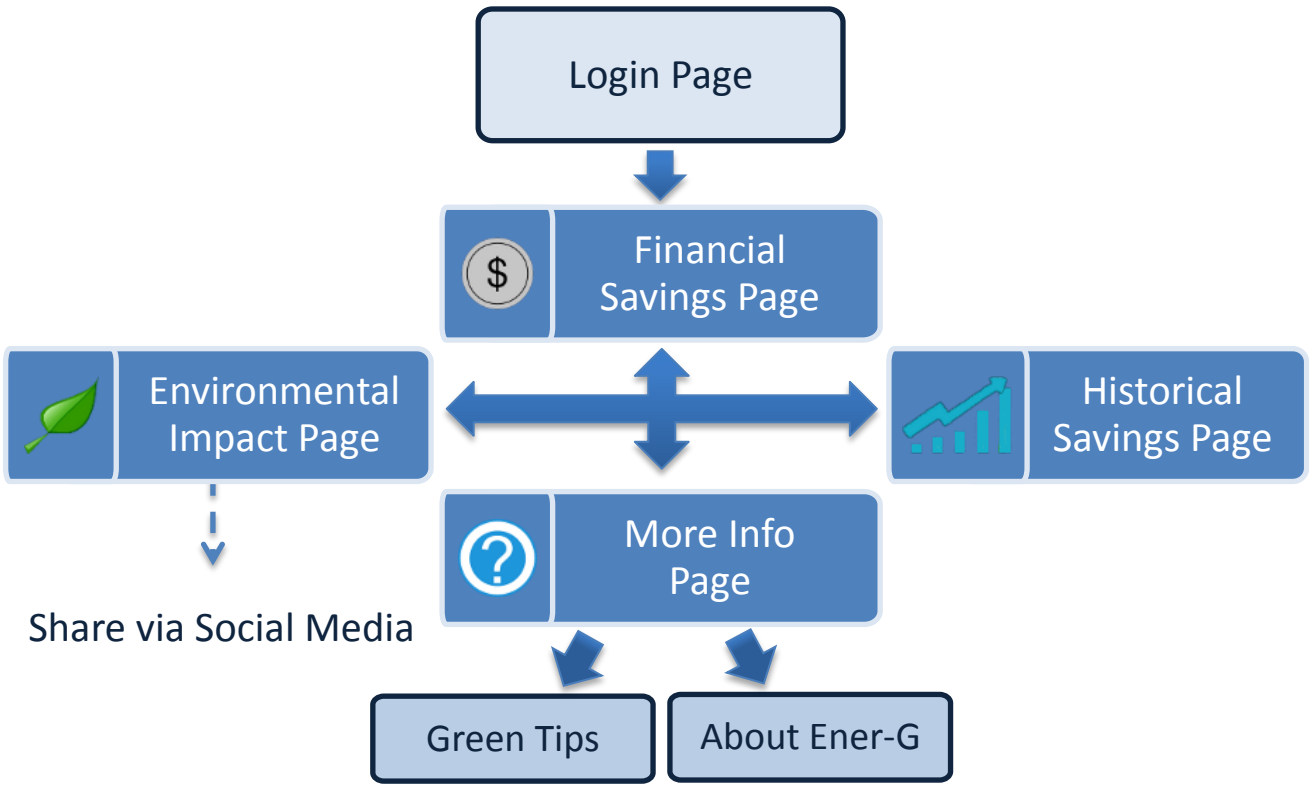

Figure 1: Flowchart of app operation and page navigation.

Financial Savings Page

The financial savings page provides the user with information on the money saved as a result of their Ener-G partnership. The page would show the discrepancy between the projected energy bill without Ener-G's installations, the current bill, the total cost savings, and the client's share of the cost savings (Figure 11). The user should be able to view this data on a monthly, yearly, and overall cumulative basis.

Figure 2: An example of content shown on the financial savings page of an Ener-G app.

Historical Savings Page

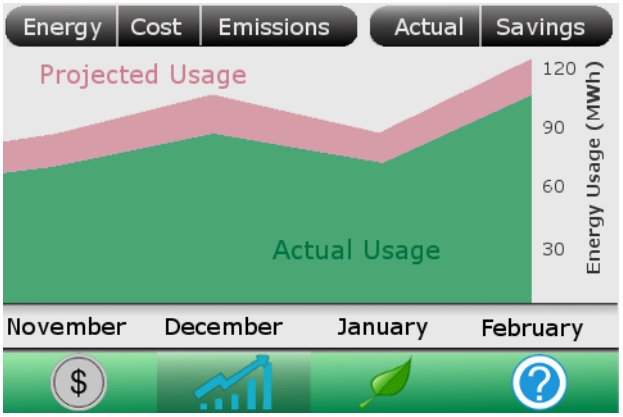

Figure 3: An example of content shown on the historical savings page of an Ener-G app.

The historical savings page, shown in Figure 12, would display an interactive graph of the client's performance over time, so that clients can easily track their energy usage, cost savings, and emissions reduction. These three statistics would be viewable in two ways, either in the form of a comparison between the projected performance and the actual performance, or a straightforward representation of the savings (the difference between the projected and actual performance). To clarify, the projected performance is the customer's hypothetical energy usage based on their previously installed equipment (before the Ener-G project) and energy usage history, information that Ener-G already uses to determine the project savings. The team decided this page would be best viewed horizontally on the smart phone screen, enabling the user to view more data over time. The user should also be able to scroll to the left to view older data.

Environmental Impact Page

The environmental impact page provides the user with information about the energy saved and the environmental impact of the Ener-G partnership in terms of carbon emissions. The carbon emissions values will be calculated using the electricity generation carbon emission factor of the region, listed in Tables 6 and 7. The carbon emissions reduction will also be equated to more tangible measures such as equivalent passenger car emissions, equivalent trees planted, barrels of oil conserved, and gallons of gasoline conserved. This information will be based on EPA averages for carbon emission equivalents. The user can interact with the page by selecting different equivalent measures from the row below the text. Additionally, the user can view monthly, yearly, or cumulative data, as in the financial savings page.

This page demonstrates the greater impact of their Ener-G partnership, and it appeals to responsible, eco-friendly businesses. This feature will also help the clients promote their energy efficiency efforts, since they can easily advertise this information to their customers or stakeholders.

Figure 4: An example of content shown on the environmental impact page of an Ener-G app, showing carbon emissions

Figure 5: An example of content shown on the environmental impact page of an Ener-G app, showing equivalent cars eliminated.

More Information Page

This page is an extra feature that displays random tips for reducing energy consumption. Practices such as turning down air conditioners and refrigerators can further reduce clients' energy consumption. Since Ener-G shares the savings with its clients, increased savings benefits both parties. The page should also display information about Ener-G and the app itself, by clicking the "About" tab.

Figure 6: An example of content shown on the More Information page of an Ener-G app, showing a "Green Tip"

4.3.4 Financial Options

The team gathered information on potential financial sources for funding Ener-G's initial expansion, specifically the extra capital required for the new franchises' initial projects. European Investment Bank (EIB) is the world's largest investment bank, and has been operating for over fifty years. The bank made its first loan outside of the European Commission in 1962, and its first to small and medium sized enterprises in 1988, and since then has been funding projects all across the globe (Funding Universe, 2004). Because they are a world leader in investment, the EIB is able to give out loans large enough to cover the capital required for all Ener-G projects. Though there are no projects in Central America that have received funding yet, an SME in the Dominican Republic has been approved for funding, and projects in Costa Rica and El Salvador are under appraisal (EIB, 2011b). There are also many other small loans being appraised, signed and approved in other Latin American nations. And these approved and funded loans have been in the range of $4-$100 million (EIB, 2011b).

One downside to the EIB loans is that there is no well-established financial intermediary in Central America (EIB, 2012c). There are however financial intermediaries for Caribbean nations. The major financial intermediary for the Caribbean is the Caribbean Development Bank

(CDB) which covers almost all member countries in the Caribbean and Belize, in addition there are many other smaller intermediaries in various nations. The financial intermediaries for Dominican Republic, which is one of the four countries the team found to be a good initial franchise location, are Banco ADOPEM, Banco ADEMI, and Fondesa (EIB, 2012b). The lack of a financial intermediary in Costa Rica should not be a significant setback because of the financial intermediaries available in the surrounding areas. There is already one project in Nicaragua that is working on developing new renewable energy sources and availability, and in fact up to $3.8 billion has been available for lending between 2009 and 2013 in Asia and Latin America through the Al-Invest Program (EIB, 2011).

As stated in the background, the Al-Invest program has been very successful at providing small and medium sized enterprises with business partnerships and loans. Because they are a subsidiary of the EIB, this program could be a positive stepping stone to obtaining a larger loan directly from the EIB if the lack of financial intermediary presents a large problem.

As both of these loan options direct through European Investment Bank and through ALA program, they both follow the same set of guidelines. These guidelines are outlined in Table 14 below.

Factor	EIB Policy
Interest Rate	Interest rates can be fixed or kept open (able to be changed throughout the contract period), and can be decided upon during the application and approval process and at times of disbursement requests. Also low, just enough to cover administrative and borrowing costs.
Loan Size	The EIB will only finance as much as 50% of the anticipated cost of the projects. Partnership with other financial sources is accepted.
Project Type	The EIB will finance projects for: SMEs, construction and upgrading of transportation, energy production, transfer and distribution, energy efficiency, alternative energy sources, private sector development, and environmental sustainability.
Accreditation	The EIB has a AAA reputation, which is as high as can be received
Time & Disbursement	Loans available for about two or three years. Disbursement is dependent on clients' need. EIB requires 10 to 15 days to approve disbursement request.
Protection	The EIB has a policy protecting themselves against fraud and money laundering, which helps to protect any of its clients.

Table 14: Loan factors for the European Investment Bank. All information found on the Frequently Asked Questions page of the EIB website, (EIB, 2012a).

The local banks the team investigated were Banco Nacional de Costa Rica, Banco BAC and CitiBank Costa Rica. Because these banks are not as deeply involved in the business sector as the EIB is, less information was available to an outside party; however we were able to find some information about the loans that these banks offer. Additionally, these banks operate on a much smaller scale than those of the EIB, the loans they offer are smaller. All of these options are available to Ener-G, and unfortunately the only way of knowing which option is best is by applying for the loans. Applying for the specific loans would be the only way to discover how much the banks are willing to loan and the available interest rate, as these often depend on the company's credit. Table 15 below shows the useful loan information that is available on the banks' websites.

Banco Nacional	Banco BAC	CitiBank Costa Rica
• Loans for service companies and development technology • Case by case contracts	• Direct deposit loans and mutual funding option • Higher interest rates for mutual funding • Exit fees • Case by case contracting	• Multinational • Interest rates of 16.5% for USD loans and 29.5% for colones

Table 15: Costa Rican Banks' loan information. Only contains limited information as limited information is available to the public. Additional details would need to be identified by further investigation.

Banco Nacional de Costa Rica has very little information regarding the loans they offer. However, they do have requirements for receiving these loans. The loans that Banco Nacional de Costa Rica offers are dependent on company size as well as company performance. Ener-G is considered a small enterprise by these standards. The main requirement of the bank is that the loans must be for development of "industry, agriculture, trade, services, crafts, aquaculture, tourism, eco-tourism, or development technology" (Banco Nacional, 2012). Ener-G fits two of those categories, service and development technology, and thus we believe they would be eligible to receive funding from Banco Nacional. However, as these investments are contracted on a case by case basis, little other information is made public about the individual interest rates and quantity of funding available.

BAC has two funding options available for small and medium sized enterprises. The two options are direct deposit loans, and mutual funds. Because all loans are done on a case by case basis little information is available until a company applies for the loan. Similarly to the EIB loans, loans from BAC can be funded from various different sources through mutual funding (BAC, 2010). These mutual fund loans are good as long term loans; however they can have large interest rates because many parties are involved. Moreover, these loans have exit fees if Ener-G decides that they do not need the full amount they had originally intended. The other loans available are similar to those of Banco Nacional and are addressed on a case to case basis with little information available to the public.

The last loan source within Costa Rica that the group researched was CitiBank Costa Rica. CitiBank Costa Rica is a multinational bank, which makes it much more expansive than BAC or Banco Nacional. Because Ener-G will be using the loans for international funding, the best route for them to take would be to take out loans in US dollars. With this option, the interest rates would only be 16.5% annually, as opposed to 29.5% annually if take out in colones (CitiBank, 2009).

As our team members lack expertise in financial matters, we cannot accurately recommend an option to Ener-G as being the best. However, based on the information we encountered, the EIB loans would be able to provide Ener-G the most funding at the lowest interest rate. Obtaining this loan through the Al-Invest program could be the easiest approach, assuming they can find the right financial intermediary in Central America or the Caribbean. To subsidize any funding above the 50% that the EIB will lend, Ener-G has small loan options in Costa Rica or in the franchised locations. The best option we can suggest for Ener-G is to apply for multiple loans, and decide with a financial advisor which option would be best in the short-term and the long-term for the company.

4.3.5 Structure of the Ener-G Business Plan

The team organized and compiled the results presented in this chapter into a document for Ener-G's use. The final business plan deliverable has ten sections that describe how the company will be organized. The sections include: introduction, overview of services provided to franchisees, overview of franchisee responsibilities, products and services, business development, communications practices, marketing plan, financing, training, and resources. Each section will play an important role in explaining the franchising plan to the franchisee. The business plan itself could not be included in this document due to the sensitive intellectual property present in the plan. Thus, descriptions of each section and justifications of why they are important to the company are located below.

Introduction

The introduction section of the business plan welcomes the new franchisee into the business. Some history on the company and an explanation of the Ener-G service is included. The team found that this section should include a franchise contract timeline with information about expiration, renewal, and default and termination; and an overview of the disclosure agreements and trademark information (Cheng & Fredric, 2008). The next part of the introduction involves a breakdown of franchise and franchisee responsibilities, including a value map describing the importance of various contributions. The introduction gives the franchisee a general overview of what the company is, and how the new franchise system will function. The team found this section to not only be informative but also be marketable so that the franchisee is interested in partnering with Ener-G.

Overview of Services Provided to Franchisees

This section describes the tasks performed by the parent company that benefit the franchisee, elaborating on elements of the value map presented in the introduction. As shown in the value map previously, the tasks described are in are initial training and support, ongoing training and support, project financing, design, supply chain management, research and development, and business practices. Each responsibility of the parent company is described in a paragraph that includes the benefit that each task provides to the franchise.

Overview of Franchisee Responsibilities

Parallel to the previous section, the third section contains descriptions of the tasks

performed by the franchisee. The responsibilities described are marketing and sales, audits, design, installation and maintenance, and visits and fees. The visits and fees section describes the payments involved with operating an Ener-G franchise as well as the details of visits from the parent company, which will involve performance reports and periodic recertification.

Products and Services

A general list of the technologies that Ener-G Tech Investment uses is included for the franchisee. In addition to the key technologies used, there is an explanation of the services that Ener-G provides. The services section outlines the Ener-G's project process, including pre-audit, contract, formal audit, installation, and maintenance. This section will help the franchisee understand the technologies that are offered as well as how a project is executed.

Business Development

Business development is a key section explaining the method for acquiring new customers and keeping the current customers satisfied. It includes descriptions of how the company currently builds relationships with customers and how various types of clients are categorized. Business development is an important part of the business plan because it highlights the need for good customer relationships and explains the company's philosophy about building and maintaining these relationships.

Communications Practices

To begin the Communications Practices section, there is a description of how the company currently maintains an open line of communication with its clients via a newsletter informing them of any new updates. To improve communication and increase customer touch points, the section documents our recommendations for a mobile application and e-mail updates. This communication solution could add value to the business by conveying energy savings and environmental impact information to customers, which is an added benefit of working with Ener-G.

Market Plan

The company's intention to expand requires background research into the market for their services in potential target countries. To better inform the company about selecting a new location, we included our market analysis and location recommendations from Section 4.3.2. This information will aid the company in selecting locations for franchises and what types of

customers to target there. It will serve as a knowledge base that can provide Ener-G with an understanding of new markets.

Financing

The financing section includes information on potential sources of funding that Ener-G could receive in order to pay for projects, as discussed in Section 4.3.4. The company currently uses a combination of private investors and bank loans to fund its projects. However, executives at Ener-G have indicated that providing capital for an increased number of projects in other countries will require additional sources of financing. Ultimately, the team recommends professional financial advising, but some promising financial options are listed for consideration.

Training

The training section outlines an additional service that the parent company provides to franchises. It includes a description of the required materials that Ener-G will provide for the franchisee, and the types of training procedures they will use. The training section supports the goal of the introduction section; to explain the nature of the franchise agreement to the franchisee, and provide information about what assistance they can expect to receive.

Resources

The business plan concludes with a short section detailing the sources used for obtaining the information included in the plan, such as research citations and possible sources of additional information that may be useful in the future.

Chapter 5: Conclusions

The performance-based energy efficiency service that Ener-G provides will positively benefit greater Central America and the Caribbean, reducing energy costs for large companies and reducing carbon emissions. The goal of our project was to advance energy efficiency initiatives in Central American and the Caribbean by aiding in the expansion of Ener-G. Below we describe the conclusions to our project and suggestions for Ener-G so that this goal can be achieved.

Evaluation of Ener-G's Environmental Impact

The carbon emissions projections show that the potential for carbon emissions reduction is greater in all of the prospective franchise locations than in Costa Rica. The emissions factors for other Central American and Caribbean countries are at least 10 times higher than for Costa Rica, due to Costa Rica's large amount of hydroelectric generation. Hence, assuming Ener-G's franchises will have similar numbers of clients and project sizes, the company's service will create even greater emissions reductions if they expand to foreign countries. Franchises in Caribbean nations would have especially substantial environmental impacts because of the nations' high emissions factors. Though there are other means of energy efficiency implementation, reducing this magnitude of emissions through energy efficiency would be difficult to do without the financing and project management abilities of an ESCO such as Ener-G.

Creating a Business Plan

The business expansion plan includes analyses of potential markets, descriptions of the franchise system structure, financing options, communication improvements, and additional operations details. The structure of the Ener-G franchise system is highly centralized, meaning that the main company in San Jose, Costa Rica, handles most of the responsibilities, including the higher level tasks such as financing, procurement, and design. This structure is beneficial since these areas require the most experience and are optimized by consolidation. The bottom line is that the central company provides ample value for the franchise, making it advantageous for entrepreneurs to buy into the franchise system rather than to start an independent energy service company.

By identifying and analyzing the market for energy efficiency projects in Central

America and the Caribbean, the team selected four countries that are potentially lucrative as franchise locations: Panama, Guatemala, Jamaica, and the Dominican Republic. Our analysis suggests that initial franchises in any of these countries should experience success, but the team recommends Jamaica and Panama as the optimal locations for the first franchise. Panama is recommended due to its favorable market factors and its proximity to Costa Rica. Jamaica is an ideal location for this expansion because of its high electricity price and emission factor. To establish the franchise, the company should seek an entrepreneur who is somewhat well-connected in Panama, so that the franchise will have some initial leads on potential customers.

To improve Ener-G's communications with customers, we recommend that the company uses a mobile application specially developed to suit customers' interests to convey the cost savings, energy savings, and other benefits of their Ener-G partnership. However, for accessibility reasons, the same information should also be available through e-mail updates. Our conceptual app design can be realized into an Apple or Android app by contracting a software developer. Using an app to keep clients updated shows the customer that Ener-G is on the cutting edge of the ESCO industry.

Ultimately, the team recommends that Ener-G hire a financial consultant to select the best financial source for their expansion effort. The business plan outlines a few promising options such as loans from the European Investment Bank, the ALA-IV invest program, and the ALA-V program. The company should definitely investigate these funding sources, but a financial expert opinion is needed to make such a crucial decision.

Ener-G Tech Investment as an Energy Solution for the Region

Expanding Ener-G Tech Investment through franchising would not only add to the success of the business, it would also benefit the region greatly, since there are few energy service companies in Central America and the Caribbean. The company's carbon emissions impact outside of Costa Rica would be orders of magnitude greater than their current impact. Ener-G Tech Investment offers comprehensive solutions, including savings-based financing with no start-up costs, which incentivize large energy consumers to undergo energy efficiency upgrades. This kind of ESCO model would be new to the region, and it would help instigate and accelerate energy efficiency implementation, reducing electricity usage and atmospheric emissions from electricity generation.

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Appendix A: Franchise Business Plan Created for Ener-G

[The franchise business plan has been removed for confidentiality reasons. The document contains intellectual property of Ener-G Tech Investments]

Appendix B: Interview Guide for Ener-G Executives

We would like to invite you to participate in this voluntary interview in order to provide us with information about your wishes for the expansion plan that our team will develop for Ener-G. We are conducting this research as part of a project in fulfillment of Worcester Polytechnic Institute degree requirements. This research will be published in a restricted manner that is consistent with the content of the non-disclosure agreement that our team will sign. The purpose of this interview is to collect information on Ener-G's wishes for the business expansion plan that we will create. Any information provided will be anonymous and no individually identifiable information will be used. You may choose not to respond to any part of this interview for any reason. Do you have any questions before we continue?

1. Why do you want to expand?
    a. What is your motivation?
    b. How will this help your company?
    c. How will this help the areas you franchise into?

2. How do you plan on achieving this franchising goal?
    a. How many franchisees do you plan on working with?
    b. How many employees will they each have?
    c. How closely will their model mirror yours?
    d. How are you going to find employees?
        i. Will you be sending one of your current employees abroad?

3. Where do you plan on franchising to?
    a. What factors are important when picking this location?
    b. How does this site differ from Costa Rica?
    c. How are you going to advertise to this area?

4. What are your financial plans?
    a. How much can you provide up front?
    b. How much do you expect the franchisees to provide up front?
    c. Do you plan on obtaining technology locally or from abroad?

5. Do you have a time period for this to happen?
    a. How many projects do you plan on your franchisees having in the first two years?

6. What do you plan on doing if there is a negative public reaction?
    a. How would you deal with money lost?
    b. How would that affect your base in Costa Rica?

Appendix C: Interview Transcript with Christopher Music and Daniel Friedlander

1. Plans for achieving this franchising goal

a. How many franchisees do you plan on working with?

[redacted]

b. How many employees will they each have?

[redacted]

c. How are you going to find employees?

[redacted]

i. Will you be sending one of your current employees abroad?

[redacted]

2. Time period for this expansion

a. How many projects do you plan on your franchisees having in the first two years?

[redacted]

3. What do you plan on doing if there is a negative public reaction?

a. How would you deal with money lost?

[redacted]

b. How would that affect your base in Costa Rica?

[redacted]

4. Current communication strategy

a. Exactly what information is in the newsletter that you send to your clients?

[redacted]

5. What sort of training will you provide for new franchisees?

a. What initial training?

[redacted]

b. What ongoing training?

[redacted]

c. How long will training last?

[redacted]

6. Daily operating procedures section of the business plan

a. What should go in the daily operating procedures part of the business plan?

[redacted]

b. How detailed should this section be?

[redacted]

c. How often will you be able to visit your franchisees each of your franchisees?

[redacted]

d. What kind of R&D efforts does the company do?

[redacted]

e. *Will the franchisees be designing projects, or do you think you will be able to maintain this roll for all franchise locations?*

[redacted]

Appendix D: Survey of Ener-G's clients. Conducted in Spanish

ENER-G
Energy Saving Made Simple

Encuesta para Ener-G

Estimado Socio de Negocio,

Con el fin de mejorar nuestros servicios, Ener-G Tech Investment esta en el proceso de obtener información sobre la experiencia de sus Socios de Negocios.

Toda información recibida será tratada de forma confidencial.

Estamos a su disposición para cualquier pregunta y, de antemano, le agradecemos su colaboración en este proceso.

¿Los ahorros financieros han cumplido sus expectativas?

Sí	No	Si escoge "no", indique por qué
○	○	

¿Qué son las motivaciones para hacer los proyectos de ahorro energético? Indique la importancia del 1 al 7 (7 es de más alta importancia).

	1	2	3	4	5	6	7
Por el beneficio ambiental	○	○	○	○	○	○	○
Por el beneficio económico	○	○	○	○	○	○	○
Por el beneficio de relaciones publicas	○	○	○	○	○	○	○

¿Hay otras motivaciones para hacer los proyectos de ahorro energético? Por favor especifique.

¿Estaría interesado en obtener certificaciones de eficiencia energética tales como LEED (Liderazgo en Diseño de Energía y Ambiente), ISO, Premio de la Excelencia, etc. para sus instalaciones?

Sí	No	¿Porque? Incrementoen Ingreso, Promoción, Falta de Ingreso, Falta de Tiempo, o Otra Razón
○	○	

¿Está satisfecho con el servicio de mantenimiento de Ener-G?

Sí	No	¿Existe algo que Ener-G Tech puede hacer para mejorar su servicio?
○	○	

¿Estaría interesado en recibir noticias sobre el ahorro energético y el impacto ambiental que su empresa ha tenido? ¿En tal caso, con que frecuencia?

Sí, por mes	Sí, trimestral	Sí, anual	No	Comentarios
○	○	○	○	

¿Cuál de los siguientes medios de comunicación utiliza más frecuentemente?

- ☐ Correos electónico
- ☐ Teléfono
- ☐ Sitios sociales (Facebook, Twitter, LinkedIn)
- ☐ Mensajes de texto
- ☐ Aplicaciones móviles de celular o tableta
- ☐ Correo

¿Utiliza un teléfono inteligente u otro dispositivo móvil con acceso a internet?

Sí	No	Comentarios
○	○	

¿Cuál sería la mejor manera para que recibir información sobre el impacto ambiental y ahorro energético?

Correo electónico	Teléfono	Sitios sociales (Facebook, Twitter, LinkedIn)	Mensajes de texto	Aplicaciones móviles de celular o tableta	Correo	Comentarios
○	○	○	○	○	○	

¿Promueve sus esfuerzos de ahorro energético o ambientales con sus clientes?

Siempre	De ves en cuando	Nunca	Si escoge"nunca", indique por qué
○	○	○	

¿Hay algo que Ener-G pueda hacer para facilitar la promoción de estos ahorros?

¿Cuales tecnologías o áreas considera importantes en ahorro energética en su empresa?

- [ ] Aguas
- [ ] Aire acondicionado
- [ ] Iluminación
- [ ] Refrigeración
- [ ] Calentamiento
- [ ] Electricidad (Demanda, etc.)
- [ ] Motores eléctricos
- [ ] Vehículos

En su perspectiva: ¿Como considera la calidad de los equipos instalados?

Excelente	Bueno	Aceptable	Malo	Comentarios
○	○	○	○	

¿Cómo considera el desempeño de los equipos?

Excelente	Bueno	Aceptable	Malo	Comentarios
○	○	○	○	

Submit

Appendix E: Client Survey Translated to English

Dear Business Partner,
In order to improve our services, Ener-G Tech Investment is in the process of obtaining information on the experience of its business partners.
All information received will be treated confidentially.
We are available for any questions and, in advance, thank you for your cooperation in this process.

1. Have the financial savings met your expectations?
    a. Yes
    b. No

        Please explain why (blank space)
2. What are you motivations for doing these energy saving projects? Indicate the importance on a scale of 1 to 7 (7 is the highest importance).
    a. For environmental benefits
    b. For economic benefits
    c. For public relations
3. Do you have any other motivations for doing these energy saving projects? Please explain
4. Would you be interested in receiving energy efficiency certifications such as LEED (Leadership in Energy and Environmental Design), ISO, Award of Excellence, etc.. for your buildings or projects?
    a. Yes
    b. No

        Please explain why (blank space)
5. Are you satisfied with the maintenance service provided to you by Ener-G?
    a. Yes
    b. No
    c. Is there anything Ener-G can do to better your services? (blank space)
6. Would you be interested in receiving energy savings and environmental impact updates? If so, how often?
    a. Yes, monthly
    b. Yes, quarterly
    c. Yes annual
    d. No

        Comments?
7. Which of the following media do you most frequently use?
    a. Email
    b. Telephone
    c. Social media sites (Facebook, Twitter, LinkedIn)
    d. Text messages
    e. Application on mobile phones or tablets
    f. Mail

8. Do you use a smartphone or another mobile device that has internet access?
    a. Yes
    b. No
    c. Comments?
9. What would be the best way to receive information about the environmental impact and energy savings of the company?
    a. Email
    b. Telephone
    c. Social media sites (Facebook, Twitter, LinkedIn)
    d. Text messages
    e. Application on mobile phones or tablets
    f. Mail
10. Do you promote your energy and environmental conservations efforts to your clients?
    a. Always
    b. Often
    c. Never
        Why not?
11. Is there anything Ener-G can do to help promote these savings?
12. What technologies, or areas, are considered important for your business for energy saving?
    a. Water
    b. Air conditioning
    c. Lighting
    d. Refrigeration
    e. Heating
    f. Electricity (Demand, etc..)
    g. Electric motors
    h. Vehicles
13. In your opinion, what is the quality of the installed equipment?
    a. Excellent
    b. Good
    c. Acceptable
    d. Bad
        Comments?
14. How well does the equipment perform?
    a. Excellent
    b. Good
    c. Acceptable
    d. Bad
        Comments?

* All questions were created to be properly understood in Spanish; as such some of the English translations are not identical in meaning to the Spanish version. However, the general ideas are all the same.

Appendix F: Client Survey Responses

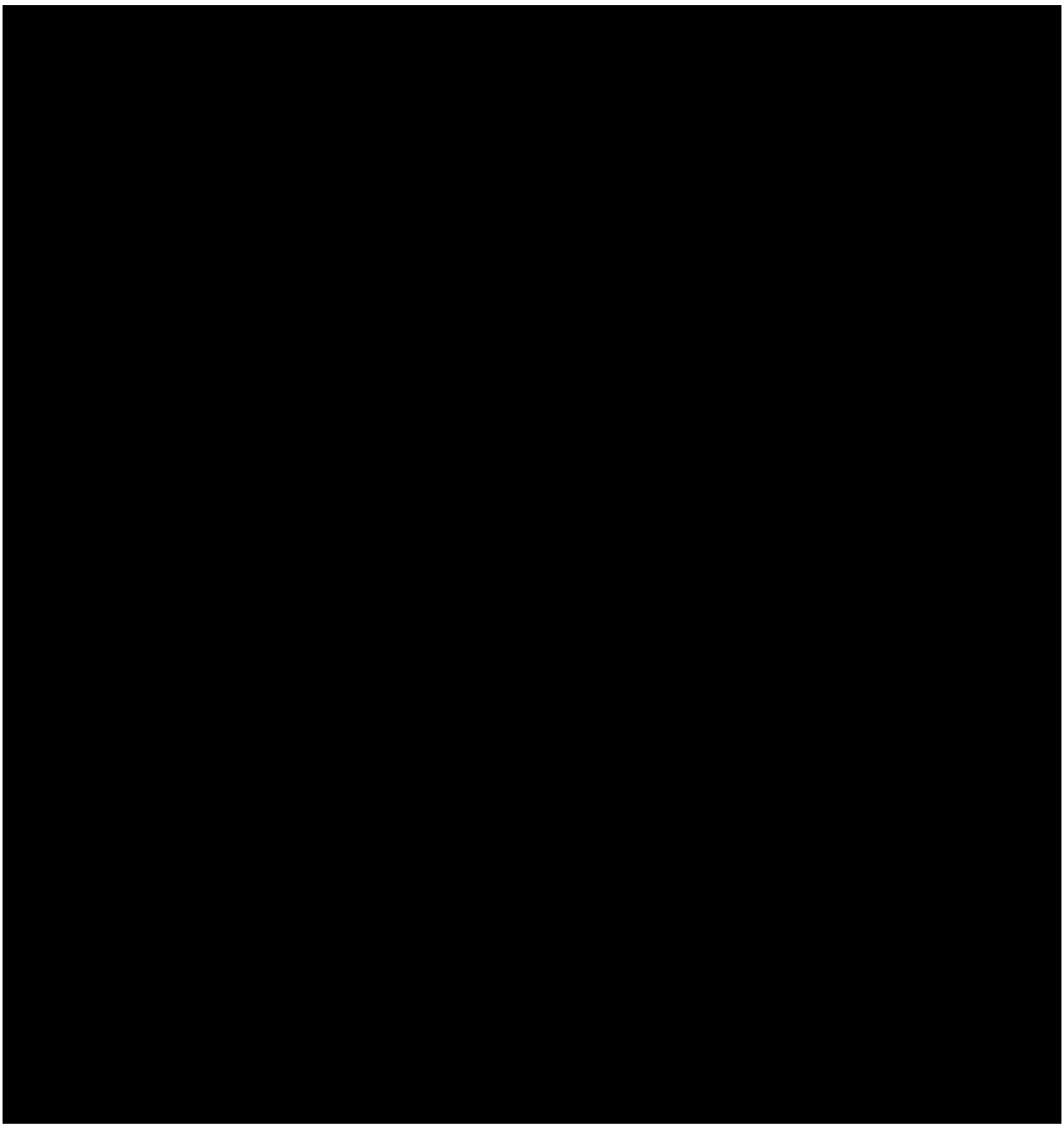

Figure 16: Responses to survey questions 1-3

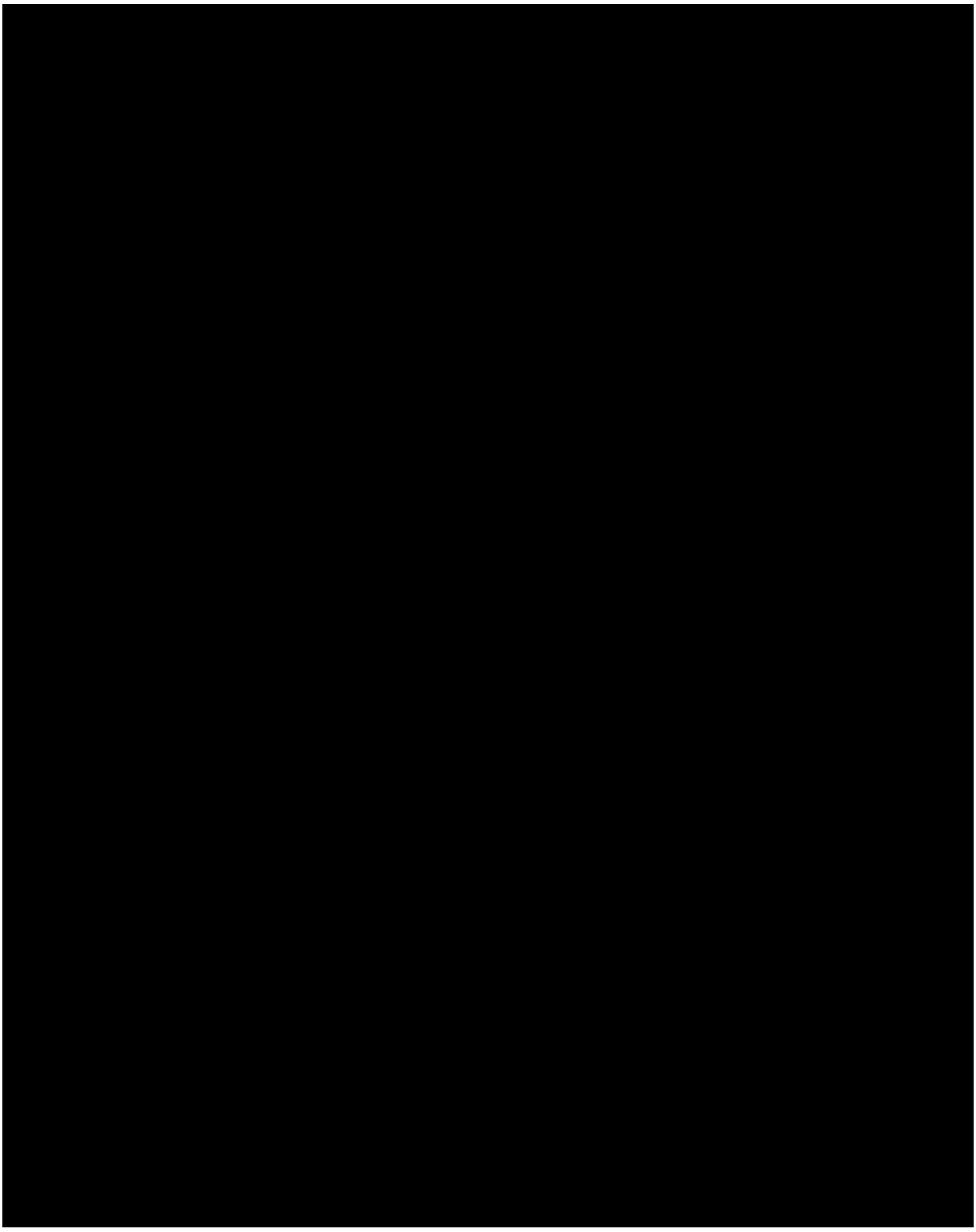

Figure 17: Responses to survey questions 4-7

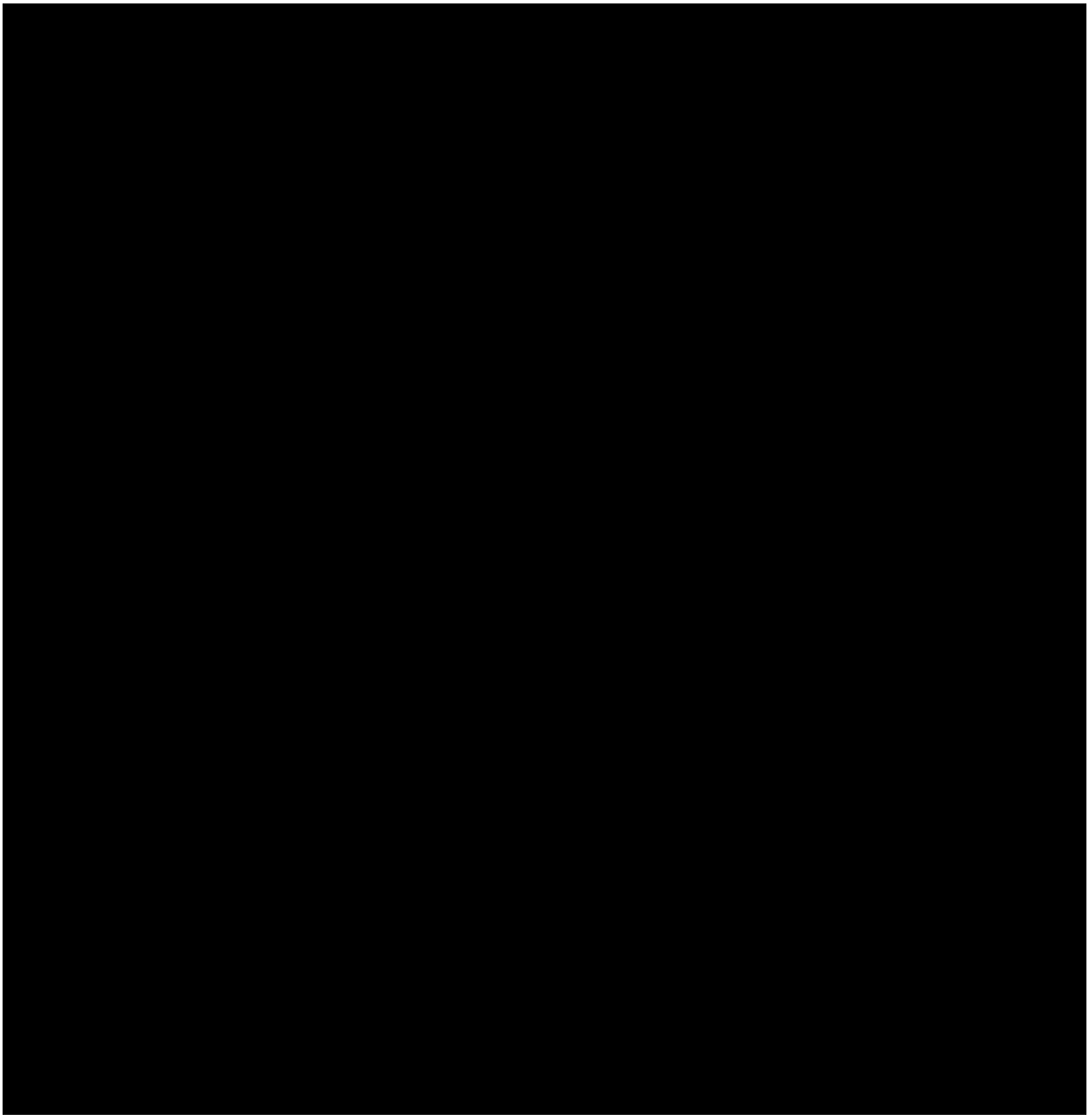

Figure 18: Responses to survey questions 8-11

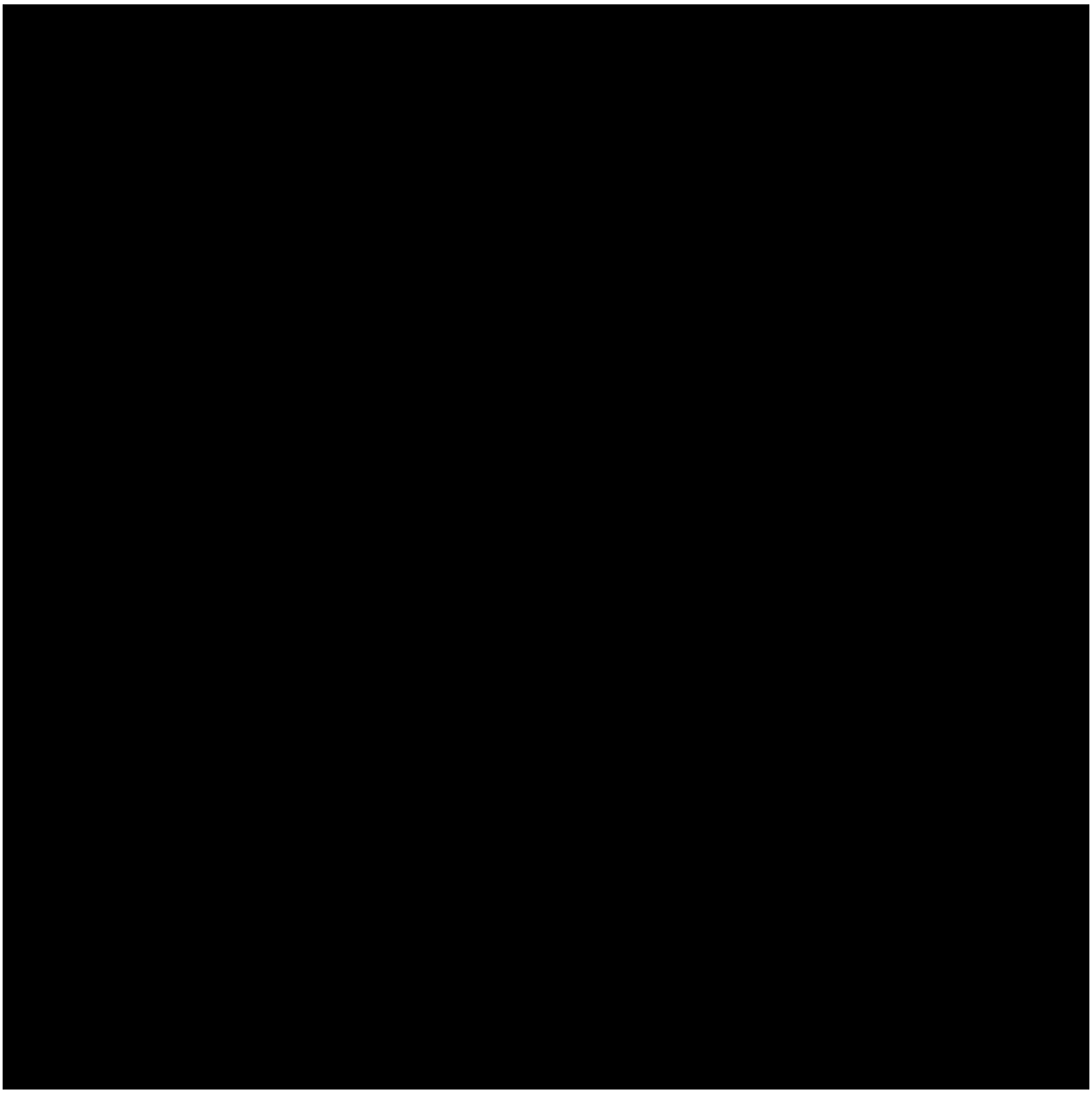

Figure 19: Responses to survey questions 12-14

Appendix G: Sources for Market Analysis Table

Electricity Prices for all Central American countries come from the sources that follow. All of these sources contain very relevant and very recent data. All except for Belize comes from a governmental source or an electric company. But based on the prices of the surrounding countries this price is likely within $.02 of the actual energy price if it is not exact.

Honduras	**Comision Nacional de Energia** (n.d.). Situacion Actual de Subsector Electrico de Honduras. Retrieved from http://www.iamericas.org/presentations/energy/TME/Angel_Soto_CNE_Honduras.pdf
Panamá	**Autoridad Nacional de los Servicios Públicos de Panamá** (2011). Precios e Ingresos. . Retrieved from http://www.asep.gob.pa/electric/Anexos/Estadisticas/2011 II Semestre/precio_e_ingreso_elec_2011.pdf
El Salvador	**Superintendencia General de Electricidad y Telecomunicaciones** (2012, January). Tarifas. Retrieved from http://www.siget.gob.sv/attachments/1576_pliego_tarifario_12%20_enero_2012.pdf
Nicaragua	**Instituto Nicaraguense de Energie - INE** (2012). Resolucion No. INE-CD- 003-01-2012. Retrieved from http://www.ine.gob.ni/oaip/ajustestarifarios/2012/Res._No._INE_003-01-2011_Pliego_tarifario_enero_2012Modificado.pdf
Guatemala	**Comisión Nacional de Energía Eléctrica** (2012, October). Boletin De Prensa CNEE - Ajuste Tarifario Trimestral. Retrieved from http://www.cnee.gob.gt/xhtml/prensa/Boletin%20Ajuste%20Tarifario%20noviembre%202012%20-%20enero%202013.pdf
Beliz	**Belize.FM | Guía para Belice** (n.d.). Los precios de la electricidad en Belice | Guía de Belice: Guía para Belice: Belize.FM. Retrieved from http://es.belize.fm/precios-de-la-electricidad-en-belice/
Dominican Republic	**Severino, J.** (2012, May). Altas tarifas de la electricidad plantean retos a competitividad - listindiario.com. Retrieved from http://www.listindiario.com/economia-y-negocios/2012/5/3/231157/Altas-tarifas-de-la-electricidad-plantean-retos-a-competitividad

The energy prices in Caribbean nations are not as readily published. Some of these sources are less reputable than the governmental agencies listed above, and some only list electricity costs for residential users. Some prices are also prices from over five years ago, but they still provide a baseline as inflation over this period of time is within about $.02-.04.

Jamaica	**Castalia Strategic Advisors**. (2011, June 23). Options to Bring Down the Cost of Electricity in Jamaica. Retrieved from http://www.castalia-advisors.com/files/Options_to_Bring_Down_Electricity_Costs_in_Jamaica_Castalia.pdf
Bahamas	**Bahamas Electricity Corporation** (n.d.). Electricity Rates. . Retrieved from http://www.bahamaselectricity.com/rates.cfm
Bermuda	**Bermuda Electric Light Company** (2012, February) Limited Notice of Rate Increase Effective March 1, 2012. Retrieved from http://www.belco.bm/images/belco2012rates.pdf
Haiti, Trinidad & Tobago	**U.S. Energy Information Administration**. (2010). Electricity Prices for Industry for Selected Countries. Retrieved from http://www.eia.gov/countries/prices/electricity_industry.cfm
Virgin Islands	**USVI Moving Center** (2009). Cost of Living in the Virgin Islands - USVI Relocation Guide. Retrieved from http://www.vimovingcenter.com/cost_of_living

All population, GDP (PPP), prospective city and annual electricity consumption information was gathered from two sites, US Central Intelligence Agency (2012), https://www.cia.gov/library/publications/the-world-factbook/index.html, and The World Bank Group (2012), http://databank.worldbank.org/data/home.aspx. Both contained the same information, the information used was selected based on which site had the most recent information

The electricity emissions factors and total emissions were found at Unión Postal Universal (2009), *Inventario y reducción de las emisiones de gases con efecto invernadero,* except for the following countries. All sources are factors from 2009 except for Bermuda and Belize. The data for Bermuda and Belize also contains data from the other countries in the region from 2004, and these factors are not too different than the recent ones the team has found.

Virgin Islands	**US Environmental Protection Agency** (2009). eGRID: Clean Energy. Retrieved from http://www.epa.gov/cleanenergy/energy-resources/egrid/
Bahamas	**The Global Environment Facility** (2009, September). Request for CEO Endorsement/Approval. Retrieved from http://www.thegef.org/gef/sites/thegef.org/files/repository/09-02-09%20Council%20document.pdf
Bermuda, Belize	**United Nations** (2004). A Manual for the Preparers and Users of Eco-efficiency Indicators.*Table 28*. Retrieved from http://www.scribd.com/doc/55442574/85/Table27-Electricity-derived-CO2-Emission-Factors-for-Non-OECD-Former-USSR

Appendix H: Graphs of Energy Consumption and Energy Sources

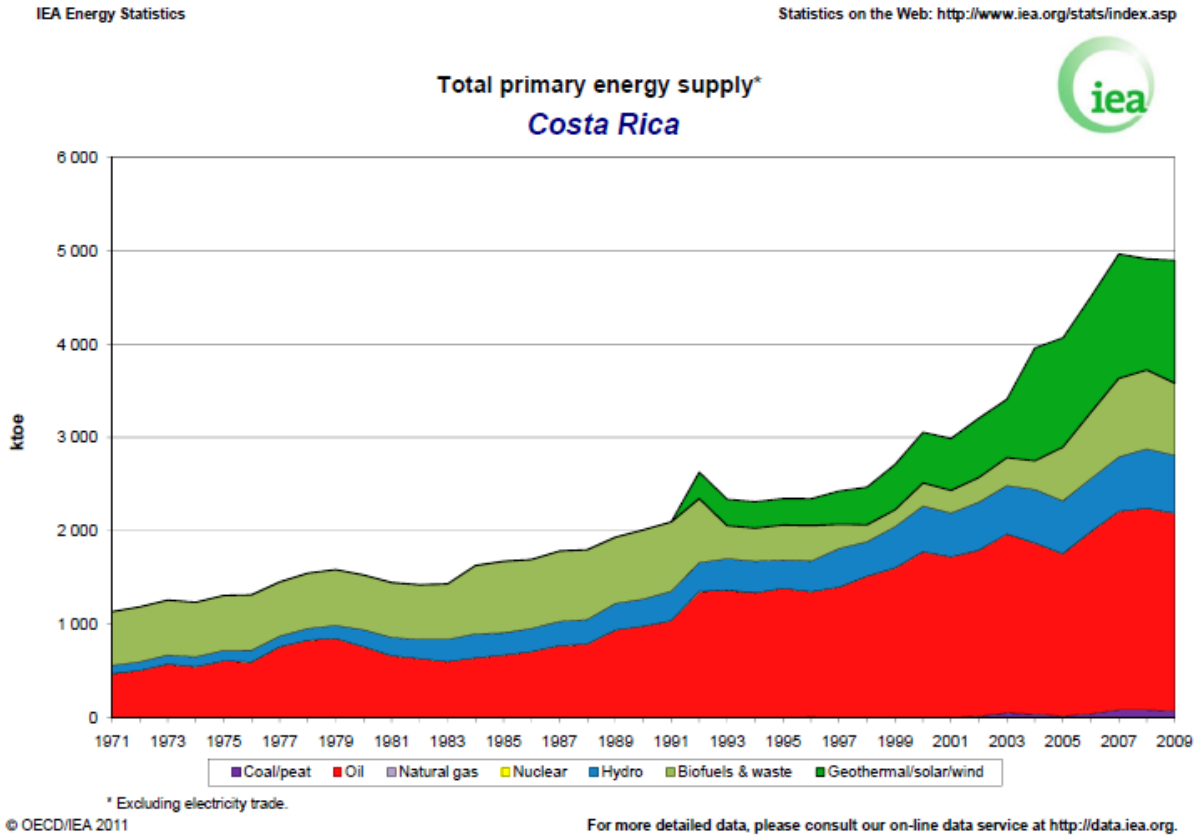

Figure 20: Graph of Costa Rican energy consumption and sources from 1971 to 2009. 1 ktoe = 11.63 GWh (OECD/IEA, 2011a)

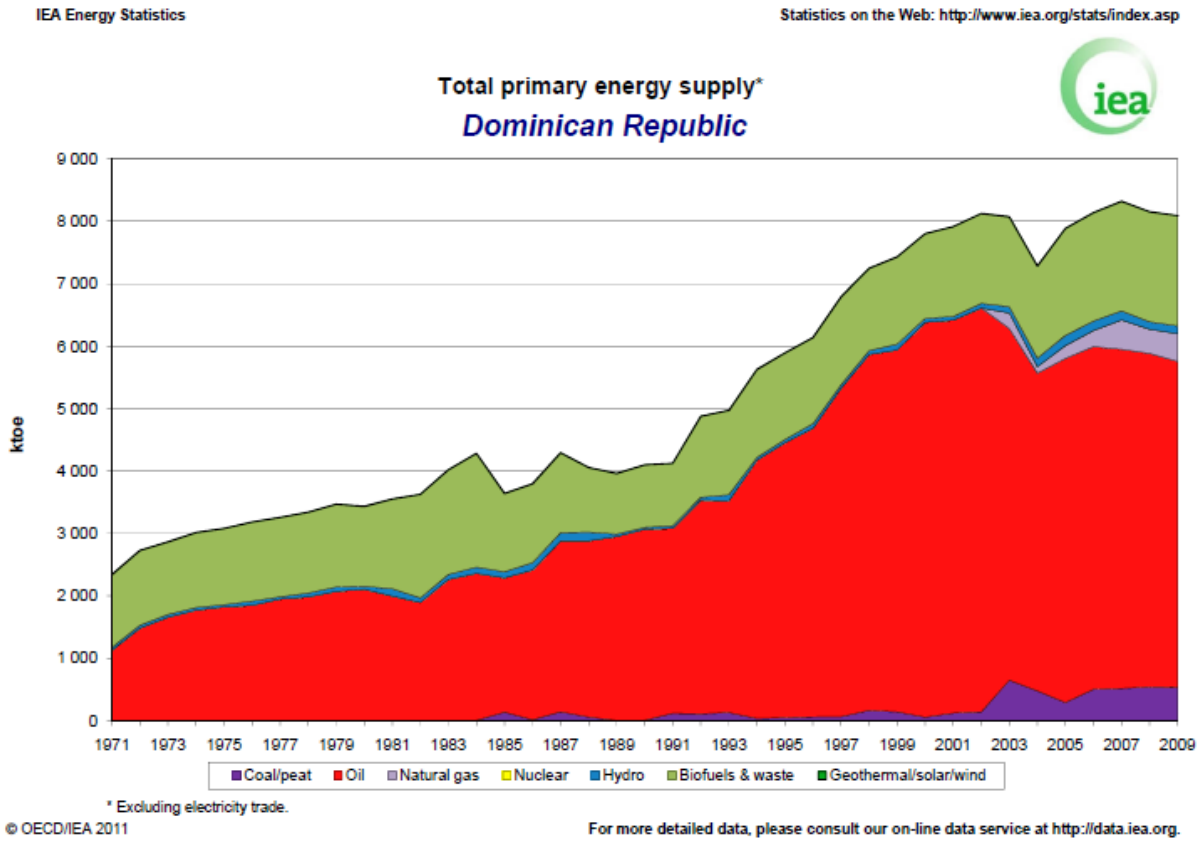

Figure 21: Graph of Dominican Republic energy consumption and sources from 1971 to 2009. 1 ktoe = 11.63 GWh (OECD/IEA, 2011b)

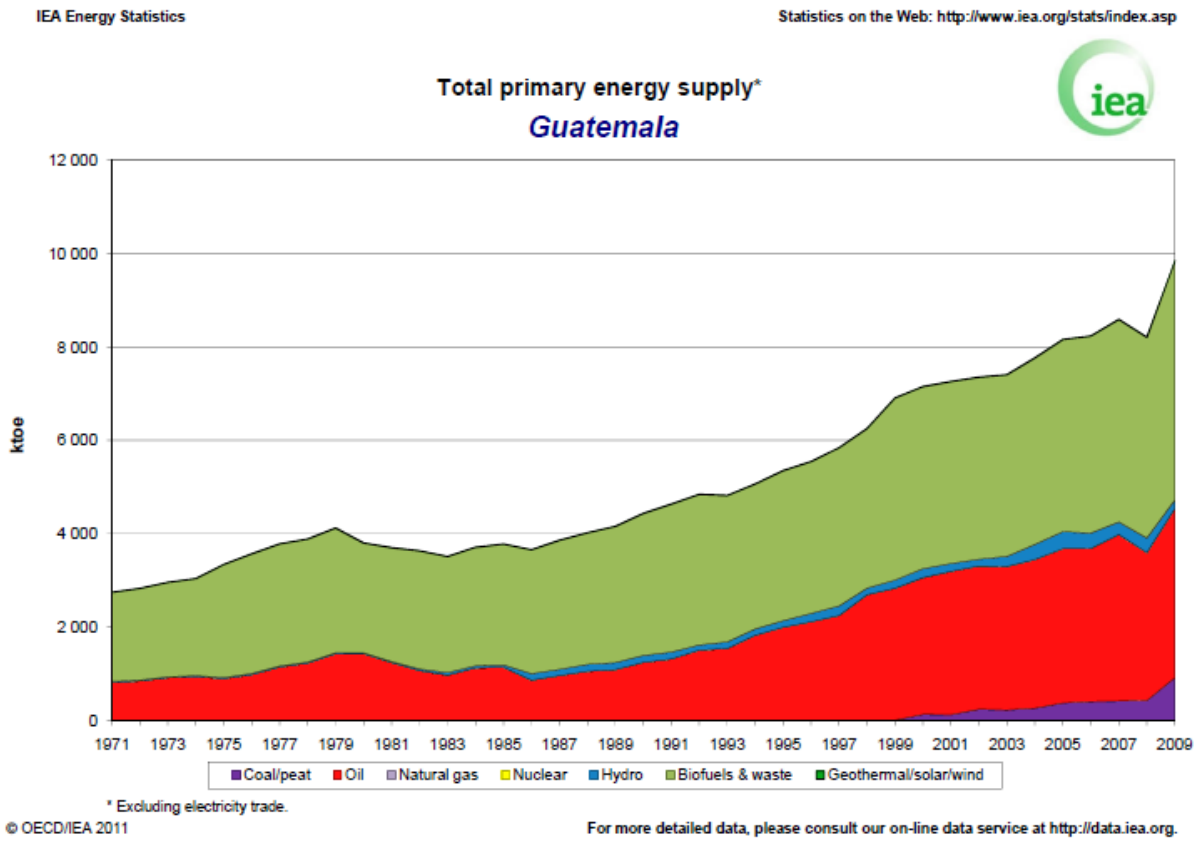

Figure 22: Graph of Guatemala's energy consumption and sources from 1971 to 2009. 1 ktoe = 11.63 GWh (OECD/IEA, 2011c)

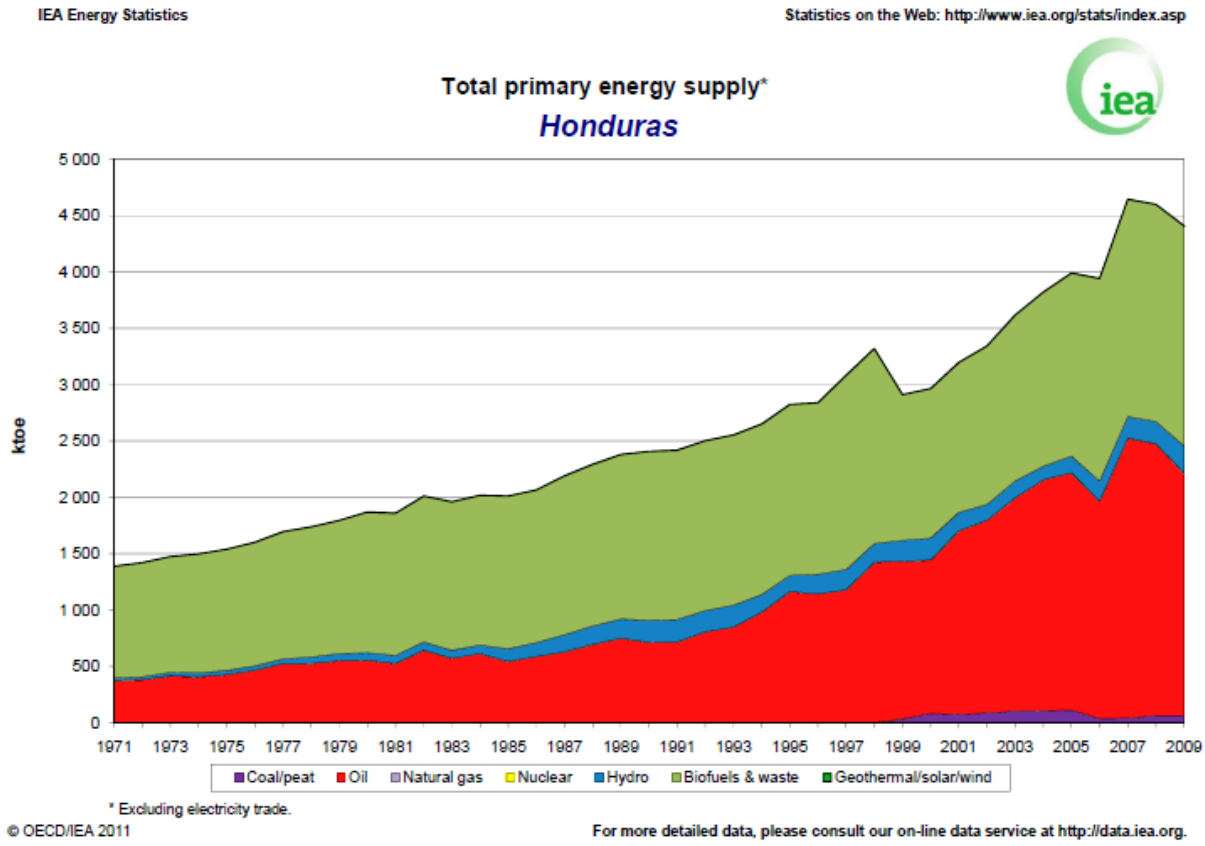

Figure 23: Graph of Honduras' energy consumption from 1971 to 2009. 1 ktoe = 11.63 GWh (OECD/IEA, 2011d)

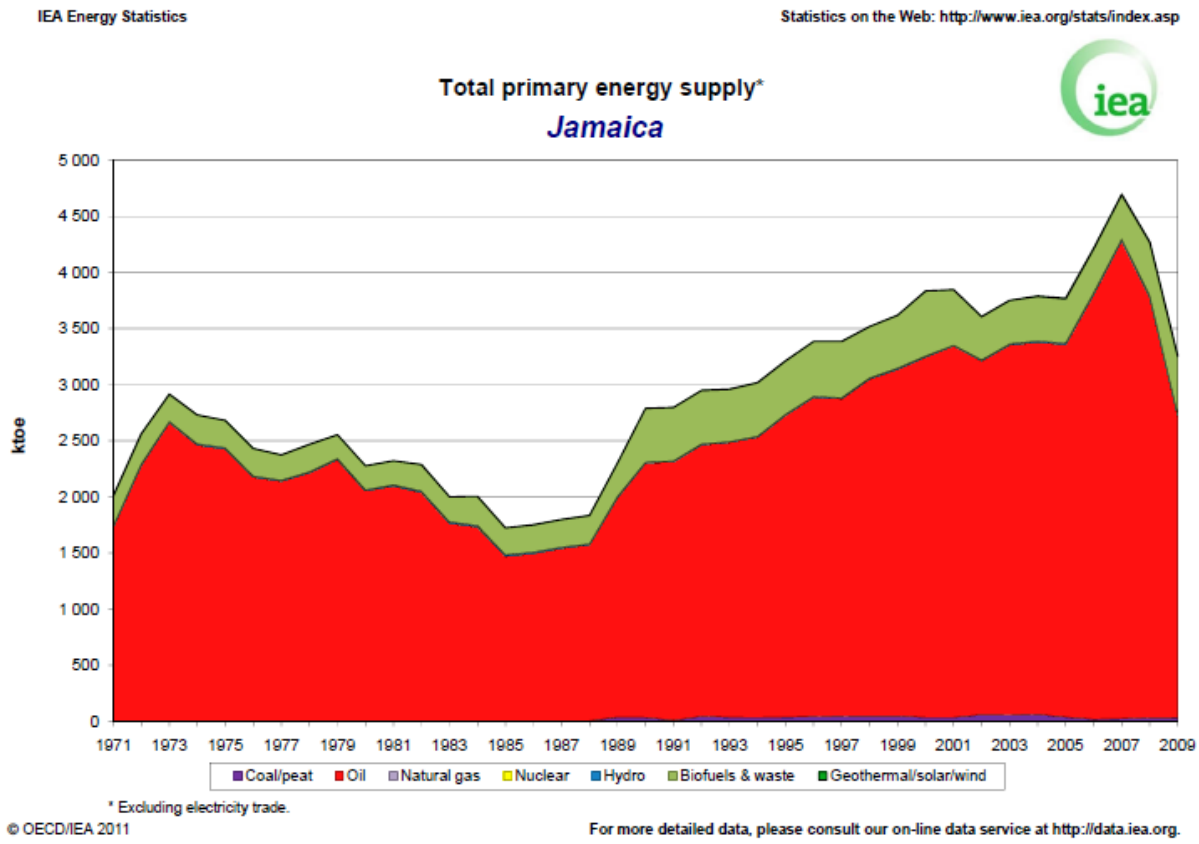

Figure 24: Graph of Jamaica's energy consumption and sources from 1971 to 2009. 1 ktoe = 11.63 GWh (OECD/IEA, 2011e)

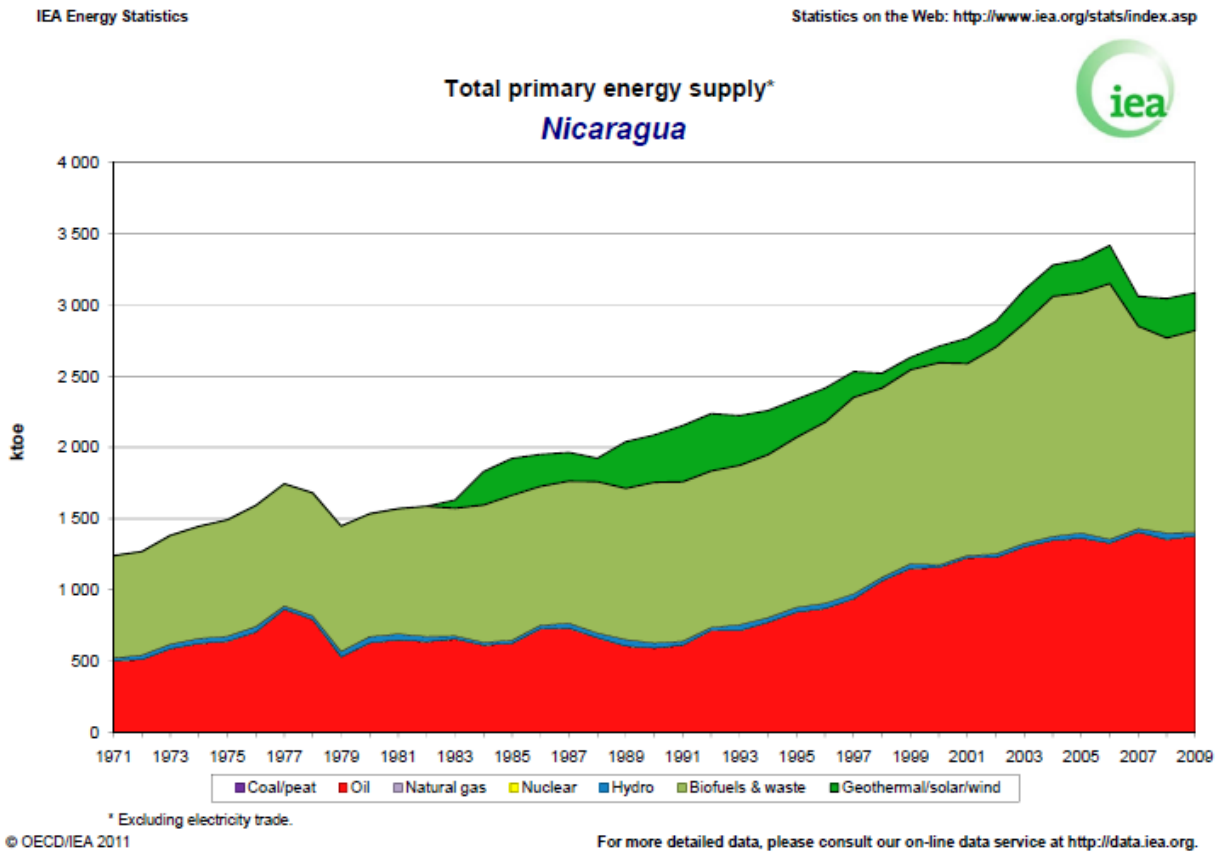

Figure 25: Graph of Nicaragua's energy consumption and sources from 1971 to 2009. 1 ktoe = 11.63 GWh (OECD/IEA, 2011f)

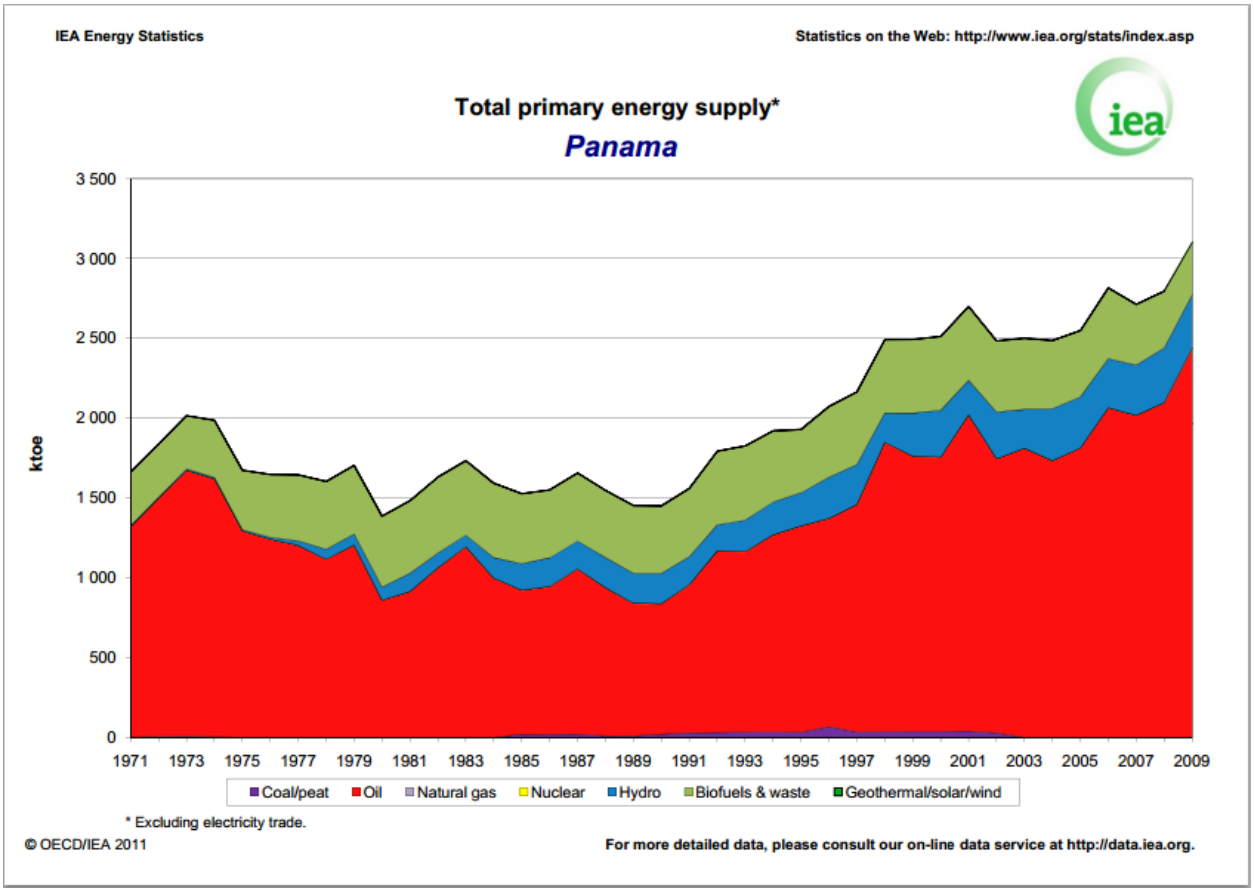

Figure 26: Graph of Panamá's energy consumption and sources from 1971 to 2009. 1 ktoe = 11.63 GWh (OECD/IEA, 2011g)