oikos Case Writing Competition 2013
Corporate Sustainability Track

3rd Place

Protecting Our Oceans:
Sustainability at Holland America Line

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Introduction

Holland America Line (HAL) was proud of its reputation as a sustainability leader in the global cruise industry. Bill Morani, V.P. Safety & Environmental Management Systems, was responsible for ensuring that the company and fleet complied with safety and environmental regulations and policies. He had been with HAL since 2003 following a 25-year career in the U.S. Coast Guard. In light of the maritime industry's significant environmental impacts and the complex and rapidly evolving regulatory environment, Bill was thinking about the company's current initiatives in order to prioritize the areas that should be emphasized in the future. Bill's thinking was interrupted as Dan Grausz, Executive V.P., Fleet Operations, came into his office waving an article about a Stena Line ferry that claimed that the two helical turbines on the deck of one of their ferries was achieving cost-effective reductions in fuel use. Dan was the leader of the Fuel Conservation Committee, and he reminded Bill that wind turbines on the ship's deck was one of the 56 initiatives in the spreadsheet tracking their priority in being considered for adoption. However, this initiative had been assigned a very low priority, and Dan asked Bill to report back to the Fuel Conservation Committee (FCC) as to whether time and resources should be expended in reconsidering or piloting it.

Bill was particularly proud of the progress HAL had made in increasing fuel efficiency. HAL had committed to reduce its fuel use (on a per passenger berth – per nautical mile traveled basis), and thus it's associated carbon emission intensity by 20% between 2005 and 2015. They achieved this goal by 2011. Reductions in the quantity of fuel used to sail each guest on a voyage reduced HAL's carbon emission intensity as well as the intensity of emissions of sulfur and nitrous oxides (SOX and NOX) and particulate matter (PM). Regulations relating to SOX, NOX and PM were becoming a major issue for the cruise industry, as there was increasing concern about their health and environmental impacts. According to Bill:

"*Fuel conservation is our 'go-to' strategy. It is a win-win. By consuming less fuel, we are not emitting as much exhausts containing green house gases and other pollutants, while reducing HAL's fuel costs, and by the way, the money saved through fuel conservation can help offset the increased cost of cleaner fuel.*"

Bill put aside his thinking about broader sustainability priorities in order to look into the wind turbine idea.

Our Oceans

Holland America Line (HAL) and the cruise industry business models rely on the oceans as their most important resource. The unspoiled waters and coral reefs at port destinations are a major attraction for passengers. Our oceans cover 71% of the earth's surface and they provide food in the form of fish and shellfish, they are used for transportation and for recreation, such as swimming, sailing, diving and surfing. They are a source of biomedical organisms that help fight disease. And very importantly, the ocean plays a significant role in

regulating the planet's climate. The oceans are an integral part of the world's climate system, absorbing CO2 and heat. The oceans and the atmosphere work together in defining our weather patterns.[i] Unfortunately, our oceans face many threats:

Overfishing: More than half the planet depends on the oceans for its primary source of food, yet most of the world's fisheries are being fished at levels above their maximum sustainable yield. Furthermore, harmful fishing methods unnecessarily kill turtles, dolphins and other animals and destroy critical habitat.

Pollution: There are numerous sources of ocean pollution. An enormous amount of oil has been accidentally spilled from ships. While this in itself is destructive to aquatic plant and animal life, the threat from land-based activities is also great. Eighty percent of all pollution in seas and oceans comes from land-based activities.[ii] More oil reaches the ocean each year as a result of leaking automobiles and other non-point sources than was spilled by the Exxon Valdez.

Eutrophication: Another serious ocean threat is algal blooms which form and spread in coastal areas due to nutrient overloading primarily as a result of fertilizer and topsoil runoff and sewage discharges in coastal areas. As the algae die and decompose, the water is depleted of available oxygen, causing the death of other organisms, such as fish.

Black and grey water: The shipping industry, as well as recreational boats, discharge black water (human waste) and grey water (water from galley sinks and showers) at varying distances from shore. Cruise ships are outfitted with equipment that treats the black and gray water prior to overboard discharge.

Ocean acidification: Global warming is primarily driven by the increasing accumulation of CO2 in the atmosphere due to the burning of fossil fuels. On the positive side for the earth's ecosystem, the oceans absorb about one third of this anthropogenic carbon, reducing the atmospheric warming potential. However, the CO2 absorbed is converted into carbonic acid, which increases the acidity of the ocean. The current rate of ocean acidification is unprecedented, and the increase in acidity dissolves the carbonates needed by organisms such as corals and oysters, thereby threatening their survival. It is estimated that acidification is a major contributor along with ocean warming to the loss of 20% of our coral reefs, and that by mid-century; we may lose another 50%. [iii]

Ocean warming: Global warming is also increasing the temperature of the ocean. Increasing ocean temperature leads to significant marine ecosystem change, influencing the generation of plankton, which forms the base of the ocean's food web. Coral reefs are also endangered as they are extremely sensitive to temperature change. Over 90% of marine species are directly or indirectly dependent on these reefs.[iv]

Tourism: While tourism generates vast amounts of income for host countries, it can have negative social and environmental side effects. The most significant impacts are in the heavily visited coastal areas. Sewage and waste emanating from the local residents, resorts, hotels, restaurants and the housing that supports the tourism related employees can find their way directly or indirectly into the bays and ocean. Even when there is municipal infrastructure, the sewage system can become overwhelmed or inadequate, resulting in seepage or dumping into the ocean. Also, careless diving, snorkeling and other tour activities can damage coral reefs.

Ocean Protection

The oceans are a global commons that is not under the control of a single nation, except for the territorial waters of coastal nations. There are a number of formal institutions and instruments that provide national governments the opportunity to cooperate in managing the ocean commons. These agreements may be bi-lateral, regional or global. Examples of these agreements include the UN Convention on the Law of the Sea (UNCLOS), which is a comprehensive treaty establishing protocols for the use and exploitation of the ocean and its resources. The International Whaling Convention (IWC), which implements the International Convention for the Regulation of Whaling, regulates the hunting of great whales. There are many other agreements and conventions, but they all apply only to nations that sign them, and even then there can be variations in enforcement.[v]

Cruise Industry

According to the World Tourism Organization (WTO), tourism has become one of the largest and fastest growing economic sectors in the world.[vi] Taking a cruise is a popular tourist experience and the cruise industry is one of the fastest growing sectors of the tourism industry. Prior to the mid-20th century, ships focused on transporting customers to a particular destination. The modern cruise industry traces its beginnings to the early 1970's in Miami, USA with cruises throughout the Caribbean. The industry created a reasonably priced opportunity for many people to experience a resort type vacation. Sometimes, cruise ships are referred to as floating hotels or marine resorts, because like land resorts, they have rooms, restaurants, entertainment, shops, spas, business centers, casinos, swimming pools and other amenities.

Cruise ships travel worldwide in every ocean, and frequently visit the most pristine coastal waters and sensitive marine eco-systems. Cruise packages typically include more than one destination. The most popular destinations are the Caribbean, the Mediterranean, a number of European ports, the Bahamas and Alaska. There are approximately 2000 ports capable of receiving cruise ships. The amount of time spent at a destination can vary from one-half day to many days, depending on the design of the cruise package. The length of cruises can vary from 2 days to over two weeks, with an average length of about seven days. Destinations vary from tropical beaches like Cozumel to nature-based destinations such as Alaska while others might feature historical and culturally rich locations such as Istanbul. The cruise product is incredibly diversified, based on destination, ship design, on-board and on-shore activities, themes and cruise lengths. Cruise accommodations and amenities differ and are priced accordingly. A typical classification of cruise types ranges from budget to conventional to premium and lastly to luxury.[vii] Exhibit 1 elaborates on the differences between these categories. The passenger capacity of cruise ships tends to be larger at the budget and conventional categories and varies from a few hundred to over five thousand passengers.

The popularity of cruising is reflected in its growth. Since 1980, the industry has had an annual passenger growth rate of 7.6%. Between 1990 and 2010, over 191 million passengers have taken a cruise.[viii] Twenty four percent of the American population has cruised. As demand grew, the industry responded by building more cruise ships. As of 2012, there were

256 cruise ships.[ix] Newer ships tend to be bigger, they include innovative amenities such as planetariums and bowling alleys and they are being designed to conserve fuel.

The typical cruise passenger is predominately Caucasian (93%), average age is 46 years, well educated, married (83%) with an average household income between ($90-100k).[x] The leading factors in the customer decision to select a cruise package are the destination and the price. Customers tend to be very price sensitive. It does not appear that many customers factor a cruise line's environmental practices into their choice of cruise lines.[xi] The uniqueness of the experience also ranks highly. The customer can choose from luxury, premium, conventional and budget offerings based on the packages being offered and the price. The packages are highly differentiated based on destination and the amenities associated with the ship. Ninety percent of the bookings come through travel agents.[xii]

Industry Structure

The cruise line industry is a 30 billion dollar a year global industry. Three major cruise companies dominate the industry, and in 2012 controlled 84.3% market share based on number of passengers: Carnival Corporation (51.6%), Royal Caribbean Cruises Ltd. (21%) and Norwegian Cruise Line (7.1%).[xiii] The major cruise companies each have a number of brands, allowing them to operate within the different pricing segments. The market shares of the brands of Carnival, which includes HAL, are listed in Exhibit 2 along with the market shares of other cruise lines. Many of HAL's and Royal Caribbean's brands were a result of acquisitions. The resulting consolidation of the industry led to the high level of market share concentration. However, this level of concentration was not viewed as anti-competitive by the Federal Trade Commission, because cruise ships are viewed as part of the resort industry, rather than as an independent cruise industry. Carnival Corporation had 2011 revenues of $15.8 billion and averaged net income to revenue of 13.0% over the three years 2009-11. Royal Caribbean had 2011 revenues of $7.5 billion and averaged net income to revenue of 6.1% over those three years.[xiv]

There are a number of Cruise Line Associations. The largest is the Cruise Line Industry Association (CLIA), whose membership includes 22 of the world's largest cruise line companies, accounting for 97% of the demand for cruises.

The cruise lines have the ability to compete with each other on the basis of a highly diversified set of offerings. Much like hotels, they offer different levels of comfort and style, all priced accordingly. In addition, cruise lines can vary destinations, cruise lengths, ship themes and amenities in the packages they offer. To the envy of traditional hotels, the major cruise lines operate at 100% occupancy levels. They do this through a marginal pricing strategy, adjusting prices downward as the date of departure approaches.

There are major barriers to entry and exit in the industry due to the high cost of purchasing ($300-500 million) or selling a single cruise ship and the large investment required to operate a cruise line. In terms of the supply chain, there are many sellers to choose from in terms of food, supplies, equipment and fuel. On the other hand, ship builders are few and are in a strong negotiating position. Cruise ships need many employees. There might be as few as 2 to 2.5 passengers for each employee. While there is an ample supply of cabin

stewards and other lower skill jobs, there is a shortage of qualified deck and engineering officers.[xv]

Regulations

The mechanisms governing the shipping industry are complex and multi-layered. Shipping activities are regulated by a mixture of the international law of the sea and the laws of various nations. The country where a ship is registered is called the flag state. The flag state is obligated to ensure that the ships it registers comply with regulations set down in international conventions and agreements to which the flag state is a signatory. The International Maritime Organization (IMO) plays an important role in developing regulations relating to shipping.[xvi] *The IMO* is the United Nations' specialized agency responsible for improving maritime safety and preventing pollution from ships. Their regulations relate to safety, labor standards and the environment. Even though a ship may be registered in a flag state that has not ratified a particular IMO convention, that ship must conform to the conventions adopted by nations it visits. Since almost all cruise ship ports are in nations that have ratified the IMO regulations, cruise ships must abide by IMO regulations.

Sustainability in the Cruise Industry

There is a wide range of environmental and social aspects and potential impacts associated with cruise ship operations. There are discharges to water and to air, enormous amounts of waste are generated and there are environmental aspects associated with inputs such as packaging and food sourcing. Social aspects relate to employees, cruise customers and impacts on destination communities. The environmental aspects and impacts are displayed in Exhibit 3.

Prior to 2000, each of the 3 major cruise companies listed above had been convicted of violations of U.S. water quality laws. In response to these convictions, the Cruise Line Industry Association (CLIA) developed Cruise Industry Waste Management Practices and Procedures.[xvii] CLIA members have adopted these voluntary environmental standards, which exceed the requirements of U.S. and international laws. Formal adoption is reflected by a cruise line including the requirements in the company's Safety Management System (SMS). As a result of these standards and an industry-wide effort to be responsible environmental citizens, the cruise industry has dramatically improved its environmental performance.

However, some cruise lines perform better than others in the environmental and social arena, because CLIA does not describe the manner in which the voluntary standards are to be implemented by their members or impose consequences for failing to incorporate them. Also, there may be a failure to adhere to an adopted voluntary standard due to equipment failure or operator error. Lastly, the standards do not address every environmental issue. In comparing performance across cruise lines, Holland America Line has been recognized as a top performer.

Holland America Line and Sustainability

Holland America Line (HAL) was founded as a shipping and passenger line in 1873 and offered its first vacation cruises in 1895. Over its first 136 years, HAL has carried over 11 million passengers. In 1989, HAL became a wholly owned subsidiary of Carnival Corporation. HAL maintains its own identity, operating its own fleet and managing its marketing, sales and administrative support. In 2011, HAL operated 15 mid-size ships and expected to carry 750,000 passengers to 350 ports in 100 countries. HAL operates ships with passenger capacities in the 1200 to 2100 passenger range. HAL is recognized as a leader in the industry's premium' segment. HAL has more than 14,000 employees and is headquartered in Seattle, Washington, USA.[xviii] Holland America has received a number of awards for environmental sustainability and responsible tourism. In 2006, HAL was awarded the Green Planet Award, which recognizes eco-minded hotels, resorts and cruise lines for outstanding environmental standards.[xix] This award was based on their ISO14001 certification and the installation of shore power plug-in systems on three ships. In 2008, Virgin Holidays awarded HAL the Responsible Tourism Award based on reducing dockside emissions by 20%, increasing recycling by 50% and instituting a training program to avoid 'whale strikes'.[xx] HAL was named the World's Leading Green Cruise Line at the World Travel Awards in London in 2011[xxi] and they received a 2010 and 2012 Rear Admiral William M. Benkert Gold Environmental Protection Award from the U.S. Coast Guard.[xxii] HAL does not advertise its environmental credentials or accomplishments to potential customers, nor do any of their competitors.

In 2009, HAL released its first sustainability report covering activities from 2007-2009. Other Carnival Corporation subsidiaries also developed sustainability reports and were among the first in the industry to do so. Their sustainability report used the Global Reporting Initiative's (GRI) G3 Guidelines as the framework for their report. They include a GRI content index so that readers can see where GRI categories are covered in the report. The data in this baseline report was not independently verified, although this was not unusual among first time GRI reporters. Their environmental management system (EMS) was recertified in 2009 and 2012 as meeting the ISO 14001 environmental standards.

Discharges to Water

Exhibit 4 diagrams the various discharges associated with a cruise ship. The primary discharges to water include black water (sewage), gray water (from showers, sinks, laundry and the galley), and bilge water (potentially oily water leaked from engines and equipment that accumulates in the bilges). Black water is an issue because it contains pathogens, including fecal coliform bacteria that needs to be removed before being released into the environment. Untreated blackwater can cause serious contamination of fisheries and shellfish beds, resulting in a general contamination of the food chain and a risk to human health by transmitting infectious diseases.

On most cruise ships, sewage is treated using a marine sanitation device (MSD) that disinfects the waste prior to discharge. While regulations require the use of marine sanitation devices (MSDs), there is a newer technology, Advanced Waste Water Purification Systems (AWWPS) that are capable of producing water effluent that is as clean or cleaner

than that produced by many municipal treatment plants.[xxiii] HAL was instrumental in developing the AWWPS technology for use in cruise ships. The first installation was on the ms Statendam in 2002. These systems use a combination of screening, maceration, biodigestion, ultrafiltration and ultraviolet light to go a quantum leap beyond MSDs. Approximately 40% of cruise ships have AWWPSs and more are being added every year. Holland America is a leader in this area, as twelve of their fifteen ships had AWWPSs.

MARPOL and U.S. regulations require that treated sewage (MSD or AWWPSs) be discharged at least 3 nautical miles (nm) from shore and untreated sewage at least 12 nm from shore. In addition, there are no discharge zones (NDZs) that limit discharges in certain areas. MSD discharges by HAL are at least 12 nm from shore.

Graywater can contain a wide variety of pollutant substances, including oil and some organic compounds, detergents and grease, suspended solids, nutrients, food waste and small concentrations of coliform bacteria. In the U.S., graywater was not considered a pollutant until recently. Current regulations prohibit the discharge of graywater within three miles of the coast in California and Alaska. CLIA voluntary standards specify a distance of at least four miles from the coast. There do not appear to be conclusive studies as to the safest distance from shore to discharge black water or gray water.[xxiv] Regulators require that discharged bilge water be less than 15 ppm (parts per million) while the vessel is enroute and not operating in a special area. HAL was also a leader in improving bilge water treatment prior to overboard discharge.

HAL also reduces the amount of water used and discharged through various water conservation strategies. In 2009 HAL used their EMS to set a target to use 7 percent less water than in 2008. They exceeded the target using 9% less water through a number of approaches, including low-flush toilets, low flow shower heads and faucets, specialized pool filters, etc. In 2010, HAL passenger growth was 9.8%, but overall water use rose by only 1.8%.[xxv]

Solid and Hazardous Waste

Cruise ship waste streams can be either hazardous (chemicals from dry cleaning or photo processing, solvents, paint waste, etc.) or non-hazardous (food waste, paper, plastic, glass, etc.). The industry has grown 7.6% per year between 2000 and 2009, but has cut its waste almost in half. [xxvi]

The potential impact from pollution by solid waste on the open ocean and coastal environment can be significant, with a diversity of effects and consequences, including aesthetic degradation of surface waters and coastal areas, entanglement of sea birds, fish, turtles, and cetaceans, which may result in serious injury or even death by ingestion or asphyxiation, and nutrient pollution derived from continued disposal of food wastes in restricted areas.

HAL's disposition of solid waste breaks down as 26% going ashore primarily to landfills, 16% recycled to shore, 39% incinerated on board and 19% (food waste and ground glass) discharged at sea. Recycled items include glass, paper, cardboard, aluminum, steel cans and plastics. On HAL ships, paper and cardboard are shredded and are most often incinerated to

reduce the fire load carried by the vessel. Food waste that has gone through a pulper is discharged more than 12 nautical miles from shore.

In 2006 HAL set objectives to reduce solid waste offloads by 15% and to increase materials recycled ashore by 10%.[xxvii] Between 2007-2008, solid waste disposed ashore increased by 5% and the total amount of solid waste recycled ashore increased by 86% attributable to fleet personnel properly segregating materials. The total quantity of waste generated by HAL during 2009 was 28% less than during 2008. The amount of material incinerated decreased by 27% in this period. Some of their waste management initiatives included replacing highly toxic perchloroethylene dry-cleaning with a non-toxic technology, developing a paint and thinner recycling program and implementing a list of approved chemicals to reduce the use of toxics. HAL donates many partially used products and reusable items (mattresses, toiletries, linen, clothing, etc.) to non-profits.

Supply Chain Issues

Exhibit 3 shows that the primary inputs for a cruise are food, packaging materials, fresh water and fuel. Fresh water is needed to clean and prepare food, clean kitchen equipment, wash guest and crew linens and clothes and to maintain engine room equipment. HAL used their EMS to target 7% less water use between 2008 and 2009 and they exceeded that target and used 9% less water. HAL has been working with their vendors to reduce packaging and this is reflected in their solid waste reduction.

One important supply chain issue with food is the sustainability of the seafood served. In 2010, Hal partnered with the Marine Conservation Institute (MCI) to protect marine ecosystems.[xxviii] MCI is a non-profit organization working with scientists, politicians, government officials and other organizations around the world to protect essential ocean places and the wild species in them. The HAL/MCI program is entitled "Our Marvelous Oceans" and includes the purchasing of sustainable seafood to be served on board, the development of a series of video programs about the oceans to be shown to guests and support for MCI to provide grants to graduate students and young scientists engaged in historical marine ecology. As part of the sustainable seafood program, MCI evaluated over 40 species of fish for HAL. MCI classified fish options within each species for HAL as best choice, good choice, not sustainable and need more information. Best choice seafood items are abundant, and caught or farmed in an environmentally friendly way. Good choice items are evaluated by MCI as acceptable although there may be some environmental concern. In those cases best choice alternatives are sought. For the 'not sustainable' category, HAL discontinued purchases of those items. When more information was needed, HAL went back to the suppliers, and in many cases where there was a sustainability issue, suppliers worked hard to find sustainable alternatives for HAL. In a few instances, HAL had to eliminate specific menu items, but in some cases they were able to find an acceptable substitute for a menu item they wanted to retain (e.g. sustainably fished dover sole caught with hook and lines). HAL embraced this program because there was strong interest at the top management levels and even though purchasing costs were higher.[xxix]

Social sustainability issues

The cruise industry also has social aspects in the areas of guest experience, employee satisfaction and impacts on port communities visited by cruise ships. HAL's 800,000 guests are provided an opportunity to have a unique vacation, traveling by water to beautiful and interesting destinations, and they rate the cruise line very highly on follow-up surveys. In terms of employees HAL makes considerable effort to be a socially responsible employer. Their sea going workforce was 81% Filipino and Indonesian, who are away from home 3 to 10 months of the year, working seven days a week. All of the Filipino and Indonesian employees work under a collective bargaining agreement. The International Labor Organization in Switzerland sets standards which the CLIA supports. Benefits for HAL employees include health care, room and board, paid vacation, sick leave, compassionate leave and preparation of cuisine from their homeland. Seventy-two percent of HAL's more than 14,000 crew, officers and shore side employees were covered by collective bargaining agreements in 2009.[xxx]

Community impacts associated with port visitations have complex social and environmental aspects for HAL and other cruise lines. When the cruise ship docks, thousands of passengers disembark, and it is a boon to merchants and the local economy. Many port destinations are economically dependent on tourists and cruise ships. However, the cruise line passengers can engender perceptions of income inequality and have other cultural impacts. Also, human health can be impacted by air pollution from sulfur oxides (SOX), particulate matter (PM) and nitrous oxides (NOX) emitted from the ship's stacks. About 9-14% of a cruise ship's emission occur in ports (depending on the type of ship), as some of the ship's diesel engines are used to power lights, refrigeration units, pumps and other equipment.[xxxi]

Coastal water pollution is primarily an indirect impact associated with the cruise ships. While the cruise lines follow established regulations and voluntary standards that minimize the risk to the coastal waters, the number of passengers engaging in shore excursions in combination with tourists staying at the local resorts and hotels can place an excessive burden on the local municipal sewage treatment systems. Overflow from those systems or leaching from injection wells that are drilled to contain the sewage can enter the coastal water leading to algal blooms and pollution that degrade the coral reefs and coastal ecosystems that are the raison d'etre for visiting the destination.

Another issue is the environmental footprint of the shore side vendors and tour operators (boating, snorkeling and diving) that cater to the guests. The cruise lines responses to shore side issues are referred to as destination stewardship. In 2003, CLIA partnered with Conservation International (CI) to establish the Ocean Conservation and Tourism Alliance with the goal of addressing the shared responsibilities among cruise lines, governments, civil society, and shore operators to manage the growth of tourism in sensitive ecosystems. An example of CI's efforts in partnership with the Coral Reef Alliance is the Mesoamerican Reef Tourism Initiative (MARTI), a stewardship initiative involving Carnival and Royal Caribbean cruise lines.[xxxii] MARTI is intended to protect the natural resources that draw tourists to Mexico, the Caribbean, Belize and Honduras. MARTI partners meet in a multi-stakeholder format that includes private sector, government and non-governmental organizations to develop solutions to port related environmental issues.

Emissions to air

Cruise ships generate the energy they need for propulsion as well as the electricity needed for lights, refrigeration, HVAC and other equipment. Approximately 60% 0f the energy generated goes for propulsion, 15% HVAC, 10% lighting, 5% refrigerators and freezers and 10% to other systems.[xxxiii] Engine exhaust is the primary source of ship emissions. The most significant gasses are CO2, NOX, SOX and particulate matter (PM). The major concern with CO2 is global warming. The primary concern with SOX, NOX and PM is air pollution in coastal areas.

The primary fuel used by cruise ships is heavy fuel oil (HFO). Distillate and low sulfur fuel oil (LSFO) offer an alternative to HFO. The price of these lower sulfur fuels fluctuate, but they are expected to cost between 10 and 50% more than HFO.[xxxiv] Burning LSFO or distillate fuel reduces SOX and PM pollution, but the carbon footprint of these fuel is about the same as HFO. HAL relies primarily on HFO, but changes in national and international regulations in 2015, will require an increase in use of more expensive distillate fuel. In 2011, about 4% of fuel use at HAL was distillate.[xxxv] (See Exhibit 7: Fuel Use and Efficiency). Considering that fuel costs can be on the order of 15% of operating expense, increases in fuel cost would have a major impact on the industry.

CO2 emissions

There is a high level of agreement that global warming is undermining the complex web of natural systems that allows life to thrive on earth. The CO2 emissions from the burning of fossil fuels accounts for most of the increase in GHG concentrations. Approximately 2-3% of the global total of CO2 emissions comes from shipping, mostly from the 50,000 merchant ships plying the ocean.[xxxvi] The 350 cruise ships contribute in a small way to this problem. In comparison to shipping, CO2 emissions from aviation contribute 2%, road transport 21% and 0.5 % from rail.[xxxvii] According to the IMO, there is "significant potential to reduce GHG through technical and operational measures. The IMO estimates these measures could reduce emissions rate by 25% to 75% below 2009 levels-see Exhibit 5. Of course, not all of these measures are technically feasible and/or cost effective for the cruise lines, especially in the short term. Ship retrofit is very expensive, so design changes need to be built in up front. Some ships are getting as much as 7-10% fuel reduction from coatings.[xxxviii] Speed reductions can significantly increase fuel efficiency. A 10% reduction in speed can provide an energy saving of 19%.[xxxix] Just like with driving an automobile, ship size and speed is the most critical defining parameter with respect to fuel consumption.

Holland America Line's response to its GHG impact has been to reduce fuel use through:

- More energy efficient equipment
- More energy efficient ships
- Energy Conservation
- Shore power
- Circulate monthly fuel use data to encourage competition between vessels
- Sharing best practices from high performing ships

- Providing monetary incentives to senior shipboard staff to encourage fuel conservation practices.

These options not only conserve fuel and reduce GHG, they also reduce the amount of SOX, PM and NOX because less fuel is burned. Exhibit 6 shows fuel use at HAL between 2007 and 2009. Fuel use overall increased due to an expanding fleet and passenger growth, however, on a normalized basis, the fuel used per available lower berth on the ships steadily decreased over that period.

SOX and NOX

The maritime industry accounts for approximately 4% and 7% respectively of global SOX and NOX emissions[xl], of which a small proportion is attributable to the cruise industry. Combustion of HFO produces sulfur dioxide and particulate matter Sulfur dioxide reacts with other substances in the air to form acid rain, which falls to earth as rain, fog, snow or dry particles. Some may be carried by wind for hundreds of miles. Acid rain causes deterioration of cars, buildings and historical monuments; and causes lakes and streams to become acidic and unsuitable for many fish. PM may cause serious human health problems, including respiratory diseases, neurological damage, birth defects or cancer. Emissions from cruise ships are of concern while a ship is at port, close to residents of coastal communities. NOX causes a wide variety of health and environmental impacts. Ground-level Ozone (Smog) - is formed when NOX and volatile organic compounds (VOCs) react in the presence of heat and sunlight. Children, people with lung diseases such as asthma, and people who work or exercise outside, are susceptible to adverse effects such as damage to lung tissue and reduction in lung function.

The health and other environmental impacts associated with SOX, PM and NOX emissions have been under intense regulatory scrutiny. International regulations (MARPOL) in 2000 had lowered sulfur limits in fuel to 4.5% and by 2012 to 3.5 %, and by 2020, global sulfur limits are set at 0.5%. However, certain national and regional regulations have put reduced sulfur emissions on an even shorter time line. Emission Control Areas (ECAs) are being established that impose very tight limits on sulfur, NOX and PM for ships entering those areas. For example, sulfur limits are restricted to 1.0% levels already in the Baltic and EU rules will cap sulfur at 0.1% by 2015. Significant reductions in NOX are also being mandated. Australia, NZ and Hong Kong have voluntary measures, likely to develop into ECAs by 2015. The industry is experimenting with seawater scrubbers in the stacks, which would remove a high level of SOX and PM. However, it is not yet clear as to whether the use of sea water scrubbers will be a less expensive option than low sulfur fuels. In any case, increasing regulatory pressure to reduce SOX, PM and NOX will have a significant financial impact on HAL and the rest of the cruise industry.

Managing Fuel Conservation at HAL

In 2005, HAL's parent, Carnival Corporation set an ambitious corporate goal of increasing fuel efficiency as measured by the amount of fuel used per lower berth per nautical mile by 20% by 2015. In order to address the need to reduce fuel use, HAL had established a Fuel

Conservation Committee in 2007 that systematically identified and assessed fuel reduction opportunities based primarily on projected fuel savings and return on investment (ROI). The committee had been very effective in adopting successful initiatives based on established financial criteria, and HAL reached their 2015 target in 2011. (See Exhibit 7: Fuel Use and Efficiency).

Bill participated in the weekly Fuel Conservation Committee[xli] meeting in Seattle, which explored and implemented various fuel conservation initiatives. In 2012 the committee was evaluating close to 50 initiatives. These initiatives fell into five broad categories, a majority of which required capital investments in new and modified equipment:

- Sailing and maneuvering (6 initiatives): Many of these initiatives involve the use of software to optimize speed and maneuvering.
- Modifying or adding equipment (28 initiatives): A wide variety of initiatives such as upgrades of air conditioner chiller control systems.
- Operational improvements (8 initiatives): Initiatives such as running one sea-water cooling pump while in port.
- Monitoring various sources of energy consumption (10 initiatives): Initiatives such as installation of KWh meters in electrical substations to monitor the energy consumption of various users.
- Waste Heat recovery (4 initiatives): Initiatives such as adding an additional heat exchanger to reuse high temperature waste heat for potable water heating

The committee's spreadsheet included estimates of potential savings from each initiative and the cost per ship. Typically, the estimates of savings were measured in terms of percentage of overall fuel budget. For the thirty eight initiatives for which estimates had been made, 13 would save 0.25% fuel or less, 16 saved between 0.26% and 0.99%, nine might save more than 1.0%. The committee also tracked whether each initiative was proven or assumed to be viable and its stage of implementation (study, funding required, implemented or discontinued). If the committee decided that a proposed fuel conservation initiative should be implemented, it was pilot tested on a single ship. Performance was tracked and if the results met investment criteria, the initiative would be eligible to be rolled out to other ships. Finally, based on all of this information, the committee assigns a priority (1, 2 or 3) to each initiative. Because there is a limited capital budget available to pursue fuel conservation projects, even initiatives with a priority of 1, might not be implemented, or might not be implemented fleet wide.

Because of the unproven nature of the wind turbine initiative, and skepticism on the part of HAL's engineering department personnel, the Fuel Conservation Committee had long ago assigned a priority '3' and an estimated fuel savings of less than 0.25%. Wind turbines can be horizontal (HAWT) or vertical axis (VAWT). However it appeared that VAWT were most appropriate on ships as they can withstand much higher wind speeds, and are significantly more efficient than HAWT.[xlii]

Bill read the article about Stena Line, a ferry line operating with travel service between Britain, Holland and Ireland. He learned that Stena Line estimated that the two turbines installed on Stena Jutlandica would generate about 23,000 kWh per year, equivalent to the

domestic electricity consumption for 4 normal homes during one year. (See Exhibit 8 for a photo of Stena Jutlandica) This was equivalent to a reduction in fuel consumption of between 80 and 90 tons per year.[xliii] Bill began to inquire internally at HAL about the wind turbine idea, and one of his direct reports had received unsubstantiated information from a third-party that the Stena Line installation was projected to be very cost effective and that contrary to intuition, the turbines reduced aerodynamic drag on the ferry. Bill also found another article describing how Hornblower Cruises planned to launch the Hornblower hybrid to take passengers on sightseeing, dinner and social events in New York Harbor.[xliv] This 600 passenger vessel would incorporate helical wind turbines, solar panels and hydrogen fuel cells in addition to its diesel engine. The company believed the combination of alternative power generators would result in fuel savings that justified the investment.

Bill consulted with Pieter Rijkaart, former Director of New Builds, who had led the design and build of almost all of HAL's current fleet. Pieter mirrored the skepticism expressed by other engineers. For example, the engineers noted that a cruise liner is much larger and more streamlined than a ferry, raising questions about the applicability of the Stena Line performance results. There were also cost issues. A pilot test on one ship would require a large up-front investment in addition to the cost of the turbine, as it would have to be anchored to the deck and tied into the electrical grid on the ship. There were also major aesthetic concerns. Cruise ships are designed to have a beautiful appearance, and having bulky wind turbines on the deck could be an eyesore. Lastly, the amount of energy supplied by the wind turbines would account for an extremely small percentage of the ships energy needs.

Bill wondered whether there were intangible benefits associated with the use of wind turbines. HAL had already demonstrated a proactive interest in alternative energy initiatives. HAL had installed heat reflective film on windows to reduce the transfer of heat to the interior, and thus reducing the load on air conditioners. At a cost of $170,000 per ship, and a projected fuel savings between 0.5-1.0%, three ships had this technology installed and other ships awaited funding.[xlv] Also, HAL had adopted an initiative involving the pumping of used cooking oil into the fuel line. In 2010, HAL reused 51,000 liters of used cooking oil. This very low cost option resulted in both the reduction of fossil fuel and avoidance of the disposal cost of drums of used cooking oil. Wind turbines represented another opportunity for HAL to explore using alternative energy. While this could contribute to HAL's reputation as a sustainability leader in the industry, Bill did not believe that reputation should be factored into a FCC decision. According to Bill: "We don't talk about whether something will get good press." While the turbines would produce only a very small amount of the electricity used on the boat, they would contribute to reduced fuel use. Bill did not have enough information to estimate ROI or payback. Given that there were dozens of other proposed initiatives in the FCC spreadsheet, he wondered whether it made sense to expend FCC effort on this initiative. On the other hand, Bill said, "I would be concerned that we could be missing an opportunity". Bill was eager to pull together his thinking on the turbine initiative for the upcoming FCC meeting so that he could get back to longer-term thinking about the sustainability priorities facing HAL.

Discussion Questions

1. From the viewpoint of the cruise line companies, do you believe that the industry will be more or less attractive in the future? Explain your thinking. How will sustainability issues and regulations impact industry attractiveness?
2. Who are the key stakeholders in relation to HAL's sustainability issues. What is the influence of each in terms of their potential impact on HAL?
3. What are the most significant environmental issues facing Holland America Line? In what ways has Holland America gone beyond compliance in its environmental initiatives?
4. What are the most significant social issues facing Holland America Line?
5. Bill Morani has asked for your assistance in assessing what action to take with respect to the wind turbine initiative. What would you recommend?
6. What are the challenges facing Bill Morani and Holland America in moving their sustainability agenda forward?

Acronymus used in the case

AWWPS	Advanced Waste Water Purification System
CI	Conservation International
CLIA	Cruise Line Industry Association
CO2	Carbon Dioxide
FCC	Fuel Conservation Committee
HAL	Holland America Lines
HAWT	Horizontal Axis Wind Turbine
HFO	Heavy Fuel Oil
HVAC	Heating, Ventilation and Air Conditioning
IMO	International Maritime Organization
IWC	International Whaling Convention
MARTI	MesoAmerican Reef Tourism Association
MCI	Marine Conservation Institute
MSD	Marine Sanitation Devices
NOX	Nitrous Oxide
PM	Particulate Matter
SOX	Sulfur Oxide
UNCLOS	United Nations Convention on the Law of the Sea
VAWT	Vertical Axis Wind Turbine
VOC	Volatile Organic Compounds
WTO	World Tourism Organization

Exhibit 1: Characteristics of Cruise Line Segments

Budget Segment

- Low-price
- Appealing to youth and lower income population segments
- Small ships with a minimum of on-board facilities
- Leading cruise lines in this segment include Louis Cruise, Travelscope, Thompson, Island Cruises, Pullmantur and Fred Olsen

Contemporary Segment

- Most popular and profitable segment based on application of economies of scale
- Offers resort-type facilities with a strong emphasis on on-board activities and services, such as beauty shops, golf, ice skating, etc.
- Well adapted to families with children
- Broad target market with "something for everyone"
- Cruise lines in this segment include Royal Caribbean International, Carnival Cruises, Norwegian Cruise Line, Disney, MSC, P&O and Costa

Premium Segment

- A somewhat more sophisticated product than contemporary- better suited to repeat cruise passengers
- Clientele in the over-40 age group
- Itineraries featuring rarely visited ports
- Cruise lines in this segment include Celebrity Cruises. Holland America Line, and Oceana Cruises

Luxury Segment

- High style luxury with emphasis on the destination and on-board facilities
- Exclusivity, with fewer passengers and a much more formal atmosphere
- Spacious accommodations
- Clientele: couples and singles with a taste for super luxury resorts on land, with no facilities for children
- Longer itineraries (10 days or more) and unusual ports and places
- Cruise lines in this segment include Radisson Seven Seas, Silversea Cruises, Seabourn Cruise Line and Crystal Cruises

Source: Cruise Tourism: Current Situation and Trends, 2010, WTO

Exhibit 2: Share of Worldwide Passengers and Number of Ships: 2011

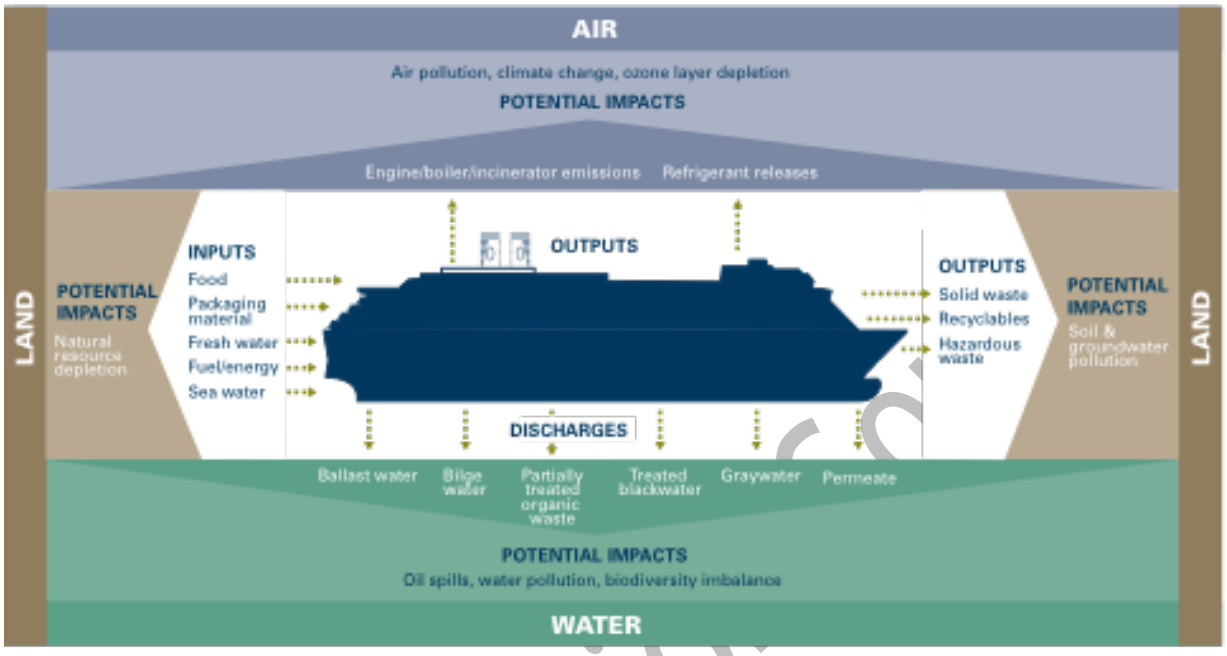
Parent Company	Brand	Share of Worldwide Passengers (%)	Number of Ships
Carnival Corporation and PLC (CCL)	Carnival Cruise Line	21.1	24
	Costa	7.2	17
	Princess	6.4	16
	AIDA	4.4	8
	Holland America	3.7	15
	Other CC Lines	6.4	23
	TOTAL CC Lines	49.2	103
Royal Caribbean Cruises, Ltd. (RCCL)	Royal Caribbean International	17.0	22
	Celebrity	4.7	11
	Other RCCL Lines	2.1	7
	TOTAL RCCL	23.8	40
Norwegian		7.1	11
MSC Line		5.8	12

Source: Cruise Market Watch 2011

http://www.cruisemarketwatch.com/market-share/

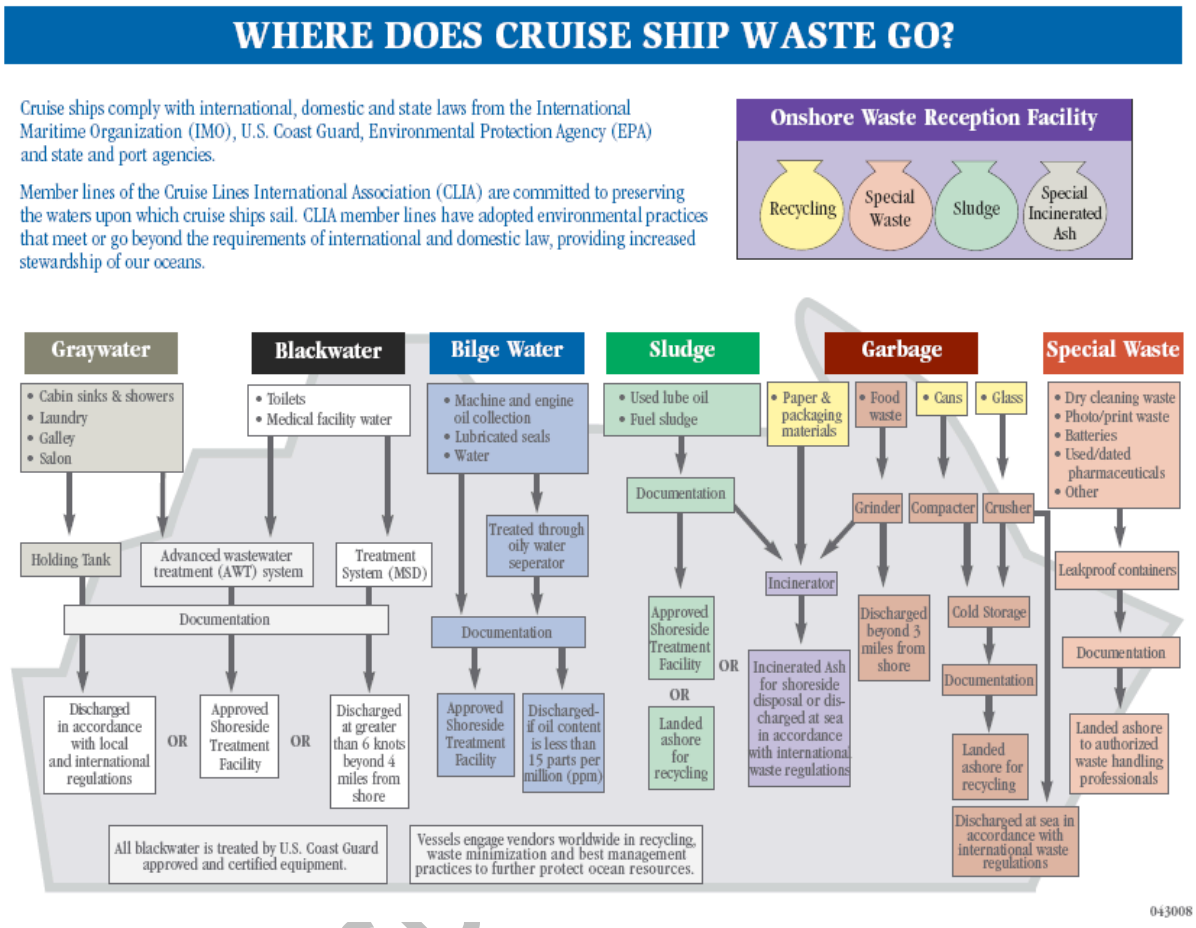
Exhibit 3

Environmental Aspects and Potential Impacts from Cruise Ship Operations



Source: Holland America Lines

Exhibit 4: Where Does Cruise Ship Waste Go?



Source: Cruise Line Industry Association

Exhibit 5: Assessment of Potential Reductions of CO2 Emissions from Shipping Using Known Technology and Practices

	Saving of CO2	Combined within category	Overall combined
DESIGN (new ships)		10% to 50%	25% to 75%
Concept, speed and capability	2% to 50%*		
Hull and superstructure	2% to 20%		
Power and propulsion system	5% to 15%		
Low-carbon fuels	5% to 15%		
Renewable energy	1% to 10%		
OPERATION (All ships)		10% to 50%	
Fleet management	5% to 50%		
Voyage optimization	1% to 10%		
Energy management	1% to 10%		

Reductions at this level would require reductions of operational speed.

Source: Second IMO GHG Study 2009, UN International Maritime Organization.

Exhibit 6: Fuel Use at Holland America Line

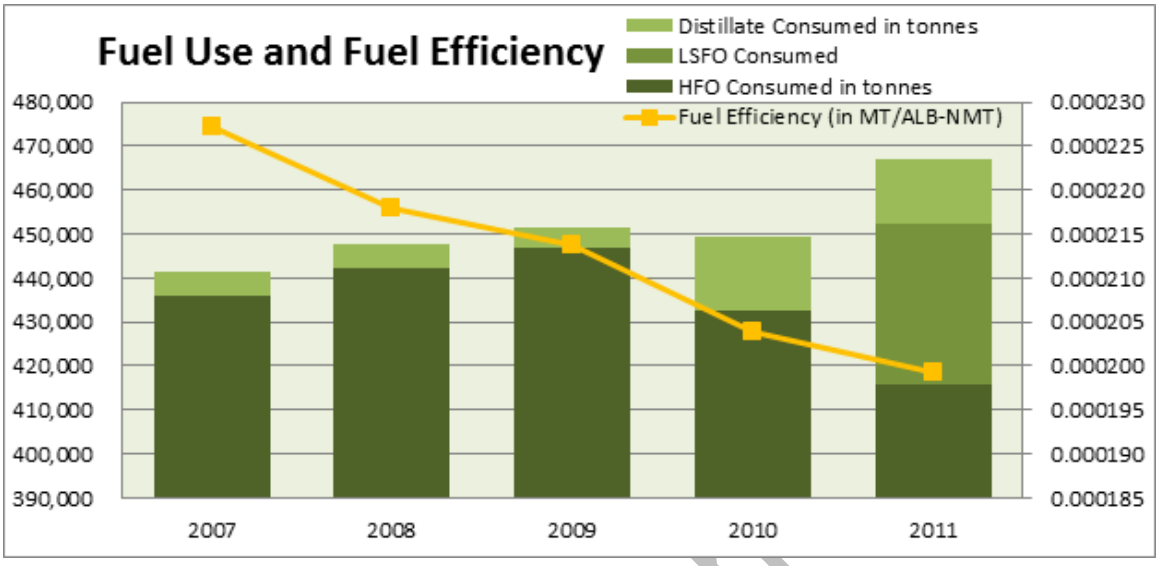
Measure	Units	2007	2008	2009
Heavy Fuel Oil (HFO) Use	Metric Tonnes (MT)	435,806	442,362	446,765
	Kg/ALB-km*	0.1211	0.1163	0.1141
Distillate Fuel Use**	MT	5,730	5,230	4874
Direct GHG Emissions				
Carbon Dioxide	MT	1,395,571	1,407,527	1,420,216
Equivalent (CO2-e)	Kg/ALB-km	0.3883	0.3862	0.3628
Other Emissions				
Nitrogen Oxides (NOX)	MT	28,327	29,093	29,357
	Kg/mile	21.2	22.2	21.2
Sulfur Oxides (SOX)	MT	19,411	18,606	18,606
	Kg/mile	14.5	14.2	13.4
Particulate Matter (PM 10)	MT	523	537	542
	Kg/mile	0.391	0.411	0.392

* Kg/ALB is a measure of efficiency agreed upon by all of Carnival Corporation's operating lines. It is the quantity of fuel used in kilograms divided by the available lower berths in the fleet times the number of kilometers traveled by the fleet.

** Distillate fuel is used in the diesel electric generators in geographic regions as specified by laws and regulations.

Source: Holland America Line 2009 Sustainability Report, p.65.

Exhibit 7: Holland America Line Fuel Use and Fuel Efficiency 2007-2011



Source: Internal Holland America document

Exhibit 8: Wind Turbines on Stena Jutlandica

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[xviii] Holland America Line 2009 Sustainability Report. www.hollandamerica.com/about-best-cruise-lines/Main.action?tabName=Sustainability#

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[xxi] http://www.worldsleadingcruiselines.com/about-us/press-room/holland-america-news/holland-america-line-receives-second-benkert-environmental-award.aspx, accessed August 1, 2012

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[xxiii] CLIA at 35, p.20

[xxiv] Post and Courier, Charleston, S.C., 2011, www.postandcourier.com

[xxv] email exchange with Tina Stotz ??????date

[xxvi] http://www.ethicaltraveler.org/2010/01/sustainability-in-the-cruise-industry/, accessed August 1, 2012

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[xxviii] Interviews with Lance Morgan at Marine Conservation Institute and Tina Stotz at HAL, Fall 2011. Also, see http://www.marine-conservation.org/what-we-do/program-areas/how-we-fish/holland-america/sustainable-seafood/

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