Encouraging Best Environmental Management Practices
In the Hotels & Inns of Puerto Rico

An Interactive Qualifying Project Report submitted to the faculty of
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Sponsored by: Compañía de Tourismo de Puerto Rico

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This project report is submitted in partial fulfillment of the degree requirements of Worcester Polytechnic Institute. The views and opinions expressed herein are those of the authors and do not necessarily reflect the positions or opinions of Compañía de Tourismo de Puerto Rico or Worcester Polytechnic Institute. This report is the product of an education program, and is intended to serve as partial documentation for the evaluation of academic achievement. The report should not be construed as a working document by the reader.

-May 1, 2008-
Abstract

This project, sponsored by the Compañía de Turismo de Puerto Rico focused on expanding Best Environmental Practices in the small inns and hotels of Puerto Rico. The project included interviews with CTPR staff, outside experts, audit visits to eight inns, and extensive background research. The project concludes with several recommendations with appropriate initial suggestions to CTPR for BEMP expansion including: a webpage for small inns and hotels with extensive BEMP information, a brochure explaining BEMPs, and a student involvement program.
Executive Summary

The goal of this project is to address the issue of communication between the Compañía de Turismo de Puerto Rico (CTPR) and small hotels and inns in Puerto Rico regarding the use of best environmental management practices (BEMPs). The tourism industry in Puerto Rico has expanded rapidly in the last decade and is expected to continue growing quickly. While the growth in the tourism industry is vital to Puerto Rico’s economy, steps must be taken to limit the detrimental effects of mass tourism on the environment. The Puerto Rico tourism industry depends on the island’s healthy, pristine environment which draws millions of visitors each year. If the environment is neglected and abused the main attraction for Puerto Rico is endangered. Water and energy conservation as well as pollution and waste generation are major areas of concern. Although major chain hotels have the capital and human resources to implement BEMPs, many smaller businesses do not have adequate resources or knowledge to alter operations in order to reduce negative impacts on the environment.

CTPR has recognized the increasing gap of the use of BEMPs between chain hotels and small privately owned establishments on the island and created the Initiative Toward Sustainability and Excellence to confront the issue. The project team worked with CTPR to assess the awareness and implementation of BEMPs in small inns as well as the perceptions of the owners and/or managers. The team held interviews with the inn owners/managers and CTPR staff and conducted on site inspections of eight sample hotels. The team assessed the extent of BEMPs in the hotels and identified several barriers to the implementation of further BEMPs.

The project team concluded that increased and alternative communication is required between CTPR and small inns and hotels of Puerto Rico. The most common and prevalent obstacle to the implementation of BEMPs in small hotels and inns is a lack of communication and information. Based on the data gathered, the group was able to produce a list of recommendations for CTPR in order to produce better communication between themselves and the inn/hotels on the island:

1. Create a web page to serve as a central hub for information on BEMPs for hotel and inn owners throughout the island.
2. Develop an incentive program to promote and encourage BEMP implementation throughout hotels and inns.

3. Create and distribute a brochure as well as the creation of a website that will provide hotel owners with information on BEMPs.

4. Create a hotel and inn information distribution list.

5. Initiate communication and promote the webpage through a mass email distribution.

6. Create a student involvement program with schools in Puerto Rico as a means to encourage BEMPs with students.

The website takes priority over all other recommendations as the project team believes it is the greatest resource to increase the communication and knowledge associated with BEMPs and small hotel and inns. It should describe BEMPs, why they are necessary, how to implement them, how they provide benefits both economically and ecologically, as well as inform hotel owners of incentives and programs available to them. It will provide several links to related websites, and also a way to contact CTPR to answer any questions. All of the recommendations produced by the project team will in some way produce better communication between CTPR and the small hotel and inns in Puerto Rico.
Acknowledgements

We would like to thank the Compañía de Turismo de Puerto Rico for allowing us the opportunity to come to Puerto Rico and assist them in their efforts to implement Best Environmental Management practices in small inns and hotels. In the department of Quality we would like to thank Angel La Fontaine-Madera, Ana Leticia Vélez Santiago, Benny R. Santiago, and the many others who offered us a comfortable and memorable work experience.

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- Elsie Herger of the Hostería del Mar;
- Edwin Jaime of El Guajataca;
- Nelson Santos of the Pineapple Inn; and,
- Juan López of the Palmas de Lucía.

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Authorship Page

All four team members contributed to and reviewed all sections of this report and therefore we jointly accept responsibility for the project as a whole and decline the option of individual authorships.
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1.0 Introduction

In recent years, concern among institutions and the general public about the extent of human impacts on the environment has grown substantially. The increased media coverage of environmental issues such as ozone depletion, deforestation, declining biodiversity, urban sprawl, and pollution has grasped the public’s attention and has created a greater awareness of the consequences of human activities on the planet. Most notably has been the discussion of global warming and climate change caused by manmade greenhouse gasses. In response to these concerns, many industries, including the tourist industry, have begun to explore ways to reduce their environmental impact. Many companies have led the way by adopting new technologies and practices that adhere to the “reduce, reuse, recycle” mantra in order to reduce their energy and water consumption and their pollutant and solid waste generation. These various activities are referred to collectively as Best Environmental Management Practices or BEMPs.

The tourism industry has grown tremendously over the last few decades and has become the “largest business sector in the world economy (TIES, 2008).” According to The International Ecotourism Society the “travel and tourism industry is responsible for over 230 million jobs and over 10% of the gross domestic product worldwide.” Tourism in the Caribbean specifically has risen 39% from 2002 to 2006. Throughout the 90s, tourism in this region generated nearly $96 billion US dollars in yearly expenditures and employed roughly 400,000 people (Duval, 2004). This rapid growth in the tourism industry is expected to continue and it is projected that global tourism receipts will reach two trillion dollars by 2020 (Figure 1). The environmental footprint of mass tourism will grow alongside this expansion.
Statistical data gathered from around the world estimates that one occupied hotel room uses about 209 gallons of water per day, and the average amount of waste produced by one guest each night is equal to one kilogram. In terms of electricity, the average guest uses about 1.8 kW of electricity per day (Bohdanowicz, 2005).

In light of the increasing awareness of the environmental impact humans have on the earth, it has come to the attention of the tourism industry that improving BEMPs can increase profits by attracting more guests and reducing costs. Since the general public has become more conscious of the detrimental impact we are having on the environment over the past several years, they are now more aware of their own personal impact. This new environmentally conscious population is more inclined to stay at a hotel that utilizes BEMPs than one that does not. Furthermore, BEMPs reduce expensive, wasteful practices which lower operational costs and therefore increases the company’s bottom line.

There are three well-known BEMP accreditation programs for green buildings and/or establishments: LEED, ISO 14001, and Green Globe 21. These three programs award certification for compliance with their environmental standards. The problem with LEED certification is that it is not designed specifically for hotels, so the processes to revamp an older hotel in compliance with LEED standards could prove quite costly. ISO 14001 is an
environmental management system (EMS) that grants certificates to hotels that implement environmental policy, planning, implementation and preparation, checking and corrective action, and management review. There is presently no international accreditation program, but Green Globe is striving to become the first by associating itself with PATA Green Leaf, the Caribbean Alliance for Sustainable Tourism, and Green Key. These associations make Green Globe the only program with comprehensive environmental coverage.

Two large hotel chains, Hilton and Marriott, both have one hotel each that has been LEED certified (a Hilton hotel in Washington, and a Marriott at the University of Maryland). Hilton is looking into energy-saving light bulbs and water-saving features. The Marriott joined the EPA’s Energy Star program which began recognizing commercial buildings in 1999 for outstanding advancements in energy conservation.

The Copamarina Resort in Puerto Rico is another great model for the benefits of implementing BEMPs. The Copamarina has twice won the Puerto Rico Hotel and Tourism Association’s Green Hotel of the Year award. There are 53 current properties in the Caribbean that are Green Globe certified, more than any other region in the world. Seven other properties are pursuing certification at this time. Unfortunately, many hotels choose not to “go green” because they fear the financial costs may exceed the benefits. The Paradores, a collection of small inns in Puerto Rico, feel as though they do not have the financial means to make the initial investments that BEMPs would require. They are unsure the savings will balance out the costs and whether the payback periods of BEMPs would be sufficient to cover the initial expenses. Large hotels are usually governed by policy; therefore all the hotels in a chain would be forced to adopt BEMPs if their governance required it. Large hotels have the advantage of high revenue and greater access to the public through media outlets. The smaller hotels in Puerto Rico are mostly privately owned and do not have access to the media or the financial resources like the larger hotel chains.

Therefore the goal of the project group was to help the Compañía de Turismo de Puerto Rico (CTPR) bridge a gap of communication in order to convince small inns and hotels throughout the island that adopting BEMPs would be both economically and ecologically beneficial to them and Puerto Rico. The nature and range of BEMPs already established in the hotel trade and, more specifically, in Puerto Rico was examined by researching diverse sources on the subject. The project team has determined the current use of BEMPs at a sample of small
inns, as well as the owners/managers perceptions, knowledge, and awareness of specific environmental management practices. Interviews served as the primary means of data collection. After data collection had been completed, costs analyses were performed to determine potential savings, cost of implementation, and payback periods associated with specific BEMPs. These cost analyses can then be used to promote the implementation of BEMPs throughout the island. Finally, the project team has explored alternative methods that CTPR might use to encourage greater use of BEMPs, such as the development of a website and advertising tools, such as a brochure and mass-emailing, to provide hotel owners/managers with information about the different environmental management practices, including costs and payback periods.
2.0 Background

In recent years, concern has grown substantially among institutions and the general public regarding the extent of human impacts on the environment. The increased media coverage of environmental issues such as ozone depletion, deforestation, declining biodiversity, urban sprawl, and pollution has grasped the public’s attention and has created a greater awareness of the consequences of human activities on the planet. Most notably has been the discussion of global warming and climate change caused by manmade greenhouse gasses. In response to these concerns, many industries, including the tourist industry, have begun to explore ways to reduce their environmental impact. Many companies have led the way by adopting new technologies and practices that adhere to the “reduce, reuse, recycle” mantra in order to reduce their energy and water consumption and their pollutant and solid waste generation. These various activities are referred to collectively as Best Environmental Management Practices or BEMPs.

The purpose of this chapter is to discuss the nature and range of the tourism industry in Puerto Rico and how La Compañía de Turismo de Puerto Rico (CTPR) can potentially implement BEMPs among smaller hotels and inns throughout the island. The chapter begins with an overview of the tourism industry established in Puerto Rico, its growth, and how it may currently benefit from the use of BEMPs. Next we discuss uses of BEMPs as they are already established in major hotel chains, the benefits they give to the hotels that use them, and the three most common regulatory programs. The chapter concludes with a discussion of BEMPs throughout the Caribbean and specifically the troubles faced by the small inns of Puerto Rico in implementing them.

2.1 Tourism in Puerto Rico

The Caribbean provides a vacation destination for tourists to experience an array of exciting activities while enjoying a relaxed atmosphere that has given rise to the phrase “be active, be relaxed” (The Official Tourism Site of the Caribbean, 2008). Throughout the 90s, tourism in this region generated nearly $96 billion US dollars in yearly expenditures and
employed roughly 400,000 people (Duval, 2004). Tourist receipts increased by 360 percent in the Caribbean from 1980 to 2002 and is expected to triple over the next fifteen years (CTPR, 2006). Puerto Rico is one of the major tourist destinations in the Caribbean along with Jamaica and the Dominican Republic. Puerto Rico is “blessed with excellent beaches and warm sunny weather” as well as “unique natural attractions (CTPR, 2006 p.9).”

The Puerto Rican government constantly strives to maintain market share and grow in the competitive market that is Caribbean tourism. US citizens do not need a passport to visit Puerto Rico, and this has fueled the Puerto Rico tourism industry for the past three decades. Typically more than 85% of tourists that visit Puerto Rico are from the US (CTO, 2008), and approximately 87% of overnight tourists in 2004 were from the US (Figure 2).

**Figure 2: Distribution of Overnight Visitors to Puerto Rico (CTPR, 2006)**

![Distribution of Overnight Visitors to Puerto Rico](image)

Advertising and marketing is another area that has played a major role in the development of the tourism industry through these early years. More recently, CTPR is restructuring its media campaign in order to reach a much wider audience (Axesa, 2008). The restructuring consists of switching from a geographic or demographic approach to a psychographic one, enabling CTPR to understand the psychographics of the best customers (Axesa, 2008). The psychographic assessment includes examining the interests, values, and personalities of the target market. Sustainable tourism is another facet that CTPR has emphasized.
in recent years in an effort to strengthen the industry while minimizing its impact on the environment. In order to understand how this might be possible we must first examine the range and nature of tourism in Puerto Rico.

2.1.1 Hotel Industry Growth and Tourist Activity

Many different measures show the growth of the tourism industry over the past several years. The hotel registrations on the island have been growing at a rate of 4.4% during the last ten years (Axesa, 2008). The number of hotel rooms in Puerto Rico has also grown 31 percent from 1995 to 2004 (CTPR, 2006) and showed an increased from 13,459 to 13,577 rooms in fiscal year 2006, a 0.9% increase (Axesa, 2008). The main reason that the percentage increase was not greater is directly associated with the 4.6% increase in room supply due to the construction of the Sheraton Four Points in Humacao, the Faro Suites in Aguadilla, and other smaller scale hotels located throughout the island (Axesa, 2008).

![Figure 3: Total Room Inventory 1996-2006](http://www.businessregisterpr.com/websearchservlet?tourism=true)

The growth of total room inventory correlates with the growing numbers of tourists arriving on the island. The strength of the new developments taking place on the island did not
go unnoticed, as the number of tourists increased from about 4,110,000 in 1996 to 5,070,000 in 2005 (Axesa, 2008). The year 2006 suffered from a slight 1% decrease in total visitors due to the increased cost of travel and stressful international situations (Axesa, 2008). Despite this drop, 2006 generated the highest amount of expenditures, totaling approximately $3.3 billion dollars (Axesa, 2008). The number of visitors shown in Figure 5 provides an overall view of the increase of tourist activity. This includes visitors who do not stay over, mainly those that are arriving from cruise ship that has docked in one of the three main ports in Puerto Rico; San Juan, Mayaguez, and Ponce (Miralles, 2007).

Figure 4: Number of Visitors and Expenditures 1996-2006

![Number of Visitors and Expenditures 1996-2006](http://www.businessregisterpr.com/websearchservlet?tourism=true)

The recent growth in the annual tourist (over-night) arrivals provides even more compelling data concerning the strengthening trend the hotel industry within tourism has experienced. The annual number of tourist (stop-over) arrivals increased from 1,065,462 in 2002 to an estimated 1,485,296 in 2006 (CTO, 2008). Newly repositioned hotels may be another reason why they are experiencing this growing trend. Some of these re-positionings include the
conversion of the former Hyatt Dorado Beach Hotel in Dorado to a five-star hotel, the New W Hotel at Vieques in the former Martineau Bay Resort, the conversion of Isla Verde's Howard Johnson to a Howard Johnson Plaza, and the change of the Best Western Pierre Hotel in Santurce to a Doubletree Hilton (Axesa, 2008).

Despite these new developments, the annual number of stay-over arrivals declined by 6.3% to 765,863 (CTO, 2008) in 2007. The decline may be linked to the “self inflicted economic recession” that Puerto Rico has been experiencing in the past two years, “partly due to all the crises that have afflicted the islands bitterly divided government” (Miralles, 2007 p.1). It can also be directly linked to recent events, including the dengue epidemic, crime, and the slaughter of dogs (Miralles, 2007). In spite of this drop, CTPR is confident that the future of the tourism industry is bright, confidently expressing that room inventory will grow and improvements in the tourist attractions throughout the island will continue (Miralles, 2007). Future plans and investments include 5,359 new hotel rooms under construction by December 2008, totaling nearly $1.3 billion in new investment and generating an additional 3,774 new jobs (PRTC, 2007). One example is seen through Fairmont Hotels who, together with U.S. investors, will invest $223 million to open the Fairmont CoCo Beach Resort & Residences in 2009 (PRTC, 2007).

**Figure 5: Puerto Rico's Annual Tourist (Stay-over) Arrivals**

![Puerto Rico's Annual Tourist (Stay-over) Arrivals](CTO, 2008)
2.1.2 Economic Impact

The economy of Puerto Rico consists of diverse industrial and service sectors that have far surpassed agriculture as the primary focus of economic activity and income (CIA, 2008). For nearly three decades the growing tourism industry in Puerto Rico has provided thousands of jobs, in construction, the hospitality industry, and associated service sectors. The number of jobs attributable directly and indirectly to Puerto Rican tourism has increased by 32,524 in a sixteen year period (Figure 6). Employment in Hotels increased from 73,000 in 1985 to 136,000 in 2002 (Figure 6). This trend provides evidence that the tourism market has been growing stronger as time has progressed in the past two decades, most notably the hotel and lodging areas section.

Figure 6: Puerto Rico Employment Generated by Tourism 1985-2003

The breakdown of the Gross Domestic Product (GDP) consists of 45% Industry, 54% Services, and 1% Agriculture (Figure 7). In the late 90s, tourism provided approximately a 2% share to the GDP, contributing nearly $85 million dollars (CTO, 2008). More recently, the share that tourism contributes to GDP has grown to approximately 7% (Axesa, 2008). The services that tourism provides do not compare to the economic contribution from pharmaceuticals, which supplies 60% of the islands exports (Axesa, 2008).
The Puerto Rican government has invested heavily in the past to promote the tourist industry by attracting developers and a vast number of business and corporate visitors. For example, The Convention Center, inaugurated in November 2005, is the largest and most technically advanced center in the Caribbean and Latin America (PRCC, 2007). With bookings confirmed well into 2010, the Convention Center is already having an impact, and organizers expect it to generate over $300 million a year into the economy (Long, 2006). The Convention Center is only one element of an even larger program, the Puerto Rico Convention Center District. The development is planned to be completed in 2012 and will be the largest waterfront development in the history of the United States (Song, 2006). Conceived as a multi-use urban center, the 113-acre complex will include three hotels, retail shops, restaurants, three office towers, residential units, recreational areas and cinemas, with the Convention Center at its heart (Song, 2006).

Since its creation, the Convention Center is already promoting green practices. The Green Program implemented at the Puerto Rico Convention Center (PRCC) consists of using recyclable products that do not harm the health of the visitors, the faculty, or the environment. All of the
products used to clean the center are also considered green. These items include tissue paper, paper towels, toilet paper, and various cleaning chemicals. The center also is actively pursuing recycling programs that exceed those specific products and also recycle wooden pallets, kitchen oil, paper, and cardboard. This program also connects the center with many organizations which consult with them on certain BEMPs. Some of the organizations include the Engineering Department, for electrical conservation, HVAC, for Hepa filters and the regulated control of thermostats on the building, Termini, for pest control, and the Eco lab, for the kitchen use and landscaping practices (PRCC, 2007).

2.2 Tourism Industry and the Environment

This section outlines the negative impacts the tourism industry has on the environment, and the BEMPs that can be implemented to reduce its environment footprint. The negative impacts include pollution due to air travel, depletion of natural resources, disruption of natural ecosystems (such as coral reefs), and physical impacts (United Nations Environment Programme (UNEP), 2004). There are several products on the market to help hotels reduce their impact such as low-flow toilets and shower heads, solar water heaters, and fluorescent light bulbs.

2.2.1 Negative Impacts of Tourism on the Environment

Many individuals have begun to recognize that maintaining and protecting the environment is critical for the tourism industry in the Caribbean. Quintero and Vega comment on the dangers of overdevelopment:

“The uncontrolled development of tourism has brought about the deterioration of areas that bear natural and cultural importance, in addition to the loss of diversity in said areas, which will ultimately destroy the patrimony of Caribbean countries, the primary source of revenue for this industry (Quintero & Vega n.d. p.10).”

Loss of biological diversity is a current threat to the tourism industry. The effects of a loss of biodiversity include:

- Threats to opportunities for recreation and tourism, food supplies, sources of wood, medicines and energy.
- Interference with essential ecological functions such as species balance, soil formation, and greenhouse gas absorption.

- Reduction of the productivity of ecosystems (UNEP, 2004).

Nature tourism, like that in the Caribbean, uses biodiversity created by a rich and varied environment as its main attraction. When land and resources are strained by excessive use, however, nature tourism actually causes a loss to biodiversity. Natural tourism impacts biodiversity in a negative way when “…impacts on vegetation, wildlife, mountain, marine, and coastal environments exceed carrying capacity.” Another harmful practice by tourists occurs mostly without their knowledge. The introduction of foreign species of insects, plants, and diseases causes enormous destruction and disruption of the natural ecosystems (UNEP, 2004).

According to the United Nations Environment Programme (UNEP), the hotel industry also contributes to the depletion of the ozone layer. The use of chlorofluorocarbons (CFCs) has been shown to contribute to the destruction of the ozone layer. The hotel industry’s wide use of refrigerators, air conditioners, and propellants in aerosol spray cans, which all contain ozone depleting substances and CFCs, does not help the problem (UNEP, 2004).

Tourism is also directly linked to climate change. There is a general consensus among scientists that the temperature of the Earth’s surface has risen steadily due to an increase in greenhouse gas emissions into the atmosphere. The most destructive greenhouse gas is carbon dioxide ($CO_2$), which is generated from fossil fuels like coal, oil, and the natural gasses burned by cars, power plants, and industry (UNEP, 2004).

As a whole, the tourism industry accounts for about 50% of traffic movements due to the movement of people from their homes to other destinations. Air traffic, the rapidly expanding and popular mode of travel, contributes about 2.5% of the production of carbon dioxide. Commercial passenger jets are the fastest growing source of greenhouse gas emissions, and the number of international travelers is expected to increase from 594 million in 1996 to 1.6 billion in 2020 (UNEP, 2004).

The United Nations Environment Programme argues that tourism contributes to climate change, yet is also affected by it. Since climate change “is likely to increase the severity and frequency of storms and severe weather events,” (UNEP, 2004) which will negatively impact the industry. Global warming may cause damage to fragile ecosystems, like coral reefs found in the
Caribbean, due to increased sea temperatures and reduced rainfall. When a coral reef is stressed by increasing water temperatures, lower water quality, and an increase in suspended sediments, the zooxanthallae, a single-celled algae that gives the reef its color, leaves its home in the reef. This loss of algae results in a “bleaching” effect that eventually kills the reef. Possibly the most widely known coral reef, the Great Barrier Reef, which brings in about $640 million to the tourism industry, has been experiencing coral bleaching for the last twenty years (UENP, 2004).

According to Bohdanowicz, waste generation is one of the greatest threats to the environment that the hotel industry produces (Bohdanowicz, 2005). By implementing methods of recycling and biodegradable disposable items, a hotel can decrease waste dramatically. Methods that can be implemented include gray water recycling, which reuses waste water for irrigating the landscape, or strategic placing of recycling bins all over the hotel (Sage Blossom, 2008). By decreasing waste reduction, the hotel is saving the environment while lowering the costs of waste disposal.

2.2.2 Energy Use in Hotels

It has been estimated that the hotel sector includes 360,000 facilities and 30 million beds worldwide. Lodging establishments in the United States used 146.5TWh of energy in 2004, which is 9.4% of the total energy consumed by all commercial buildings in the United States. The average guest uses about 1.8 kW of electricity per day (Bohdanowicz, 2005). Of that 146.5TWh of energy, 60-80% is electricity, and the rest is natural gas and oil consumption. Hotels in the Caribbean are located in a hot climate, so the electricity consumption is closer to 80% due to the high prevalence of electric space cooling (Bohdanowicz & Martinac, 2002).

Energy expenditures in limited-service hotel comprises about 3-5% of the gross revenue, compared with 4-6% for typical full-service hotels. In upscale, luxurious, or historic hotels, the energy expenses could constitute up to 10% of their gross revenues. Total energy expenditure for the lodging industry in the mid 1990s was $2.08 billion, or 5.2% of gross revenues. Between the early 1990s and 2000 the energy expenditure rose from 2.08 billion to $5 billion (Bohdanowicz & Martinac, 2002). More modest, limited service hotels (i.e. those with lower star ratings) tend to spend proportionately less on electricity because they use fans rather than individually-operated air conditioning units to cool guest rooms. Upscale, full-service hotels use central
cooling and heating systems for common areas with individually-controlled heating and cooling units for guest rooms that tend to use proportionally more energy per guest (Table 1).

**Table 1: Hotel Ratings and Services Provided**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Services Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Star</td>
<td>Heating or fan cooling when necessary</td>
</tr>
<tr>
<td>Two Star</td>
<td>Heating or fan cooling when necessary. Central heating and comfort cooling seasonally available.</td>
</tr>
<tr>
<td>Three Star</td>
<td>Central heating and comfort cooling seasonally available. Individual heat control in bedrooms. Temperature maintained within the range of 18-25°C</td>
</tr>
<tr>
<td>Four and Five Star</td>
<td>Central heating and comfort cooling available in entire premise. Individual heat and air conditioning control in all rooms. High quality equipment with very low noise emission level.</td>
</tr>
</tbody>
</table>

(Bohdanowicz & Martinac, 2002).

When it comes to the generation of CO₂, it is estimated that typical hotels release about 160kg CO₂/m² of room floor area annually. This is equivalent to about 10 tons of CO₂ per bedroom per year. As a whole, the hotel industry releases at least 130 million tons of CO₂ per year. According to the EPA, if the energy efficiency of American hotels was increased by 30%, it would prevent the release of 6 million metric tons of CO₂ into the atmosphere per year (Bohdanowicz & Martinac, 2002).

Statistical data gathered from around the world estimates that one occupied hotel room uses about 209 gallons of water per day, and the average amount of waste produced by one guest each night is equal to one kilogram (Bohdanowicz, 2005).

**2.2.3 Specific BEMP Practices**

There has been an evolution in business ethics in recent years regarding corporate social responsibilities and the environment. The traditional bottom line of companies has become the “triple bottom line” including economic, social, and environmental considerations. The economic sector includes innovation, capital efficiency, and growth enhancement. Human rights,
indigenous communities, and community outreach comprise the social sector. The environmental sector includes ideas such as zero waste, biodiversity, emissions reduction and minimal impact on the environment through the use of BEMPs. Increasingly, businesses are realizing it is essential to operate at an equilibrium point between the three sectors; this balance is referred to as sustainability (Figure 8).

**Figure 8: Venn Diagram of the “Triple Bottom Line” (Peter Adler, 2002)**

In light of the substantial environmental impact of hotels and pressure from investors, customers, and the general public, many hotels are beginning to adopt BEMPs. Many old hotels have been updated and remodeled to be more environmentally friendly while new hotels incorporate BEMPs into their design and construction. There are many different BEMPs already
in use today to conserve water and energy, reduce solid waste, and minimize the environmental impacts of landscaping.

2.2.3.1 Energy Conservation:

Replacing incandescent light bulbs with compact fluorescent bulbs is the most common practice adopted by establishments and households because fluorescent bulbs are inexpensive, easy to install, and have a short economic-payout period (about eight months). Fluorescent bulbs use only 20-25% of the electricity that incandescent bulbs use and last about thirteen times as long (10,000hrs) (Energy Star, 2008). They operate at a cooler temperature as well, therefore reducing the chance of fire or burns and reducing cooling demand. A common misconception is that fluorescent bulbs are much dimmer than incandescent bulbs; however, an 18W fluorescent bulb produces 1100 lumens, nearly identical to the 75W incandescent bulb that produces 1150 lumens. A standard fluorescent bulb costs approximately two dollars and can have a lifetime savings of $31 dollars. Even hotels that don’t consider themselves “green” have taken this first step because it makes sense financially (Hodges, 1995). There are, however, several disadvantages associated with fluorescent bulbs: they don’t yet fit all fixtures; they don’t operate well in low temperatures; they take up to fifteen seconds to obtain maximum brightness; and, they cannot be used with dimmer controls. Fluorescent bulbs also contain mercury, which means that proper disposal is necessary to avoid environmental contamination.

Motion sensor lights are another effective and inexpensive way to reduce electricity consumption. Motion activated lights and timed lights are only on while someone is in the room and are off when they are not needed, saving otherwise wasted energy and money.

Solar water heating is an alternative to conventional heating methods. Due to their use of solar energy, solar water heaters are energy efficient. The amount of savings depends on many factors such as the amount of hot water used, the amount of solar energy available and the previous system. Passive solar energy heating systems are more expensive to purchase initially, however, owners are protected from future rises in the costs of natural gas, and on a monthly basis the savings are usually higher than the costs. Water heating bills have shown to decrease between 50%-80% on average (U.S. Dep. of Energy, 2008).
2.2.3.2 Water conservation:

Flow restriction devices, such as low flow showerheads and faucets, are an inexpensive way to reduce water consumption in hotels. Faucet aerators cost five to ten dollars and low flow shower heads cost eight to fifty dollars depending on the model and features included. Low flow faucets aerate, or mix air into the water, and low flow showerheads can be aerating or non-aerating. Both restriction devices reduce the flow to 2.5 gallons per minute or less, reducing water consumption and utility bills (Eartheasy, 2008).

Major Ozone assisted laundry systems do not require hot water or detergents, which usually contain phosphorus that can have negative effects on the environment, and spent water can be filtered and reused. They have a large start up cost but in the long run they “result in considerable water and energy savings (Schneider, 1996).”

Another common method that is being used to aid in saving natural resources is commercial grade water-efficient washing machines. Water-efficient washing machines are not only being used to decrease the amount of water consumed, the washers are also known for their energy efficiency. While these washers are friendlier to the environment and cost less in the long run, they are much more expensive initially. In 2004 the city of Toronto gave out incentives of $60 for water/energy-efficient washers whose cost ranged from $800 up to $2000. Although the incentive was a very small portion of the cost over 5000 people purchased the washers. The sale of these washers helped the city decrease its water-use by 6% over the year. The city found by publicizing water efficiency through incentives increased the awareness of the people, as the website dedicated to the city’s water division had an increase of visits by over twice the previous years (Elzen, 2004).

2.2.3.3 Solid Waste Reduction

Solid waste management in Puerto Rico is complicated by “limited disposal space available on an island community and Puerto Rico's delicately balanced ecosystem (EPA, 2008).” Puerto Rican residents produce more trash than mainland citizens and they recycle less, compounding the problem further (EPA, 2008). Recycling is probably the most well known BEMP, but many people are unaware of the potential extent of recycling. It is well known that glass, plastics, paper, and aluminum cans can be recycled, but some hotels have begun to recycle
specialized wastes such as used vegetable oil for fuel, composting leftover foodstuffs for fertilizer, and even soap recycling.

Plastic disposable utensils, cups, and plates are often used in hotels and can be a large constituent of solid waste. While they are dubbed “disposable,” they take a long time to breakdown. There has been a recent push toward biodegradable utensils that breakdown readily. Spudware is one brand of biodegradable utensils that are made from potatoes. They cost the same as plastic and “they have the look and feel of plastic and outperform plastic in boiling and microwave testing” (Spudware, 2008).

2.2.3.4 Landscape BEMPs:

Traditional impervious cover, such as rooftops and asphalt, increases the volume of runoff and the rate of erosion. Permeable paving materials for sidewalks and driveways allow for more infiltration to recharge subsurface flows and reduce the runoff of pollutants. Permeable pavers are also safer than traditional asphalt because tires get better traction and have better skid resistance. Unbound open graded aggregate is the most permeable and least expensive cover for driveways and parking lots. The downside of permeable pavers is that they need to be power washed regularly (Ferguson, 2005). Other practices to reduce runoff due to impervious cover include rooftop gardens and rain barrels which store water for later irrigation. Low water and low maintenance landscaping by careful selection of plants can drastically reduce water and energy consumption and reduce labor costs. “Conserving water by choosing drought-resistant plantings and using appropriate watering techniques will have a positive impact (Town of Fountain Hills, 2008).” A study completed by the California Department of Water Resources concluded that “annual operational and maintenance costs were less than half in the low water-use landscape project compared to the higher water-use landscape project (Dep. of Water Resources, 2008).”

Grey water recycling utilizes the water from showers, sinks, and laundry for irrigation. It is very popular among golf courses to relieve enormous water costs and is increasing among the hotel industry. Grey water usually has very little contaminants and can be used for landscape irrigation without risk of pollution. Grey water recycling reduces the volume of waste water and the consumption of potable water. This is especially important to areas that have limited water supply.
2.3 Promotional Programs

There is no single U.S. standard for a green hotel, yet there are multitudes of products and organizations offering their stamps of approval to hotels in exchange for a fee (Audi, 2007). There are, however, four well-known BEMP accreditation programs for green buildings and/or establishments: LEED, ISO 14001, Green Globe 21, and Energy Star. These four programs award certification for compliance with their environmental standards, and each charge an annual fee.

2.3.1 LEED

Leadership in Energy and Environmental Design (LEED) was created by the U.S. Green Building Council in 1998 and “…provides third-party verification that a building project meets the highest green building and performance measures (“Project Certification,” 2008). There are six categories of commercial buildings that can be certified: New Construction, Existing Buildings, Commercials Interiors, Retail, Schools, and Core & Shell.

Buildings that are LEED-certified boast the following qualities: lower operating costs and increased asset value; reduced waste sent to landfills; conserved energy and water; healthier and safer buildings for occupants; reduced harmful greenhouse gas emissions; qualifications for tax rebates, zoning allowances, and other incentives in hundreds of cities; demonstration of an owner’s commitment to environmental stewardship and social responsibility. Some examples of the requirements to become LEED certified are: reduced site disturbance; storm water management; heat island reduction; light pollution reduction (to improve night sky access); water performance measurements (plumbing and fixture fitting efficiency); water efficient landscaping; energy efficient performance; and refrigerant management (for ozone protection) (“LEED for Existing Buildings,” 2008).

The LEED certification has four categories: certified, silver, gold, and platinum. Points are awarded for different criteria to determine the certification thresholds. Credit for things such as an automation system to control key building systems, system-level metering to report correct energy usage, and on/off-site renewable energy can help a building advance through the thresholds. The program overall helps buildings towards becoming more sustainable without being cost ineffective (“LEED for Existing Buildings,” 2008). When it comes to hotels, the
problem with LEED certification is that it is not designed specifically for hotels, so the processes to revamp an older hotel could prove quite costly (Audi, 2007).

2.3.2 Green Globe

EC3 Global is an environmental advisory group that provides a “pathway…to set, manage, and attain sustainability targets ("Who Is EC3 Global?", 2008).” One of these pathways is Green Globe, which is specifically targeted towards sustainable travel and tourism. The program has participants in 42 countries, and is expanding every year. According to their website, the Green Globe program is proven to reduce costs in energy consumption, waste production, and resource conservation ("Benefits for Your Organization,” 2008).

Green Globe is an organization that provides benchmarks for companies and provides an environmental management framework for organizations to achieve sustainability (EC3, 2008). Green Globe focuses their efforts on making operational improvements. Affiliation with Green Globe opens up opportunities to be connected to highly respect environmental organizations that could be beneficial in promoting the hotel. Hotels that wish to be considered for awards and membership must prove that they are serious about the environmental, social and economic performance of their establishment (EC3, 2008).

Once a company commits to becoming a part of Green Globe, it must go through there is a two-step benchmarking process including policy and certification stages. Under the first step there are two sub steps:

1. The first step is called policy stage where the company and Green Globe work to establish a Sustainability Policy

2. The second stage is called the benchmarking stage where the company is assessed on the benchmarks set in the first stage in order to achieve the Benchmarked “Bronze” status.

The second step is to achieve certification which is organized by a 4 stage process:
1. The first stage is compliance which consists of the company’s ability to comply with relevant legislation and policy requirements.

2. The second stage is the approach stage in which the company implements an environmental and sustainable approach.

3. The third stage is the performance stage in which performance outcomes are documented.

4. The communication stage is the last stage. The communication stage is the consulting stage and once this stage is completed the company is assessed under set criteria and achieves certified (silver) status as a Green Globe Organization. (EC3, 2008)

The specific environmental challenges that the program addresses are: reduction in greenhouse gas emissions; energy efficiency, conservation, and management; and improved waste water management. In order to become certified, an organization must complete a series of 6 steps defined by the program. The six steps are policy, benchmarking, compliance, approach, performance, and communication. If a company achieves Green Globe certification for five or more years, they are rewarded with the right to use the Green Globe Certified logo (“Company Programme,” 2008). There are 53 current properties in the Caribbean that are Green Globe certified, more than any other region in the world. Seven other properties are pursuing certification at this time.

2.3.3 ISO14001

The last program we will discuss is ISO14001. This program is a formal environmental management system (EMS) that ensures an organization is conforming to its policies regarding environmental targets for operations and activities. The International Organization for Standardization developed a series of EMS called ISO 14000. More specifically, ISO 14001 is the part of the series that involves specifications with guidance for use.

The ISO 14001 EMS comprises five core principles: environmental policy; planning, implementation and operation; checking; corrective action; and management review. For a hotel to achieve accreditation under this standard, they need to commit to comply with environmental
legislation and regulations, make continual efforts to improve, analyze the macro and micro aspects in the planning stage, develop a set of responsibilities, training procedures, operational controls, and documentation, monitor performance, and review the EMS periodically (Chan, 2004).

By the end of 2000, there were 22,897 ISO 14001 certificates achieved; only 66 were obtained by the restaurant and hotel industry.

2.3.4 Energy Star

EPA’s Energy Star program began recognizing commercial buildings in 1999 for outstanding advancements in energy conservation. Energy Star awarded 1,420 office buildings, manufacturing plants, and hotels across the United States with an Energy Star label in 2007. The winning hotels use “heating and air-conditioning systems, water heaters, kitchens, and pools [that] are all operated with efficiency programs that hotel executives said pay for themselves within four years” and “properties receiving the Energy Star label have collectively saved nearly $1.5 billion annually in reduced energy bills (Palmer, 2008).” Furthermore, it is estimated that 4,800 energy efficient fluorescent light bulbs installed in several Marriott hotels reduce carbon dioxide emissions by 52 tons each year. Other BEMPs employed by the award winning hotels include hyper efficient LEDs for exterior lights, ozone laundry systems, and hotel vans that run on used vegetable oil from the hotel restaurant. One hotel owner “praised an Energy Star Web-based program that makes it easy for property owners to track energy use and savings (Palmer, 2008) (See Appendix VIII).” The largest one-year increase of buildings receiving the Energy Star award was from 2006 to 2007, indicating more and more companies are adopting energy saving BEMPs.

2.4 Major Hotels Worldwide Going Green

In general, a wide range of knowledge of BEMPs can be observed in hotels throughout the world. Some BEMPs currently employed in hotels are alternative energy sources, the use of an on-site water recycling plant, biodegradable disposables, recycling of materials and water, and donating old items that can no longer be used in an environmentally friendly hotel. In addition,
these hotels also educate their employees and their guests about their practices and cleaning methods that are used in order to save the environment (Sage Blossom, 2008).

Since the threat of global warming has been in the spotlight the last few years, hotels are beginning to become more aware of the importance of implementing BEMPs. The adoption of eco-friendly policies into hotel company guidelines has led to changes in financial policies as well as incorporating the cost of implementing environmental practices into fiscal budgets (Bohdanowicz, 2005). The corporate sector of these companies are investing in improvements for their hotels in order to save money by decreasing their consumption of natural resources, and decrease waste production (Bohdanowicz, 2005). By following these procedures, hotel chains are able to publicize how they are working to save the environment to get an edge on competing hotels. The incentives for implementing BEMPs, the knowledge and perceptions of hotel personnel and guests with regards to BEMPs, and what two major hotels chains, Marriott International Inc. and Hilton Hotels Corp are doing, are discussed in this section.

2.4.1 Incentives

An objective of local governments and utility companies has been to convince hotels and other large businesses that implementing green practices are beneficial. Economically friendly policies have provided incentives for hotels to make energy-saving improvements. Electric companies, such as National Grid, in the United States have been working to decrease individual large-scale consumer’s energy consumption in order to decrease the chance of having to spend millions to build new generating plant (Michael Thompson, personal communication, January 24th, 2008). In order to reduce energy consumption, electric companies visit hotels and suggest ways they could decrease costs while providing lower costs on energy efficient appliances.

Green Globe 21 is an organization associated with environmentally friendly practices, and offers suggestions as to how hotels can become more economically friendly. A Green Globe 21 winner for the most environmentally friendly hotel receives a seal of approval to advertise their successful implementation of BEMPs. The Copamarina Resort, a winner of the Green Globe 21 award, recycles their water, trash, and even unused cooking grease from the restaurant. Each room displays a pamphlet on current practices the hotel utilizes such as a clean towel policy where a request for clean towels is indicated by placing them on the floor. By using this request method, the water usage per guest is reduced. The hotel also informs their guests that each room
has its own ten gallon water tank to encourage guests to use less water (Barnes, Batsone, Orthodoxou, & Terrio, 2006).

2.4.2 Knowledge of BEMPs

In order to ascertain the extent of a hotel personnel’s knowledge about BEMPs, Bohdanowicz conducted a series of three surveys accessing the perceptions of BEMPs in 4,049 European hotels (Bohdanowicz, 2005). Previous studies focused on distinct areas or chains and results showed that chain hotels are more likely to participate in BEMPs. The study was conducted by e-mail and the information was collected from 610 establishments. Since only hotels with e-mail were surveyed, the sampling was biased towards the larger hotels and seventy-percent were part of a hotel chain. Bohdanowicz (2005) concluded that hotel personnel do not feel that environmental practices are essential for successful business operations but cost savings and increasing customer awareness are important (Bohdanowicz, 2005). Training hotels on the methods that are available and providing them with cost-savings graphs may increase the willingness of small inn owners to participate in establishing a BEMP program.

2.4.3 Guests’ Perceptions of BEMPs

Participation from hotel guests is an essential part of a hotel’s ability to implement BEMPs. Without the contribution of the hotel guests, BEMPs would be difficult to implement. A recent study performed by J.D. Power and Associate’s 2007 North America Hotel Guest Satisfaction Study, shows that when guests are aware of the hotel’s program, 3 out of 4 will participate (Tews, 2007).

Since conservation is such an important issue globally, it is vitally important that hotel properties actively market their eco-friendly offerings and make them easy to recognize and participate in,” said Linda Hirneise, executive director of the travel practice at J.D. Power and Associates. “Offering green programs is a win-win situation for both hotel guests and hotel operators. Guests are increasingly looking for these types of offerings, and hotels are finding that going green actually saves money. 

-(Tews, 2007).

A study conducted in 2007 by the Cornell Hotel and Restaurant Quarterly found that guests respond positively to hotels that are working to help the environment (Goldstein, Griskevicius, & Cialdini, 2007). Cornell Hotel and Restaurant Administration Quarterly conducted a study in 2007 to communicate to guests, through the use of display cards, the implementations of BEMPs in the hotel. Cards were printed with messages displaying four
different themes: environmental protection, social responsibility, partnership with the hotel for environmental protection, and benefits for the hotel. The four separate messages were: “Help Save the Environment,” “Help Save Resources for Future Generations,” “Partner with us to Help Save the Environment,” and “Help the Hotel Save Energy.” The study revealed that about 30% of the hotel guests responded positively to the environmental protection and social responsibility; however, only 15% of guests participated when asked to help the hotel. The positive responses were measured by how many guests chose to join in a towel reuse program. The study also established that guests are more likely to participate in energy saving practices if the hotel has made it clear that a contribution or a donation to an environmental cause has already been made (Goldstein, Griskevicius & Cialdini, 2007).

2.4.4 Hilton Hotels Corp. & Marriott International Inc.

Two large hotel chains, Hilton Hotels Corp. and Marriott International Inc., are still in the discovery stages of “going green.” Both chains have one hotel each that has been LEED certified (a Hilton hotel in Washington, and a Marriott at the University of Maryland). As for specifics, Hilton Hotels Corp. is looking into energy-saving light bulbs and water-saving features. The Marriott joined the EPA’s Energy Star program, recognizing them for using fluorescent lighting and reducing greenhouse-gas emissions. One barrier both hotel chains are experiencing is trying to save time, water, energy, and waste without “downgrading the quality of service (Audi, 2007).”

2.5 Major Hotels vs. Small Hotels

The differences in environmental practices between large hotel chains and small privately owned properties have been investigated in order to determine why large hotel chains seem to be more environmentally friendly than small inns. In this section, the barriers for implementing BEMPs in both large and small hotels are discussed.

2.5.1 Barriers for Implementation of BEMPS

Bohdanowicz (2005) found that before hotels would be willing to implement BEMPs there were a few concerns that would need to be addressed. More specifically, expense was a
major issue for both large and small hotels. Hotel managers were afraid that upgrading their establishment to fit the requirements of environmental programs would be more of a financial burden than beneficial to the environment. The hotel managers were not aware that the implementation of certain environmentally friendly practices in the hotel had the potential to save money and build reputation in a positive manner. Although guests have proven to respond negatively to the money saving aspect on the hotels behalf, they are more than pleased to participate in green methods in order to save the environment.

2.5.1.1 Large Hotels

Through research, it was determined that larger hotel chains are more apt to participate in environmental practices due to increased awareness about environmental impacts and the costs and benefits of alternative management practices. Small hotels, however, are often less aware of their effects on the environment which can be seen in the statement, “Our impacts are non-significant, as we are a small hotel” (Bohdanowicz, 2005). One hypothesis is that hotel chains are more likely to participate in environmental practices because many of them have these practices written in their company policies. If a hotel chain is governed by policy, all the hotels in that chain would thus be required to adopt BEMPs (Bohdanowicz, 2005).

Financial benefits are another reason large hotels “go green.” Many members of the general public have become more conscious of the detrimental impact we are having on the environment and are now more aware their own personal impact. This new environmentally conscious population is more inclined (and actually demands) to stay at a hotel that promotes their BEMPs than one that does not.

2.5.1.2 Marriott International Inc

Marriott hotels are one of the leaders in the industry toward sustainability and green practices. While Marriott recognizes the important benefits to the environment, the driving force behind the implementation of BEMPs is their bottom line. Marriott participates in several environmental organizations including Environmentally Conscious Hospitality Operations (ECHO), Energy Star, and is an EPA climate leader having reduced their green house gas emissions by 20% (a requirement by the EPA). Marriot has begun to use environmentally friendly and recycled materials for construction and design of new hotels with BEMPs in mind.
Some of Marriott’s BEMPs include maximizing natural lighting, using fluorescent bulbs, low maintenance and low water landscaping, solar cell collectors for heating water, flow restriction devices, grey water recycling, using electronic thermostats, and donating leftover foodstuffs to farms (Marriott International, 2008).

There is a “growing movement of vacationers who prefer culturally and socially minded travel and seek out businesses that conserve resources (Marriott International, 2008).” Marriott recognizes it can gain customer loyalty and admiration through environmentally responsibility and has made considerable efforts to attract this demographic. Arne Sorenson, a chief financial officer for Marriott, said “I think lots and lots of people will vote with their feet to send their business to environmentally responsible companies and less responsible companies will lose business.” Marriot encourages customers to reuse their linens and towels without having them washed every day which saved an estimated 11-17% on hot water bills. Some Marriott hotels, in combination with other BEMPs, plant enough trees to operate carbon neutral and offer free parking for hybrid vehicles.

While Marriott’s efforts have made them good corporate citizens, they don’t deny it has saved them a lot of money in the process. “Being green is good business,” said Pat Maher, a vice president of Marriott; “it is important for the environment and saves our hotels money (Marriott International, 2008).” Participating Marriott hotels saw a 65% reduction in lighting costs due to the installation of fluorescent bulbs, 20% less water consumption due to flow restriction devices, 35% reduction in total energy costs due to energy efficient appliances, and 30% reduction in energy for air treatment systems simply by banning smoking indoors. While some Marriot hotels are ahead of the curve with BEMPs, many are still trying to catch up. It is more difficult for older hotels to adopt some of the BEMPs because such adoption would require substantial capital investments and renovations (Marriott International, 2008).

An interview was conducted with Howard Gerhardt, the general manager of the courtyard by Marriott in Worcester, to test the interview and audit questions and to obtain the perceptions of a manager of a large hotel chain. Mr. Gerhardt was only vaguely familiar with BEMPs and admitted that his hotel, constructed in 2000, had not yet adopted many sustainable practices. While Mr. Gerhardt is not at liberty to make decisions regarding the implementation of BEMPs he said there is little communication and education about them. He said recently however, there has been more communications regarding BEMPs and many guests have inquired about green
practices in the hotel. Until recently Mr. Gerhardt didn’t think of environmental stewardship as a hotel responsibility but he recognizes that BEMPs can save the hotel money and guests are attracted to green hotels. The Worcester Courtyard has some BEMPs, however they were implemented for financial reasons, not to be environmentally conscious. All of the lights in the hotel had been changed over to fluorescent light bulbs several years ago but it was not because it was good for the environment it was “simply good business” (Gerhardt, Personal Communication, February 15th, 2008). The electricity cost per occupied room per night is $5.70, a number that Gerhardt is not happy with.

They have also begun to leave cards in guest rooms asking customers to reuse bath towels and bed linins without having them washed every day. Mr. Gerhardt said this was done because there was a “direct correlation to saving money” because there are less labor costs and the life of the linins are longer when washed less frequently. Timed lights are installed as well as low flow showerheads to reduce water consumption which costs the hotel $0.90 per occupied room per night. Although Mr. Gerhardt and the Worcester Courtyard are proud that these practices are beneficial to the environment, he was clear that they were introduced solely for the financial benefits to the hotel. Mr. Gerhardt identified some of the larger scale BEMPs as cost or labor prohibitive and said guest satisfaction was an obstacle for others. For example, he believes replacing individual shampoo containers with a permanent dispenser would not convey the elegance and class that customers expect from Marriot hotels.

2.5.1.3 Small Hotels

While big hotels have begun to implement BEMPs in earnest, smaller hotels are more reticent. Payback periods were seen as a major issue for many small inns. Many privately owned smaller hotels and inns didn’t see the benefit of spending money they don’t have in order to potentially save money in the future (Bohdanowicz, 2005). In addition, one hotel expressed the following when asked about the financial impact of greening their facility,

It is important to analyze whether financial resources available to hoteliers are sufficient to undertake otherwise important environment-related initiatives. The environmental awareness of local authorities (especially in the rural areas) is often low, and they have limited budgets. In addition, the application procedures for the EU funds are complex and still perceived as unobtainable for small enterprises. As a result, hotel companies need to find their own capital. Such a situation concerns countries with relatively low environmental awareness and low income (including hotel turnover) [such as Poland and
other countries of the former Eastern Block, now the new members of the European Union].

-(Bohdanowicz, 2005).

2.5.2 Benefits of BEMPs

The Island Shangri-La Hotel in Hong Kong, one hotel that is ISO 14001 certified, reported a financial savings of $1.5 million over a two-year period. Apart from this enormous financial savings, the general manager declared a commitment to the community as the main reason for pursuing an ISO 14001 certification. The increased moral of the hotel staff and the sales team’s advantage of attracting the growing number of customers from the green-conscious population were only a plus (Chan, 2004).

The InterContinental Hotel at Hyde Park reported an energy savings of 34% (870 kWh/m²/annum to 575 kWh/m²/annum) when lighting was changed to be more energy efficient, when heat was recovered from refrigeration equipment, when energy management systems were installed on boilers, and staff awareness campaigns were put in place. The Forte Crest Hotel in West Yorkshire reduced energy costs by 45% and replacement costs by 85% simply by converting to energy-efficient lighting (Kirk, 1995).

2.6 BEMPs in the Caribbean

As previously mentioned, there is no set standard for green hotels in the United States. There is also no present international accreditation program, but Green Globe is striving to become the first by associating itself with PATA Green Leaf, the Caribbean Alliance for Sustainable Tourism, and Green Key. These associations make Green Globe the only program with true environmental coverage (Bramwell & Lane, 2003).

With regard to BEMPs, the small inns of Puerto Rico are still lagging behind the larger hotels. One of the barriers the small inns face is that ISO 14001 and LEED are normally used by larger companies; therefore the smaller hotels in Puerto Rico that we are studying might not be able to afford the annual fees.

There have been many programs developed to promote BEMPs in the world. Some Caribbean businesses, however, are reluctant to make the change. At the Sustainable Tourism Meeting in May of 2007, Peter Hillenbrand (a tourism and environmental expert) stated that when faced with the opposition between businesses that will implement BEMPs and those that
won’t, there are two options: one is to “scare the heck out of [the ones that don’t].” or demonstrate to the governments and people that the technology needed to adopt BEMPs is becoming less expensive (Hillenbrand, 2007). If a hotel is managed properly, financial institutions are willing to grant access to funds for improvement projects. One suggestion he made was purchasing in commodities in bulk in order to save money (JohnRose, Oakes, 2006).

In Jamaica, the National Environment and Planning Agency (NEPA) has produced a brochure titled “Good Environmental Practices for Hotels,” that gives examples of how to eliminate wastes, conserve energy and water, and lower emissions, and is targeted towards the hotel industry of the island. The brochure lists contact information for NEPA as a way to invite further contact with the hotels (“Good Environmental Practices for Hotels,” 2005).

### 2.6.1 Puerto Rico

In Puerto Rico, CTPR is taking steps to initiate the adoption of these BEMPs in both large and small hotels. Of the collection of small inns in Puerto Rico, only one of them has been recognized as Puerto Rico Hotel and Tourism Association’s Green Hotel of the Year award twice. Besides encouraging benevolent impacts on the environment, the incentives offered by CTPR help ease the transition into BEMPs in hotels in Puerto Rico. Act #78 of the Tourism Development Act of 1993 stipulated the following tax credits and exemptions for both new and existing hotels (Toro, 2003):

- Tax credit equal to 50% of the total cash equity up to 10% of the total project cost
- 90% Puerto Rico income tax exemption for the first 10 years (100% in Vieques and Culebra)
- 100/90% municipal license tax exemption for new and existing business
- 90% municipal property tax exemption
- 100% excise tax exemption on imported goods and locally acquired ones
- 100% municipal construction excise tax exemption
- Up to an 11% discount on electrical utility expenses
2.6.1.1 Paradores’ Perceptions

The Paradores de Puerto Rico are a group of twenty inns on the island that are “tucked away from San Juan’s hustle and bustle (“Paradores de Puerto Rico,” n.d.).” These family owned Paradores (or Country Inns in English) appeal to tourists seeking a quieter Puerto Rican experience. They are located near or in natural or historical places around the island, and strive to represent the culture and traditions of Puerto Rico (Hau, 2006). The inns can be found mainly along the coast of the island, with a few exceptions of inland inns.

At a presentation given in 2006, Myma Hau explained some of the perceptions of these small Puerto Rican inns, and reasons why they have not joined in on the BEMPs revolution. Although there has been an increase of recent environmental laws and regulations in Puerto Rico, there has been no action plan for these small inns to abide by the new legislation. The rules are set in place, but the government is providing no means of helping the inns comply with them (Hau, 2006).

Key areas of worry are the availability of technical assistance, incentives, sustained gross income, and growth of the number of visitors, the policies around green space and open space, and the absence of clear and flexible guidelines. Since the properties are small, they have their own specific obstacles such as (Hau, 2006):

- The integration of sustainable principles for owners
- The ability to measure levels of sustainability
- Generation of an increase in the number of visitors and length of stay
- Lack of influence on government agencies to act based on sustainable principles
- Limited access to funds

The challenges faced by Puerto Rico as a whole are also pressuring the Paradores owners. Two of these challenges include the feeling that the economy of Puerto Rico is on a downward slope, therefore the business climate is too rigid to justify the spending large capital. (Hau, 2006):
In order to be certified for environmental practices, Hau insists that there needs to be a balance of flexibility, quality, sustainability, and heath/hygiene/safety. In order to recruit these Paradores, guidelines for BEMPs should include an adjustment to the Paradores’ owner’s reality, room for creativity and transition, design respect, performance, and should address all types of tourism facilities. If the system is to work, employees need to be educated, and a “GREEN FLAG” local certification program should be put into place (Hau, 2006). Since the inns do not have the same advantages as the larger hotels, the major certification programs like LEED, Green Globe, and ISO 14001 might be too expensive for them.

2.6.1.2 Focal Point of CTPR

Lately the focal point of CTPR has shifted to emphasize the leisure market, rather than business and convention visitors. As President and CEO of CTPR, Terestella Gonzalez Denton, noted this in a recent news article:

The truth is we have been relying too much on business and corporate visitors, and in meeting and convention tourism, since we have been doing well in both segments. We've forgotten about the big potential we have in the leisure market; having the best natural resources, historic and cultural sites and even world-class gastronomical venues. (Miralles, 2007).

Connecting with these inns is essential for CTPR to understand the perceptions of the managers/owners of the inns in terms of BEMPs and how they may be implemented to complement the natural resources and historical and cultural sites supported by these inns.

The use of BEMPs should not be limited to newly constructed developments such as the Puerto Rico Convention Center, but should also be widely promoted to the hotel industry, specifically smaller inns. With the focal point of CTPR shifting to encompass more of the leisure market, it is essential that small inns be made aware of the potential impacts of BEMPs on both their business operations and the environment of Puerto Rico. Many of the specified inns lack the knowledge and awareness of BEMPs; therefore, the communication gap must be bridged in order to modernize the inns in terms of BEMPs.
2.6.1.3 BEMP Potential

The realization that tourism in Puerto Rico has become a major contributor to the economic development and growth of the small island has created waves of enthusiasm towards these practices. Some organizations, such as the Casa Grande Mountain Resort, have already begun to take advantage of best environmental management practices. This small inn has established a reputation for bringing together tourism and green practices, winning Puerto Rico Hotel and Tourism Association’s Green Inn awards in 1999, 2003, 2004, and 2006 (Casa Grande Mountain Resort). Newman and Sage argue that many areas that have potential to be “ecotourism destinations” should not be overlooked, specifically citing Puerto Rico (Newman and Sage, n.d.).

Here is an island where millions have been coming for years – mainly for the sun, the resorts, and the casinos – and missing some of the best parts. In recent years the Old City of San Juan has been restored and has become a very civilized urban environment. Now more and more travelers are visiting the mountains and the caves that make up the natural Puerto Rico. The infrastructure is here.

-(Newman and Sage, n.d).

The implementation of BEMPs would enable small inns to better take advantage of the islands natural beauty. In the next section of this proposal, a set of objectives with associated tasks are examined by which CTPR might observe the range and extent to which BEMPS are currently employed by small inns, as well as an introduction to an education process to persuade those inns to expand BEMPs in their operations.
3.0 Methodology

The goal of this project is to assist the Compañía de Turismo de Puerto Rico (CTPR) bridge a gap of communication in order to convince small inns and hotels throughout the island that adopting best environmental management practices (BEMPs). The project team has utilized several different methods including interviews, audit surveys, cost analyses, brochures, and internet resources to collect the proper data to support the implementation of BEMPs throughout the inns participating in CTPR’S Initiative Toward Sustainability and Excellence (See Appendix V). In order to achieve the project goal our team has established a set of well thought-out objectives.

The set objectives, in conjunction with the associated tasks for this project were the following:

1. Examine the nature and range of BEMPs already established in the hotel industry and, more specifically, in Puerto Rico.
   - Tasks:
     - Independent research from scholarly journals, books, websites, along with other sources and an interview with a Courtyard Marriott located in Worcester Massachusetts

2. Determine the extent of BEMP usage throughout the hotels/inns, and evaluate the owners/managers perceptions, knowledge, and awareness of specific practices
   - Tasks:
     - Interview key individuals in CTPR actively participating in the Sustainability Initiative
     - Conduct interviews, including audit questions, with the owners/managers of the selected inns participating in the sustainability initiative.

3. Calculate cost analyses to estimate the savings and costs incorporated with the implementation of specific BEMPs at each specific inn.
   - Tasks:
Examination of past methods developed by individuals in order to display the savings associated with certain sustainable practices.

Creation of preliminary tables for simple plug-in calculations.

Calculation of potential savings, cost of implementation, and payback periods of the BEMPs in the inns

4. Explore alternative methods that CTPR might use in order to communicate more effectively with all small hotels and inns on the island

   o Tasks:
     - Review informational materials on BEMPs.
     - Compile the data collected from the previous objectives.
     - Consult with members of CTPR in order to structure the brochure and mass-email outline to fit the needs specified by their company.

The following headings consist of more detailed tasks associated with each objective.

3.1 Range of BEMPs

The project’s first objective examined the nature and range of BEMPs already established in the hotel trade and, more specifically, in Puerto Rico. In order to satisfy the first objective the project group researched the topic thoroughly and also conducted an interview with the Courtyard Marriott, a hotel chain that have established programs to successfully implement green practices. By successfully completing this objective our project team built aggregate background knowledge of BEMP usage in hotels worldwide that was used for further justification of the project goal.

3.1.1 Research

In order to satisfy the objective the project team has researched and examined many sources to gain a better understanding of BEMPs and their effect on the major hotel chains and also the regulatory programs that promote and uphold them. Journals provided the project team with case studies that have been conducted in hotels and inns. The studies not only compared reasons why some hotels choose to or chose not to participate in BEMPs, but also tested methods of publicizing BEMPs to the hotel guests. Journal reviews provided the project teams with
additional sources to be investigated. Government websites provided additional information on current incentives and programs associated with BEMPs. In addition, a previous IQP project, entitled *Implementation of Sustainable Tourism in Puerto Rico*, provided the project team with basic information on conducting the project and sustainable tourism in Puerto Rico. Major journals researched include; the Journal of Sustainable Tourism, Tourism Management, Journal of Hospitality and Tourism, the Geographical Journal, Yale’s F&ES Bulletin, and Production & Operations Management. Newspapers were also used to gain valuable information, including the Boston Globe, the Wall Street Journal, and Caribbean Business. The official website of the Caribbean Tourism Organization also provided the project team with valuable statistical data pertaining to tourism in Puerto Rico.

**3.1.2 Interviews**

An interview pretest was conducted on the campus of WPI with the head of facilities, Fred DiMauro. Conducted through email, the project team found that a more formal and in-person interview style was needed to gather the proper information.

An interview was then carried out with the general manager, Howard Gerhardt, of the Courtyard Marriott located in Worcester (See Appendix I). The interview was conducted on-site and received good feedback from the interviewee. It provided informational materials relevant to the first objective.

**3.2 BEMPs at small Inns**

The project’s second objective determined the extent of BEMPs and evaluated the owners/managers basic knowledge of BEMPs and their attitudes towards them. The project team conducted a series of interviews with CTPR employees, consultants working with CTPR, as well as a series of interviews and audits at a sample of small inns actively participating with CTPR’s *Initiative Toward Sustainability and Excellence* in order to collect the necessary information.

**3.2.1 Interviews with CTPR Employees and Consultants**

The project team also created and conducted interviews, (See Appendix II), with several key CTPR employees and consultants, gaining a better understanding of the purpose and nature of the *Initiative towards Sustainability and Excellence* in relation to the inns. The questions were
also adjusted before specific interviews in order to better fit the needs of the project. In addition, interviews with hotel employees provided feedback on how easily certain BEMPs could be introduced and implemented. The task offered the project group better insight into how CTPR views barriers for the inns in implementing BEMPs. It also provided valuable information on the organizations perceptions of BEMPs and the effect they have on the inns after successful implementation. CTPR employees also provided the project team with information regarding the monthly electric and water consumption including costs and also waste produced for each inn (See Appendix X).

3.2.2 Interviews with Owners/Managers of Inns

Interviews were performed at the inns (Appendix V), with the manager/owner of the establishment. Interview questions for the Haciendo El Jibarito and Hotel Las Villas del Pepino were allowed to be looked over and faxed back to CTPR due to time constraints and other obstacles encountered during the onsite visits. These interviews provided the project team with valuable information in terms of the current workings of the inns and how their managers/owners understand BEMPs. It also provided the team with the owners/managers knowledge of BEMPs impact on both business operations and the environment. Managers/owners perceptions on the implementation of these practices and the barriers that exist were also collected.

3.2.2.1 Use of a Translator

Some of the hotel owners spoke very little or no English at all, therefore a translator was used to ask questions and gather information at these locations. Ana Velez translated the project team’s questionnaire into Spanish, and also asked the owners questions while at each property. Based on what was observed at each inn during the tour, the group asked additional questions that were not included on the questionnaire and specific only to that property. Ana relayed the questions, and translated the owners’ answers into English so they could be documented. She asked questions both during the tour of the property and after, to ensure the group received all the necessary information.
3.2.3 Walk-Through of Property

The project team also conducted a walk-through inspection of the establishments visited, examining specific areas to provide additional information to the audit questions. Specific areas include the total number of guest rooms, number of lights in each room, total refrigerators/microwaves, evidence of motorized lawn equipment, number of low flow shower-heads and toilets, if solar water heaters are installed, number of florescent bulbs installed, recycling programs installed, and whether or not walled shampoo and conditioner dispensers are installed. The project team was escorted to rooms and other buildings on the property by the either the managers/owners or employees.

3.3 Cost Analyses

The project team’s third objective consisted of calculating cost analyses to estimate the savings and costs incorporated with the implementation of specific BEMPs at each specific inn. Visual representations of the benefits to business operations were created through plug in calculations into customized tables.

The project group first examined past methods developed by individuals used to display the savings associated with certain sustainable practices. Worksheets employed in the 2006 IQP, Implementation of Sustainable Tourism in Puerto Rico, were examined to create preliminary tables for the project (See Appendix VII).

The main focus of the tables was the use of compact fluorescent light bulbs to replace regular incandescent bulbs. The cost of electricity before and after the implementation of the new bulbs was analyzed to determine the amount saved in terms of cost and electricity usage. Other general BEMPs were looked at such as low-flow toilets and shower heads and solar panels. The savings and payback periods were used in the website as an example to further encourage the use of BEMPs in hotels/inns in which these practices are not already in place.
3.3.1 Tables

The project team first created preliminary tables for simple plug-in calculations that assisted the team to determine estimated costs and savings of BEMP implementation. These tables were universal and were able to be customized to any specific inn because of the extent in which BEMPs are already in use. The monthly usage and costs for each hotel/inn were different based on the size of the property and the amount of electricity used.

The tables were then customized to better meet the needs of specific inns. The preliminary tables were customized once information was obtained from the inns via interviews and walk-through audits. The calculations were dependent on the prices of natural resources and amount consumed. The data utilized include monthly electric usage and costs, and also water consumption and cost.

Calculations were performed to produce the potential savings, cost of implementation, and payback periods for each of the properties. These calculations were allowed to be adjusted to coincide with the needs of both CTPR and the inns participating in the Sustainability Initiative.

By investigating the hotels use of energy and the cost of new appliances, a payback period graph could be used to depict the amount of time it would take to start saving money while saving the environment. The time it would take to make the money that was spent on new items is minimal compared to the amount of potential savings.

Generalized cost analyses were also conducted to show the cost benefits and payback periods of other BEMPs such as solar panel systems, wind turbines, and low flow showerheads.

3.4 CTPR Communication

The team’s final objective proposed alternative methods that CTPR might use to communicate more effectively with the small hotel and inns in Puerto Rico. Methods proposed include a distributable brochure, a hotel and inn distribution list, a mass-emailing plan, student involvement programs, a CTPR BEMP incentive program, and an internet resource in the form of an interactive webpage. The brochure highlights what BEMPs are and potential implementation methods. It also provides pre-calculated data sheets to display the operational
benefits of implementing certain practices. The proposed webpage includes calculation spreadsheets for inn managers/owners to calculate potential savings themselves as well as additional information on the benefits of BEMPs.

The project team first collected and reviewed informational materials on BEMPs that may serve useful in forming draft copies of a brochure, providing insight into ways to best communicate to the inns the benefits of BEMPs other than the savings (Appendix III). Other methods were examined by the project team to create a benchmark for the layout of the brochure.

The second task compiled the data collected from the previous objectives and together set the benchmark for preliminary brochures. The draft brochures include pertinent information as to why implementing BEMPs is important and the benefits of doing so. The brochure also provides a layout that is easy to create if it was to be used by CTPR. It covers general information and leads to the webpage for additional more specific information.

3.5 Summary

Through research, interviews, audit surveys, and cost analyses, the required information to satisfy the project goal was gathered and analyzed. The information was used to generate recommendations for CTPR to improve communications with small inns and hotels throughout the island and convey the need for BEMPs in their establishments. Along with the recommendations, a brochure and specific cost analyses for each inn visited were created, as well as an outline for an interactive website to promote the use of BEMPs. A final report was also created, summarizing the methods, results, and conclusion of the study.
4.0 Results and Analysis

This section outlines the data and information that was collected through the stated methods in the previous section. The first subsection includes current practices of each inn obtained by on-site inspections and interviews with the owners/managers. The information obtained includes basic information on the property and also information obtained through questions asked during the audit. The information gathered during the audit was then used to produce cost-savings within the cost analyses worksheets. The second subsection outlines potential cost savings associated with decreased energy consumption after implementing specific BEMPs, including fluorescent light bulbs, solar panels, wind turbines, and minimum flow showerheads. The third subsection summarizes the project team’s analysis of the commonalities between the properties by including how the manager/owners feel about BEMPs and future plans and obstacles that need to be overcome. All interviewees gave verbal consent to use their statements and opinions in the report.

4.1 Profiles of Inns Visited

In order to get a better understanding of the small hotels and inns BEMP usage the project team conducted an on-site inspection. The property walk-through was essential in understanding the scope of the property and in accessing the problems they are facing and how they are currently approaching them. In this section, descriptions, photos, and information obtained from the onsite inspection is included. In the descriptions, the amenities of each room are described along with photos. Other areas of the hotels including laundry facilities, restaurants, pools, and convention centers, if any, are also shown.

The hotel and inns were located throughout Puerto Rico and ranged in size. The eight that were selected were used by the project team to create a benchmark for conclusions and recommendations.
Figure 9: Map of Hotels and Inns visited including Dates of Inspection
4.1.1 Hotel Las Villas del Pepino

Located in the mountains of San Sebastian, the Hotel Las Villas del Pepino is a small twenty-one room establishment with a pool, convention center, a restaurant, and a bar and grill. The inn emphasizes its tranquil setting and fresh air to attract guests.

Hotel Las Villas del Pepino was the first inn visited by the project team on the morning of March 18th, 2008. The property is owned by Senora Maraliza Serrano, but was not interviewed due to language barriers and time constraints. The property is very spread out across several acres and the roads used to travel to the different areas are paved with traditional blacktop. The team visited four areas of the property and saw the convention center, three rooms, one of the two restaurants and a laundry room. The convention center is located furthest from the entrance and is surrounded by a large, impervious parking lot.
Inside the Cheneliz Convention Center several types of lighting are utilized, including forty-six tube lights, forty-two recess lights, four flood lights, two ceiling lamps and one chandelier.

Additionally there were eight air conditioners and three sets of bathrooms throughout the room. Each restroom had one set of seventy-five watt Phillips lights, three sinks, and three toilets that use six liters per flush. The men’s room also had three urinals which use 3.8 liters per flush.
The kitchen of the convention center had an additional two toilets and a sink. The kitchen had two walk-in freezers, one glass-door freezer, nine commercial size sinks, one regular sink and nine tube light fixtures.

One wall of the kitchen is lined with commercial stoves and fryers covered by vents.
A step was taken in the convention center to be more energy efficient by replacing five lights with compact fluorescent light bulbs.

The Restaurant Paoppino is down hill from the convention center and is surrounded by a small pond and the villas. The restaurant was small, but contains a bar and four individual bathrooms. Throughout the restaurant there were twenty-two lights, four of which were fluorescent, and there were two air conditioners. In the kitchen there were two ovens with stovetops, a griddle and fryer.
The ten villas are located above the restaurant and grouped together in the surrounding area.

Each villa and room had a solar-water heater and some had back-up electric-water heaters.
Each room had a Haier mini-fridge and a small coffee maker and microwave. There were six lights inside and one light outside of each room as well as and an additional two lights for every three rooms. Five of the lights in the villa the team saw were fluorescent and the hotel had been taking steps to replace burnt out lights with the fluorescent ones. In addition the outside lights could only be turned on from the inside of each villa and are not turned on automatically.

Although there were separate containers for soap, shampoo, conditioner and lotion, each bathroom also had a dispenser for those products.
The laundry room was in the same building as eleven of the rooms and had two washers and an old dryer. The washers were energy star Kenmore Elite and one washer had an Eco Star antibacterial controller, which regulated the wash.

With the amount of pavement surrounding the area of the hotel, it was necessary to have drainage pipes that cause erosion which could be detrimental to the environment. The hotel has made use of recycled water; water is collected at the top of the mountain and is used to wash the sidewalks and other outdoor surfaces.
Since the team didn’t have time to speak with the owners, translated interview questions were left to be answered and returned by fax.

4.1.2 Hacienda El Jibarito

The project team visited Hacienda El Jibarito, located in San Sebastian, on March 18th, 2008 and met with the owner, Senor Ernesto Valle. The hotel, which was a sugarcane farm until 1986, consists of a main building and nine villas across hilly terrain. The main building contains a restaurant, a lounge area, and eight guest rooms. Two of the nine villas have two guest rooms each while the other seven villas each have a single room. Thus, the inn boasts a total of nineteen guest rooms. The inn uses a greenhouse to grow fresh strawberries and eggplant and sugar cane and papaya are also grown on the property. As added attractions for guests, there is also a pond with a fountain located near the entrance and many types of animals, including chickens, goats, cows and horses.

The entrance driveway leading to the main building is paved and there are several more dirt or gravel paths traversing the property on which diesel powered utility vehicles are used. One of these paths leads to a waterfall and pool that is popular with the guests. There is an indoor and outdoor pool with an outdoor bar facility. Approximately half of the light fixtures used compact fluorescent light bulbs, while the rest were the traditional incandescent bulbs. One reason for the combination of fluorescent and incandescent lights is the difficulty in finding compact fluorescent bulbs that fit the many chandelier light fixtures at El Jibarito, which have six small light bulbs each.
Several plants grown at El Jibarito are used in some of the dishes at “Laurnaga,” the hotel restaurant. Growing organic foods on site is a good practice because it reduces the energy used for production and transportation associated with commercial agriculture. Also it is easier to control the amount and type of fertilizer and pesticides applied to the plants for locally grown products.

**Figure 24: Greenhouse at Jibarito**

The owner and employees understand the importance of water conservation as the heat and lack of rainfall damages their plants and dries up the waterfall and stream. They have made some effort to conserve water at El Jibarito and the guests are asked to help as well through the use of signs like this one.

**Figure 25: Jibarito Water Conservation Sign**
There are many animals on the property and the runoff of animal wastes should be monitored to ensure it is not negatively impacting the surroundings.

Figure 26: Chickens at Jibarito

The diesel powered utility vehicle could be replaced by a more environmentally friendly vehicle that has less polluting exhaust. Also animals, such as horses, could be used to travel around the property to reduce pollution and to make it more entertaining for the guests.

Figure 27: Utility Vehicle at Jibarito
The minimal pavement at Jibarito reduces the amount of impervious cover and because most of the paths are dirt or gravel they allow for more infiltration and less runoff.

Figure 28: Jibarito Gravel Path

There is a standard washer and dryer onsite and they use an environmentally friendly laundry detergent that contains biodegradable surfactants and no phosphates.

Figure 29: Dryer at Jibarito
A dirt path leads to one of the Villas at El Jibarito. The steep slopes make runoff and erosion a concern, but there are presently no plans to solve the potential problem.

**Figure 30: Villas at Jibarito**

With so many animals and plants on the hilly property, runoff of animal wastes, fertilizer, and pesticides should be considered. Since guests can go swimming in the water fall and pool not far from the farm there may be a human health concern as well as environmental concerns. Pathogens from animal wastes can cause disease and fertilizers containing nitrogen and phosphorous can cause increased vegetation growth in the pool. As this increased vegetation decomposes it lowers the level of dissolved oxygen in the water and kills fish and other life in the water. This process is known as eutrophication.

**Figure 31: Pond at Jibarito**
4.1.3 The Pineapple Inn

The third inn visited by the project team was the Pineapple Inn in the town of Rincón on March 25, 2008. This town is a popular tourist destination because it is one of the few spots on the island where the waves are big enough to surf. Another attraction for the town is the beauty of the sunsets. Since it is located on the west coast of Puerto Rico, it is the only region where the sun sets over the water.

Figure 32: Pineapple Inn Sign

The Pineapple Inn is owned by Nelson Santos, with whom the group spoke, and Mark Kelly. This was the smallest of the properties visited by the group with only six rooms, all contained in a guest house setting. The name of the inn gives away the decorative motif of the entire property; anything and everything was either colored or shaped like a pineapple. During the visit to the inn, the group was able to visit three of the six rooms and interview one of the owners, Nelson Santos, for a few moments.
During the on-site inspection, the group was able to view three rooms, one of which was occupied so it was viewed from the doorway. The rooms were different sizes, but all contained the same amenities. Each of the rooms contained six light bulbs total, an individually controlled air conditioner, individually wrapped toiletries, a microwave, coffee maker, television, DVD player, and refrigerator. Natural light was let into each room by an average of three windows with blinds. Only one fluorescent light bulb was evident but the owner plans to upgrade the others as they need to be replaced. They are currently in the process of starting to switch over to fluorescent light bulbs from traditional incandescent. Not all of the rooms had fluorescent bulbs, but many of the outdoor lights did. The main goal of the establishment at the time of the visit was to replace at least one light bulb in each room’s ceiling fan with a fluorescent bulb, and to continue by replacing the lights in the bathroom, and finally the nightstand table bulbs. The lights outside by the pool stay on all night long, and those all have fluorescent bulbs in them.
Figure 34: Pineapple Inn AC

Figure 35: Pineapple Inn Ceiling Fan

Figure 36: Pineapple Inn Electronics

Figure 37: Pineapple Inn Toiletries

Figure 38: Pineapple Inn Low-Flow Toilets
In the general vicinity of the property, there was a pool, outdoor shower, outdoor bar area with grill pit, separate restroom, and various chairs, hammocks, and seating areas. There were no concrete or asphalt walkways, except around the pool. Crushed stone was used to cover all ground where there was no grass.

Figure 39: Pineapple Inn Pool

Figure 40: Pineapple Inn Crushed Stone

Figure 41: Pineapple Inn Outdoor Shower

Figure 42: Pineapple Inn Outdoor Bar
In terms of BEMPs, The Pineapple Inn has already implemented a few environmentally friendly practices. Nelson Santos was new to running a hotel, so the process of converting to BEMPs was slow, but he had started with recycling. All guests are encouraged to recycle, and the housekeepers are instructed to separate clean recyclables out of the trash when they replace the bags. The inn also uses recycled toilet paper, which turns out to actually be cheaper than regular toilet paper. The guests do not seem to notice the difference, so the practice is still in use.

In addition to recycling, solar water heaters are also in use in the inn. There is one solar water heater per room, and also a backup electric generator in case of rainy or cloudy days when all rooms are occupied.
The laundry facilities contained a utility sink, cleaning supplies, laundry detergent, and one Kenmore Elite washer and dryer. All cleaning products contained biodegradable surfactants and no phosphates, a great environmentally friendly practice.
4.1.4 Luquillo Sunrise Beach Inn

On April 1, 2008 the project team visited the Luquillo Sunrise Beach Inn located in Luquillo. The general manager, Sherri Fisher, was interviewed in English on-site; the group was able to perform an onsite inspection of the facility and also complete the questionnaire. The inn housed fourteen individual one-bedroom units and one two-bedroom unit, for a total of 15 units.

Each of the rooms contained approximately eight light bulbs, a television, coffee maker, refrigerator, microwave, air conditioner, and ceiling fan.
In terms of BEMPs, the inn has taken several steps to make itself more environmentally friendly. Out of the eight light bulbs in the units, there are four fluorescent bulbs above each of the vanity mirrors. Each of the rooms also contains an in-shower dispenser for shampoo, conditioner, and soap. When Sherri Fisher makes her early morning rounds, she notices that many room doors are open, indicating that guests are letting the natural breeze cool them off, and not an air conditioner.
In other areas of the inn, the manager has implemented other BEMPs, including mop water recycling, general recycling, and energy efficient appliances. In the main lobby area, the inn has its environmental policy posted for guests to see. Specifically for energy conservation, the staff is replacing standard light bulbs with fluorescent bulbs as they burn out. The housekeeping staff is also instructed to turn off all appliances and the air conditioner when they clean the rooms. The day of the visit, a crew was installing solar panels on the roof for water heating.

To reduce their solid waste, the Luquillo Sunrise Beach Inn focuses their efforts on recycling. The manager is adamant about recycling, and boasts that 99% of the aluminum on the property is recycled. As for glass and plastics, about 75-80% of those materials are recycled at the inn. In the lower level of the building, there are three recycling bins set up for glass,
aluminum, and plastic in both English and Spanish. Housekeepers are instructed to separate out recyclables from the regular trash when they clean the rooms as well. Ms. Sherri Fisher stated that she didn’t want to add to the problem, and gave the example that she would never give guests drinks in Styrofoam cups to take to the beach and lose. Even though the beach is a public place, the inn has in makes efforts to clean the beach around the area in front of the inn daily and sets up trash bins, which they in turn empty. She told us that if the beach is dirty and polluted, that is something that Americans notice and she makes efforts to keep things clean to keep her guests happy.

Figure 56: Luquillo Recycling Bins

The inn use to donate wastes to a local pig farmer, but he felt that the inn didn’t “produce enough to justify him coming (Sherri, personal communication).” There was also a compost program, but it is not going well and the progress has been subject to stop/start status. This is attributed to maggot infestation of the compost, which could be avoided if all the meat and fats are excluded from the compost.

The manager of the inn has installed low flow toilets and showerheads in all of the rooms/units to help the property conserve water. The laundry facility has two washing machines and two dryers; one of the washing machines has an energy saving setting but it is unclear how often that setting is used. On non-windy days, the staff dries linens on the clothesline to conserve energy. They also employ the towel reuse program, which is advertised by a sign in each of the rooms. The linens are done in each room about once every three days, in order to conserve water.
4.1.5 Hostería del Mar

The fifth inn visited by the project team was Hostería del Mar on April 4th, 2008. Hostería del Mar is located on the beach of Ocean Park in San Juan and is minutes away from the Condado, Isla Verde, Old San Juan and Plaza las Américas. A mixture of tropical and contemporary Puerto Rican hospitality and ocean views help add charm to the twenty-four room establishment, which sits on 900 square feet. Not only can guests enjoy the ocean breeze, they can also experience Mediterranean cuisine with a Latin touch for any meal at the inn's own restaurant, Uvva.
The project team began their visit to the Hostería del Mar with a meeting in the lobby with the owner, Elsie Herger. The lobby was open to the restaurant and was cooled completely by the ocean winds and lit by the numerous windows allowing the sun to shine in. Elsie Herger was very excited to answer our questions and provided the team with useful information. Once the visit was complete the team decided the property would be perfect to use as an example for all inns and small hotels of Puerto Rico.

Once the project team was finished meeting with the owner, Elsie Herger, the on-site inspection was performed. The inspection included the common areas and three guest rooms in the establishment, all of which were different. However, the team was unable to view one of the establishment’s one-room apartments, of which there were four. Each room is very different in set-up and furniture, but each room has an air-conditioner, cable TV, telephone and bathroom. Although there were a different number of lights in each guest room, Elsie Herger alleged that every light bulb in the establishment has been replaced with fluorescent light bulbs and even though the unit price of electricity has been rising, she has seen a decrease in her energy bills. While the team walked around the rooms they only found one incandescent light bulb that might have been missed when replacing the bulbs.

As of now, they have replaced nine toilets and all showerheads with low flow hardware. Also, instead of washing sheets every day the establishment has switched to washing sheets every two days to decrease energy and water consumption of on-site laundry, which is done with biodegradable soap. The use of biodegradable cleaning agents throughout the inn is not only beneficial in conserving the environment, it is also beneficial to people with allergies that could be bothered by the chemicals found in cleaning agents.

The establishment has made many efforts to be more environmentally conscious including steps to recycle, save energy and decrease waste production. Although the only steps made to incorporate BEMPs are minimal at the moment Senora Elsie Herger wishes to incorporate many more. Although there is no dependable recycling program in the city, Senora Elsie Herger has been recycling many materials. She reuses the newspapers as dirt on her farm and uses the uncooked leftover food from the restaurant as compost to grow the fruits and vegetables used in the restaurant. The left over oil from the kitchen is picked up and used as fuel. Bottles are taken to a recycling center by an employee once a week and efforts are being made to have a pig farmer pick up left over cooked food. Elsie says she receives multiple calls
from the city informing her of a recycling program but has yet had anyone come. Since no one has come and there is no other recycling program that she knows of she doesn’t really have a way to do so.

Elsie Herger stresses the use of biodegradable cleaners to decrease the effects on the environment and to keep the harsh smells of cleaning agents out of her establishment. A year ago, policies were changed from washing the sheets everyday to every other day unless requested otherwise. Since the new policy has worked so well, cards will be placed in the rooms to inform guest of the policy and to start a towel reuse program.

Several suites are available with kitchenettes and the apartments each have a full kitchen. Not all rooms have a refrigerator, but efforts are being made to install switches to turn off the refrigerators when no guests are staying in the room. Elsie Herger wishes to install motion sensors in each room to regulate the use of electricity. Motion sensors will be used to turn off the lights and air-conditioners while no one is in the room. Shampoo and conditioner dispensers were not installed in the bathrooms but were before the tile in the bathroom was replaced. Elsie Herger said the dispenser will be reinstalled once they find a contractor to do so.

The owners of the inn try to make use of their ocean front property by maximizing windows to let in light and the breeze. The restaurant maximizes the natural setting with windows that completely opens up to the ocean and uses no lights.

**Figure 60: Uvva Restaurant’s use of Natural Lighting**
The entrance to the establishment was surrounded by fish pools and a waterfall. Although rain water is not reused presently, it would be very beneficial to the establishment to be recycled and used in the outdoor attractions.

**Figure 61: Waterfall at the Entrance**

![Waterfall at the Entrance](image)

4.1.6 Hotel El Guajataca

On Wednesday, April 09, 2008 the project team visited Hotel El Guajataca and met with the owner’s assistant, Edwin Jaime. The property appears to live up to its slogan of having, “The best view in Puerto Rico.” Each of the thirty-eight rooms in the 78 year old establishment in Quebradillas has a beautiful view overlooking the ocean.

**Figure 62: Plaque at Hotel El Guajataca**

![Plaque at Hotel El Guajataca](image)
The inns main attraction is the beautiful views and is perfect for functions and weddings overlooking the ocean.

**Figure 63: Ceremonial Archway**

Although the majority of the staff only spoke Spanish, they were very welcoming and Ana Velez translated for the project team. During the visit to Hotel El Guajataca, the project team was able to sit down with the inns assistant manager, Edwin Jaime. Ana Velez translated each question and answer, since there was a language barrier. Once the interview with Edwin Jaime was completed, an employee showed the project team around the property, including several guest rooms.

The inn has a private company plant trees, clean up the property, and maintain the surrounding area. Although the company is expensive for the inn, Edwin Jaime feels that it is worth it because they are taking care of the environment. The electricity and water bill of the establishment is high per month, $7,000 and $3,000 respectively. The inn also makes use of gas which usually totals around $1,000 each month.

The property owners were making small steps to make sustainability improvements to the property including changing light bulbs to fluorescent.
Each of the six rooms visited by the team was different in set up, furniture and size making it difficult to generalize lights per room. On average, each guest room at the Hotel El Guajataca had five light bulbs, most of which had been replaced by fluorescent bulbs. Lights outside are on timers but there are no motion sensors installed on the property. Laundry is done onsite and linens are washed everyday, which could help account for high bills. Each room had a solar water heater backed up by a gas heater in case the sun did not provide enough energy to warm the water.

Figure 64: Fluorescent Light Bulbs

Figure 65: Solar Water Heaters
Although Hotel El Guajataca was in the process of replacing each shower head with new shower heads that combine air and water that work by water pressure, the shower heads already installed were not low flow. The project group noticed shampoo dispensers in a few of the rooms, but the inn was in the process of being removed and replaced with individual bottles, which counteracts the sustainability program.

**Figure 66: Toiletries**

Only twelve rooms had a mini-fridge, but they were left on even with no guests. The project team also noticed that a television had been left on in one of the rooms that could have been empty for weeks. Although there is no recycling program on the property, oil and left over food is picked up to be used in other industries. Implementing a recycling program could help reduce the cost of trash disposal while helping to save the environment. The inn has a private company water the landscape manually every two days, but incorporating a BEMP to use rain water to water the plants could help decrease the water bill. The property of Hotel el Guajataca has a beautiful view but it is difficult to make improvements with the high price of energy and water. A few minor changes to the property, such as not washing the linens every night could be very beneficial in the long run.

4.1.7 Palmas de Lucia

The seventh inn visited by the project team was to the Palmas de Lucia located in the Yubucoa town and took place on April 15, 2008. Palmas de Lucia is less than one acre located in front of Lucía Beach on Puerto Rico’s southeast coast. The property is surrounded by views of the mountains and the beach, which is only a short walk from the establishment. The team
met with the owner, Juan López, and inspected the property, which consisted of thirty-four guest rooms, a restaurant and a pool.

**Figure 67: Palmas de Lucía Pool Area**

![Image of Palmas de Lucía Pool Area](image1)

The inn has taken large strides to become more sustainable over the past years and Juan is currently investigating additional changes that could be made. Juan has begun the process by replacing all light bulbs on the property, except those light bulbs in the restaurant which are on a dimmer, with fluorescent light bulbs.

The establishment recycles everything that they can, from paper and plastic to left over food. In each room there is a recycling bin which is separated out daily by housekeeping. Paper, plastic, aluminum and glass is separated and picked up two times a week.

**Figure 68: Recycling Bins in the Guest Rooms**

![Image of Recycling Bins in the Guest Rooms](image2)
Left over food from the kitchen is picked up by a pig farmer. A company provides the establishment with a container to store left over oil from the kitchen and is picked up twice a month.

**Figure 69: Containers for Oil (left) and Recyclables (right)**

Each guest room has an energy efficient mini-fridge and microwave and five light bulbs. In order to keep guests from leaving their outside lights on all night, they are unscrewed until a guest wants to use it. In efforts to save energy, the mini-fridges are turned off while there are no guests in the room and only turned on one day before a guest will arrive and the time the room is inhabited.

**Figure 70: Mini-fridge and Microwave**
Although laundry is not done on-site, there are signs in the guest rooms explaining that sheets will only be washed every third night and towels will only be washed if they are placed on the floor. Guests who require sheets to be washed daily are able to request to do so.

**Figure 71: Sign Introducing Sustainability in Guest Room**

![Sign Introducing Sustainability in Guest Room](image)

Each guest room has a low-flow toilet and showerhead installed in the bathroom. Although amenities such as shampoo, soap, lotion and conditioner are placed in each bathroom rather than a dispenser, they are only replaced if they guest has used them.

**Figure 72: Toiletries**

![Toiletries](image)
A private company does landscaping for the property but only organic materials are used as fertilizer every six months. The pool uses a sand filter and an electrolyte mix of salt and chlorine in the pool rather than using chlorine alone, which can be harmful to the environment.

**Figure 73: Electrolyte System**

Across from the property is a large paved parking lot with no run-off control. The parking lot had been gravel but was paved once CTPR suggested it.

Although they have taken many steps to become more sustainable they wish to use the wind from the beach to their advantage by using a wind power system but the initial price is very expensive and the pay back period could be over fifteen years.

**4.1.8 Marina de Salinas**

**Figure 74: Marina de Salinas**
The project team visited Marina de Salinas located on the coast in Salinas on April 17. The hotel has 32 guest rooms and a marina. It also includes a convenience store, a snack bar, and Restaurante Costa Marina. Each of the rooms had four to six lights approximately half of which were fluorescent light bulbs. Crushed stone was used throughout the property allowing for increased infiltration of rain water.

**Figure 75: The Marina**

There was a marina that could dock 103 vessels at which guests could launch their own boats or rent boats, kayaks, and other water craft from the establishment. Although the motor oil from the boats is collected to be recycled, accidental oil spills are still a concern and there is a $5,000 fine for any contamination.

**Figure 76: Outdoor Snack Bar**

The outdoor snack bar and sitting area extended over the water and is sometimes used for events such as weddings.
Each room was equipped with a microwave and half refrigerator. Each room also gives the guest the option of using a fan instead of the air conditioning which saves some energy.

All of the toilets and showerheads are low flow at the Marina de Salinas. Individual toiletries are provided instead of a dispenser and the toilet paper is made from recycled materials.
Solar water heaters are used at the Marina de Salinas and back up diesel generators are used when the demand is too high or poor weather reduces the solar water heaters efficiency.

There was also a restaurant called Restaurante Costa Marina which included a banquet hall at the marina. The many large windows utilize a lot of natural lighting reducing the expenditures for electric lighting.

An interview was not conducted at Marina de Salinas due to time conflicts.

4.1.9 Summary of BEMP Usage and Results

The group gathered data on each BEMP implemented at each property, and compiled the information for easy viewing. The team looked for the following BEMPs during the site inspection: fluorescent lights, low-flow shower heads, low-flow toilets, wall mounted shower
dispensers, towel reuse programs, grey water recycling, solar water heating, motion sensors, wind power, solar panels, green roofs, detention basins, organics/oil recycling, and geothermal power. There are many other BEMPs that may be adopted and the hotel and inn owners/managers were given the opportunity to comment on others that may be used at their establishment: No other significant BEMPs were employed.

Low-Flow toilets were the most prominent BEMP throughout the eight selected establishments, followed by low-flow showerheads, having almost every establishment implementing 100%. The project team believes that this is due to their accessibility and the fact that modern equipment is mostly all low-flow. The use of fluorescent light bulbs varied from one hotel to the next, as did the use of grey water recycling, towel-reuse programs, wall-mounted shower dispersers, solar water heating, and recycling programs. The varying numbers provide evidence that the hotel and inns may be unaware, or unable, to implement each specific BEMP. Fluorescent light bulbs are more widely accepted by the small inns and hotels due to their participation with CTPR’s *Initiative Toward Sustainability and Excellence*. Communication with the inns and hotels is a major driving factor for adopting certain practices. The project team believes that if the communication of BEMPs were promoted more intensely these hotels and inns, much like all others throughout the island, will adopt these practices.

Solar panels, wind power, geothermal power, green roofing, and the use of detention basins were not present in any of the establishments. Solar panels, wind and geothermal power, and green roofing, may be too expensive for the small lodging areas to adopt; there is currently no financial backing provided for the adoption of these practices to become more widespread. The use of detention basins to deter run off in areas are simply overlooked due to the fact that the contents of the soil do not pose much of a concern of hotel and inn owners/managers.
<table>
<thead>
<tr>
<th>Method</th>
<th>Palmas de Mar</th>
<th>The Pineapple</th>
<th>Pepino</th>
<th>Jabarito</th>
<th>Luquillo Sunrise</th>
<th>Guajataca</th>
<th>Hosteria de Mar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florescent lights</td>
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<td>3</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>8</td>
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<td>10</td>
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<td>Low-Flow Toilets</td>
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<td>10</td>
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<tr>
<td>Geothermal Power</td>
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<tr>
<td>Organics/Oil Recycled</td>
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<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

The ranking system is based on a 0-10 scale. 0 is used to indicate that the BEMP is not installed. A 10 signifies 100% implementation throughout the entire establishment.
4.2 Cost Analyses Worksheets and Comparisons

In order to compare the environmental practices in each of the hotels, the group developed cost analysis worksheets. These worksheets allow for visual representation of the savings incurred by implementing BEMPs, and also allow a basis for comparing hotels to each other in terms of resource consumption and cost. Due to the inability to acquire key information, the project group focused its efforts on using only the fluorescent light bulb cost analysis worksheet.

Based on the average number of lights in each guest room, the monthly cost of electricity was calculated for each hotel. The monthly savings was determined by calculating the electricity costs for the number of regular incandescent bulbs in each room, and subtracting from that the monthly cost of replacing those bulbs with compact fluorescent bulbs. All calculations were obtained using the average cost of electricity per kWh ($0.25), the average cost of a bulb ($4 fluorescent, $0.52 regular), and the average number of bulbs replaced per month (0.09 for fluorescent, 1.04 for regular).

Table 3: Cost Comparison Table

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kWh electricity</td>
<td>$0.25</td>
</tr>
<tr>
<td>Average compact fluorescent light bulb</td>
<td>$4.00</td>
</tr>
<tr>
<td>Average incandescent light bulb</td>
<td>$0.52</td>
</tr>
</tbody>
</table>

In each of the tables, the first section shows the current electricity usage and bulb costs for regular incandescent bulbs. The total number of rooms in the inn/hotel, the number of incandescent bulbs per room, the total number of incandescent bulbs in the entire hotel, the monthly cost of electricity, and the number of new bulbs needed per room (based on life span of incandescent bulbs) are all shown.

Second, the same information is shown for the compact fluorescent bulbs. One major difference between the two types of bulbs is the amount of electricity needed. Regular incandescent bulbs use approximately 10.8 kWh each of electricity per month versus the compact fluorescent that use approximately 2.74 kWh each (Barnes, Batsone, Orthodoxou, & Terrio, 2006). By changing to compact fluorescent bulbs, each socket conserves 8.06 kWh of
electricity, which is approximately $2.02 per month. The average number of bulbs per room is five, which adds up to a $10.10 savings on electricity cost per month per room (if no fluorescent bulbs were in place to start with).

The third section of each chart outlines the statistics for converting the number of regular incandescent bulbs to compact fluorescent in each room. The numbers per hotel vary, since each had a different number of regular bulbs to start with. Finally, the monthly costs and savings for electricity are totaled, along with the total investment (calculated using the cost and life span of each bulb), and the payback period.

Table 4: Example Cost Analysis Worksheet

<table>
<thead>
<tr>
<th>2</th>
<th>Current Electricity Usage and Bulb Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Total number of rooms</td>
</tr>
<tr>
<td>4</td>
<td>Number of regular bulbs/room</td>
</tr>
<tr>
<td>5</td>
<td>Total number of regular bulbs</td>
</tr>
<tr>
<td>6</td>
<td>Electricity used per month per bulb (kWh)</td>
</tr>
<tr>
<td>7</td>
<td>Total electricity used/month (kWh)</td>
</tr>
<tr>
<td>8</td>
<td>Monthly Electricity costs ($)</td>
</tr>
<tr>
<td>9</td>
<td>Bulbs/month/room</td>
</tr>
<tr>
<td>10</td>
<td>Monthly bulb costs ($)</td>
</tr>
<tr>
<td>11</td>
<td>Total Monthly cost regular bulbs all rooms ($)</td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Compact Fluorescent Light Bulbs</td>
</tr>
<tr>
<td>14</td>
<td>Number of fluorescent bulbs/room</td>
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<td>15</td>
<td>Total number fluorescent bulbs</td>
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<td>16</td>
<td>Electricity used/month/bulb (kWh)</td>
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<td>18</td>
<td>Monthly electricity costs ($)</td>
</tr>
<tr>
<td>19</td>
<td>Bulbs/month/room</td>
</tr>
<tr>
<td>20</td>
<td>Monthly bulb costs ($)</td>
</tr>
<tr>
<td>21</td>
<td>Total monthly cost all rooms ($)</td>
</tr>
<tr>
<td>22</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Converting to Fluorescent Bulbs</td>
</tr>
<tr>
<td>24</td>
<td>Number of bulbs in room not fluorescent</td>
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<tr>
<td>25</td>
<td>Electricity used/month/fluorescent bulb</td>
</tr>
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<td>26</td>
<td>Total electricity used/month (kWh)</td>
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<td>27</td>
<td>Monthly Electricity cost ($)</td>
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<td>28</td>
<td>Total Monthly Costs in all rooms ($)</td>
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<td></td>
</tr>
<tr>
<td>30</td>
<td>Savings</td>
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<td>31</td>
<td>Total Monthly Cost (regular + fl bulbs) all rooms</td>
</tr>
<tr>
<td>32</td>
<td>Total monthly cost if all were fluorescent ($)</td>
</tr>
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<td>33</td>
<td>Monthly electricity cost savings ($)</td>
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<tr>
<td>34</td>
<td>Total investment ($)</td>
</tr>
<tr>
<td>35</td>
<td>Payback Period (months)</td>
</tr>
</tbody>
</table>
4.2.1 Usage and Cost Comparison

The seven hotels/inns visited by the group range from six to thirty-eight rooms, and have from four to thirty light bulbs per room. This range indicates their varying electricity needs, yet allows for comparison between them. From the information collected from each of the hotels/inns, the average monthly electricity savings for all of them was $384.43 with an average payback period of 1.59 months. The average number of fluorescent bulbs per room was 2.86, an average of 45.068% of the total bulbs per room.

To show the percentage of money saved by installing fluorescent light bulbs, the team compared the current usage of fluorescents to no use at all. This means that electricity costs of 100% incandescent usage was compared to each hotel’s current fluorescent bulb usage. The average value for all the properties combined was calculated to be 14.52%.

One important figure to notice is the correlation between the percent of fluorescent bulbs used compared to the percentage of money saved. The prime example is Palmas del Lucia, with the highest energy cost savings of 24.2% of their bill ($347.59). By replacing three incandescent bulbs in each room with fluorescent bulbs, a 75% increase in fluorescent bulbs, the property was able to cut a staggering 24.2% off their electric bill. This property serves as a great example for the rest of the island, and proves that the initial investment is most definitely a great financial benefit for business operations.
Table 5: Statistical Comparison of Usage and Cost for Properties

<table>
<thead>
<tr>
<th></th>
<th>Guajataca</th>
<th>Hosteria</th>
<th>Jibarito</th>
<th>Luquillo</th>
<th>Palmas</th>
<th>Pepino</th>
<th>Pineapple</th>
<th>Averages</th>
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</thead>
<tbody>
<tr>
<td>Number of Rooms</td>
<td>38</td>
<td>24</td>
<td>11</td>
<td>15</td>
<td>34</td>
<td>21</td>
<td>6</td>
<td>21.28571</td>
</tr>
<tr>
<td>Total bulbs/room</td>
<td>5</td>
<td>4</td>
<td>30</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>9.571429</td>
</tr>
<tr>
<td>Monthly electricity cost</td>
<td>$365.43</td>
<td>$153.02</td>
<td>$1021.16</td>
<td>$257.148</td>
<td>$547.40</td>
<td>$223.90</td>
<td>$122.94</td>
<td>$384.43</td>
</tr>
<tr>
<td>Monthly Savings w/ F. Bulbs</td>
<td>$194.24</td>
<td>$61.34</td>
<td>$787.19</td>
<td>$153.35</td>
<td>$347.59</td>
<td>$107.34</td>
<td>$92.01</td>
<td>$249.00</td>
</tr>
<tr>
<td>Monthly electricity usage</td>
<td>1133.16 kWh</td>
<td>456.48 kWh</td>
<td>3386.68 kWh</td>
<td>812.4 kWh</td>
<td>1748.28 kWh</td>
<td>683.76 kWh</td>
<td>405.24 kWh</td>
<td>1232.286 kWh</td>
</tr>
<tr>
<td>Number fluorescent bulbs/room</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2.857143</td>
</tr>
<tr>
<td>Payback period (Months)</td>
<td>1.8</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.594286</td>
</tr>
<tr>
<td>Percent Fluorescent bulbs/room</td>
<td>60%</td>
<td>75%</td>
<td>6.67%</td>
<td>50%</td>
<td>42.9%</td>
<td>66.7%</td>
<td>14.3%</td>
<td>45.068%</td>
</tr>
<tr>
<td>Percent Savings to Date</td>
<td>19.3%</td>
<td>24.2%</td>
<td>2.15%</td>
<td>16.1%</td>
<td>13.8%</td>
<td>21.5%</td>
<td>4.6%</td>
<td>14.52%</td>
</tr>
</tbody>
</table>
The direct correlation between increasing the amount of fluorescent bulbs and lowering energy costs is one of the greatest arguments for the implementation of BEMPs in properties on the island. With the average return investment time of only 1.59 months, these properties should see savings almost immediately. The Pineapple Inn is an example of how a small change can go a long way. This inn replaced just one incandescent bulb in every room (a 14.3% increase in fluorescent bulbs) which resulted in a $122.94 per month savings on the inn’s electric bill.

![Figure 81: Benefits of Fluorescent Bulb Usage](image)

4.2.2 Further Cost Analyses

Although a cost analysis for further BEMPs beyond compact fluorescent light bulbs was not possible because of a lack of data, basic cost analyses can be completed by using some general assumptions. The following are examples of possible cost savings for low flow showerheads, solar panels, and wind power based on average parameters.
According to Fernando Abruñas, low flow shower heads and aerators cost an average of five dollars. These showerheads and aerators produce 2.5 gal/min compared to the 5 gal/min that a normal showerhead generates. Obviously, the water consumption is cut in half; if an establishment converts only one shower head (assuming that an average shower is eight minutes) it can save 20 gallons per shower. Assuming that an average hotel room consumes 209 gal/day (160 gallons from showering) they can save 80 gallons per day.

The charge for water consumption is broken down into ranges of volume of water consumed. There is a base charge for the first 2,641.2 gallons, $19.71. The next block is $2 for every 262.12 over the base ending at 3,961.8 gallons total. Block three consists of a total of 9,244.2 gallons at $2.93 per 262.12 gallons consumed. The fourth block charges $3.93 for every 262.12 gallons after block three. If the establishment is located in the third block it will save $26.83 per month \[\frac{(80 \times 30)}{262.12} \times $2.93\]. A property located in the fourth block will save $35.98 per month \[\frac{(80 \times 30)}{262.12} \times $3.93\]. The payback period for the single showerhead changeover is only one month. 100% implementation of this BEMP would dramatically lower the establishments water consumption and save money with a short payback period. (Information based on Hosteria de Mar which is an average size small hotel and inn with 24 total guest rooms).

For the next example regarding solar panels, assume the following system is purchased and installed:

- Thirty 120 watt panels @ $585 each = $17550
- Twenty four aluminum brackets @ $6 a pair = 72
- Cables and charger equipment = approx. $500-700
- Total = approx. $19,000

The system generates an average of 11.88 kWh/day, saving the establishment approximately 356 kWh/month. Assuming an average small hotel or inn consumes 1,232.286 kWh per month at $.25 per kWh, the installation of the solar panel system will save the property $89 out of approximately $308.07 a month. The payback period for this solar panel system is roughly eighteen or nineteen years assuming there is no fluctuation in savings per month.

Many establishments are hesitant to implement solar panel systems due to the long payback period. Federal and state incentives are a major driving factor for establishments to
implement solar BEMPs and none of the interviewed managers/owners or CTPR employees/consultants are aware of any that are currently offered for Puerto Rico.

The following example demonstrates cost savings associated with wind power. If the average monthly energy consumption for a small hotel is 1200 kWh per month at $0.25 per kWh the monthly bill would be $300. If the average wind speed at the hotel is 14 mph a wind mill could produce 2500 kWh of electricity each month. After using 1200 kWh the hotel could sell the extra 1300 kWh of energy produced to the energy grid for $0.25 per kWh. Therefore, not only would the electricity used that month be free but the energy sold would generate $325. At this rate a wind turbine costing $36,000 would pay for itself in approximately five years and all power sold afterwards would be profit.

Wind power can save a business a lot of money on electric bills if done properly. One of the major challenges to implementing wind power is the initial capital investment required to install the wind turbine. Many small hotels do not have the resources to fund such an expensive project without some type of financial incentive.

4.3 Interviews Results and Analysis

Concern of the human impact on the environment has grown exponentially in recent years. Awareness throughout the island has increased, in the hotel industry especially. In order to gauge the knowledge and perceptions of small innkeepers, the project group visited eight inns that were participating in an initiative with CTPR. The Initiative Toward Sustainability was created by CTPR in order to improve awareness of sustainability throughout the island. This section is an analysis of the commonalities between the properties by including how the manager/owners feel about BEMPs, future plans and obstacles that need to be overcome.

Along with the interviews conducted with the managers/owners, the project group was fortunate enough to interview with CTPR employees and consultants working on the Initiative Toward Sustainability and that information is also included in this section. The consultants were interviewed in order to get their prospective on the industry as a whole, since they have had experience working with a variety of inns. Those employees working on the Initiative Toward Sustainability have a range of specialties and are working together to help inns improve their establishments. The project group chose to interview three who were familiar with the extent of BEMPs being used in the hotels. The information provided helped the project team get CTPRs
view on the program rather than just the inn owners/managers view. Alida Ortiz and Ada Torres were interviewed about BEMP in Puerto Rico. Fernando Abruñas, an architect provided the team with valuable information on BEMP and products used in hotels. Eddie Perez, from the Marketing Department of CTPR was interviewed about the website they currently use and the project team’s proposed website as well. Although they have been working diligently with the group in the initiative, there is still a lot that needs to be done to promote sustainability throughout the island.

4.3.1 Knowledge of Best Environmental Management Practices

Through interviews with hotel managers and CTPR employees the project team is convinced that greater awareness of sustainability and BEMP need to be encouraged throughout the island. Education is essential in promoting sustainability and BEMP and moving the hotel industry closer to sustainability. Most inn owners are only aware of those practices suggested by CTPR’s Initiative Toward Sustainability. According to Ada Torres, inn owners/managers are “familiar with good practices” but she has found that they are not aware of broader issues of “environmental care and conservation.” This lack of knowledge is not confined just to the inn owners, however; it’s “not just the inns, it’s the country as a whole.”

Like many others, Elsie Herger of Hostería del Mar feels a lack of education about sustainable development is a major problem in Puerto Rico. She knows that the newspapers are making efforts to educate people by including articles on the environment and management practices. She points out that before the CTPR program she was unaware of the many ways her hotel was wasting energy, “It never occurred to me that having the refrigerator on all the time was costing so much money.” She feels that having a website to educate the hotels on different practices would be very beneficial, “It costs nothing to save energy.”

Elsie also informed the project team about her time as a director of a program with the Puerto Hotel and Tourism Association (PRHTA) and CTPR, to stress the importance of education and law enforcement to keep the areas surrounding the hotel clean. The program was initiated to help clean up the water and beaches and programs were also set up in schools to teach children about the effects of littering. Laws were put in place to make the owners of businesses responsible for their surrounding environment and to fine those breaking the laws that harmed the environment. Unfortunately, the laws were not enforced and the program died. Although the
program died she still makes the efforts to stay true to it and cleans up the beach daily and uses the debris and trash as compost.

4.3.2 Importance of Sustainable Development for the Tourism Industry

The project group has come to believe, through communication with inn owners/managers and the employees of CTPR, that sustainable development is not only essential in the tourism industry but essential for the future of Puerto Rico. Some feel that it should be required by law that not only hotels, but all businesses, should be responsible for the environment surrounding their establishment. Ada Torres argued that since Europe is very adamant about recycling, Europeans are not going to want to visit places that “have lots of garbage” because it “affects their experience.”

Nelson Santos of the Pineapple Inn thinks sustainability is important both for the island and for his business, and that it is his responsibility to keep up and maintain the environment around his property. Edwin Jaime of El Guajataca feels that everything related to sustainability is positive and by implementing these changes he can help the world and can even help improve the ambiance of the inn. Edwin Jaime feels it is essential to participate in sustainable development because it not only affects his establishment; it pays a role in global warming occurring around the world.

The immediate environment surrounding the inns is not the only aspect affecting the tourism industry. As illustrated in section 2.2, the main attraction of Puerto Rico, in a tourism sense, is its natural environment. The tourism has had a negative impact on the environment of Puerto Rico since the carbon dioxide gases released through travel (by airplanes, cars, etc.) accelerates ozone depletion. According to the United Nations Environment Programme, the tourism industry accounts for about 50% of traffic movements due to the movement of people from their homes to other destinations. With increased ozone depletion, the effects of global warming have become evident and have the potential to have a negative effect on the industry.

Elsie Herger of the Hostería del Mar asserts the global warming has already taken its toll on the environment of Puerto Rico and can only be slowed by the aggressive promotion of sustainable development. One example of a stressed environment is the bleaching of the coral reefs, which is caused by increased water temperature and reduced rainfall (UENP, 2004). Sustainable tourism would make great progress in slowing the damage to Puerto Rico’s natural environment. Elsie Herger of the Hostería del Mar not only feels that sustainable development
should be required by law of every hotel, she also feels the effect of global warming and is afraid it is very serious. Puerto Rico isn’t used to temperature changes and the weather lately has been something Puerto Rico has never seen before. Although she might not see the effects of global warming she still feels it is important for her to save the environment for our descendents, but in order to do so she would need financial help.

4.3.3 Cost Considerations

Cost is a driving force associated with the lack of BEMPs being practiced, which has become evident to the project group. Most inn owners/managers understand that the payback period would overcome the high initial costs; they do not have the financial backing to make such investments. After the inn keepers voiced their opinions on payback periods and upfront costs, it has become evident that incentives are essential for smaller establishments to incorporate BEMPs. Many of the newer buildings can easily incorporate green technologies into their original plans but it is much more difficult for existing buildings. The cost of BEMPs was a common obstacle for all inns. Speaking with the inn owners not only helped the group determine the effect of costs, it also helped determine methods the inns have incorporated to become more sustainable incrementally.

Juan López of Palmas de Lucía, as well as many inn owners, explained to the project group that their properties were not built for sustainability. Incorporating BEMPs in older buildings, which many of the inns are, can be a costly investment, costly investments that these inns cannot afford. Since the inns do not have the funds to make upfront investments many of the inns have taken steps in order to become more sustainable incrementally.

Nelson Santos of the Pineapple explained that even though the inn was suffering financially, they were proceeding little by little, whenever they could. Many of the inns have done the same and have been replacing incandescent light bulbs with fluorescent as they go out. Another small change to increase sustainability is described in section 2.2.3.2. By replacing shower heads and toilets with low flow hardware, the hotel has the potential to save on water consumption, which can cost the establishment large sums of money.

As illustrated in section 2.2.3.1 there are many benefits associated with replacing bulbs. The use of fluorescent light bulbs is the most popular BEMP the group observed. All of the hotels had at least one fluorescent light bulb in each of their guest rooms. Not only is the
payback period as short as eight months, the bulbs last longer and do not release as much heat. Another benefit is that fluorescent bulbs use only 20-25% of the electricity that incandescent bulbs use and last about thirteen times as long (10,000hrs). Although this is a small change, it has its benefits and a large sum of money is not required upfront.

There was some concern expressed by owners/managers that the fluorescent lights do not fit their light fixtures, don’t compliment their décor, and/or they take too long to brighten, therefore guests do not respond well to them. One of the biggest misconceptions is that fluorescent bulbs are much dimmer than incandescent bulbs; however, an 18W fluorescent bulb produces 1100 lumens, nearly identical to the 75W incandescent bulb that produces 1150 lumens (Hodges, 1995). The good news is that the market is expanding, and there are more styles and colors of lights available as time goes on. In order to accommodate guests’ needs yet still save money, almost every single property used fluorescents in all their outdoor lighting, which is on for long periods of time at night and does not operate on a motion detector.

Other methods are simple changes in the operations of the establishment. Many of the inns have been incorporating signs in their guest rooms, such as one requesting guests to save energy by turning off the AC when it isn’t needed. Other signs ask guests to only put their towels on the floors if they need to be washed and explain that sheets will only be washed every three days unless otherwise requested. These methods require no money to implement and are steps towards sustainability.

Some methods can be costly but the benefits have to potential to out way the cost. Elsie Herger of the Hostería del Mar believes that the cost of implementing BEMPs has not been a problem for implementing smaller projects that are steps towards sustainability, but feels money is a problem for the bigger projects such as solar panels and motion detectors. Solar water heating was a popular method seen in almost all hotels visited by the group. The initial cost for the panels is about $850, with a payback period around nine to eleven years (for a 50-gallon water heater) (F. Abruñas, personal communication). The high cost and slow payback period are a deterrent, however owners are protected from future rises in the costs of natural gas, and on a monthly basis the savings are usually higher than the costs. Water heating bills have shown to decrease between 50%-80% on average (U.S. Dep. of Energy, 2008).

Although motion detectors will be very expensive to buy at first she feels it will be very beneficial because guests and maids will leave the lights and air-conditioners on all day even
when they aren’t there. Implementing motion sensors would decrease wasted energy of lights and air-conditioners left on when they aren’t being used. Newer buildings are designed for occupancy sensors which turn off lights and air-conditioners when there have been no occupancy for a set period of time.

Juan López of Palmas de Lucía wishes to make use of the ocean breeze by using wind power but feels that the fifteen year payback period is too long. Like many other inns, Juan feels that payback periods should be under 2 years but wouldn’t be against longer payback periods if there were incentives to help pay for such investments.

4.3.4 Incentives

After investigating incentives offered to the inns for implementing BEMPs, the project group has come to understand that there is a severe lack of incentives available to aid and convince the hotels of Puerto Rico to implement BEMPs. Many properties in Puerto Rico do not have the resources and money to invest in such projects. If there were incentives offered to help, many establishments feel that they would be more likely to incorporate some of the larger investments into their operations.

The available incentives researched by the group were issued by the government in Act #78 of the Tourism Development Act of 1993 for both new and existing hotels (Toro, 2003):

- Tax credit equal to 50% of the total cash equity up to 10% of the total project cost
- 90% Puerto Rico income tax exemption for the first 10 years (100% in Vieques and Culebra)
- 100/90% municipal license tax exemption for new and existing business
- 90% municipal property tax exemption
- 100% excise tax exemption on imported goods and locally acquired ones
- 100% municipal construction excise tax exemption
- Up to an 11% discount on electrical utility expenses

Edwin Jaime of El Guajataca feels that cost is usually a factor because many of the small inns have no guests during the week and are only busy on the weekends and incentives provided by CTPR or the government would help a lot. He feels that a short pay-back period of less than two years could persuade him to implement BEMPs when initial cost is an issue.
Alida Ortiz and Ada Torres agree that there is no current incentive program in place with CTPR, but they hope one will permeate through their project. According to Alida, in order to ensure that CTPR introduces formal incentives for BEMPs in hotels, they need to go through their pre-existing regulations and insert amendments that specifically mention BEMPs, since there are none currently (Alida Ortiz & Ada Torres, personal communication). Although there is no formal incentive program set up, there are some that few are aware of. The Puerto Rico Hotel Association and the EPA offer a $1,800 grant with the Departamento de Recursos Naturales y Ambientales that covers energy and water. The program is a 3-year program in the beginning phases, and will provide guidelines and identify material prices for interested parties in terms of BEMPs (Alida Ortiz & Ada Torres, personal communication).

Another incentive offered by the government that only Sherri Fisher of the Luquillo Sun Rise Beach Inn was aware of, was 11% discount on electricity, and an energy-saving plan issued by CTPR. When CTPR visits the inn, they perform an energy audit. The inn then submits a 5-year plan on reducing energy, and the audits help mark the progress made. Also, Sherri Fisher had read in the newspaper that the government issues a tax credit for solar water heaters, but she wasn’t completely positive it was true, nor did she know how to obtain the credit.

Elsie Herger of the Hostería del Mar saw a decrease in her energy bills after replacing old bulbs with fluorescent so she understands the benefits of spending money to save money and thinks it is worth it in the end. Although she is beginning these programs without incentives there are other establishments that would be unable to do so without financial backing and thinks it is essential that programs are set up. It would also be easier to persuade her to begin these programs if there was a short pay back period even if she isn’t around to see the turnaround. In order to provide incentives, hotel inn/owners need to be aware of them.

4.3.5 Communication between CTPR and Hotels

The project team has come to believe that there needs to be a way for CTPR to convey the importance of sustainable development, what it is and what is offered in terms of help to hotel owners/managers. As of now there is very little guidance offered for the hotel owners/managers and improvements need to be made such as the Initiative Toward Sustainability and Excellence. Many inn owners are very impressed by the work being done by CTPR to do so. Sherri Fisher of the Luquillo Sun Rise Beach Inn is very impressed by the work
being done by the CTPR and states, “The pilot program is very aggressive and they are working on it [initiating sustainable development].”

Shelly Fisher feels that CTPR’s on-site inspection certainly opened her eyes to even more BEMPs that the inn might consider. Sherri stated that her eyes were opened when CTPR became involved in her hotel’s operating business. When asked if a website designed to give information about BEMPs would be helpful, she indicated that it would, but she felt the on-site inspections were perhaps the most helpful aspect of the Sustainability Initiative. The individuals working with CTPR who came to her inn were able to notice things that she did not, and were also able to help her determine which BEMPs were good for her specific inn.

Edwin Jaime of El Guajataca provided the electricity and water bill costs of the establishment, which is high per month, $7,000 and $3,000 respectfully. The inn also makes use of gas which usually totals around $1,000 each month. Edwin Jaime hopes that having a website would help him gain information and aid him in decreasing his monthly energy costs. A website would also help him how to decide how to choose energy efficient appliances such as washing machines. Edwin Jaime wanted to thank the Tourism Company for the work they have been doing to help the inn. The sustainability project has helped him become more knowledgeable on BEMPs.

Eddie Perez, a CTPR employee in the Marketing & Promotion department made it clear that CTPR’s website focuses on “consumers, not on the industry. The message and structure of the website are directed to the consumer.” It is unclear whether or not CTPR communicates directly with the inns, since Sr. Perez only works with the consumers/tourists. But through interviews the project group has found that CTPR communicates mostly by email and is very minimal.

During several interviews, the group asked if a brochure displaying a simple version of BEMPs with a link to a website for more information would be a good idea. All interviewees agreed that the brochure would be a great idea, and they were enthusiastic about it. Alida and Ada both praised the idea saying that it would be a “tremendous product.” Their input for the content was that it should say something about the regulations, but in a “friendly, basic way – not too technical because they won’t read it.” Another suggestion was to include the identification of other industries that owners/managers can make a connection to, such as recycling plants or detergent brands that use friendly chemicals. Australia currently has a website that contains a
checklist and options for Environmental Management Systems (EMS), which is a good option for “those not trained in specific areas (Ada Torres, personal communication).”

Sr. Perez gave the group some helpful information on beginning the design of the webpage. He stated that the two most important things for hotels to know is that CTPR has a great deal of investment in marketing and advertising (media plans, new investments, new partnerships, etc.) and that they have business intelligence; they know what kinds of tourists are coming to Puerto Rico, how much they are spending, where they are going, etc. This information would be beneficial for the inns on the island that are not part of the Initiative Toward Sustainability and Excellence project.

Sr. Perez also suggested that the page include a section on service, since that is one of the areas owners have “trouble” in. He said, “Hotels have to learn that service is essential. When you go to the Dominican Republic or Cuba, when you go to a hotel, the whole country understands that service is the key to a great experience. We in Puerto Rico in some sections of our beautiful country don’t understand that when you see a visitor or a tourist, you have to give them a smile or be courteous.”

### 4.3.6 Communicating with Guests

Communicating the importance and use of BEMPs with hotel guests has become essential in getting hotel guests to participate. The project team has come to understand that once guests are aware of the practices and encounter them in hotels, they are very willing to participate. Those participating in the Initiative Toward Sustainability and Excellence have began communicating through signs on the walls, which was suggested by CTPR.

Edwin Jaime of El Guajataca feels that many people are aware of what is happening around the world and feels guests would appreciate BEMPs in the establishment. He thinks that guests would feel more comfortable knowing that even an establishment that has been open for seventy-eight years is focused on saving the environment and not just publicizing the view surrounding the property.

Sherri Fisher conveyed that 80% said when choosing a hotel, sustainability wasn’t what they were looking for, but once they visit inn, they want to help out. For example, all of Luquillo’s guests say they need an air conditioner, but when they get to the property and see the beach and the beauty of the natural setting, they don’t use it so it is possible to stress the use of natural wind rather than use energy for air conditions on waterfront properties. This coincides
with the research conducted by the group. A study conducted in 2007 by the Cornell Hotel and Restaurant Quarterly found that guests respond positively to hotels that are working to help the environment (Goldstein, Griskevicius, & Cialdini, 2007). Other water front properties such as Hostería del Mar and Palmas de Lucía have also considered using their location to their benefit. Hostería del Mar uses the wind as a natural cooling system rather than using air-conditioners in their restaurant and Palmas de Lucía has investigated using wind power but has encountered many obstacles in doing so.

4.3.7 Obstacles

The project team has come to believe that there are many obstacles that need to be overcome in order to increase sustainable development in hotels across the island. Money is not the only problem faced, there is also a lack of regulation of what laws need to be followed and education on sustainability. As of now there are numerous laws but there is a severe lack in regulation, no matter how many laws are put into place, they aren’t beneficial unless they are followed and regulated. As Ada Torres stated, “Puerto Rico has no lack of laws and regulations,” but the enforcement “is a problem (Ada Torres, personal communication).”

The lack of enforcement is due to the constant amendment and adoption of laws, and also understaffing. There is a “severe lack of training because of the overwhelming amount of regulation;” therefore, not all of the officers can be knowledgeable of every single regulation. Alida added that there is “lack of training for all levels,” including judges who experience a conflict of jurisdiction when it comes to who is responsible. This confusion stems from the same reason why the officers are not enforcing the law – rapidly changing laws and thus lack of knowledge (Alida Ortiz & Ada Torres, personal communication).

Recycling is one of the easiest and most obvious BEMPs, but according to Alida Ortiz and Ada Torres, implementation has been a major issue in Puerto Rico. The lack of recycling could have a very negative impact on tourism on the island. From the marketing standpoint, CTPR is supposed to sell the natural beauty of the island as a tropical paradise. The amount of trash apparent on the island could have a detrimental impact on tourism, and prevent visitors from wanting to return (Alida Ortiz & Ada Torres, personal communication).

Solid waste management in Puerto Rico is complicated by “limited disposal space available on an island community and Puerto Rico’s delicately balanced ecosystem (EPA,
2008).” Puerto Rican residents produce more trash than mainland citizens and they recycle less, compounding the problem further (EPA, 2008). Recycling is probably the most well known BEMP, but many people are unaware of the potential extent of recycling. It is well known that glass, plastics, paper, and aluminum cans can be recycled, but some hotels have begun to recycle specialized wastes such as used vegetable oil for fuel, composting leftover foodstuffs for fertilizer, and even soap recycling (EPA, 2008).

Inn owners are expected to recycle; however, regulations vary between each of the municipalities. The inconsistencies with fees are another issue; some municipalities on the island offer free recycling pickup twice a week, but others charge a fee. Some pick up on site, others do not (Alida Ortiz & Ada Torres, personal communication).

Alida Ortiz informed the project group that there are currently no native standardized regulations for good environmental practices in Puerto Rico. It would be difficult to bring board certification for green practices (such as Green Globe) to the local area because of the lack of education and experience the Puerto Rican people have with standardizations of green practices. It is also confusing because there are so many certification labels available. The overall regulations in the hotel industry are unsatisfactory because hotel/inn owners only care about the guests’ experience. They feel that the guests care more about the hotel’s service than if they are green or not, therefore they have no desire to pursue standardization. (Alida Ortiz & Ada Torres, personal communication). Once these obstacles have been overcome implementing BEMPs across Puerto Rico will be much more beneficial and easier to implement.
5.0 Conclusions and Recommendations

The project team has reached several conclusions regarding the extent of BEMPs, obstacles to their implementation, perceptions of hotel owners, and costs savings, and has created several recommendations to improve communication about BEMPs in small inns and hotels in Puerto Rico. Analysis of the data revealed several similarities and patterns among the inns and hotels from which conclusions were drawn. Small hotel and inn owners/managers need a means to quickly and easily access information on environmental practices and programs to compensate for the extreme lack of knowledge and awareness on the subject. In order to initiate this communication CTPR must create and display incentives to these hotel and inns, most importantly the cost savings created through the cost analyses. They must also create other additional incentives, loan interest loans and tax breaks, to pursue the implementation of BEMPs throughout the island. These conclusions and subsequent recommendations for CTPR, which will fulfill the goal and objectives of the project, are described in the following sections.

5.1 Education on Sustainability

The project team has concluded that the most important strategy that CTPR must pursue is the creation of educational materials on sustainability and environmental issues/programs on the island. Not only by educating hotels and inns, but by also including areas of the public schooling system where young people can be taught the values of energy and water conservation, recycling, and other methods needed for a sustainable environment for the future.

More directly related to the scope of the project, it is essential that hotel and inn owners/managers become educated in the area of environmental practices and sustainable business operations. CTPR currently does not offer such a resource, only on-site visits and several non-personalized forms of conferences and training seminars are used to educate a selective group. The project team has concluded that resources must be made available for every establishment to help spread the message of sustainability and excellence, more specifically the implementation of BEMPs.

5.1.1 Lack of Education and Knowledge

After interviews with three members of the Dream Team and eight owners/managers of selected inns and hotels participating in the sustainability initiative, the project team concludes
that the managers and owners of small hotels and inns in Puerto Rico are willing to adopt environmentally friendly practices, but lack the knowledge and guidance to do so without CTPR. There is little awareness of incentives offered by CTPR, such as the 11% discount on electricity available after the inn undergoes an electrical audit and develops a 5-year plan. Most owners and managers look to the newspapers for information and do not know of any other resource that can be used besides personal contact. Governmental incentives are also ineffective due to the lack of education and promotion. Some of these include paybacks on solar water heaters and water reuse programs. Recycling programs that can be used for free are also unknown in many areas of the island where they are offered. Managers and owners need to be educated on all the opportunities available to decrease costs of their operations and their impact on the environment.

5.1.2 Education on Cost Saving

The project team has come to the conclusion that cost is the biggest influence on hotels and inn’s decision to implement BEMPs. Money is the greatest barrier that small lodging areas face; they do not have the type of resources available to larger hotels, many of which are members of hotel chains with deep pockets. The team recommends that the audit questions and cost analyses be utilized by CTPR to help educate the small hotel and inns on the potential cost saving and payback periods associated with BEMPs. For on-site interactions, the audit section of the interview questions should be used to compile all the necessary data for the cost analyses. The cost analyses may then be completed and presented to the hotels and inns to visually display the cost savings and payback periods with BEMPs. In order to educate all managers and owners on the island, the cost analyses will also be made available on the proposed webpage that is discussed below.

Many of the problems identified during the course of the project can be solved by implementing the instruments recommended in the next sections, including a webpage, a CTPR BEMP incentive program, a hotel and inn distribution list, mass-email distributions, a brochure, and a student involvement program.

5.2 Prioritized Outline of Recommendations

The following is a prioritized outline of the recommendations that the project team has produced. There are several options to pursue. The project team has ranked the recommendations
in order of the best ways to communicate. These different educational tools are developed in more depth below in sections 5.3 – 5.6. The project team recommends that CTPR should:

- Create a webpage to serve as a central hub for information on BEMPs for hotel and inn owners/managers throughout the island.
- Develop an incentive program to promote and encourage BEMP implementation throughout hotels and inns.
- Create a hotel and inn distribution list making a common area of hotel and inn information to be utilized in a mass-email distribution plan.
- Develop a mass email distribution plan to initiate communication and promote the webpage.
- Create a distributable brochure as another means to promote and support the webpage.
- Develop a student involvement program to encourage environmental practices with students as well as provide CTPR a personal touch.

5.3 Educational Tools

Based on the project teams experience with the Initiative Toward Sustainability and Excellence, we believe that CTPR should create educational tools to be made available for all hotels and inns. The project team interviewed Eddie Perez, the head of Marketing & Promotion at CTPR, and gathered valuable data. The group found that personalization is extremely important when communicating with an individual or establishment and that the most common form of personal communication from CTPR to hotels include emails. These are personalized by using the name of the establishment at the beginning and also a customized sentence or two. The project team has concluded that this personal touch is needed when dealing with small hotels and inns in order to initiate a productive business relationship with good communication. Currently, CTPR has no means of communicating with all the hotels and inns on the island, only consumers. Magazines, commercial advertisements, and other forms of mass media are used to communicate with consumers and the project team recommends that these be manipulated to also communicate with hotels and inns.

Considering the large numbers of properties located throughout the island, the project team, along with Eddie Perez, has concluded that several methods of communication must be created to bridge the current gap and promote the implementation of BEMPs. An interactive
internet resource in the form of a webpage, along with personalized emails and distributable brochures, can solve the problem.

5.3.1 Proposed Webpage

The creation of an internet resource in the form of an interactive webpage is essential for CTPR to bridge the gap of communication between the agency and smaller hotels and inns throughout the island. CTPR currently has a webpage, www.GotoPuertoRico.com, but it does not provide much information for hotel and inn managers, only individuals looking to travel to Puerto Rico. The creation of a webpage will allow CTPR to communicate directly with the hotels and inns and also compile a list of inns willing to participate in existing or potential programs. This will save time and money and also allow CTPR to focus its resources on hotels and inns that are willing and able to participate in certain programs offered.

5.3.1.1 Purpose

The main purpose of the proposed webpage is to serve as a central hub for hotel and inn owners throughout the island to create an understanding of sustainability and specific practices that are available. It will also serve many secondary purposes, such as expanding knowledge and awareness of regulations, recycle and waste collection programs, and CTPR programs availability; satisfied by several links located at the top or side of the webpage.

5.3.1.2 Content: Outline

- Main Page
  - Links located at the top of site
    - EPA official website
    - CTPR Documents
      - How to become certified
      - Regulations that are expected
      - Detailed document on Sustainability
      - Detailed document on Service
  - Links located on the right side
    - Links to Websites that sell BEMP materials
      - www.Greenhotel.com
      - www.energystarflourescentlights.com
      - www.envirolet.com
      - www.yourguidetogreen.com
      - www.energy.sourcenguides.com
      - www.solardyne.com
Cost Analyses worksheets (First section under links)
- Simple plug in calculators to display cost savings/payback period

Short write-up: Tourism industry in Puerto Rico
- Focus on hotels and lodging areas

List of current and potential CTPR programs
- Descriptions and goals
- Area for managers/owners to sign up for program

Short write-up: Competitive Comparison
- Puerto Rico vs. Dominican Republic, Jamaica, and Aruba
- Explain how CTPR programs create competitive advantage through sustainability

Secondary pages (through links)
- Simple list of different BEMPs
  - How to best implement them
  - Benefits associated with each (cost and environment)
- Simple, easy to read, definition and explanation of Sustainability
- User-friendly blog to communicate about BEMPs and related issues
- Full PDF of WPI project background section
- Pre-recorder online seminar and training videos
  - Importance of BEMPs and Sustainability
  - How to improve service

5.3.1.2 Detailed Content

The home page will contain several links to other websites that will provide relevant information to hotel and inn owners. The project team recommends that the EPA webpage be provided to the visitors of the homepage through a link. The hotel and inn owners will have the option of visiting the webpage to review regulatory information and environmental responsibilities. The group also recommends that several links be created to provide information to inn and hotel managers related to CTPR regulations and documents. Detailed documents outlining sustainability and service should also be made available to display what CTPR expects from hotels and inns throughout the island. If possible, a link to Puerto Rican Recycling Programs is recommended to permit the inn and hotel owners the ability to research programs that they could participate in. If the inns and hotels do not already have any recycling programs established, it is most likely due to lack of knowledge and resources. The link will provide options for the owners to pursue the best recycling program to fit their needs. Similarly, the project group recommends that the webpage also contain a link to Puerto Rico Solid Waste Management, if any. The link should supply free municipal trash pickup routes that may be taken advantage of, as well as ways to reduce waste production. Finally, the webpage should contain
links to sites that sell materials essential to implementing BEMPs; such as florescent light bulbs, low flow toilets and showerheads, solar water heaters, and green roofs. These sites will provide the best purchasing options for the establishments simply because they will have different options to choose from in one common area. The quick link will cut back on user frustration as all needed materials are a click away.

The project team also recommends that the main page contain a brief competitive comparison between the tourism industry in Puerto Rico and others such as the Dominican Republic, Jamaica, and Aruba. Along with this comparison should be an explanation as to how CTPR’s programs plan to create a greater market share through sustainability and excellence.

Cost analyses worksheets with simple plug-in areas to generate/calculate potential savings when implementing specific BEMPs as well as their payback periods should also be provided on the main page of the recommended webpage. There should also be a few examples of completed cost analyses for specific hotels to visually display the financial benefits. As stated in the previous section, it will educate the managers and owners on the opportunities for cost savings they may have overlooked or not expected.

A list of programs offered by CTPR should follow, with descriptions and requirements available. The owners will be able to research different programs, such as the Initiative Toward Sustainability and Excellence, and pick which one may be most beneficial to their operations. The project team recommends that an area for the owners to sign up for certain CTPR programs be available after each description, allowing CTPR to generate numbers of how many hotels and inns wish to implement BEMPs and better their service through CTPR’s help.

Secondary pages should be available through links that are labeled with respect to what they offer. A simple link will provide the users with descriptions of different BEMPs, how to implement them, and the benefits that are associated with each. Another secondary page should contain information on sustainability that would be more user friendly than that of the detailed documents of CTPR. Users of the website will be able to familiarize themselves with sustainability and their establishments more easily through this link.

Finally there should be a secondary page relative to the tourism industry in Puerto Rico, more specifically hotels and lodging areas, and their negative impact on the environment. An explanation of how BEMPs will prevent the degradation of the environment is recommended to promote the importance of establishing a sustainable hotel sector within the tourism industry.
Other recommendations to the webpage include the use of a blog as well as a full PDF of the WPI IQP project background section. The blog will provide a place where owners of hotels and inns can communicate both with one another and employees at CTPR. It will also create another vessel for owners to expand their knowledge on sustainable practices as well as excellence in service. The PDF can be downloaded and used for further reference to promote the importance of BEMP usage.

**5.4 Advertising and Promotional Materials**

Several materials need to be produced to support the proposed webpage. The project group concludes that several methods are needed considering that many inns and hotels may not be responsive to only a single attempt at communication. The following recommendations will be more effective if employed together.

**5.4.1 Hotel and Inn Distribution List**

The project group recommends that a database consisting of all hotels, inns, and other lodging areas in Puerto Rico be compiled; including their postal and email addresses, the name of the establishment, the first contact, the second contact, the category it falls under (hotel, parador, guest house), phone and fax number, and the geographical region. The list creates a common area where all information on hotel and inns can be stored, old and new, and can then be utilized in a mass-email distribution plan to promote the use of BEMPs and the proposed webpage.

**5.4.2 Mass-email Distribution**

The project group recommends that a generic email be created, with areas of customizability, which will directly address each hotel and inn on the ideal that the environment is the most important aspect of the tourism industry and that it is their responsibilities to protect and preserve it. The areas of customizability will be the greeting at the beginning of the email, the hotels name and its first contact, as well as the first several sentences being unique to each establishment. The sentences can be typed up and added to the excel spreadsheet and plugged into the generic email containing several paragraphs that will be the same for all. These custom sentences are used to personalize the email and connect the hotel and inn with CTPR. The email distribution will also serve the purpose of promoting the webpage as well as special offers and
training programs/seminars that are offered by CTPR. It can also contain any other means created by CTPR to further communicate with the hotels and inns.

5.4.3 Distributable Brochure

In order to further promote and support the proposed webpage, the project team recommends a distributable brochure be produced. The project team recommends that CTPR pursue the possibility of mass producing these brochures and distributing them throughout the island after the webpage is completed. The following are brief descriptions that the project team purposes be used for the layout of the brochure.

5.3.3.1 Content

The front page of the brochure should be bright and attention grabbing with a relevant, interesting picture. The title should also be interesting and informative to let the reader know right away what the brochure is about.

- Maybe use the term “Eco-Hospitality”
- CTPR’s Initiative Toward Sustainability and Excellence should be on the front somewhere so the brochure has credibility.

The inside panels should contain several different sections, each providing unique information pertaining to BEMPs. The main body of the brochure needs to be well organized, clear, and easy to read. It should be written in short, clear statements so it is easily understood and not long and boring to read.

- The first section needs to explain what BEMPs are. The brochure will be written in a way that assumes the reader has no background knowledge of the topic.
  - Definition: Best Environmental Management Practices (BEMPs) are policies and technologies that reduce the negative effects of a business on the environment. BEMPs help to conserve energy and water as well as reduce the amount of solid waste and pollution generated.
  - The importance of BEMPs will be outlined; citing specific testimonies obtained from hotel and inn owners on the responsibilities the establishments have to maintain the surrounding environment.
- The next section should describe the benefits of implementing BEMPs.
➢ Save money by reducing the operational costs of hotels will probably be the most important benefit for hotel owners. It is important to explain how they will save money by lowering their water and electricity bills through the use of BEMPs.

➢ Another benefit is the appeal of eco friendly hotels to customers. The owners need to be aware that they may be able to attract more guests by adopting BEMPs.

➢ Finally the brochure should explain how BEMPs help the environment. Although this is important to many people, it may be the benefit of least concern to a hotel owner, thus it is last in the list.

- The next section will list common BEMPs already in use in the hotel industry and should be a starting point or first goal for hotels to achieve. These are BEMPs that are relatively easy to implement and inexpensive. For example installing and utilizing the following:
  
  ➢ Compact fluorescent light bulbs
  ➢ Flow restriction devices (low flow showerheads, faucets, toilets)
  ➢ Energy efficient appliances (washer, dryer, AC, refrigerators, etc.)
  ➢ Solar water heaters
  ➢ Renewable energy sources (wind and solar)
  ➢ Communicate to guests the hotel's efforts to be more green and ask them to help conserve water and energy and reduce solid waste by recycling.
  ➢ Wash linens and towels only when requested by the guest and in between occupancies

The back of the brochure should be used to promote the webpage and contain information on how it can be accessed and what it offers.

- There will be a section directing the reader to visit a website to get more information on BEMP’s.
  
  ➢ There needs to be a short description of what can be found on the website, including general information on the effects of hotels on the environment, BEMPs that owners can implement, Green technologies and products, interactive savings calculator to determine payback periods and long term savings.
  ➢ The URL address for the website should be clearly stated at the end of the description and possibly at the bottom of page.
5.5 Student Involvement Programs

The project team recommends that CTPR work with local universities to create a student involvement program. Tourism is a growing field of study at many universities in Puerto Rico and the use of environmentally friendly practices should be encouraged. Student Involvement Programs could be produced by CTPR and universities and used to create the personal touch CTPR may need. The student groups will be able to visit inns and hotels that have chosen to participate in any of the new programs that were created. The teams can perform specific tasks, such as conducting audits and providing information to managers and owners of hotels on BEMPs. The students can also be offered class credits for participating in the programs or community service hours.

5.6 CTPR BEMP Incentive Program

Finally, the project group has come to the conclusion that in order for BEMP implementation to become more abundant in small hotel and inns on the island additional financial incentives may need to created. After talking with Fernando Abruñas, a consultant familiar with all types of environmental practices and CTPR’s operations working with them, the project group discovered that there currently are no incentives offered by CTPR or the Government for the hotels and inns to adopt BEMPs. All managers/owners interviewed commented that financial incentives would be a major driving factor for their establishments to adopt more BEMPs. The team recommends that CTPR attempt to create a financial incentive program, working with the government, to encourage the adoption of BEMP throughout small hotel and inns. The incentives can include several different types of tax breaks, such as tax credits for the implementation of wind power turbines or other alternative methods of energy. These tax breaks will quicken the return on investment for the owner of the establishment encouraging him or her to make the investment. CTPR may also look to create low interest loans for capital improvements aiding the small inns and hotels with the initial investment process. The project team understands that this recommendation may be out of the range of CTPR but still believe that it should rank 2nd in the list of priorities.
References


DiMauro, F. Head of WPI Facilities (January 28, 2008) (Personal Communication)


Schneider, K. (1996). Ozone assisted laundry. *Journal of Cleaner Production, 4*(1)


Appendix I: Interview Questions

**Interview Questions for Hotel Managers/Owners**

1. What do you know about Best Environmental Management Practices?
2. How important do you feel sustainable development is for the tourism industry?
3. Should inns be responsible for maintaining the environment surrounding the establishment?
4. Would the cost of implementing these practices influence your choice?
5. Would you be more inclined if there was a short pay back period?
6. Do you think it is beneficial to your establishment if you alter your operations?
7. How does a company’s environmental practices influence a guest’s choice of hotel?
8. Would financial incentives persuade you to adopt green practices?
9. What are the incentives that are offered by CTPR?
10. What do you feel are the major obstacles for implementing BEMPs?
11. How do you communicate to customers your goals for BEMPs and how they can help?

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<thead>
<tr>
<th><strong>Hotel Information</strong></th>
<th><strong>Response</strong></th>
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</thead>
<tbody>
<tr>
<td>What is the total number of guest rooms in the establishment</td>
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<tr>
<td>How many lights are in each room?</td>
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<td>How many refrigerators are there? How many are energy efficient?</td>
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<tr>
<td>How many microwaves are there? How many are energy efficient?</td>
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<tr>
<td>How much laundry is done on site?</td>
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<tr>
<td>How often do you wash bed linens from occupied rooms?</td>
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<tr>
<td>How often do you wash bath towels from occupied rooms?</td>
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<td>How many acres does the hotel occupy?</td>
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<td>How often is motorized landscape</td>
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<tr>
<td>Equipment used?</td>
<td>How much of the property has an impervious cover?</td>
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**Water conservation:**

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<th>Response</th>
<th>Difficulty to Implement</th>
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<thead>
<tr>
<th>How many low flow showerheads are installed?</th>
<th>How many low flow toilets are installed?</th>
<th>How many regular toilets are installed?</th>
<th>How many liters per flush?</th>
<th>Do you use water efficient washing machines? If so, how many?</th>
<th>Is grey water recycling practiced?</th>
<th>What is the monthly water cost?</th>
<th>How many total motion sensors or timed faucets are installed?</th>
<th>Is solar- water heating practiced?</th>
<th>How many rain barrels are used?</th>
<th>Is the landscaping designed for low water consumption?</th>
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**Energy Conservation:**

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<table>
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<tr>
<th>How many energy efficient appliances are installed? (Stoves, AC, refrigerators, microwaves)</th>
<th>How many florescent light bulbs are installed?</th>
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</table>

(1 being very easy and 9 being very difficult to implement)
| How many lights operate on motion sensor or a timer? |  |
| Is natural lighting maximized through windows and sky lights? |  |
| How many solar panels are in use? |  |
| Is wind power utilized? |  |
| Is geothermal energy utilized? |  |
| How many energy efficient dryers are installed? |  |
| How often are bottles of toiletries replaced in each room? |  |
| How often is non motorized landscape equipment used? |  |
| Is the building insulation modern and efficient? |  |

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<tr>
<th><strong>Solid Waste Reduction:</strong></th>
<th><strong>Response</strong></th>
<th><strong>Difficulty to Implement</strong></th>
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<tbody>
<tr>
<td>Does your inn have a recycling program.</td>
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<td>(1 being very easy and 9 being very difficult to implement)</td>
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<tr>
<td>How much of the following materials is recycled?</td>
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<td>Plastics</td>
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<td>Glass</td>
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<td>Paper</td>
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<td>Cans/aluminum</td>
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<td>Are organics composted for future use, such as fertilizer?</td>
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<td>Is used oil from the kitchen recycled for other uses?</td>
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<td>Are organics donated to farms or other industries for use?</td>
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<tr>
<td>Are biodegradable disposable utensils, plates, and cups used?</td>
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<td>How many shampoo/soap dispensers are installed?</td>
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<p>| <strong>Erosion/Runoff</strong> | <strong>Response</strong> | <strong>Difficulty to Implement</strong> |</p>
<table>
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<tr>
<th>Question</th>
<th>(1 being very easy and 9 being very difficult to implement)</th>
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<tr>
<td>What percentage of the roof do roof top gardens occupy?</td>
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<td>What percentage of pavement is made from porous paving materials?</td>
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<td>Are detention basins used to control runoff?</td>
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<td>Has the soil been tested for nutrient and contaminant levels?</td>
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<td>How much fertilizer is used in a year?</td>
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<td>How much of the property has an impervious cover?</td>
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What other environmentally friendly technologies or practices do you employ?
Appendix II: CTPR Interview Questions

Questions for CTPR Staff

1. How is the communication between the inns and CTPR about their environmental practices? Do you communicate by email, phone, meetings, or onsite inspections?

2. Do the inn managers know what regulations they need to follow? How do they know?

3. Is there a single authoritative website they can go to for information on BEMPs and how to implement them into their hotels?

4. What has already been done to encourage BEMPs in hotels? What’s been accomplished and what has failed?

5. What incentives are offered to hotels to adopt BEMPs? Is there financial assistance to help cover the initial cost of implementing BEMPs?

6. What regulations or policies are the inns required to follow regarding BEMPs?

7. Is there a general interest in becoming green globe certified amongst these small inns?

8. Why were these inns/hotels chosen/agree to participate in CTPR’s initiative toward sustainability and excellence?

9. Are the larger hotels in Puerto Rico more environmentally conscious than privately owned inns?

10. What do you think of a brochure summarizing the need, importance, and benefits of BEMPs to be distributed to the inns?

11. What do you think of a CTPR website that the hotel managers can use to calculate the initial cost and long term savings of implementing BEMPs?
Appendix III: NEPA Brochure

NEPA Brochure that could be used as a preliminary model. (Title page and contents):

For additional information on how to "green" hotels, contact:
The National Environment and Planning Agency (NEPA)
10 & 11 Caledonia Avenue
Kingston 5
Tel: 754-7540
Fax: 754-7545/6
Hotline: 1-888-961-5005
Email: pubed@nepa.gov.jm
Website: http://www.nepa.gov.jm

Good Environmental Practices for Hotels

EMISSIONS

- Ensure that the air-conditioning units use environmentally friendly alternatives to chlorofluorocarbons (CFCs) as they cause ozone depletion.
- Fire extinguishers
  - Replace your traditional halon fire extinguisher at the end of its useful life with a more environmentally friendly alternative. Contact your supplier.

Air quality

- Install exhaust fans in guest rooms to improve indoor air quality. These devices break down the oxygen to produce pure oxygen, which removes odour and purifies the air.

Purchasing

- Adopt a policy to purchase environmentally sensitive products, e.g., items that are recyclable or biodegradable or made from recycled materials.
- Purchase items in bulk to reduce packaging waste.
- Reuse and recycle ink ribbons and cartridges.
- Purchase fewer items that require long-distance transportation thus reducing pollution.
- Use old sheets to make laundry bags thereby replacing plastic bags.
- Reuse containers for storing and holding cleaning liquids.

STAFF

- Train all staff to incorporate environmental housekeeping practices in their daily routines.
- Speciality train all engineering and maintenance staff so that they will be actively involved in improving the operating efficiency of all equipment.
Appendix IV: Timeline for Methods

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<tr>
<th>Tasks</th>
<th>Week 1</th>
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<td>Research Lit</td>
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<td>Int. CTPR Staff</td>
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<td>Visit Inns</td>
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<td>BEMP Cost/Benefit</td>
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<td>Brochure/Website</td>
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April

<table>
<thead>
<tr>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>8</td>
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<td>16</td>
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<td>18</td>
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</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
</tbody>
</table>

Colors:
- Hacienda el Jibarito and Las Villas del Pepino
- The Pineapple Inn
- Luquillo Sun Rise Beach
- Hosteria del Mar
- El Guajataca
- Palmas de Lucia
- Marin de Salinas
## Appendix V: Inn Contact Information

### Specific Inn Information

<table>
<thead>
<tr>
<th>Property</th>
<th>Address</th>
<th>Region</th>
<th>Contact Person</th>
<th>Telephone</th>
<th>Town</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Guajataca</td>
<td>Rd. 2, Km. 105, 8, Quebradillas, PR 00678</td>
<td>Oeste</td>
<td>Sr. Javier Colombany</td>
<td>787-896-3070</td>
<td>Aguada</td>
<td><a href="mailto:Colombany@hoteleguajataca.com">Colombany@hoteleguajataca.com</a></td>
</tr>
<tr>
<td>Parador Villas del</td>
<td>Rd. 465, Km. 8.3 Bo. Bajeras Playa, Montones, Isabela, PR 00652</td>
<td>Oeste</td>
<td>Sra. Myrna Hau</td>
<td>787-872-2045</td>
<td>Isabela</td>
<td><a href="mailto:villahau@ptc.net">villahau@ptc.net</a></td>
</tr>
<tr>
<td>Mar Hau</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parador Palmas de</td>
<td>Carr. 901, Panorámica, Km. 5.6, Yabucoa, PR 00787</td>
<td>Este</td>
<td>Sr. Juan Lopez</td>
<td>787-893-4423</td>
<td>Yabucoa</td>
<td></td>
</tr>
<tr>
<td>Lucía</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marina de Salinas</td>
<td>Rd. 781, G-8 Chapin Street, Salinas, PR 00936</td>
<td>Sur</td>
<td>Ing. Jorge Arce</td>
<td>787-752-8484</td>
<td>San Juan</td>
<td><a href="mailto:arce@coqui.net">arce@coqui.net</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hacienda El Jibanto</td>
<td>Carr. 446, Hm. 5.5 Barrio Salto II, San Sebastian 00886</td>
<td>Oeste</td>
<td>Sr. Ernesto Valle</td>
<td>787-896-5019</td>
<td>San</td>
<td><a href="mailto:haciendaaljibanto@yahoo.com">haciendaaljibanto@yahoo.com</a></td>
</tr>
<tr>
<td>Luquillo Sun Rise</td>
<td>A2 Ocean Blvd, Luquillo, PR 00773</td>
<td>Este</td>
<td>Damien Wilson</td>
<td>787-889-1713</td>
<td>Luquillo</td>
<td><a href="mailto:info@luquillosunrise.com">info@luquillosunrise.com</a></td>
</tr>
<tr>
<td>Beach Inn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parador Villas</td>
<td>Carr. 123, Km. 36, Int. 522, Adjuntas, PR 00601</td>
<td>Sur</td>
<td>Sr. Jesus Ramos</td>
<td>787-829-1717</td>
<td>Adjuntas</td>
<td><a href="mailto:villas@villasotomayor.com">villas@villasotomayor.com</a></td>
</tr>
<tr>
<td>Sotomayor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel Melia</td>
<td>75 Cristina St. Box 1431, Ponce, PR 00733</td>
<td>Sur</td>
<td>Sr. Nicolas Albers</td>
<td>787-842-0260</td>
<td>Ponce</td>
<td><a href="mailto:info@hotelmelia.pr.com">info@hotelmelia.pr.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parador Joyuda</td>
<td>Carr. 102, Km. 11.7 Bto. Joyuda, Cabo Rojo, PR 00623</td>
<td>Oeste</td>
<td>Sr. Juan Carlos</td>
<td>787-851-5650</td>
<td>Cabo Rojo</td>
<td><a href="mailto:mail@joyudabeach.com">mail@joyudabeach.com</a></td>
</tr>
<tr>
<td>Beach</td>
<td></td>
<td></td>
<td>Tamayo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hostería del Mar</td>
<td>No. 1, Calle Tapia, Ocean Park, San Juan, PR 00911</td>
<td>Norte</td>
<td>Sra. Elsie Herger</td>
<td>787-727-3302</td>
<td>Ocean Park</td>
<td><a href="mailto:hosteria@crashe.net">hosteria@crashe.net</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel Las Villas</td>
<td>Bo. Pozas Central, Hato Amba Station, San Sebastian, PR 00835</td>
<td>Oeste</td>
<td>Sra. Mariliz Serrano</td>
<td>787-896-5900</td>
<td>San</td>
<td><a href="mailto:serrerano@crashe.net">serrerano@crashe.net</a></td>
</tr>
<tr>
<td>del Pepino</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Pineapple Inn</td>
<td>2311 Calle 11 Sector Stella, Rincón, PR 00877</td>
<td>Oeste</td>
<td>Sr. Nelson Santos</td>
<td>787-823-1430</td>
<td>Rincón</td>
<td><a href="mailto:info@thepineappleinn.net">info@thepineappleinn.net</a></td>
</tr>
<tr>
<td>Treasure Island</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Hotel Lago Vista</td>
<td>Carr. 119, km. 22.1 San Sebastian, PR 00835</td>
<td>Oeste</td>
<td>Arq. Fernando</td>
<td>787-260-5522</td>
<td>San</td>
<td><a href="mailto:lagovista@coqui.net">lagovista@coqui.net</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ramírez</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel Molino Inn</td>
<td>HW 54 Ave. Albizu Campos Km 2.1, Guayama, PR 00704</td>
<td>Sur</td>
<td>Sr. Santos Santiago</td>
<td>787-866-1515</td>
<td>Guayama</td>
<td></td>
</tr>
</tbody>
</table>
Appendix VI: BEMP vs. Conventional

Usage of previous IQP’s Cost Analyses: (Barnes, Batsone, Orthodoxou, & Terrio, 2006)

Compact Fluorescent Light Bulbs (50 rooms):

<table>
<thead>
<tr>
<th></th>
<th>Incandescent 60W light bulb</th>
<th>Compact Fluorescent 15W light bulb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average life expectancy (hr)</td>
<td>875</td>
<td>10,000</td>
</tr>
<tr>
<td>Average burn time per day (hr)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Cost/bulb</td>
<td>$0.52</td>
<td>$12.45</td>
</tr>
<tr>
<td>Energy use/bulb/year (kWh)</td>
<td>131.4</td>
<td>32.85</td>
</tr>
<tr>
<td>Electricity cost/bulb/year</td>
<td>32.85</td>
<td>$8.21</td>
</tr>
<tr>
<td>Total room cost/hotel/year</td>
<td>$8,424.48</td>
<td>$5,421</td>
</tr>
</tbody>
</table>

*Only counted bulbs in guest rooms

Average number of light bulbs/room = 5
Electricity cost = $0.25/kWh
Total savings per year = $3,003.48
Initial investment = $3,112.50
Payback period = 1.04 years

Low-flow shower heads (50 rooms):

<table>
<thead>
<tr>
<th></th>
<th>Conventional Shower Head</th>
<th>Low-Flow Shower Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water in gal/min</td>
<td>6</td>
<td>2.5</td>
</tr>
<tr>
<td>Water used per room per day (m³)</td>
<td>0.45</td>
<td>0.19</td>
</tr>
<tr>
<td>Water used per 50 rooms per day (m³)</td>
<td>22.73</td>
<td>9.47</td>
</tr>
<tr>
<td>Water used per 50 rooms per month(m³)</td>
<td>681.82</td>
<td>284.09</td>
</tr>
<tr>
<td>Monthly costs</td>
<td>$1,486.36</td>
<td>$619.32</td>
</tr>
</tbody>
</table>

Cost of 50 low-flow shower heads = $187.50
Installation = $0
Total Monthly savings: $619.32
Pay-Back period: 0.30 months
Low-flow toilets (50 rooms):

<table>
<thead>
<tr>
<th></th>
<th>Conventional 5 gal</th>
<th>Conventional 3.5 gal</th>
<th>Low-Flow 1.6 gal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water used per flush (gal)</td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Water used per room per day (m³)</td>
<td>0.08</td>
<td>0.05</td>
<td>0.02</td>
</tr>
<tr>
<td>Water used per 50 rooms per day (m³)</td>
<td>3.79</td>
<td>2.65</td>
<td>1.21</td>
</tr>
<tr>
<td>Cost 50 rooms/month</td>
<td>$247.73</td>
<td>$173.41</td>
<td>$79.27</td>
</tr>
<tr>
<td>Savings of Low-Flow toilet over 5-gal and 3.5-gal toilets</td>
<td>$168.45/month</td>
<td>$94.14/month</td>
<td></td>
</tr>
<tr>
<td>Pay-back Period</td>
<td>77 months</td>
<td>138 months</td>
<td></td>
</tr>
</tbody>
</table>

1 Low-Flow toilet: $160.00
50 Toilets: $8,000.00
Installation: $5,000.00
Total initial costs: $13,000
Appendix VII: Cost Analysis Worksheets

Low-Flow Shower Heads
(Barnes, Batsone, Orthodoxou, & Terrio, 2006)

This worksheet is designed to help compare the current water costs and consumption to the potential savings that result from the installation of low-flow toilets.

Instructions: For each line, fill in the number that is representative of your facility and carry out the calculations as directed in parenthesis.

<table>
<thead>
<tr>
<th><strong>Current Water Usage</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 1</td>
<td>Number of rooms:</td>
</tr>
<tr>
<td>Line 2</td>
<td>Current type of shower head (gal/min):</td>
</tr>
<tr>
<td>Line 3</td>
<td>Total gallons per day (Line 1 x Line 2 x 20)</td>
</tr>
<tr>
<td></td>
<td>*20 = average daily shower usage in minutes</td>
</tr>
<tr>
<td>Line 4</td>
<td>Total gallons per month (Line 3 x 30)</td>
</tr>
<tr>
<td></td>
<td>*30 = days per month</td>
</tr>
<tr>
<td>Line 5</td>
<td>Convert to m³ (Line 4/264)</td>
</tr>
<tr>
<td></td>
<td>*264 gal = 1 m³</td>
</tr>
</tbody>
</table>
| Line 6                  | Monthly water costs (Line 5 x $2.18) | $ __________ |}

<table>
<thead>
<tr>
<th><strong>Water Usage with Low-Flow Shower Head</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 7</td>
</tr>
<tr>
<td>Line 8</td>
</tr>
<tr>
<td>Line 9</td>
</tr>
<tr>
<td>Line 10</td>
</tr>
<tr>
<td>Line 11</td>
</tr>
<tr>
<td>Line 12</td>
</tr>
</tbody>
</table>

Savings
Line 13  Monthly water saved (Line 4 – Line 10):  ___________ gal

Line 14  Monthly water saved in m³ (Line 13/264)  ___________ m³

Line 15  Monthly cost reduction (Line 6 – Line 12)  $___________

**Initial Investment**

Line 16  Cost of shower heads (Line 7 x $3.75)  $___________

**Payback Period**

Line 17  Time required for investment to equal savings (Line 16/Line 15)  ___________ months
**Low-Flow Toilets**

This worksheet is designed to help you compare your current water costs and consumption to the potential savings that result from the installation of low-flow toilets.

Instructions: For each line, fill in the number that is representative of your facility and carry out the calculations as directed in parenthesis.

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Current Water Usage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of rooms:</td>
<td>___________ rooms</td>
</tr>
<tr>
<td>2</td>
<td>Current type of toilet (gal/flush)</td>
<td>___________ gal</td>
</tr>
<tr>
<td>3</td>
<td>Total fluid gallons per day (Line 1 x Line 2 x 4):</td>
<td>___________ gal *4 = flushes per day per toilet</td>
</tr>
<tr>
<td>4</td>
<td>Total flushed gallons per month (Line 3 x 30)</td>
<td>___________ gal</td>
</tr>
<tr>
<td>5</td>
<td>Convert to m³ (Line 4/264):</td>
<td>___________ m³ *264 gal = m³</td>
</tr>
<tr>
<td>6</td>
<td>Monthly water costs (Line 5 x $2.18)</td>
<td>$___________ *$2.18 = average cost of water per m³</td>
</tr>
<tr>
<td></td>
<td>Water Usage with Low-Flow Toilet</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Number of rooms:</td>
<td>___________ rooms</td>
</tr>
<tr>
<td>8</td>
<td>Gallons per flush using Low-Flow toilet</td>
<td>1.6 ___________ gal</td>
</tr>
<tr>
<td>9</td>
<td>Total flushed gallons per day (Line 7 x Line 8 x 4)</td>
<td>___________ gal</td>
</tr>
<tr>
<td>10</td>
<td>Total flushed gallons per month (Line 9 x 30)</td>
<td>___________ gal</td>
</tr>
<tr>
<td>11</td>
<td>Convert to m³ (Line 10/264)</td>
<td>___________ m³</td>
</tr>
<tr>
<td>12</td>
<td>Monthly water costs (Line 11 x $2.18):</td>
<td>$___________</td>
</tr>
<tr>
<td></td>
<td>Savings</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Monthly water saved (Line 4 – Line 10)</td>
<td>___________ gal</td>
</tr>
<tr>
<td>14</td>
<td>Monthly water saved in the m³ (Lin 13/264)</td>
<td>___________ m³</td>
</tr>
<tr>
<td>15</td>
<td>Monthly cost reduction (Line 6 – Line 12)</td>
<td>$___________</td>
</tr>
<tr>
<td></td>
<td>Initial Investment</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Number of toilets (equal to Line 7)</td>
<td>___________ toilets</td>
</tr>
<tr>
<td>Line 17</td>
<td>Cost of toilets (Line 16 x $160.00)</td>
<td>$__________</td>
</tr>
<tr>
<td>Line 18</td>
<td><strong>Cost of labor for installation</strong></td>
<td>$__________</td>
</tr>
<tr>
<td></td>
<td>*generally assume $2,500 for 50 rooms</td>
<td></td>
</tr>
<tr>
<td>Line 19</td>
<td>Total initial investment (Line 17 + Line 18)</td>
<td>$__________</td>
</tr>
<tr>
<td><strong>Payback Period</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line 20</td>
<td>Time required for savings to equal investment (Line 19/Line 15)</td>
<td>____________ months</td>
</tr>
</tbody>
</table>
**Compact Fluorescent Light Bulbs**

This worksheet is designed to help you compare your current water costs and consumption to the potential savings that result from the installation of compact fluorescent light bulbs.

Instructions: For each line, fill in the number that is representative of your facility and carry out the calculations as directed in parenthesis.

### Current Electricity Usage and Bulb Costs

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of rooms:</td>
<td>___________ rooms</td>
</tr>
<tr>
<td>2</td>
<td>Total guest room light bulbs (Line 1 x 5):</td>
<td>___________ bulbs</td>
</tr>
<tr>
<td></td>
<td>*5= average light bulbs per room</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Electricity used per month per bulb:</td>
<td>___ 10.8 ___ kWh</td>
</tr>
<tr>
<td></td>
<td>*based on average burn time of 6 hours per day For a 60W bulb</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Total electricity used per month (Line 2 x Line 3):</td>
<td>___________ kWh</td>
</tr>
<tr>
<td>5</td>
<td>Monthly electricity costs (Line 4 x 0.25):</td>
<td>$___________</td>
</tr>
<tr>
<td></td>
<td>*$0.25 = electricity cost per kWh</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bulbs per month per room (0.208 x 5):</td>
<td>___________ bulbs</td>
</tr>
<tr>
<td></td>
<td>*0.208 = bulbs per month per socket *5 = average number of bulbs per room</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Monthly bulb costs (Line 1 x Line 6 x $0.52):</td>
<td>$___________</td>
</tr>
<tr>
<td>8</td>
<td>Total monthly cost (Line 5 + Line 7):</td>
<td>$___________</td>
</tr>
</tbody>
</table>

### Electricity Usage and Bulb Costs with Compact Fluorescent Light Bulbs

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Electricity used per month per bulb:</td>
<td>___ 2.74 ___ kWh</td>
</tr>
<tr>
<td></td>
<td>*based on average burn time of 6 hours per day For a 15W bulb</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Total electricity used per month (Line 2 x Line 9):</td>
<td>___________ kWh</td>
</tr>
<tr>
<td>11</td>
<td>Monthly electricity costs (Line 10 x $0.25):</td>
<td>$___________</td>
</tr>
<tr>
<td></td>
<td>*$0.25 = electricity cost per kWh</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Bulbs per month per room (0.018 x 5):</td>
<td>___________ bulbs</td>
</tr>
<tr>
<td></td>
<td>*0.018 = average bulbs/month/socket *5 = average number of bulbs/room</td>
<td></td>
</tr>
<tr>
<td>Line 13</td>
<td>Monthly bulb costs (Line 2 x Line 12 x $12.45)</td>
<td>$__________</td>
</tr>
<tr>
<td>Line 14</td>
<td>Total monthly cost (Line 11 + Line 13)</td>
<td>$__________</td>
</tr>
</tbody>
</table>

**Savings**

| Line 15 | Monthly electricity cost savings (Line 5 – Line 7) | $__________  |
| Line 16 | Monthly bulb cost difference (Line 13 – Line 7)   | $__________  |
| Line 17 | Monthly overall cost reduction (Line 15 – Line 16)| $__________  |
Appendix VIII: Energy Star Online Cost Analysis

Life Cycle Cost Estimate for
1 ENERGY STAR Qualified Residential Clothes Washer(s)

This energy savings calculator was developed by the U.S. EPA and U.S. DOE and is provided for estimating purposes only. Actual energy savings may vary based on use and other factors.

Enter your own values in the gray boxes or use our default values.

<table>
<thead>
<tr>
<th>Choose the type of washing machine</th>
<th>Residential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of units</td>
<td>1</td>
</tr>
<tr>
<td>Electric Rate ($/kWh)</td>
<td>$0.097</td>
</tr>
<tr>
<td>Water Rate ($/1000 gallons)</td>
<td>$4.529</td>
</tr>
<tr>
<td>Gas Rate ($/therms)</td>
<td>$1.342</td>
</tr>
<tr>
<td>Average Number of Loads per Week</td>
<td>7.5</td>
</tr>
<tr>
<td>Type of Water Heating</td>
<td>ENERGY STAR Qualified Unit</td>
</tr>
<tr>
<td>Initial Cost per Unit (estimated retail price)</td>
<td>$500</td>
</tr>
</tbody>
</table>

Annual and Life Cycle Costs and Savings for 1 Residential Clothes Washer(s)

<table>
<thead>
<tr>
<th></th>
<th>1 ENERGY STAR Qualified Unit(s)</th>
<th>1 Conventional Unit(s)</th>
<th>Savings with ENERGY STAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Operating Costs*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity costs</td>
<td>5.45</td>
<td>7.96</td>
<td>2.50</td>
</tr>
<tr>
<td>Water costs</td>
<td>26.22</td>
<td>57.83</td>
<td>31.60</td>
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<tr>
<td>Gas costs</td>
<td>27.79</td>
<td>39.60</td>
<td>11.81</td>
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<tr>
<td>Maintenance costs</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td>$59</td>
<td>$105</td>
<td>$46</td>
</tr>
</tbody>
</table>

Life Cycle Costs*
### Summary of Benefits for 1 Residential Clothes Washer(s)

<table>
<thead>
<tr>
<th>Summary of Benefits</th>
<th>1 Residential Clothes Washer(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial cost difference</td>
<td>$200.00</td>
</tr>
<tr>
<td>Life cycle savings</td>
<td>$402.28</td>
</tr>
<tr>
<td>Net life cycle savings (life cycle savings - additional cost)</td>
<td>$202.28</td>
</tr>
<tr>
<td>Simple payback of additional cost (years)</td>
<td>4.36</td>
</tr>
<tr>
<td>Life cycle electricity saved (kWh)</td>
<td>283.80</td>
</tr>
<tr>
<td>Life cycle air pollution reduction (lbs of CO₂)</td>
<td>435.63</td>
</tr>
<tr>
<td>Air pollution reduction equivalence (# cars removed from the road/year)</td>
<td>0.0 4</td>
</tr>
<tr>
<td>Air pollution reduction equivalence (acres of forest)</td>
<td>0.05</td>
</tr>
<tr>
<td>Savings as a percent of retail price</td>
<td>40%</td>
</tr>
</tbody>
</table>
Appendix IX: Sponsor Description

The Compañía de Turismo de Puerto Rico (CTPR) is a government funded organization that was first created in 1970 to certify hotels and resorts in Puerto Rico. Certification was based on compliance with variety of regulations pertaining to public safety, hygiene, quality of services and physical facilities, such as ADA accessibility. As the industry developed these regulations became increasingly important in promoting and sustaining and developing the infrastructure. The government of Puerto Rico began to recognize the growing role of tourism in the economy and took an active role in encouraging this growth by passing the Tourism Development Act in 1993. The act was designed to promote Puerto Rico as a tourist destination. CTPR now has offices in North and South America as well as Europe, which promote tourism through advertising to potential customers and working with developers to increase the capacity of Puerto Rico’s tourist infrastructure.

The main office is stationed in Old San Juan, PR with other offices around the world including the United Kingdom, Spain, Venezuela, France, Germany, Canada, Brazil, and Argentina (Magaly Rivera). CTPR also has regional offices stationed in Aguadilla, Cabo Rojo, Ponce, Vieques, Culebra, Miami, New York, and Los Angeles. All of these offices employ over 650 fulltime employees that make on average $51,000 per year. The company is headed by the Executive Director, Terrestella Gonzalez Dentor (Compania De Turismo).

CTPR grew extensively in the early 90s and once the Tourism Development Act of 1993 was established, new tourism facilities were exempt from income and property taxes. This made it possible for new facilities to be established more quickly to respond to the growing demand in the economy. Also, the CTPR works closely with the Department of Economic Development Corporation to offer incentives such as investment tax credits to developers interested in expanding tourist attractions. These projects are funded by government bonds and loans issued through the Puerto Rico Development Fund, in order to promote tourism and socioeconomic growth in Puerto Rico (Hotel Interactive Incorporate).

In addition to enhancing the provision of tourist facilities and infrastructure, the CTPR also expends a considerable effort reaching out directly to tourists. It offers information about places of interest to tourists such as new attractions, cultural events, historic locations, and parks
and scenic vistas where visitors may experience the natural beauty of Puerto Rico. The company also production and dissemination of various promotional and marketing materials, such as the bimonthly publication of Que Pasa! This magazine includes everything tourists need to know including maps and information about lodging, restaurants, maps, nightlife, folklore, local cuisine and more.

The company also provides useful tourist information ranging from accommodations and entertainment, to sports and cultural experience. It also offers individuals information on tourism transportation, income of the internal tourism programs, and of the improvements to the tourism quality of the island. This permits individual investors and potential visitors to examine the internal and external workings of the organization. The company is continuously upgrading communications technology on the island to cater to the increasing business visitors. These upgrades included creating several internet hubs to easily access information which led to internet connections throughout the island. Potential visitors can effortlessly schedule vacations at any time increasing the flow of customers. The CTPR agency also emits endorsements and economic incentives on the construction of tourist facilities to continue development and sustain prior progress. (Compania De Turismo).

Attracting tourists is one of the main objectives of the Tourism Company as is evident on the official website. Puerto Rico is a prime tourist destination for many reasons such as the pristine beaches, historical and cultural attractions, its relaxed social environment, and even its rum production. Even the smallest things can be used to attract tourists. For example, the official CTPR website includes lists of rum recipes and brags, “Only the finest rums come from Puerto Rico (Compania De Turismo).” Gambling is another major attraction in Puerto Rico and the government closely regulates all casinos and only permits them in hotels. The CTPR has a gaming division that regulates and oversees the management of gambling operations. It has an exclusive right to all slot machine operations in Puerto Rico and ensures that they are state-of-the-art for tourists.

Maintaining its core values and objectives, CTPR’s initiative “Towards Sustainability and Excellence” is directed to impact fifteen small inns throughout Puerto Rico in terms of implementing Best Environmental Practices and new business operations. The project is one example of the services that the Tourism Company provides to hundreds of thousands of people each year. CTPR affects every individual that visits the country in some way.
Appendix X: Fernando Abruña (Architect) Interview

We realize that this information is very specific and we understand if it is not available. We appreciate any information that you have available:

Are there currently any incentives for these inns and hotels to adopt best environmental management practices? (These practices include florescent light bulbs, low flow showerheads and toilets, etc.)
NO

What is the unit price of electricity, natural gas, oil and water or other resources that might be consumed in the inns?
Electricity fluctuates with world market prices of oil. This year it has been fluctuating between 22 and 25 cents per kilowatt hour.

How many acres does each inn occupy?
We have information on some inns but not all. They vary in size quite a lot.

In each specific inn how many florescent light bulbs are used in each room if any? How many standard light bulbs?
Most Inns are changing their incandescent bulbs to compact fluorescents. There is an average of 5 to 6 lamps per room. One additional lamp when there is a room balcony.

Is grey water recycling employed at any of the inns?
It is used in a very minimal (almost negligible) way at the Luquillo Sunrise facility. They collect condensate water from an air conditioner. No other Inn is reusing gray waters.

What are the yearly and monthly costs of water, electricity and natural gas for each hotel?
I have been trying to get this data from the hotels but they have been very adamant (or uninterested) in providing it.
Ana has an Excel sheet I sent her with this info.
Luz La Fontaine from Universidad del Este might have additional data submitted by Owners directly to her.

What is the average price of low flow shower heads, water efficient washing machines, motion sensors, low flow toilets, and energy efficient fluorescent light bulbs, dryers, air conditioning, and refrigerators in Puerto Rico?
Low Flow Shower head or aerators: $5
Water Efficient Washing Machines: Conventional $800 (Residential Average), Efficient up to $1,500
Motion Sensors: $70 to $90 low end… $300 top of the line
Low Flow Toilets: Conventional Residential,$250, Water Efficient $600 (low)
Energy efficient fluorescent light bulbs: $3 to $5/each
Dryers $350 Conventional Residential, $700 Energy Efficient
Air Conditioners $600/12,000 btuh for window air conditioners, $700

How much solid waste (trash) is produced by each hotel and is there a charge for disposal?
We do not have statistics for solid waste produced by each hotel guest. Average amount of solid waste per capita in Puerto Rico is close to 4 pounds
Most hotels depend on Municipal service for trash disposal. Typical Garbage (food stuffs, consumables, plastic, paper, cardboard, aluminum and glass are normally handled by Municipalities without cost. Construction and demolition debris is normally trucked by Owner or Contractor to a Municipal Dump (where available). The Municipality normally charges approximately $150 per truck.

What recycling programs are available for the inns? Are the programs utilized?
The law requires each Municipality to have a Recycling Program in place by the end of this year. Hoteliers need to coordinate with Municipal government. Some Inns have already done this with their respective Municipal Governments.
Appendix XI: Minutes from Interview with Ada Torres and Alida Ortiz

3/14/2007
9:36am – 10:27am
Introductions

Alida – Retired professor of marine biology at the University of Puerto Rico.
- Marine conservation
- Now private consultant working for the Tourism Company and DNER for past 8 years in sustainable practices especially in marine protected areas.
- Ross: have you been working with other WPI DNER team?
  - Last year, yes.

Ada- Industrial Psychologist worked in banking and financial services for 20 years
- Designing financial products and launching financial products
- Went into hotel field – left financial services and went back to school – masters in environmental laws and regulations
  - Pushing for environmental regulations in PR
  - Consultant for Tourism company – “missing link” b/w people and the environment running the operation

Nate:
- Interview questions already set up
- Do inn managers know regulations they need to follow?
  - Familiar with DNER has said about env issues aka creek behind property means don’t cut down tress
  - Familiar with good practices
  - Do follow regulations b/c if not, pay fines if violate
  - PR has no lack of laws and regulations – the enforcement is a problem
  - Not aware of env care and conservation – her findings
  - Not just inns, entire country as a whole
- Why aren’t the laws inforced – Ross
  - Lack of resources sometimes
  - Not enough “Rangers”
  - Just recently in civil code environmental crimes
  - No state police or other authority to enforce (municipal police)
  - Ada – severe lack of training b/c overwhelming amount of regulation
    - Not all officers can know everything
    - Poses limitations – if see regulation, don’t follow protocol to process violation
      - Gets lost in court
  - Alida – lack of training for all levels – judges, conflict of jurisdiction as to who is responsible
• Too much confusion – too many laws that change too rapidly

• Any authoritative website they can go to for information?
  o Ada – there are none for PR nor the Caribbean only in general terms for Europe, Australia
  o The tourism company doesn’t have anything on best practices resources
  o Some problems may be b/c take solutions from California and apply them to PR, but culture is different, area is different, so they don’t mesh
  o Ada – no reliable industry statistics; main reason why there are no formal best practices defined
    ▪ Cannot have best practices if you don’t know what the baseline is or what can be achieved reasonably in the allotted time
  o Alida – select one or 2 issues and concentrate in them (recycling) b/c inns are expected to recycle and abide by laws but there is a gap b/c municipality who is enforcing the laws, and the inns that are supposed to be following them.
    ▪ Everywhere in the world except here
    ▪ Force them to recycle, but they don’t know how to do it
  o Ada – went to the rainforest, which is a reserve,
    ▪ Rangers are expected to pick up rubbish left by tourists
    ▪ Found Coke can in the tree
    • From marketing standpoint, supposed to sell tropical paradies, but when people come, they see lots of garbage – it is out of control
      o No conscious or awareness
      o Choose 1 or 2 areas of focus – recycling

• Ross: What does recycling law cover?
  o Plastic, metal, paper, etc. reduce reuse recycle
  o Good law on paper – but not enforced
  o Alida – industry not competing to get reusable material so there is no point in separating everything out if no one is going to use it or sell it.

• Jen: Any incentive for recycling
  o Alida - Hotel association with EPA has program $1800 grant w/ DNER
  o Covers energy and water
  o 3-year program, just started
  o Will provide guidelines
  o Identify purchase material price for interested parties
  o Alida – interview solid waste management authority
    ▪ Would be more important to hear it from them, who are regulating
    ▪ Ask them What is being recycled, how much from hotel, how much total?

• Ross: is there fee for picking up recycling?
  o Ada- yes there is a fee, b/c they need to make money
  o Ideal = industry lower the fee b/c organized in regions
  o More selling power – but need volume to sell things to get attention

• Ross: Fee for garbage disposal?
Ada - Private company yes there is a fee
2 municipalities have free (Carolina picks it up on site)

Nate: what has been done to accomplish/fail in BEMPs

Ada: we have come a long way
- Started from nothing including vocabulary
- New movement of sustainability
- Now common language – most of them are using sustainability
  - Conserving resources is not expensive and can be done
- Make an effort to tell the guests – they do respond and follow, are friendly towards the practices

Alida – we have caught their attention
Ada - you will see a difference even when you go into the inns
  - It’s a process

Nate: What incentives are offered to hotels to adopt BEMPs? Any financial assistance offered?

Alida – want to see that incentive program already in place is permeated through this
  - As of right now, no.
  - The US is behind everyone else when it comes to BEMPs
  - Thanks to Al Gore and his marketing campaign

Ada – it’s what we hope to accomplish with this project.
  - Now it’s mainstream so they should implement this now.
  - In Europe, they have recycling by color
  - Need to go back to marketing – Europeans don’t want to go to places that have lots of garbage – it effects their experience
    - They prefer all-inclusive b/c more like a “fairytale”

Nate: what should be the next step for formal incentives for hotels in BEMPs? Besides lobbying

Alida – need to go through regulations CTPR already has – supervision, etc.
  - Documents need to be amended to insert that
  - Typical restaurants endorsed by CTPR reviewing regulations, inserted in the regs everything about environmental conservation themselves
  - Documents don’t have BEMPs in them right now

Ada – Incentives: need to measure things first
  - Put a cycle in motion, need to extract from the performance and contribution from the whole, extract portion to give back
  - No measurements, so no structure can be created

Alida - Statistical basis needs to be constructed
  - Banks need to get involved too b/c they are the ones giving the money

Nate: is there interest in these inns to be accredited by Green Globe?

Ada – confusion – there are so many certification labels
  - LEED is mainstream among developers, has better brand recognition
- Small operations that are leases of buildings don’t own them, they still want to go LEED
  - Need approval from the owner
- Green Globe is easier to adapt to smaller operation – only need benchmark first, then improve performance over years
- BUT, GG has not been not supportive in the Caribbean to promote certification
  - She wrote to directory of CAST – GG is selling the concept, but not supporting it!
- Not gone forward promoting GG b/c no backing of the organization
  - They should be more interested

- Alida – locally, there are no indigenous/native regulations for good practices
  - Difficult to bring broad certification to local area
  - Need to educate the people
  - She has done training for GG in Barbados, Dominican, Jamaica
    - Have more European tourists than PR and the US
- Could use LEED
- Lousy service in hotel industry, it doesn’t matter if they are green or not
  - Customer service is what it comes down to
  - Need to have good experience
- Put lot of weight on steps that need to be taken by the inns to have good practices
  - If they get GG, that’s great, but need something local first

- Nate: Creating awareness of the best practices first, then bringing in the programs?
  - Ada – need to give them goals they can handle first, b/c if it’s too hard, they won’t reach it and will become unmotivated

- Nate: why were these hotels chosen for this program?
  - Alida – we have no idea.
    - Had to do with certain size hotel, results of evaluations and statistics over the last 4-5 years they have low achievement in service management of the hotel and client satisfaction
    - Program put together to tackle both: excellence and sustainability
    - Absolutely voluntary
  - Ada – preselected by CTPR, and they were approached and said yes.

- Nate: are the larger hotels more environmentally conscious?
  - Ada – some yes and some now
    - Marriott has some programs – will push forward for all hotels to follow guidelines
    - LXR not doing anything environmental El San Juan hotel, Condado Plaza don’t have any env. friendly program
    - They say they have the towel reuse program, but doesn’t make a huge difference
    - One obstacle was from engineering dept
• Everything in franchises is specified, can only order from certain supplier for things
  • Hard to convince them to change the light bulbs
    o Alida – guest occupancy isn’t an issue, so customers aren’t picky b/c they are such a huge change
    o Guests have not asked for it

• Nate: brochure to specify the need for BEMPs and benefits, draw attention to webpage for info for BEMPs and financial information?
  o Both: great idea. Would be a tremendous product.
  o Anything else added?
    ▪ Ada – regulations should play a part, but do it in a friendly, basic way, not too technical b/c they won’t read it
    ▪ Alida – have identification of other industries that can make connection, such as industries that recycles or use friendly chemicals, horticultural gardening
    ▪ Ada – cutting down trees – certified person knows they need to go get a permit, etc. to cut it down
      • Would provide hotels to have information of where to find people like that
    ▪ Alida – tourism municipality of Australia, Spain, Mexico
      • Have websites like that
      • In Mexico, all the information is free
    ▪ Nate: create central hub for people and provides links
    ▪ Ada – Australia website has checklist and three options for EMS
      • Good option for those people who are not trained in specific areas
    ▪ Alida – you should find out how much the owners go to the internet to find the information on all this
      • For marketing and information, they need to use the internet!!

• Ross: what happens to the garbage when it’s picked up?
  o Ada – mostly landfilled
    ▪ 6 or 7 leftover from 30, EPA is closing them down
    ▪ Now being transported off the island
    ▪ Solid Waste Management Authority (within DNER) has is plan “under revision” involves waste to energy, incineration, etc.
    ▪ No one has seen the plan, which is odd
  o Alida – there is not much land available
    ▪ There is garbage underground for 60 years
  o Ada – psychological component:
    ▪ Sales of retail sales, PR stores are the first worldwide
      • Tells us that this society is very consumerist
      • Women are “fashionistas” – compare clothes, no awareness just throwing things away.
      • Alida – There is a tax incentive for solar water heaters in Puerto Rico
Both women provided us with their cards with phone numbers so we could contact them with any additional information

Appendix XII: Interview with Eddie Perez

Eddie Perez is responsible for all advertising efforts including mail, internet, and publications.

How do you currently promote CTPR programs with the smaller hotels and inns of Puerto Rico?

Different markets: main market is US mainland east coast. When media plan designed for the fiscal year, there are some magazines include that might appeal to travelers who are looking for a more personalized experience. The make the “media mix” very wide in terms of the magazines and TV spots that they promote. Example: National Geographic magazines will focus on experience that the traveler is looking for. They expose the Paradores and small inns there.

Do the inns and CTPR communicate with themselves in terms on sustainability and service?
That’s part of the message of the add. Whent eh add is designed, they try to communicate different messages like sustainability, service, etc. different messages in each piece. The images that they mix in the add have different messages for different target audience. The small inns add has service, sustainability, etc as the main focus.

Do you comm.. directly with the inns? Anything within the island to help with CTPR’s communication.
I only handle the consumers/ tourists.

Is there any one that handles the inns?
From the perspective of quality,

What methods of communication are primarily used?
TV adds, magazines, mass media. Direct marketing w/I mass media program. Use URL in magazines. They negotiate with the magazine that besides media placement they have “media value” such as events in other places, sweepstakes, etc. This action drives more consumers to their website than the actual add.

What are the most effective means of communication between CTPR and the hotels?

What difficulties do you encounter when trying to get in touch with the hotels?
Competition is the biggest obstacle.

Are there currently any websites used to directly communicate and advertise with managers and owners of hotels and inns throughout the island.
They use email to have more effective communication with the owners in this case. Sometimes letters that he personalizes for the inns. Letters are used in direct marketing to develop pieces using the database that they have.

**How beneficial would a brochure be to promote a website and get more inns interested in sustainability?**
Could be. But, a personalized brochure is more effective than 100,000 general brochures.

**What about email? Would be more effective?**
Yes. I always start “dear all…” with a positive statement in the first sentence.

**Is it possible to produce a website that only inns could access? (i.e. password protected)**
Yes it is.

**Would it be possible to include links to sites that are not directly related to CTPR such as the energy star website?**
Yes. Could be a good idea. But, the CTPR website is focused on consumers, not on the industry. The message and structure of the website is the directed to the consumer. Make a micro-website, maybe not a whole different website.

**What information would need to be provided to begin our proposed webpage.**
One most impt things for the hotels 1) our investment in marketing and advertising (media plans, new investments, new partnerships, etc. 2) business intelligence, who’s coming to PR, how much they’re spending, where they are going, etc.

Both sections could be helpful to the tour operators, and inns, etc.

**If CTPR decides to create a webpage, how long would it take to get it up and running?**
That depends on the whole components of the website. If we are talking 3 or 4 sections, maybe 2 months to build. Depends on the info they need to get from other departments. Need translation (both English and Spanish).

**If there was a website, should there be more added to it besides links and business intelligence? (cost analyses, etc.)**
Maybe, I could say we have some troubles in terms of service. “Hotels have to learn that service is essential. When you go to the DR or Cuba, when you go to a hotel, the whole country understand that the service is the key to a great experience and we in PR in some sections of our beautiful country doesn’t understand that when you see a visitor or a tourist, you have to give them a smile, or be courteous.” Maybe include some tips on service on the website.

Ana: Maybe the people who work with excellence can give some tips to the group working with sustainability.

X: Maybe an online seminar on service and courtesy and education.
Appendix XIII: Interview with Luquillo Sunrise Beach Inn

1. What do you know about Best Environmental Management Practices?

In last 3 months had increased knowledge! Before that, (she’s an exception) b/c she lived on a sailboat for years (used only rain, solar, wind) so she is very familiar with conserving resources.

CTPR def opened her eyes. The owners are not environmentalists – says that only hippies recycle (wife owner) was dead set against fluorescents in room. CTPR educated them to tell the owners that they need to take these steps.

Jen: Did it help that they came in person? Or would a website be ok. – Definitely on-stie inspections helped because showed them what they needed to fix. Styrophome cup incident

2. How important do you feel sustainable development is for the tourism industry?

Effects the bottomline – so in that case “it’s huge.” She asked guests how impt it was in choosing a hotel - 80% said it wasn’t what they were looking for, but once they saw it, they wanted to help out. All guests said they needed to have an air conditioner, but this time of year there is very little AC usage (tells by how many doors are open in the morning while people are sleeping)

3. Should inns be responsible for maintaining the environment surrounding the establishment?

“Definitely.” Don’t want to add to the problem – wouldn’t give drinks in Styrofoam cups to take to the beach and lose. In this area, there is discussion about adopting the front beach as “friends of the parad (?)” The inn is getting life saving equipment (like trash bins) to put in public areas around the beach. It’s a public beach and yet that’s something that American’s notices. “If cleanliness = env. Friendly = happy guest, then yes. But not going to set up a booth to sell solar panels.” They are not educating the guests here.

4. Would the cost of implementing these practices influence your choice?

Yes of course.

5. Would you be more inclined if there was a short pay back period?

6. Do you think it is beneficial to your establishment if you alter your operations?

Absolutely

7. How does a company’s environmental practices influence a guest’s choice of hotel?
She asked guests how important it was in choosing a hotel - 80% said it wasn’t what they were looking for, but once they saw it, they wanted to help out. All guests said they needed to have an air conditioner, but this time of year there is very little AC usage (tells by how many doors are open in the morning while people are sleeping).

The inn is getting life saving equipment (like trash bins) to put in public areas around the beach. It’s a public beach and yet that’s something that American’s notices. “If cleanliness = env. Friendly = happy guest, then yes. But not going to set up a booth to sell solar panels.” They are not educating the guests here.

8. Would financial incentives persuade you to adopt green practices?

Yes it is the driving factor.

What about calculating on a website? “Yes.” Would be beneficial with our specific owners.

9. What are the incentives that are offered by CTPR?

Not sure about the 11% discount on electricity (if it’s environmental at all), but we didn’t have to do anything environmental to get it. Need to give them 5year plan on redcuing electricity and energy audit every year. Heard rumors from govt if buy solar hot water heaters then you get a tax credit, read about in the newspaper.

The greenhotel.com – will get signs that say turn off the AC, etc. CTPR could promote that and distribute them and put logo on it (branding also for towel resuse program). Trying to decide if going to buy the green hotel’s sign or buy their own.

10. What do you feel are the major obstacles for implementing BEMPs?

Specifically in PR – “lack of education b/c not something people do in their homes, so it wouldn’t carry over into work.” Start even with school children. Most guests are Americans or Europeans, some locals, but the locals don’t really understand how to recycle.

11. How do you communicate to customers your goals for BEMPs and how they can help?

They are not educating the guests here. They are currently using the towel reuse program that they advertise with a sign. The sign states that if towels are left on the ground, they will be washed, if they are hung on the racks, they will not be washed. The inn also has their environmental policy sign in the main upstairs lobby so the guests can see what they are doing to help the environment. They also have in that same location a sign that instructs guests on how to be proper guests. They are in the midst of using signs at the door of each room that remind guests to shut off the AC and the lights before leaving.
<table>
<thead>
<tr>
<th><strong>Hotel Information</strong></th>
<th><strong>Response</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the total number of guest rooms in the establishment</td>
<td>15 units (1 2-bedroom)</td>
</tr>
<tr>
<td>How many lights are in each room?</td>
<td></td>
</tr>
<tr>
<td>How many refrigerators are there? How many are energy efficient?</td>
<td>No, not in all (4 in higher priced rooms, 1 floater for $10, 2-bed has full kitchen)</td>
</tr>
<tr>
<td>How many microwaves are there? How many are energy efficient?</td>
<td>2 in rooms, 4 total</td>
</tr>
<tr>
<td>How much laundry is done on site?</td>
<td>Yes</td>
</tr>
<tr>
<td>How often do you wash bed linens from occupied rooms?</td>
<td>Used to be every 3rd night. Only once a week</td>
</tr>
<tr>
<td>How often do you wash bath towels from occupied rooms?</td>
<td>Sign in room (on floor = laundered)</td>
</tr>
<tr>
<td>How many acres does the hotel occupy?</td>
<td>Not sure. 1.5 maybe</td>
</tr>
<tr>
<td>How often is motorized landscape equipment used?</td>
<td>Landscaper uses lawnmower and leaf blower once a month if lucky</td>
</tr>
<tr>
<td>How much of the property has an impervious cover?</td>
<td></td>
</tr>
<tr>
<td>What is the average monthly electric bill?</td>
<td></td>
</tr>
<tr>
<td>What is the average monthly water usage?</td>
<td></td>
</tr>
<tr>
<td>What is the average gas bill?</td>
<td></td>
</tr>
<tr>
<td>Is food prepared on site?</td>
<td>Yes just breakfast</td>
</tr>
</tbody>
</table>

**Water conservation:**

<table>
<thead>
<tr>
<th><strong>Response</strong></th>
<th><strong>Difficulty to Implement</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>How many low flow showerheads are installed?</td>
<td>All</td>
</tr>
<tr>
<td>How many low flow toilets are installed?</td>
<td>All</td>
</tr>
<tr>
<td>How many regular toilets are installed?</td>
<td>0</td>
</tr>
<tr>
<td>How many liters per flush?</td>
<td></td>
</tr>
<tr>
<td>Do you use water efficient washing machines? If so, how many?</td>
<td>1 has energy saving set the other does not</td>
</tr>
<tr>
<td>Is grey water recycling practiced?</td>
<td>No. Intersted though.</td>
</tr>
<tr>
<td>What is the monthly water cost?</td>
<td>$355 in January</td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>How many total motion sensors or timed faucets are installed?</td>
<td>1 outside</td>
</tr>
<tr>
<td>Is solar- water heating practiced?</td>
<td>Yes. Installed today</td>
</tr>
<tr>
<td>How many rain barrels are used?</td>
<td>No. Afraid of mosquitoes.</td>
</tr>
<tr>
<td>Is the landscaping designed for low water consumption?</td>
<td>NO. Not pretty. Done by the owner. $5k on plants that die. Poor investments.</td>
</tr>
</tbody>
</table>

**Energy Conservation:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th>Difficulty to Implement</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many energy efficient appliances are installed? (Stoves, AC, refrigerators, microwaves)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many florescent light bulbs are installed?</td>
<td>4 in each room, replacing as they burn out.</td>
<td></td>
</tr>
<tr>
<td>How many lights operate on motion sensor or a timer?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is natural lighting maximized through windows and sky lights?</td>
<td>No sunroofs, each have a balcony.</td>
<td></td>
</tr>
<tr>
<td>How many solar panels are in use?</td>
<td>1 panel</td>
<td>Slowly transforming</td>
</tr>
<tr>
<td>Is wind power utilized?</td>
<td>Not installed but have equipment. Don’t know where to use it.</td>
<td>Will be used in new “eco-unit”</td>
</tr>
<tr>
<td>Is geothermal energy utilized?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>How many energy efficient dryers are installed?</td>
<td>1 is energy-star. Use clotheslines to dry beach towels.</td>
<td></td>
</tr>
<tr>
<td>How often are bottles of toiletries replaced in each room?</td>
<td>Have a dispensers in every room.</td>
<td></td>
</tr>
<tr>
<td>How often is non motorized landscape equipment used?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the building insulation modern and efficient?</td>
<td>Building is new (2 years old)</td>
<td></td>
</tr>
</tbody>
</table>

**Solid Waste Reduction:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th>Difficulty to Implement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your inn have a recycling program.</td>
<td>Yes. “Static bins” housekeepers have separate glass, al bins to use while cleaning. Resistance from owners to have in each room. City takes every 2 weeks for free.</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>How much of the following materials is recycled?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td>New, 75-80%</td>
<td></td>
</tr>
<tr>
<td>Paper</td>
<td>Don’t recycle paper towels.</td>
<td></td>
</tr>
<tr>
<td>Cans/aluminum</td>
<td>99%</td>
<td></td>
</tr>
<tr>
<td>Are organics composted for future use, such as fertilizer?</td>
<td>Has compost program but isn’t going well. Stop/start progress.</td>
<td></td>
</tr>
<tr>
<td>Is used oil from the kitchen recycled for other uses?</td>
<td>No. Don’t have a lot of excess oil b/c only breakfast.</td>
<td></td>
</tr>
<tr>
<td>Are organics donated to farms or other industries for use?</td>
<td>Had pig farmer&lt; but didn’t produce enough to justify him coming”</td>
<td></td>
</tr>
<tr>
<td>Are biodegradable disposable utensils, plates, and cups used?</td>
<td>Everything.</td>
<td></td>
</tr>
<tr>
<td>How many shampoo/soap dispensers are installed?</td>
<td>15 installed total. Do get bar of soap in the sink</td>
<td></td>
</tr>
<tr>
<td>Erosion/Runoff</td>
<td>Response</td>
<td>Difficulty to Implement (1 being very easy and 9 being very difficult to implement)</td>
</tr>
<tr>
<td>What percentage of the roof do roof top gardens occupy?</td>
<td>0</td>
<td>Trying to start the program</td>
</tr>
<tr>
<td>What percentage of pavement is made from porous paving materials?</td>
<td>Not sure. “I Doubt it.”</td>
<td></td>
</tr>
<tr>
<td>Are detention basins used to control runoff?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>Has the soil been tested for nutrient and contaminant levels?</td>
<td>No, but there is no soil, it’s just sand.</td>
<td></td>
</tr>
<tr>
<td>How much fertilizer is used</td>
<td>Top secret. No idea.</td>
<td></td>
</tr>
</tbody>
</table>
in a year?

How much of the property has an impervious cover?

What other environmentally friendly technologies or practices do you employ? Do promote environmental tourism. Guests are not golf/tennis types. Don’t have a pool. All about nature – so hiking/kayaking crowds. Don’t advertise golfing, etc.
Appendix XIV: Interview with Hosteria del Mar

1. What do you know about Best Environmental Management Practices?

Working on motion detectors in rooms. A little, not too much but working on it. For example, in every detergent and everything we use in the hotel, it is biodegradable, and the water is reused of the plants. Also we change the sheets every other day. They are working on towel reuse program with signs but not implemented yet. They do recycle including the food from the restaurant to a pig farm in the country. The excess is made into compost. It is her farm where she grows her own plants for the hotel. People come and collect the left over oil she thinks for fuel. A man comes to collect the coke bottles every Wednesday an employee delivers the bottles to the recycling center. She recycles the newspaper into dirt on her farm. Cannot recycle the cooked food (fish, chicken) except for a woman who feeds her cats with it. The vegetables, bones, etc. has no place to go. Trying to get someone to collect the food and take it to a pig farm…working on it.

2. How important do you feel sustainable development is for the tourism industry?

Should be 100% implanted by a law for every hotel. You can see right here what is hapeneing with global warming – it is serious. You see the climate changing even in PR, we see things we’ve haven’t seen before. It might not be important for us, but for the young people it is very important. I think the CTPR is working very hard. The pilot program is very agressie and they are working on it.

3. Should inns be responsible for maintaining the environment surrounding the establishment?

Yes. I am going to tell you a story. Was director of program w/ PRHTA. Joined the clean up the world program. Was president of a committee she created with PRHTA and CTPR. They took divers from the ocean and took cars out of rivers and cleaned the water on the island. Another pilot program to teach kids in school to recycle and not litter, so they could teach their parents how to recycle. They worked with the police to fine people for breaking the law. One thing part of the law was that every business person in hotels, malls, stores, was responsible for their surroundings. They could be fined if did not follow the rules. But they are not enforced. The program died b/c no one took it over. Needs endorsement. They clean the beach around the hotel and use trash for compost.

4. Would the cost of implementing these practices influence your choice?

The BEMPs they are using now are not expensive. Example: Solar Panels? That is very expensive and it’s very difficult and something that we’ve been looking at with this program. We are going to do certain things to try and improve. Some of the projects you cannot have in a hotel, customers do not want that. We have to develop something more. If they get help from the
5. Would you be more inclined if there was a short pay back period?

Yes. She said she’s older, so she might not see the turnaround.

6. Do you think it is beneficial to your establishment if you alter your operations?

Alter in what sense? Clarification…

Yes. Saw a decrease in the bills after implementing the solar water heater and changing the bulbs. People need to know, there needs to be more education for both the business people and everyone.

One thing is going to be expensive but we are going to do it – motion detectors. Guests leave it on all day so that the room will be clean. If you leave your room and the maids are cleaning, they will leave it on so it’s cooler for them. “It’s expensive but in the end it will save a lot of money.”

7. How does a company’s environmental practices influence a guest’s choice of hotel?

I think it attracts. Once we finish with everything we are doing, we have a webpage and we are going to put all the details on the webpage. Like everything we use is biodegradable, and people are not sleeping with chemicals in their sheets. She is allergic to choride so it will appeal to people that have allergies. People that are pro-environment will be more likely to go there.

8. Would financial incentives persuade you to adopt green practices?

Yes. And many people would be also. Because there are things that I’m doing without incentives, but many we cannot do without incentives or backing.

9. What are the incentives that are offered by CTPR?

No.

10. What do you feel are the major obstacles for implementing BEMPs?

Lack of knowledge of what we are doing and what we can do for the environment. I think knowledge is the key. The newspaper is starting to work on it, so people are doing something. There is a problem with iguanas and the government is working on a plan so that people start eating them to control the population.
<table>
<thead>
<tr>
<th>Hotel Information</th>
<th>Response</th>
<th>Difficulty to Implement</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the total number of guest rooms in the establishment</td>
<td>24. 4 one-bedroom apartments.</td>
<td></td>
</tr>
<tr>
<td>How many lights are in each room?</td>
<td>10 total. 8 mini and 2 mid-sized. Not sure if energy efficient</td>
<td></td>
</tr>
<tr>
<td>How many refrigerators are there? How many are energy efficient?</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>How many microwaves are there? How many are energy efficient?</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>How much laundry is done on site?</td>
<td>Yes.</td>
<td></td>
</tr>
<tr>
<td>How often do you wash bed linens from occupied rooms?</td>
<td>Every 2 days. Used to everyday. Switched over 1 year ago.</td>
<td></td>
</tr>
<tr>
<td>How often do you wash bath towels from occupied rooms?</td>
<td>Working on the cards for bed linens and the towels and to turn off lights when not in the room.</td>
<td></td>
</tr>
<tr>
<td>How many acres does the hotel occupy?</td>
<td>900 square feet</td>
<td></td>
</tr>
<tr>
<td>How often is motorized landscape equipment used?</td>
<td>Never. Use rakes to clean the beach.</td>
<td></td>
</tr>
<tr>
<td>How much of the property has an impervious cover?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the average monthly electric bill?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the average monthly water usage?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the average gas bill?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is food prepared on site?</td>
<td>Yes.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water conservation:</th>
<th>Response</th>
<th>Difficulty to Implement</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many low flow showerheads are installed?</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>How many low flow toilets are installed?</td>
<td>New ones are low-flow. Trying to restrict flow in older ones. 9 low-flow total.</td>
<td></td>
</tr>
<tr>
<td>How many regular toilets are installed?</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>How many liters per flush?</td>
<td>Not sure. She buys energy efficient machines, but when they break the handyman might go buy non-efficient ones. 2 washers 3 dryers</td>
<td></td>
</tr>
<tr>
<td>Do you use water efficient washing machines? If so, how many?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is grey water recycling practiced?</td>
<td>Used for the plants.</td>
<td></td>
</tr>
<tr>
<td>What is the monthly water cost?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>How many total motion sensors or timed faucets are installed?</td>
<td>None yet but coming soon in every room. Including AC. None for outside either b/c have to be on all night</td>
<td></td>
</tr>
<tr>
<td>Is solar- water heating practiced?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>How many rain barrels are used?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>Is the landscaping designed for low water consumption?</td>
<td>Don’t have that many plants outside.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy Conservation:</th>
<th>Response</th>
<th>Difficulty to Implement (1 being very easy and 9 being very difficult to implement)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many energy efficient appliances are installed?</td>
<td>Not sure.</td>
<td></td>
</tr>
<tr>
<td>(Stoves, AC, refrigerators, microwaves)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many florescent light bulbs are installed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many lights operate on motion sensor or a timer?</td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>Is natural lighting maximized through windows and sky lights?</td>
<td>Yes. Every room is open to the ocean with glass windows. No AC in restaurant b/c windows provides high air circulation.</td>
<td></td>
</tr>
<tr>
<td>How many solar panels are in use?</td>
<td>For hot water yes. For every room and the apartments.</td>
<td></td>
</tr>
<tr>
<td>Is wind power utilized?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>Is geothermal energy utilized?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>How many energy efficient dryers are installed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often are bottles of toiletries replaced in each room?</td>
<td>Have dispensers. After remodel, marble could not have it, so all rooms on second floor have bottles. Apartments and first floor have dispensers.</td>
<td></td>
</tr>
<tr>
<td>How often is non motorized landscape equipment used?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Is the building insulation modern and efficient?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Solid Waste Reduction:</strong></th>
<th><strong>Response</strong></th>
<th><strong>Difficulty to Implement</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your inn have a recycling program.</td>
<td>No program in neighborhood so no. Mayor said they would start, but have yet to come visit even though they call often. Are starting on their own with glass.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Erosion/Runoff</strong></th>
<th><strong>Response</strong></th>
<th><strong>Difficulty to Implement</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>What percentage of the roof do roof top gardens occupy?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>What percentage of pavement is made from porous paving materials?</td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>Are detention basins used to control runoff?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>Has the soil been tested for nutrient and contaminant</td>
<td>No soil only sand.</td>
<td></td>
</tr>
</tbody>
</table>
What other environmentally friendly technologies or practices do you employ?

Everything is organic. Fruits are grown at her country house. At the beginning, the maids thought the detergents didn’t clean b/c of the chemicals, but you have to force them to start, so it comes little by little. Occupancy in February was higher than in March, but the bills were still lower than before! The water she cannot share b/c they have a broken pipe and she had an $11,000 bill. They are adjusting the bills b/c of the breakage so they need to wait to see The only thing saving in the water was the washing of the linens from everyday to every other day. Got low flow showers many years ago.

Call her to make sure she has the papers so we can look at the bills.

Website proposed. Would you use it?
Yes! If we have suggestions she would love them.

Anything specific on the website?
Anything that will help us with energy and/or water. “It never occurred to me that having the refrigerator on all the time was costing so much money.” If the room is not occupied, unplug them. That costs nothing and saves energy.
Appendix XV: Interview with El Guajataca

1. What do you know about Best Environmental Management Practices?

If you look around, you can see that they pick up the garbage (a private company comes). They are also planting trees around the property as well. Starting to change light bulbs to fluorescent and trying to install solar water heater system. 38 total rooms - all have solar water heaters. They have backup energy as well – gas.

2. How important do you feel sustainable development is for the tourism industry?

It’s really important b/c of what’s happening in the world (the environmental changes like global warming, etc.) – it’s one of the most important things. They need to help the world by implementing these changes.

3. Should inns be responsible for maintaining the environment surrounding the establishment?

Definitely, they do this currently all around the property. The cost is a little higher because of the workers needed, but they definitely do that.

4. Would the cost of implementing these practices influence your choice?

Definitely yes it has b/c these properties don’t have occupancy during the week, so there is little income.

5. Would you be more inclined if there was a short pay back period?

Yes, as long as he makes the money back. Should be short time though. 1-2 years is ok.

6. Do you think it is beneficial to your establishment if you alter your operations?

Everything is positive that has to do with sustainability. Yes. It is beneficial to the property and makes the ambiance better.

7. How do a company’s environmental practices influence a guest’s choice of hotel?

They have a really great view. If you give the good ambiance and good practice it’s healthier in terms of sustainability and ambiance. The guests know what’s going on in the world, so they feel more comfortable. The property has been around for 78 years.

8. Would financial incentives persuade you to adopt green practices?
Definitely, yes. That’s the most important thing. Best incentive for adopting practices for good sustainability.

9. What are the incentives that are offered by CTPR?

Not sure. Know about regulations for their property to exist, but don’t know about BEMP incentives. CTPR isn’t giving them money, but he wants to thank the company for sustainability project b/c it increases his knowledge of good practices.

10. What do you feel are the major obstacles for implementing BEMPs?

Money.

11. How do you communicate to customers your goals for BEMPs and how they can help?

Visual is most important. When they look around they can see the BEMPs and how clean the hotel is. Guests who come to this hotel prefer to see things than reading them.

How often do you use the internet to do research?

They use the internet for marketing.

If there was a website available to see BEMPs and financial benefits, would the owner’s use it?

Definitely, it would be a good guide for the property.

What information would you like to see on the website that would help you with your business operations?

Laundry services – has a machine that uses liquid gas or carbon. He needs help with that. Also electricity b/c they have a high electricity and water costs, so how to improve that.

Did you see a difference after installing fluorescent light bulbs?

They buy 200kWh with a contract with the electric company. If they go below, they still pay the same, if it goes up, they get charged regular rate.

What is the price per kWh?

Not sure. They usually go over, so the $7,000 is somewhere around.

<table>
<thead>
<tr>
<th>Hotel Information</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the total number of guest rooms in</td>
<td>38</td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>How many lights are in each room?</td>
<td>5</td>
</tr>
<tr>
<td>How many refrigerators are there? How many are energy efficient?</td>
<td>Not in all rooms. 12 total supposed to be energy efficient.</td>
</tr>
<tr>
<td>How many microwaves are there? How many are energy efficient?</td>
<td>None.</td>
</tr>
<tr>
<td>How much laundry is done on site?</td>
<td>Yes.</td>
</tr>
<tr>
<td>How often do you wash bed linens from occupied rooms?</td>
<td>Everyday.</td>
</tr>
<tr>
<td>How often do you wash bath towels from occupied rooms?</td>
<td>Everyday.</td>
</tr>
<tr>
<td>How many acres does the hotel occupy?</td>
<td>6.6 acres.</td>
</tr>
<tr>
<td>How often is motorized landscape equipment used?</td>
<td>2 times/month.</td>
</tr>
<tr>
<td>How much of the property has an impervious cover?</td>
<td></td>
</tr>
<tr>
<td>What is the average monthly electric bill?</td>
<td>$7,000+</td>
</tr>
<tr>
<td>What is the average monthly water bill?</td>
<td>No more than $3,000/month</td>
</tr>
<tr>
<td>What is the average gas bill?</td>
<td>About $1,000/month</td>
</tr>
<tr>
<td>Is food prepared on site?</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Water conservation:</strong></td>
<td><strong>Response</strong></td>
</tr>
<tr>
<td>How many low flow showerheads are installed?</td>
<td>2 rooms have showerheads that use air pressure. Bought for all rooms, trying to install now.</td>
</tr>
<tr>
<td>How many low flow toilets are installed?</td>
<td></td>
</tr>
<tr>
<td>How many regular toilets are installed?</td>
<td></td>
</tr>
<tr>
<td>How many liters per flush?</td>
<td></td>
</tr>
<tr>
<td>Do you use water efficient washing machines? If so, how many?</td>
<td>No.</td>
</tr>
<tr>
<td>Is grey water recycling practiced?</td>
<td>No.</td>
</tr>
<tr>
<td>How many total motion sensors or timed faucets are installed?</td>
<td>Only outdoors. Timed not motion detection.</td>
</tr>
<tr>
<td>Is solar- water heating practiced?</td>
<td>Yes.</td>
</tr>
<tr>
<td>How many rain barrels are used?</td>
<td>No.</td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Is the landscaping designed for low water consumption?</td>
<td>Manually.</td>
</tr>
<tr>
<td><strong>Energy Conservation:</strong></td>
<td></td>
</tr>
<tr>
<td>How many energy efficient appliances are installed? (Stoves, AC, refrigerators, microwaves)</td>
<td></td>
</tr>
<tr>
<td>How many florescent light bulbs are installed?</td>
<td>Are changing over now.</td>
</tr>
<tr>
<td>How many lights operate on motion sensor or a timer?</td>
<td>Only outside.</td>
</tr>
<tr>
<td>Is natural lighting maximized through windows and sky lights?</td>
<td>Yes.</td>
</tr>
<tr>
<td>How many solar panels are in use?</td>
<td>Water heaters in all rooms.</td>
</tr>
<tr>
<td>Is wind power utilized?</td>
<td>No.</td>
</tr>
<tr>
<td>Is geothermal energy utilized?</td>
<td></td>
</tr>
<tr>
<td>How many energy efficient dryers are installed?</td>
<td></td>
</tr>
<tr>
<td>How often are bottles of toiletries replaced in each room?</td>
<td>Few rooms with dispenser, rest have bottles.</td>
</tr>
<tr>
<td>How often is non motorized landscape equipment used?</td>
<td></td>
</tr>
<tr>
<td>Is the building insulation modern and efficient?</td>
<td></td>
</tr>
<tr>
<td><strong>Solid Waste Reduction:</strong></td>
<td></td>
</tr>
<tr>
<td>Does your inn have a recycling program.</td>
<td>None.</td>
</tr>
<tr>
<td>How much of the following materials are recycled?</td>
<td></td>
</tr>
<tr>
<td>Plastics</td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td></td>
</tr>
<tr>
<td>Paper</td>
<td></td>
</tr>
<tr>
<td>Cans/aluminum</td>
<td></td>
</tr>
<tr>
<td>Are organics composted for</td>
<td>No.</td>
</tr>
<tr>
<td>future use, such as fertilizer?</td>
<td>Is used oil from the kitchen recycled for other uses?</td>
</tr>
<tr>
<td>Are organics donated to farms or other industries for use?</td>
<td>Yes. Pig farmer</td>
</tr>
<tr>
<td>Are biodegradable disposable utensils, plates, and cups used?</td>
<td>Only glass and plastic in the rooms.</td>
</tr>
<tr>
<td>How many shampoo/soap dispensers are installed?</td>
<td>Few.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Erosion/Runoff</th>
<th>Response</th>
<th>Difficulty to Implement</th>
</tr>
</thead>
<tbody>
<tr>
<td>What percentage of the roof do roof top gardens occupy?</td>
<td>No.</td>
<td>(1 being very easy and 9 being very difficult to implement)</td>
</tr>
<tr>
<td>What percentage of pavement is made from porous paving materials?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are detention basins used to control runoff?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the soil been tested for nutrient and contaminant levels?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>How much fertilizer is used in a year?</td>
<td>A private company handles that.</td>
<td></td>
</tr>
<tr>
<td>How much of the property has an impervious cover?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix XVI: Interview with Palmas del Lucia

1. What do you know about Best Environmental Management Practices?

We use fluorescent lights in every room. They have recycling in each room (bins for glass, aluminum, paper, cans). Houskeeping takes it and divides it up. The guests know that they throw things away in the garbage and it gets separated. Recycling is collected twice per week. Recycle everything. Reuse 2-liter bottles of coke and Pepsi and recycle them.

2. How important do you feel sustainable development is for the tourism industry?

3. Should inns be responsible for maintaining the environment surrounding the establishment?

People care more about the environment now than before, and 10-15 years from now, it will be the deciding factor in which guests choose hotels. Yes they are responsible for maintaining the environment around the hotels. Cleaners are environmentally friendly. They work to help the environment – it’s important to them.

4. Would the cost of implementing these practices influence your choice?

When you’re going to implement something new, the cost is going to be pretty high. We are trying. Everything that we do for the first time is going to cost more. If the payback period is 1-3 years, we do it pretty quick. If 8-10 years, that is not good enough, it’s too long.

**How do you determine the investment?**

They calculated what it would cost to change all the light bulbs, and they buy in bulk. They know that they will make their money back

**When did you change over your light bulbs?**

2 years ago. We changed all the lights in the hotel at the same time.

**Did you see a reduced cost in electricity?**

No. If they make a change in one month, sometimes the cost goes up, like electricity costs may go up when they change something, so they it doesn’t seem like they are saving money. Cost of electricity is up 25% so the cost is higher, but they know they are saving electricity.

5. Would you be more inclined if there was a short pay back period?

6. Do you think it is beneficial to your establishment if you alter your operations?
You have to make the return investment. In the pool, they don’t use chlorine; they use photocell (?) Make money back in 2 years. Use salt and half chlorine. Try to use wind power, but the payback is around 14 years, which is not good. When they can control the return investment, they know it’s going “to be good for everybody.” Trying to get more benefits from the government b/c if the govt gave 50% in tax credit, the return investment would be half, and in that time they can do it w/o a problem. “In this kind of business, we need to watch the cost all the time.”

7. How does a company’s environmental practices influence a guest’s choice of hotel?

8. Would financial incentives persuade you to adopt green practices?

9. What are the incentives that are offered by CTPR?

There are no incentives. They are working to trying to make a law, but may take 1-2 years, but if they approve it, as a small property, we will make the investment. One of the things that is killing us right now is the power. For each dollar they get, they take $0.08 in power. That is a lot of money.

10. What do you feel are the major obstacles for implementing BEMPs?

The money. Just money. We don’t have any reason we can stop because everything that I include for implementing practice, we don’t need a special permit or anything.

11. How do you communicate to customers your goals for BEMPs and how they can help?

We have a letter in the room that we say that we are environmentally friendly and we need help with it. We are working with CTPR in a program to advertise specific practices (that is a goal they are trying to achieve with the company).

<table>
<thead>
<tr>
<th>Hotel Information</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the total number of guest rooms in the establishment</td>
<td>34</td>
</tr>
<tr>
<td>How many lights are in each room?</td>
<td>5. Untwist the lights in the balcony so guests cannot use it. If they need it, they can twist it to turn on.</td>
</tr>
<tr>
<td>How many refrigerators are there? How many are energy efficient?</td>
<td>Small yes in all 34. All energy efficient and turned off until the day before the guests arrive.</td>
</tr>
<tr>
<td>How many microwaves are there? How many are energy efficient?</td>
<td>Yes. Energy efficient?</td>
</tr>
<tr>
<td>How much laundry is done on site?</td>
<td>Not on-site.</td>
</tr>
<tr>
<td>How often do you wash bed linens from occupied rooms?</td>
<td>Every 3 nights. Have a sign in the room that says they will wash every 3 nights but</td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>How often do you wash bath towels from occupied rooms?</td>
<td>Towel reuse program. Hang on the rack or put on the floor for washing.</td>
</tr>
<tr>
<td>How many acres does the hotel occupy?</td>
<td>&lt;1 acre</td>
</tr>
<tr>
<td>How often is motorized landscape equipment used?</td>
<td>Twice per month.</td>
</tr>
<tr>
<td>How much of the property has an impervious cover?</td>
<td>Parking lot has asphalt b/c of regulation. Before it was gravel, but CTPR recommended asphalt.</td>
</tr>
<tr>
<td>What is the average monthly electric bill?</td>
<td>$9,050</td>
</tr>
<tr>
<td>What is the average monthly water bill?</td>
<td>$1,300</td>
</tr>
<tr>
<td>What is the average gas bill?</td>
<td>$500 just for kitchen</td>
</tr>
<tr>
<td>Is food prepared on site?</td>
<td>Yes.</td>
</tr>
</tbody>
</table>

### Water conservation:

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>How many low flow showerheads are installed?</td>
<td>Yes. In all 2.5 gal/MIN in all rooms</td>
<td></td>
</tr>
<tr>
<td>How many low flow toilets are installed?</td>
<td>Yes. 1.6 gal/L in all rooms</td>
<td></td>
</tr>
<tr>
<td>How many regular toilets are installed?</td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>How many liters per flush?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you use water efficient washing machines? If so, how many?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is grey water recycling practiced?</td>
<td>No. Would have to separate shower and sink water, would need construction</td>
<td></td>
</tr>
<tr>
<td>What is the monthly water cost?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many total motion sensors or timed faucets are installed?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>Is solar- water heating practiced?</td>
<td>No. We tried but we couldn’t because people use a lot of water so it runs out for other people.</td>
<td></td>
</tr>
<tr>
<td>How many rain barrels are used?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>Is the landscaping designed for low water consumption?</td>
<td>Yes. We sprinkle the water at night, but this part of the island it rains a lot (near El Yunque).</td>
<td></td>
</tr>
<tr>
<td>Energy Conservation:</td>
<td>Response</td>
<td>Difficulty to Implement</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>How many energy efficient appliances are installed? (Stoves, AC, refrigerators, microwaves)</td>
<td>Not in the kitchen.</td>
<td></td>
</tr>
<tr>
<td>How many florescent light bulbs are installed?</td>
<td>All in the rooms except in the restaurant. Cheapest place is Sam’s or Home Depot.</td>
<td></td>
</tr>
<tr>
<td>How many lights operate on motion sensor or a timer?</td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>Is natural lighting maximized through windows and sky lights?</td>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>How many solar panels are in use?</td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>Is wind power utilized?</td>
<td>No. Want to though, but payback period is too long.</td>
<td></td>
</tr>
<tr>
<td>Is geothermal energy utilized?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many energy efficient dryers are installed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often are bottles of toiletries replaced in each room?</td>
<td>Changed whenever needed. If they don’t use it, it doesn’t get changed. Same with soap, etc.</td>
<td></td>
</tr>
<tr>
<td>How often is non motorized landscape equipment used?</td>
<td>Twice per month.</td>
<td></td>
</tr>
<tr>
<td>Is the building insulation modern and efficient?</td>
<td>Yes.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Solid Waste Reduction:</th>
<th>Response</th>
<th>Difficulty to Implement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your inn have a recycling program.</td>
<td>Yes.</td>
<td></td>
</tr>
<tr>
<td>How much of the following materials is recycled?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics</td>
<td>98%</td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td>98%</td>
<td></td>
</tr>
<tr>
<td>Paper</td>
<td>98%</td>
<td></td>
</tr>
<tr>
<td>Cans/aluminum</td>
<td>98%</td>
<td></td>
</tr>
<tr>
<td>Are organics composted for future use, such as fertilizer?</td>
<td>Pig farmer takes leftovers</td>
<td></td>
</tr>
<tr>
<td>Is used oil from the kitchen recycled for other uses?</td>
<td>Yes. A company comes and recycles the oil. They provide a container and they come twice per month. Is free now, before was $20/collection. Now that they need the oil, they collect it for free.</td>
<td></td>
</tr>
<tr>
<td>Are organics donated to farms or other industries for use?</td>
<td>Yes.</td>
<td></td>
</tr>
<tr>
<td>Are biodegradable disposable utensils, plates, and cups used?</td>
<td>No. Cups and utensils in use, not biodegradable.</td>
<td></td>
</tr>
<tr>
<td>How many shampoo/soap dispensers are installed?</td>
<td>None.</td>
<td></td>
</tr>
</tbody>
</table>

| Erosion/Runoff | Response | Difficulty to Implement |
| What percentage of the roof do roof top gardens occupy? | None. | (1 being very easy and 9 being very difficult to implement) |
| What percentage of pavement is made from porous paving materials? | None. |
| Are detention basins used to control runoff? | Runs off automatically. |
| Has the soil been tested for nutrient and contaminant levels? | No. |
| How much fertilizer is used in a year? | Every 6 months they use organic fertilizer. |

**What other environmentally friendly technologies or practices do you employ?**

In the pool, with the salt and half chlorine. Guests are issued towels for bathing and pool use.

**If CTPR produced a website, would you use if often to look into other practices, incentives, programs, etc?**

Yeah, I think so, sure. I’m sure that I would.
Is that an area that they’re lacking in?
Yes.
**How do they communicate with you right now?**
Right now I’m part of the team they are working with, we communicate by email. Next week I have another meeting with the architect b/c he has someone who specialized in wind power.
### Appendix XVII: Completed Cost Analysis Worksheets (Fluorescent Bulbs)

**Las Villas del Pepino**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td><strong>Current Electricity Usage and Bulb Costs</strong></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Total number of rooms</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>Number of regular bulbs/room</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>total number of regular bulbs</td>
<td>42</td>
</tr>
<tr>
<td>6</td>
<td>electricity used per month per bulb (kWh)</td>
<td>10.8</td>
</tr>
<tr>
<td>7</td>
<td>total electricity used/month (kWh)</td>
<td>453.6</td>
</tr>
<tr>
<td>8</td>
<td>Monthly Electricity costs ($)</td>
<td>113.4</td>
</tr>
<tr>
<td>9</td>
<td>Bulbs/month/room</td>
<td>1.04</td>
</tr>
<tr>
<td>10</td>
<td>Monthly bulb costs ($)</td>
<td>22.7136</td>
</tr>
<tr>
<td>11</td>
<td>Total Monthly cost regular bulbs all rooms ($)</td>
<td>136.114</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td><strong>Compact Fluorescent Light Bulbs</strong></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Number of fluorescent bulbs/room</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>total number fluorescent bulbs</td>
<td>84</td>
</tr>
<tr>
<td>15</td>
<td>Electricity used/month/bulb (kWh)</td>
<td>2.74</td>
</tr>
<tr>
<td>16</td>
<td>Total electricity/month (kWh)</td>
<td>230.16</td>
</tr>
<tr>
<td>17</td>
<td>Monthly electricity costs ($)</td>
<td>57.54</td>
</tr>
<tr>
<td>18</td>
<td>Bulbs/month/room</td>
<td>0.09</td>
</tr>
<tr>
<td>19</td>
<td>Monthly bulb costs ($)</td>
<td>30.24</td>
</tr>
<tr>
<td>20</td>
<td>Total monthly cost all rooms ($)</td>
<td>87.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td><strong>Converting to Fluorescent Bulbs</strong></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Number of bulbs in room not fluorescent</td>
<td>2</td>
</tr>
<tr>
<td>23</td>
<td>Electricity used/month/fluorescent bulb</td>
<td>2.74</td>
</tr>
<tr>
<td>24</td>
<td>Total electricity used/month (kWh)</td>
<td>5.48</td>
</tr>
<tr>
<td>25</td>
<td>Monthly Electricity cost ($)</td>
<td>1.37</td>
</tr>
<tr>
<td>26</td>
<td>Total Monthly Costs in all rooms ($)</td>
<td>28.77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td><strong>Savings</strong></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Total Monthly Cost (regular + fl bulbs) all rooms ($)</td>
<td>223.894</td>
</tr>
<tr>
<td>29</td>
<td>Total monthly cost if all were fluorescent ($)</td>
<td>116.55</td>
</tr>
<tr>
<td>30</td>
<td>Monthly electricity cost savings ($)</td>
<td>107.344</td>
</tr>
<tr>
<td>31</td>
<td>Total Investment ($)</td>
<td>168</td>
</tr>
<tr>
<td>32</td>
<td>Payback Period (months)</td>
<td>1.56507</td>
</tr>
</tbody>
</table>
# Hacienda el Jibarito

<table>
<thead>
<tr>
<th></th>
<th>Current Electricity Usage and Bulb Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td><strong>Total Electricity Usage and Bulb Costs</strong></td>
</tr>
<tr>
<td>3</td>
<td><strong>Total number of rooms</strong></td>
</tr>
<tr>
<td>4</td>
<td><strong>Number of regular bulbs/room</strong></td>
</tr>
<tr>
<td>5</td>
<td><strong>Total number of regular bulbs</strong></td>
</tr>
<tr>
<td>6</td>
<td><strong>Electricity used per month per bulb (kWh)</strong></td>
</tr>
<tr>
<td>7</td>
<td><strong>Total electricity used/month (kWh)</strong></td>
</tr>
<tr>
<td>8</td>
<td><strong>Monthly Electricity costs ($)</strong></td>
</tr>
<tr>
<td>9</td>
<td><strong>Bulbs/month/room</strong></td>
</tr>
<tr>
<td>10</td>
<td><strong>Monthly bulb costs ($)</strong></td>
</tr>
<tr>
<td>11</td>
<td><strong>Total Monthly cost regular bulbs all rooms ($)</strong></td>
</tr>
</tbody>
</table>

## Compact Fluorescent Light Bulbs

<table>
<thead>
<tr>
<th></th>
<th>Compact Fluorescent Light Bulbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td><strong>Total number of fluorescent bulbs/room</strong></td>
</tr>
<tr>
<td>14</td>
<td><strong>Total number fluorescent bulbs</strong></td>
</tr>
<tr>
<td>15</td>
<td><strong>Electricity used/month/bulb (kWh)</strong></td>
</tr>
<tr>
<td>16</td>
<td><strong>Total electricity/month (kWh)</strong></td>
</tr>
<tr>
<td>17</td>
<td><strong>Monthly electricity costs ($)</strong></td>
</tr>
<tr>
<td>18</td>
<td><strong>Bulbs/month/room</strong></td>
</tr>
<tr>
<td>19</td>
<td><strong>Monthly bulb costs ($)</strong></td>
</tr>
<tr>
<td>20</td>
<td><strong>Total monthly cost all rooms ($)</strong></td>
</tr>
</tbody>
</table>

## Converting to Fluorescent Bulbs

<table>
<thead>
<tr>
<th></th>
<th>Converting to Fluorescent Bulbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td><strong>Number of bulbs in room not fluorescent</strong></td>
</tr>
<tr>
<td>24</td>
<td><strong>Electricity used/month/fluorescent bulb</strong></td>
</tr>
<tr>
<td>25</td>
<td><strong>Total electricity used/month (kWh)</strong></td>
</tr>
<tr>
<td>26</td>
<td><strong>Monthly Electricity cost ($)</strong></td>
</tr>
<tr>
<td>27</td>
<td><strong>Total Monthly Costs in all rooms ($)</strong></td>
</tr>
</tbody>
</table>

## Savings

<table>
<thead>
<tr>
<th></th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td><strong>Total Monthly Cost (regular + fl bulbs) all rooms ($)</strong></td>
</tr>
<tr>
<td>31</td>
<td><strong>Total monthly cost if all were fluorescent ($)</strong></td>
</tr>
<tr>
<td>32</td>
<td><strong>Monthly electricity cost savings ($)</strong></td>
</tr>
</tbody>
</table>

## Total Investment ($)

<table>
<thead>
<tr>
<th></th>
<th>Total Investment ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td><strong>Total Investment ($)</strong></td>
</tr>
</tbody>
</table>

## Payback Period (months)

<table>
<thead>
<tr>
<th></th>
<th>Payback Period (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td><strong>Payback Period (months)</strong></td>
</tr>
</tbody>
</table>
## Pineapple Inn

<table>
<thead>
<tr>
<th></th>
<th>Current Electricity Usage and Bulb Costs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Current Electricity Usage and Bulb Costs</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Total number of rooms</td>
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<tr>
<td>4</td>
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### Compact Fluorescent Light Bulbs

<table>
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</thead>
<tbody>
<tr>
<td>13</td>
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### Converting to Fluorescent Bulbs

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</thead>
<tbody>
<tr>
<td>23</td>
<td>Number of bulbs in room not fluorescent</td>
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<tr>
<td>24</td>
<td>Electricity used/month/fluorescent bulb</td>
<td>2.74</td>
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<tr>
<td>25</td>
<td>Total electricity used/month (kWh)</td>
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### Savings

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<p>|   | Payback Period (months)                                       | 15.8507|</p>
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<td>Number of regular bulbs/room</td>
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<td>electricity used per month per bulb (kWh)</td>
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<td>7</td>
<td>total electricity used/month (kWh)</td>
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<td>Monthly Electricity costs ($)</td>
</tr>
<tr>
<td>9</td>
<td>Bulbs/month/room</td>
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<tr>
<td>10</td>
<td>Monthly bulb costs ($)</td>
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<tr>
<td>11</td>
<td>Total Monthly cost regular bulbs all rooms ($)</td>
</tr>
<tr>
<td></td>
<td>Compact Fluorescent Light Bulbs</td>
</tr>
<tr>
<td>14</td>
<td>Number of fluorescent bulbs/room</td>
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<tr>
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<td>Total number fluorescent bulbs</td>
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<td>18</td>
<td>Monthly electricity costs ($)</td>
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<td>Bulbs/month/room</td>
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<tr>
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<td>Savings</td>
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<td>Total Monthly Cost (regular + fl bulbs) all rooms</td>
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<td>32</td>
<td>Total monthly cost if all were fluorescent ($)</td>
</tr>
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<td>33</td>
<td>Monthly electricity cost savings ($)</td>
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<td>Total investment ($)</td>
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### Hostéria Del Mar

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<tr>
<td>Electricity used per month per bulb (kWh)</td>
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<tr>
<td>Bulbs/month/room</td>
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<td>Monthly bulb costs ($)</td>
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<td>Total Monthly cost regular bulbs all rooms ($)</td>
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<table>
<thead>
<tr>
<th>Compact Fluorescent Light Bulbs</th>
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</thead>
<tbody>
<tr>
<td>Number of fluorescent bulbs/room</td>
</tr>
<tr>
<td>Total number fluorescent bulbs</td>
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<tr>
<td>Electricity used/month/bulb (kWh)</td>
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<td>Total electricity/month (kWh)</td>
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<td>Bulbs/month/room</td>
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<td>Monthly bulb costs ($)</td>
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<tr>
<td>Total monthly cost all rooms ($)</td>
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<table>
<thead>
<tr>
<th>Converting to Fluorescent Bulbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of bulbs in room not fluorescent</td>
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<tr>
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<tr>
<td>Total electricity used/month (kWh)</td>
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<tr>
<td>Monthly Electricity cost ($)</td>
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<table>
<thead>
<tr>
<th>Savings</th>
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<tbody>
<tr>
<td>Total Monthly Cost (regular + fl bulbs) all rooms ($)</td>
</tr>
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<td>Total monthly cost if all were fluorescent ($)</td>
</tr>
<tr>
<td>Monthly electricity cost savings ($)</td>
</tr>
<tr>
<td>Total investment ($)</td>
</tr>
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</table>

| Payback Period (months) | 1.56507 |
## Palmas del Lucia

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<td>440.749</td>
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## Compact Fluorescent Light Bulbs

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>13</td>
<td><strong>Number of fluorescent bulbs/room</strong></td>
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<tr>
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<td><strong>Total number fluorescent bulbs</strong></td>
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<tr>
<td>15</td>
<td><strong>Electricity used/month/bulb (kWh)</strong></td>
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<td>16</td>
<td><strong>Total electricity/month (kWh)</strong></td>
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<td>17</td>
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<tr>
<td>18</td>
<td><strong>Bulbs/month/room</strong></td>
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<td><strong>Monthly bulb costs ($)</strong></td>
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<tr>
<td>20</td>
<td><strong>Total monthly cost all rooms ($)</strong></td>
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</table>

## Converting to Fluorescent Bulbs

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<tr>
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</thead>
<tbody>
<tr>
<td>23</td>
<td><strong>Number of bulbs in room not fluorescent</strong></td>
</tr>
<tr>
<td>24</td>
<td><strong>Electricity used/month/fluorescent bulb</strong></td>
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<tr>
<td>25</td>
<td><strong>Total electricity used/month (kWh)</strong></td>
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<tr>
<td>26</td>
<td><strong>Monthly Electricity cost ($)</strong></td>
</tr>
<tr>
<td>27</td>
<td><strong>Total Monthly Costs in all rooms ($)</strong></td>
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</tbody>
</table>

## Savings

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>30</td>
<td><strong>Total Monthly Cost (regular + fl bulbs) all rooms</strong></td>
</tr>
<tr>
<td>31</td>
<td><strong>Total monthly cost if all were fluorescent ($)</strong></td>
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<tr>
<td>32</td>
<td><strong>Monthly electricity cost savings ($)</strong></td>
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<td><strong>Total investment ($)</strong></td>
</tr>
<tr>
<td>34</td>
<td><strong>Payback Period (months)</strong></td>
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El Guajataca

<table>
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<td>20</td>
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<td>21</td>
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<table>
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<tbody>
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<td>25</td>
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<td>26</td>
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<tr>
<td>27</td>
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<tr>
<td>28</td>
</tr>
</tbody>
</table>

| Payback Period (months)                                                       | 1.65507|
Appendix XVIII: Example Brochure

Outside:

Please Visit our Website
Be sure to visit our website for much more information on BEMPs. The website includes many more ideas and technologies that can protect the environment and save you money. There is also an interactive applet that can calculate your potential savings and payback periods for BEMPs. You can also find links to green products and find out about incentives offered to upgrade your establishment.

Puerto Rico Tourism Company

Puerto Rico Tourism Company

Puerto Rico Tourism Company

Puerto Rico Tourism Company
What are BEMPs?

Best Environmental Management Practices (BEMPs) are policies and technologies that reduce the negative effects of a business on the environment. BEMPs help to conserve energy and water, as well as reduce the amount of solid waste and pollution generated.

Why are BEMPs important?

BEMPs are necessary to run a hotel in an eco-friendly manner. All human activities have some impact on the environment and it is everyone's responsibility to be a steward of the environment.

As we come to better understand how we affect the environment it is clear that we must change the way we conduct business to be more sustainable. BEMPs help limit the environmental footprint of our estates and preserve nature's health and beauty for future generations.

What are the Environmental benefits of BEMPs?

The use of BEMPs can significantly reduce the negative impacts of hotels on the environment. The energy that is conserved by BEMPs can reduce the amount of greenhouse gases produced by your establishment. The water conserved through the use of simple BEMPs can reduce the strain on the environment, especially during times of low rainfall.

BEMPs also reduce the amount of garbage and pollution generated by hotels, helping to maintain Puerto Rico's pristine environment.

How do BEMPs help me?

Not only do BEMPs protect the environment but they can help make your hotel more successful. You can save money by reducing the operational costs of your hotel. Energy and water efficient appliances reduce the amount of energy and water consumed and will reduce energy and water bills. For example, for each incandescent light bulb replaced with a fluorescent light bulb will save on average $2.034 per month.

Furthermore, many tourists are becoming very environmentally conscious and prefer to stay at green hotels. If your establishment is eco-friendly you can attract this growing demographic to increase business.

Common BEMPs in use today:

Here are several BEMPs that are relatively simple and inexpensive to implement in your establishment:

- Compact fluorescent light bulbs
- Flow restriction devices (including low flow toilets, showerheads, and faucets)
- Energy efficient appliances (Microwave, Air conditioner, refrigerator, washer, dryer)
- Solar water heaters
- Use renewable energy sources such as wind or solar power

What can I do right now?

There are practices that can be implemented immediately with no investment so you can start saving the environment and money right away. Such simple practices include turning off lights and appliances when they're not needed and only wash linens as requested by the guest.