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Designing a Central Resource for Environmental Management in Costa Rica

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Designing a Central Resource for Environmental Management in Costa Rica

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Abstract

In order to mitigate climate change, Costa Rica set a national goal to become carbon neutral by 2021. To help achieve this goal, organizations within Costa Rica could become carbon neutral through the use of environmental management systems to improve their sustainability and environmental product declarations to communicate the environmental impacts of products. Using information obtained through research and interviews with large organizations, our project created a central location of information in the form of a website that contains relevant standards, resources, and guidelines to help small and medium-sized organizations move towards carbon neutrality.

Acknowledgements

Executive Summary

Climate change is a problem that is gaining greater attention worldwide. One way to mitigate the negative effects of climate change is through carbon neutrality, or net zero carbon emissions from an organization, country, or other entity (U.S. Environmental Protection Agency, 2011a). Costa Rica has set a national goal to become the first carbon neutral country by the year 2021 (Dobles, 2008). To meet this goal, Costa Rica has implemented programs on both governmental and organizational levels. For example, the Instituto de Normas Técnicas de Costa Rica (INTECO; Technical Standards Institute of Costa Rica) released a standard for organizations to follow in order to become carbon neutral (INTECO, 2009). One private agency that provides support to further environmental efforts in Costa Rica is Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ; the German Society for International Cooperation) (GIZ, 2011). Through these initiatives, Costa Rica aims to alleviate the causes of climate change.

At the organizational level, companies could reduce their greenhouse gas emissions to help achieve carbon neutrality through the use of environmental management systems (EMSs) and environmental product declarations (EPDs). An EMS is a systematic approach to developing and implementing sustainable programs and processes within an organization to reduce its negative environmental impacts (U.S. EPA, 2011b). An EPD is a method for documenting and communicating the greenhouse gas emissions and environmental impacts of a product throughout its life cycle to consumers and stakeholders (International EPD Cooperation, 2008b). Due to the complexity of calculations over the entire product life cycle needed for an EPD, organizations often start with EMSs to help mitigate their environmental impacts as an organization and then produce EPDs for their products.

While many large organizations in Costa Rica have been working on developing and implementing EMSs, small and medium-sized enterprises (SMEs) are lacking the necessary resources and information to help them begin this process. The complexity and abundance of information can often be confusing for organizations that lack experience with these topics. Therefore, we created a website for SMEs as a tool to help them gather the relevant information and understand the methods for producing EMSs and EPDs.

We compiled information for our website through several means. First, we researched previously implemented EMS and EPD case studies to provide organizations with examples of successful practices. Second, we compiled guides and calculation tools that could be helpful for

organizations in quantifying their emissions and developing an EMS or EPD. Then, we collected information regarding national and international standards that focus on the various processes involved in an EMS or EPD. Lastly, we conducted interviews with large national and multinational organizations, which had already developed EMSs, in order to gain information about what standards and resources were useful during this process.

Our results showed that many national and international environmental standards were relevant to developing and implementing an EMS. These included the INTECO carbon neutrality standard, as well as the ISO 14000 series of standards, which is published by the International Organization for Standardization (ISO) and contains standards related to EMSs, EPDs, greenhouse gas inventories, and life cycle assessments (INTECO, 2011; International Organization for Standardization, 2011a). By studying these and other pertinent standards, the SMEs interested in EMSs and EPDs can obtain information regarding the practices necessary to develop these systems.

Additionally, our results showed that environmental management systems are often based on the three-phase approach of measuring, reducing, and compensating for environmental impacts. Organizations can calculate their environmental footprint, which encompasses all of their environmental impacts, including their carbon footprint. For the reduction phase of the EMS, all interviewed organizations had already determined which of their processes provided opportunities to reduce their environmental impacts. However, the individual reduction programs can vary greatly depending on the processes specific to the organization and industry. The compensation phase of an EMS is most often applied to greenhouse gas emissions and can be completed through the use of a carbon credit system. From these results, we developed guidelines outlining the important steps, including details on the phases of measuring, reducing, and compensating for the negative environmental impacts of organizations. This set of guidelines aimed to assist organizations with the development and implementation of effective environmental management systems in order to become carbon neutral.

Though EMSs are related to the organization as a whole, EPDs can also be useful to organizations while attempting to decrease their environmental impacts. The resources we provided to organizations regarding EPDs included case studies of EPDs that have been implemented in other countries. In addition, we created a set of guidelines for the steps to be taken by organizations during the process of creating an EPD, which includes completing a life

cycle assessment and a verification process. We provided supplemental resources on our website, located within these guidelines, to help organizations find the information they need to complete the necessary analyses and develop verifiable EPDs for their products.

We created a website to provide SMEs with a central location for information and resources that are important to the development and implementation of EMSs and EPDs. The webpages provide SMEs with the systems and tools that could help them to quantify and minimize their negative environmental impacts. Through this information, organizations could potentially become carbon neutral. With organizations nearing carbon neutrality, Costa Rica will move closer to reaching its national goal of carbon neutrality by 2021.

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List of Acronyms

CPS	Country Partnership Strategy
CYMA	Competitividad y Medio Ambiente; Competitiveness and the Environment
EMS	Environmental Management System
ENCC	Estrategia Nacional de Cambio Climático: National Strategy on Climate Change
EPD	Environmental Product Declaration
FONAFIFO	Fondo Nacional de Financiamiento Forestal; National Forestry Financing Fund
GEDnet	Global (Type III) Environmental Declaration Network
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit; German Society for International Cooperation
IPCC	Intergovernmental Panel on Climate Change
INTECO	Instituto de Normas Técnicas de Costa Rica; Technical Standards Institute of Costa Rica
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
MINAE	Ministerio de Ambiente y Energía; Costa Rica Ministry of the Environment and Energy
PAS	Publicly Available Specification
PCR	Product Category Rules
PDS	Product Data Sheet (Japan's EcoLeaf Program)
PEAD	Product Environmental Aspects Declaration (Japan's EcoLeaf Program)
PEIDS	Product Environmental Information Data Sheet (Japan's EcoLeaf Program)
PND	Plan Nacional Desarrollo; National Development Plan
PSA	Pago por Servicios Ambientales; Payment for Environmental Services

Glossary of Terms

Competitividad y Medio Ambiente (CYMA) – Competitiveness and the Environment; A Costa Rican project that works in the public and private sector to help decrease the impacts of society on the environment

Country Partnership Strategy (CPS) – A Costa Rican project that is involved with improving the quality of life for its people with a main focus on higher education

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) – German Society for International Cooperation; An international organization that works with other organizations in producing and performing "political, economic, ecological, and social" programs

Environmental Footprint - The quantification of materials, waste, water, energy, and air through metric measurements, and the impact on land and ecosystems using qualitative analysis

Environmental Management System (EMS) - The collection of processes and practices that enables an organization to reduce its environmental impact and increase its operating efficiency

Environmental Product Declaration (EPD) – A document that provides information to consumers about the environmental impacts of the product as analyzed by a life cycle assessment

Estrategia Nacional de Cambio Climático (ENCC) – National Strategy on Climate Change; A plan designed by the governmental organization, MINAE, to present the Costa Rican national goal of achieving carbon neutrality by 2021

Fondo Nacional de Financiamiento Forestal (FONAFIFO) – National Forestry Financing Fund; The division of MINAE that manages programs related to reforestation, such as the Payment for Environmental Services Program

Greenhouse Gases – A gas that absorbs and emits radiation through the infrared spectrum, which contributes to the greenhouse gas effect

Greenhouse Gas Inventory – The systematic approach used by organizations to calculate their total greenhouse gas emissions

Green-washing – A term used when an organization or product is presented as environmentally friendly without substantial evidence

Instituto de Normas Técnicas de Costa Rica (INTECO) – Technical Standards Institute of Costa Rica; A private organization in Costa Rica whose mission is to improve the quality of life of society through technical standardization

International Organization for Standardization (ISO) – An organization that releases internationally approved standards regarding manufacturing and industry

Inventario e informe de gases con efecto invernadero (GEI) – Inventory and Report of Greenhouse Gases; The guide to the first pilot program developed by ENCC and MINAE

Life Cycle Assessment (LCA) – The analysis of the environmental impacts of a product from production to disposal

Ministerio de Ambiente y Energía (MINAE) –Ministry of the Environment and Energy in Costa Rica; The governmental organization that produced the ENCC and is the national authority for environmental efforts

Pago por Servicios Ambientales (PSA) – Payment for Environmental Services; A program developed by the Costa Rican government and managed by FONAFIFO that provides landowners with compensation for conserving, maintaining, and replanting their forests

Plan Nacional de Desarrollo (PND) – National Development Plan; The strategy written by the government to inform Costa Rican citizens of the government's agenda during the presidential election period

Product Category Rules (PCR) – A set of rules based on the type of product that defines the criteria included in an LCA or EPD

Product Data Sheet (PDS) – A document that provides the information presenting the raw data collected about the environmental impacts of a product (Japan's EcoLeaf Program)

Product Environmental Aspects Declaration (PEAD) – A document that provides a simplified explanation of the environmental impacts of a product based on the PEIDS data (Japan's EcoLeaf Program)

Product Environmental Information Data Sheet (PEIDS) – A document that uses the data from the PDS to complete an LCA (Japan's EcoLeaf Program)

Publicly Available Specification (PAS) – A provisional British standard, lasting for two years prior to its review and endorsement by the British Standards Institute, which creates a management system, a product benchmark, or codes of practice

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Chapter 1: Introduction

Climate change is capturing greater attention from the scientific world, especially in the last decade, as its damaging effects are becoming more apparent. Climate change is caused by an increase in atmospheric greenhouse gases from both human actions and natural processes. Some of these greenhouse gases are water vapor, carbon dioxide, and methane. Results of climate change include global warming, extreme weather occurrences, and shifts in climate zones. These effects can increase flooding and the spreading of tropical diseases. Combined with reductions in biodiversity due to the endangerment and extinction of hundreds of species, these forecasts have prompted certain experts and world leaders to take action (U.S. Environmental Protection Agency, 2011a). For example, the United Nations Environment Programme and the Ministerio de Ambiente y Energía (MINAE; Ministry of the Environment and Energy) in Costa Rica have developed plans and procedures to try to mitigate the negative effects of climate change.

In Costa Rica, eco-tourism is an important part of the national economy. As such, both governmental and private organizations have advocated sound environmental practices and precautions to prevent environmental damage. One of the country's long-term goals, as presented in the Plan Nacional de Desarrollo (National Development Plan), is to achieve carbon neutrality (C-neutrality) by 2021, meaning that the net amount of carbon dioxide or other greenhouse gases emitted into the atmosphere would be zero (Dobles, 2008). There have been many initiatives taken in an effort to reduce net carbon dioxide output. One of these initiatives is the Forest Conservation Program, which protects forests that store carbon dioxide. Collective tree planting programs and various incentives to purchase environmentally friendly automobiles are also being employed to increase environmental awareness and reduce negative environmental impacts (Herro, 2007). Another potential strategy to mitigate carbon output is through the use of environmental management systems (EMSs) and environmental product declarations (EPDs) by organizations. EMSs are important for helping organizations develop systematic and regulated methods to measure, reduce, and compensate for their emissions (U.S. EPA, 2011b). EPDs provide information to consumers about the environmental impacts of products throughout the various stages of production, distribution, and use (International EPD Cooperation, 2008b).

Organizations are important contributors to the overall environmental impact of Costa Rica due to their industrial and agricultural activities, such as manufacturing processes and

transportation of agricultural products. If organizations are able to manage their environmental impacts and greenhouse gas emissions, they could greatly contribute to the progress of the country towards carbon neutrality by 2021. While environmental management systems can help organizations manage their emissions, it can be complicated for organizations to implement EMSs due to the complexity of the standards that outline these systems. Organizations are lacking a central location of information and resources that can assist them with developing and implementing EMSs. Thus, we provided organizations with a resource-based tool that could aid them with the evaluation of their environmental effects.

In addition to helping organizations mitigate their carbon output, analysis of the environmental effects of products is useful in substantiating claims of 'green' products. The demand for greener products with fewer environmental impacts is increasing, due in part to the Estrategia Nacional de Cambio Climático (ENCC; National Strategy on Climate Change). However, 'green-washing', or the misrepresentation of an organization or product as being environmentally friendly without legitimate evaluation or evidence, has become more common (U.S. EPA, 2010). In Costa Rica, there is no universal method for reporting data regarding the environmental impacts of products or organizations. Through the use of EPDs, organizations can report their impacts on the environment, such as the amount of CO_2 emitted during a manufacturing process, and communicate these data to stakeholders and consumers (International EPD Cooperation, 2008b). However, many organizations are not yet prepared to focus on product level impacts and would need assistance to complete the analyses for EPD documentation. With proper support during the development process, the organizations could be more capable of becoming carbon neutral.

In Costa Rica, private organizations are helping other organizations to implement standards for EMSs and EPDs. One such organization is Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ; German Society for International Cooperation), which is an international organization that assists its clients in designing and initiating "political, economic, ecological, and social" programs (GIZ, 2011). One of these programs in Costa Rica is Competitividad y Medio Ambiente (CYMA; Competitiveness and the Environment), which works with governmental and private organizations to decrease the negative impacts of society on the environment (GIZ, 2011). Given the variety of standards that exist and the lack of a central location for the information needed to become carbon neutral, our project goal was to work with

GIZ-CYMA to provide resources to small and medium-sized enterprises. This compilation of information could be used to help SMEs develop and implement environmental management systems and environmental product declarations. Through this project goal, we aimed to help organizations gain the knowledge and information necessary to reduce their environmental impacts. In collaboration with GIZ-CYMA, we provided a platform of information in the form of a website, which can help move Costa Rica closer to its goal of becoming the first carbon neutral country in the world.

Chapter 2: Literature Review

In this chapter, we begin by presenting Costa Rica's environmental awareness and the initiatives that have been taken to become carbon neutral. Next, we discuss the efforts of the nation through the Estrategia Nacional de Cambio Climático (ENCC; National Climate Change Strategy) and additional actions taken by private and governmental organizations that are contributing to the carbon neutrality goal of the nation. We then discuss two tools, environmental management systems (EMSs) and environmental product declarations (EPDs), which can be used by organizations in the process of achieving carbon neutrality. An explanation of national and international environmental standards is provided since they are essential to the understanding of EMS and EPD development and implementation by organizations. As small and medium-sized enterprises (SMEs) join other organizations in moving towards achieving the national goal, Costa Rica will gradually move closer to carbon neutrality.

2.1   Environmental Awareness in Costa Rica

Costa Rica has set the goal of becoming the first carbon neutral nation in the world by 2021. One defining characteristic of the environmental efforts in Costa Rica is the amount of renewable energy that the country already uses. Costa Rica produces over 80% of its energy through renewable resources, mainly through wind and hydro-power. In addition, approximately 5% of the plant and animal species on Earth live in Costa Rica. Not only does this level of biodiversity help with counteracting net carbon production, but it also provides motivation to conserve the unique ecosystems of the country. Maintaining the biodiversity and ecosystems of Costa Rica are important for eco-tourism, an important sector of the economy, and also for attaining carbon neutrality (Herro, 2007).

The rainforest ecosystems have been and continue to be in danger of deforestation. As shown in Figure 2-1, Costa Rica had serious deforestation problems in the decades preceding 1990. In the 1940's, the rate of deforestation was 3.2%, while in the period between 1977 and 1983, the rate increased to 16.4%. By 1986, only 29% of Costa Rica's land was covered by rainforest (Zbinden, 2004). Although the deforestation rate began to decline after 1990, the effects of previous damage had resulted in Costa Rica having one of the most devastated rainforests of any Central American country. As a consequence, Costa Rica began developing programs to conserve the amount of rainforest that still remained. The country began by

implementing small incentive programs for individual forest conservation. After years of developing different strategies to reduce deforestation, the government released the Forestry Law (No. 7575) in 1996. This law stated the benefits of forests to the environment and the country, and it encouraged the protection of this valuable resource (Zbinden, 2004).
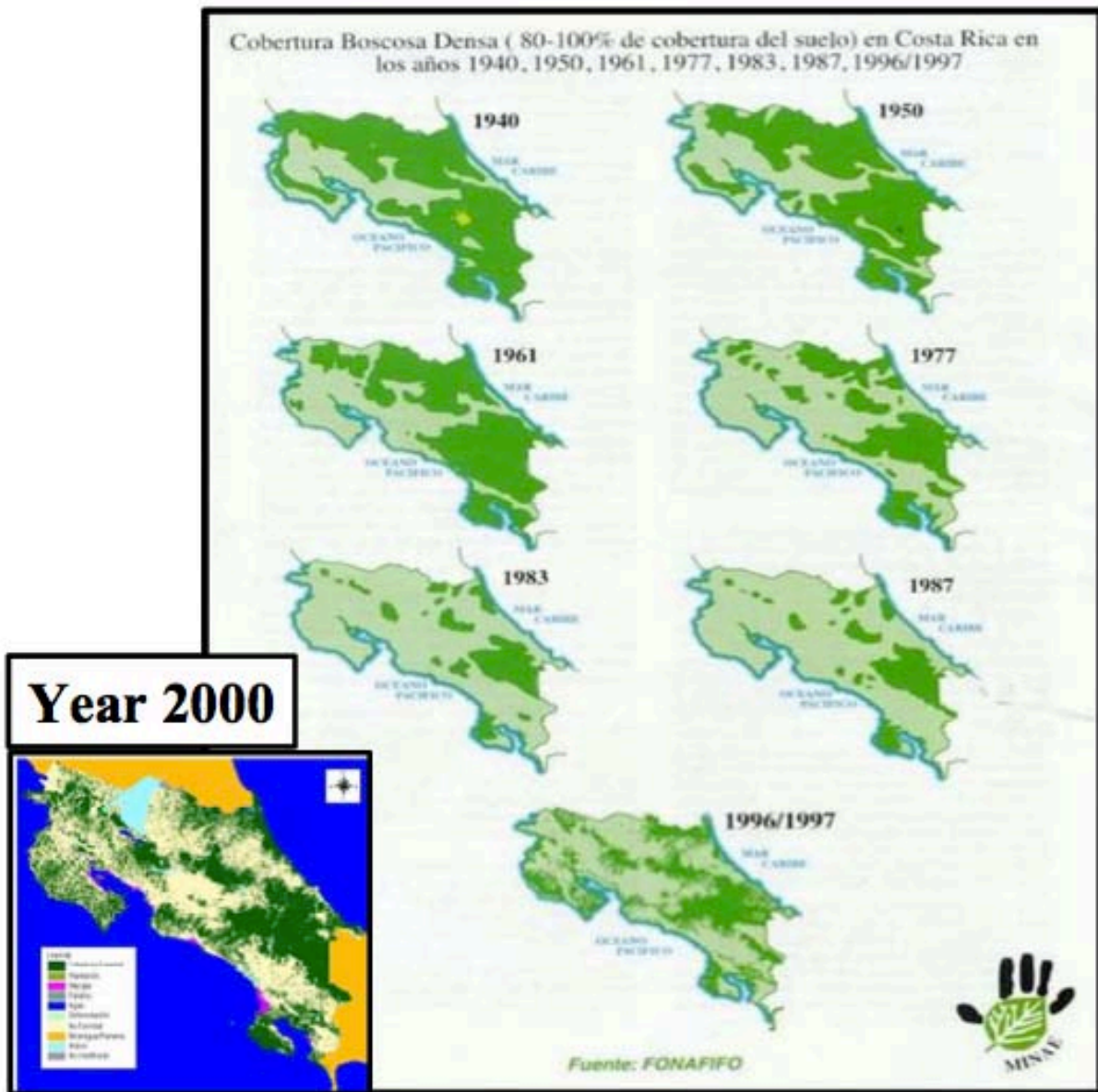
Figure 2- 1. Deforestation and Reforestation in Costa Rica since 1940 (Miranda, Porras, & Moreno, 2004)

One action taken by the Costa Rican government to protect this vital resource was the development of a program called Pago por Servicios Ambientales (PSA; Payment for

Environmental Services), which was based on the Forestry Law (No. 7575). This program is managed by the Fondo Nacional de Financiamiento Forestal (FONAFIFO; National Forestry Fund), which provides organizations with the opportunity to purchase and preserve Costa Rican forest areas. PSA focuses on providing reparation to landowners to conserve, maintain, and replant their forest area. Participation by the public in a program such as this is important to its success. As reported by Zbinden (2004), studies have been conducted pertaining to the PSA program, specifically regarding the landowners and the resources that they have available for the implementation of the program. Some factors that influence the participants' efforts are knowledge of the subject, amount of land, amount of labor required to make changes, and legal ownership of one's land. A considerable attempt has been made to educate landowners on deforestation and how they can make a positive contribution in order to mitigate the aspects that discourage public involvement. Although these obstacles are present, the program has made a difference in the extent of forest conservation as demonstrated by the participation of more than 4,400 farmers and landowners (Zbinden, 2004). According to Pagiola (2008), over 270,000 hectares, which is approximately 5.5% of the country's land, was conserved through the PSA program by 2005. Efforts, such as this forest conservation program, demonstrate growing environmental awareness in Costa Rica and the success that is possible when both the government and the residents work towards a common goal (Pagiola, 2008).

2.2   Actions to Mitigate Climate Change in Costa Rica

The Costa Rican government has taken actions to protect the environment in different aspects, such as deforestation, and has also begun taking steps to mitigate the negative effects of climate change. Carbon neutrality would help to minimize increases in greenhouse gases that contribute to climate change; therefore, the government has set the goal of carbon neutrality for Costa Rica.

2.2.1   National Strategy on Climate Change

Upon setting the goal of carbon neutrality, the government included strategies for climate change as a priority in the 2006-2010 Plan Nacional de Desarrollo (PND; National Development Plan). The ENCC, as designed by the government through the Ministerio de Ambiente y Energía (MINAE; Costa Rica Ministry of the Environment and Energy), has a two part agenda known as the National and International Strategy (Dobles, 2008). The National Strategy agenda has six

main objectives that include: mitigation, adaptation, metrics, capacity building and technology transfer, education culture and public awareness, and financing (Dobles, 2008). The objectives of mitigation and metrics, both of which can be applied to climate change issues, are those that relate most to our project.

As stated in the ENCC, the mitigation objective has three main goals: 1) to reduce emissions at the source, 2) to offset emissions with carbon sinks, and 3) to create carbon markets (Dobles, 2008). For the first goal of mitigation, sources of emissions include any entity that has a measurable output of greenhouse gases. Greenhouse gas emissions are usually measured in carbon dioxide equivalents, and the total measurable amount of greenhouse gases emitted by an entity yearly is known as its carbon footprint (U.S. EPA, 2011h). Greenhouse gas emissions can be systematically measured and recorded through the use of a greenhouse gas inventory (Greenhouse Gas Protocol, 2011b). Thus, to meet the first goal and reduce the amount of carbon emissions at the source, the entity would have to adjust or change its practices so as to produce less carbon.

The second goal in mitigation is the use of carbon sinks, which are a type of carbon offset. A carbon offset or sink is an action that invests in a different activity in order to balance emissions from the primary source. This refers to the sequestration of carbon, by means of removal or storage (EPA Victoria, 2009). The main forms of sequestration, or carbon sinks, that Costa Rica plans to use are reforestation, regeneration, and prevention of further deforestation. If an organization is below the internationally or nationally regulated level of permissible carbon emissions, then the organization can sell its remaining carbon offsets or sinks, in the form of carbon credits, to another organization or country that may otherwise exceed the regulated amount (Dobles, 2008).

The third goal of the mitigation objective involves the establishment of a carbon market or carbon credit system. This system involves offsets that can be sold, bought, and traded between entities to use in order to balance greenhouse gas emissions from other sources. A single carbon credit negates the emission of one ton of carbon dioxide or greenhouse gas equivalent so that the overall process remains carbon neutral (Yuvika Gupta, 2011). This exchange of carbon credits or offsets is the foundation of any carbon market. A carbon market enables organizations to become carbon neutral by giving them the ability to use carbon credits to offset remaining emissions, resulting in a net carbon footprint of zero (Dobles, 2008).

Carbon neutrality can be determined through metrics, which is another objective of the National Strategy. This ENCC objective is necessary to combat the prevalence of 'green-washing'. Green-washing is the misrepresentation of organizations or products as being environmentally friendly without legitimate evaluation or evidence. Green-washing has become a common practice in the marketing of many products (U.S. EPA, 2010). In order to have accurate and verifiable results, it is essential to have an established system of metrics or measurements to monitor and evaluate claims by organizations of being environmentally friendly. Creating a system of metrics to quantify the environmental impacts of industries is one of the positive steps being taken by the ENCC towards nationwide carbon neutrality (Dobles, 2008).

2.2.2 Current Actions of Private Organizations

In support of the nationwide goal of carbon neutrality, Costa Rica is making progress through programs initiated by private organizations to reduce their environmental effects. Many private Costa Rican organizations have joined the mission of carbon neutrality. For example, Nature Air, a Costa Rican airline, claims to be the world's first carbon neutral airline and has converted their land transportation and equipment fuel to biodiesel (Nature Air, 2011). Mapache, a Costa Rican car rental company, participates in reforestation programs, uses renewable energy resources, and also claims to be carbon neutral (Mapache, 2011). Coopedota R. L., a coffee manufacturer, is on its way to being the first carbon neutral coffee producer for the country. Some of the strides taken by Coopedota R. L. towards becoming carbon neutral are their programs to reduce emissions and environmental impacts through the recycling of wastewater and waste oil into energy for the organization (Long, 2011). In addition, the Country Partnership Strategy (CPS) of Costa Rica is involved in improving aspects of the country including education, infrastructure, and environmental management. CPS has been endorsed by the World Bank Board of Directors through their lending of 400 million dollars, a portion of which is being contributed to the 2021 goal of carbon neutrality (World Bank Group, 2011).

2.2.3 Current Actions of Governmental Organizations

In addition to the participation of private organizations, the government has also been active in supporting the process of becoming carbon neutral. The governmental organization MINAE proposed the ENCC, which is a guideline that details the national plan to mitigate the

negative effects of climate change. MINAE also started the "We dare you to plant a tree" campaign as part of the national mitigation strategy (Dobles, 2008). This campaign is another governmental program that compensates landowners for protecting and planting trees on their private land. In addition, a recent agreement with the United States will help in furthering progress over the next decade. This agreement forgives Costa Rica of its 26 million dollar debt to the United States, as long as the money is used for rainforest protection (Herro, 2007). These policies greatly help the country to protect its ecosystems that, in turn, will help to compensate for carbon production.

2.2.4   Current Actions of Costa Rican Agencies

One agency that is working with Costa Rica to further carbon neutrality is the host agency for our project, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ; the German Society for International Cooperation). GIZ is an international organization that collaborates with other organizations to provide support in "political, economic, ecological, and social" programs (GIZ, 2011). In addition to multinational projects, GIZ projects within Costa Rica include Competitividad y Medio Ambiente (CYMA; Competitiveness and the Environment), local and communal development, sustainable management of resources, rehabilitation and maintenance of the cantonal road network, and the Nogal Nature and Community Project (GIZ, 2011). Through these projects, GIZ is helping Costa Rica to protect its environment and natural resources, as well as to develop local and industrial sustainability.

A Costa Rican organization that works with GIZ is the Technical Standards Institute of Costa Rica (INTECO). INTECO works closely with the government and other private organizations on the subject of developing standards pertaining to the quality of life. INTECO currently has a set of standards called the INTECO Environmental Management System, which is based on the internationally accepted International Organization for Standardization (ISO) standards. An environmental management system is the set of processes and programs designed by an individual organization to help in the development of a more sustainable and efficient organization (U.S. EPA. 2011b). INTECO, as an independent verification body, checks the compliance of organizations with the INTE-ISO 14001 standard. First, organizations receive an audit from a third party verifier containing information pertaining to aspects of their environmental practices. If there are practices deemed unsuitable from this evaluation, organizations are allotted time to develop a plan describing how they will improve the features of

their organization that are unfavorable. INTECO then reviews both the audit and the plan, and it grants an Environmental Management Certificate if it is deemed to be applicable (INTECO, 2009). To further develop the INTECO environmental standards, INTECO recently collaborated with the government to produce the national standard, "Sistema de gestión para demostrar la C-neutralidad" ("Management System to Demonstrate C-Neutrality"), which helps organizations with the carbon neutrality process. If INTECO determines that an organization has achieved carbon neutrality according to this standard, the government can permit the organization to use the brand "Made C-Neutral in Costa Rica" (Dobles, 2008) through MINAE (INTECO, 2011).

In 2007, MINAE began a pilot program to support and direct organizations towards becoming carbon neutral through the measurement and reporting of greenhouse gases. However, this program was cancelled due to a change in government (Miranda, Porras, & Moreno, 2004). In order to conduct this pilot program, MINAE developed a guide entitled, "Inventario e informe de gases con efecto invernadero (GEI)," or "Inventory and Reporting of Greenhouse Gases." This program contained three phases, and there were seven steps within these phases (MINAE, 2007). Table 2-1 lists the phases, steps, and activities that were recommended to the organizations as part of the pilot program.

These steps are useful tools to help organizations conceptualize some of the necessary actions for the implementation of an environmental management system. In September of 2011, INTECO announced a new pilot program with the goal of helping organizations to implement the INTECO carbon neutrality standard. The requests for participation were due in October of 2011, the same month that our project began, thus the outcome from this pilot program was not yet available (Representative from INTECO, personal communication, November 14, 2011). However, the insight gained through this program could be used in the future to inform organizations about the practices that were found to be the most feasible.

Table 2- 1. MINAE 2007 Pilot Program Phases and Steps (Adapted from MINAE, 2007)

Phase	Step	Activities
Phase 1. Planning	N° 1. Allocate Resources	• Secure support of senior management • Define working group and budget
	N° 2. Design inventory of greenhouse gases (GHG)	• Define scope of the inventory • Identify sources of GHG emissions • Choose of base year of study
Phase 2. Elaboration	N° 3. Collect Data	• Design of an efficient data management • Obtain relevant data and quality assurance
	N° 4. Calculate emissions	• Apply computational tools • Avoid calculation errors
Phase 3. Administration	N° 5. Define goals	• Identify opportunities to reduce emissions • Make decisions about the level and type of goal
	N° 6. Reduce emissions	• Implement emission reduction activities
	N° 7. Report results	• Publicly disclose complete emission report

2.3   Importance of EMSs and EPDs

In addition to the current plans and actions that are being executed in Costa Rica, the development of both environmental management systems (EMSs) and environmental product declarations (EPDs) by organizations could further the carbon neutrality process. There are three components of an EMS including measuring, reducing, and compensating for the emissions of an organization, which coincide with the three goals of the mitigation objective of the ENCC. Although an EMS includes the reduction of and compensation for greenhouse gas emissions, it also includes other components of the environmental footprint of an organization, such as water usage, waste production, and energy consumption (U.S. EPA, 2011b). Therefore, an EMS contributes to more than helping an organization to become carbon neutral: it aids in the overall reduction of the negative environmental impacts of an organization. Environmental management

systems offer many benefits to organizations in general. The EMS of an organization demonstrates that the organization is taking responsibility for its environmental impacts. This can provide a competitive advantage within consumer markets and improve the relationship between the community and the organization. An EMS can also help to improve the efficiency and environmental performance of the organization by reducing waste production and energy consumption. A structured EMS, such as those developed through compliance with standards, helps an organization to set goals and objectives for demonstrating its environmental performance and establishes the environmental policy of the organization (INTECO, 2009).

Generally, after an environmental management system is developed and implemented, an organization can begin developing environmental product declarations for its products. An environmental product declaration provides consumers with the relevant information on certain environmental aspects of a product throughout its life cycle, including emissions. In order to create an EPD, a life cycle assessment (LCA) can be completed to systematically calculate the total environmental impacts of a product (U.S. EPA, 2011f). Since the aspects of a product life cycle can vary greatly depending on the type of product, product category rules (PCRs) must be developed and verified. PCRs define which aspects of the product life cycle should be included in an LCA. Although a product may be created by a carbon neutral organization, the product itself may not be considered carbon neutral according to its LCA and EPD. This is because the steps taken to measure, reduce, and compensate for the emissions of an organization may not consider all of the emissions released during the life cycle of a certain product. Emissions specific to an individual product consist of those from all parts of its life cycle: before, during, and after the manufacturing process. Thus, it is important for an EPD to include all of the emissions that a single product releases and not just the emissions released while it is within the operational control of an organization. The processes necessary to develop and implement EMSs and EPDs are complex and can be confusing for organizations that lack experience in environmental management. Therefore, organizations developing EMSs and EPDs often require direction, which can be partially provided through the use of relevant standards (INTECO, 2009).

2.4   National and International Standards

There are numerous national and international standards related to environmental management practices that are available to organizations interested in developing and

implementing EMSs and EPDs. Many of the internationally utilized standards are ISO standards, including the ISO 14000 series of standards for environmental management. ISO standards are released by the International Organization for Standardization, which provides standards on many different aspects of manufacturing and industry (International Organization for Standardization, 2011a). In Costa Rica, INTECO has published national standards based on ISO standards in the INTE-ISO 14000 series of standards. Additionally, on September 22, 2011, INTECO published its INTE 12-01-06: 2011 standard, "Management System to Demonstrate C-Neutrality," which defines the requirements for organizational carbon neutrality. Many of the national and international environmental standards also have a corresponding certification available if organizations choose to go through the verification process. However, if organizations decide not to become certified, the standards themselves can still be used as a resource to guide the development and implementation processes for the EMS and EPDs of the organization. To build an understanding of the expectations for organizations, we analyzed globally accepted environmental standards. Information about some of the commonly used international standards is given in Table 2-2.

Since there are many standards that are available for use by organizations in Costa Rica, it would be useful for organizations to have a central location in which these resources could be accessed. However, the requirements outlined in these standards can still be difficult for organizations to understand and implement. There are many resources that exist that could be beneficial to SMEs while they are attempting to plan and implement EMSs and EPDs. Therefore, we created a website containing the previously discussed standards as well as other resources and guides in order to help SMEs begin the carbon neutrality process.

2.5   Conclusion

The complexity and abundance of the available environmental standards make it difficult for organizations to successfully develop and implement EMSs and EPDs. Without proper guidance, it would be difficult for organizations, especially SMEs, to develop a structured environmental management system or environmental product declarations. With a valuable tool to assist them with this process, the organizations could reduce the emissions from their activities in order to mitigate their negative environmental effects, which could help with the overall efforts against climate change. There are other resources, in addition to the standards, available to organizations to help with their implementation of EMSs and EPDs. However, there is no

central location for these resources. Therefore, our project created a central platform of information to provide SMEs with the necessary information, guidelines, and resources. This information could assist organizations with the process of becoming carbon neutral that could, in turn, help Costa Rica reach its goal of carbon neutrality by 2021.

Table 2- 2. International Standards

Standard	Description
ISO 14001 (ISO, 2011b)	Outlines the specifications for the development of a successful and implementable environmental management system
ISO 14020 (ISO, 2011c)	Outlines the procedures and requirements for different types of environmental labeling; basic guidelines given that encompass nine general principles regarding environmental claims and labeling
ISO 14021 (ISO, 2011d)	Outlines the process of developing self-declarations of environmental practices or products; includes type II labels, which are developed by the producer for its goods and services
ISO 14024 (ISO, 2011e)	Serves as a guide for gaining a seal of approval for a product; includes type I labels, which are developed by a third party
ISO 14025 (ISO, 2011f)	Outlines the formatting and technical aspects of the creation of labels; includes type III labels, which are developed by the producer, are third party verified, and cover a full life cycle assessment
ISO 14040 (ISO, 2011g)	Provides the principles and framework needed to complete a life cycle assessment for a product; defines the phases of an LCA
ISO 14044 (ISO, 2011h)	Provides the requirements and guidelines for the completion of the LCA of a product
ISO 14064 (ISO, 2011i; ISO, 2011j; ISO, 2011k)	Provides resources for reducing greenhouse gas emissions and trading carbon credits
Greenhouse Gas Protocol (Greenhouse Gas Protocol, 2011)	Collaboration of World Resources Institute and the World Business Council for Sustainable Development; provides a tool for comprehending and controlling greenhouse gas emissions
PAS 2050 (British Standards Institute, 2011a)	Specification of methods to assess greenhouse gas emissions in the life cycle of products
PAS 2060 (BSI, 2011b)	Specification that explains how to measure, reduce, and compensate for current greenhouse gas emissions
Rainforest Alliance (Rainforest Alliance, 2011)	Provides certifications for agriculture, forestry, tourism, and forest carbon that relate to products and services that are sustainable with regards to their social, economic, and environmental practices

Chapter 3: Methodology

The goal of our project was to develop a tool to help Costa Rican organizations reduce their environmental impacts in order to become carbon neutral. We created a central location of resources to assist the organizations in creating and implementing environmental management systems (EMSs) and environmental product declarations (EPDs). EMSs help organizations become more sustainable through a collection of systems and practices that reduce their environmental impact and increase their operating efficiency. On a more specific level, EPDs are used to communicate information about the environmental impact of the products of an organization to stakeholders and consumers. The use of EMSs and EPDs help organizations comply with the national standard released in September 2011 entitled "Management System to Demonstrate C-Neutrality." Small and medium-sized enterprises (SMEs) have limited resources; therefore, a central platform of information to guide them in initiating the process of meeting this standard would be beneficial. We delivered this information in the form of a website. In collaboration with our sponsor, GIZ-CYMA, we completed the following objectives to achieve this goal:

1. Collected detailed information on the national carbon neutrality standard;
2. Determined the progress of EMS and EPD development in large organizations;
3. Gathered information about useful standards and resources for SMEs; and
4. Compiled tools for SMEs based on widely accepted and used EMSs and EPDs.

3.1 Interviews

In order to compile tools for SMEs, we first gathered information on: 1) standards being followed, 2) resources being utilized, and 3) initiatives being taken to become carbon neutral. We conducted interviews with representatives of different organizations to acquire information on these topics. From our interviews, we obtained additional details on the individual practices and needs of organizations. We used semistandardized interviews because the structure permitted us to develop a set of structured questions that we could ask each individual, but it also allowed for the interviewee to elaborate on or deviate from the specific interview questions as they saw fit (Berg, 2009).

3.1.1 INTECO Interview

Recently, the Technical Standards Institute of Costa Rica (INTECO) released a national standard that defines the requirements for organizations to achieve carbon neutrality in Costa Rica. In order to gather more detailed information on the standard and the related pilot program, we interviewed a representative of INTECO. From the interview, we obtained information on the current initiatives being taken by the organizations to meet the standard. We also gathered details about the types of organizations participating in the pilot program, as well as the progress of the program and challenges encountered thus far. The complete list of topics and interview questions is provided in Appendix B. From this interview, we determined that the next step in assisting SMEs was to consult large organizations that had already begun meeting environmental standards.

3.1.2 Large Organization Interviews

In order to find the most appropriate standards, certifications, and management system practices to suggest to SMEs, we gathered and analyzed information on the current practices of large organizations. We interviewed large organizations because they generally have more resources than smaller organizations and can support the most current and advanced environmental management systems and practices. In collaboration with GIZ-CYMA, we chose five large national and multinational organizations as the interview participants. Some examples of large organizations within Costa Rica are Cerveceria Costa Rica, Dole, Dos Pinos, Florida Bebidas, INTEL, and Kolbi. In relation to their practices, we investigated the standards and certifications that the organizations relied on, the actions that the organizations were taking to evaluate their carbon footprint and environmental impacts, the programs they had in place to reduce their environmental impacts, and their interest in carbon offsets. Some of the key interview questions included:

1. Does your organization have any environmental certifications?
2. What steps have already been taken by your organization with respect to environmental management systems?
3. Has your organization already evaluated its carbon footprint?
4. Does your organization have a system or plan for reducing carbon emissions?

The complete list of interview questions is provided in Appendix C.

3.2   Research on EMS and EPD Resources

After our interviews with large organizations, we compiled additional information on environmental management resources that would be useful for SMEs, such as standards used. Through our interviews with large organizations, we compiled a list of standards and resources that these organizations utilized in the EMS development process. We further researched these documents through online searches. In order to search for these documents, we either used the title of the document or key words such as environmental, standard, certification, guideline, environmental management system, environmental product declaration, and small and medium-sized organization. Through these searches, we found full copies of some of the standards that had been mentioned in the interviews. For standards that were not available online, we used online searches to find documents and websites containing important and relevant information on the standards, including summaries of the documents by the publishing entities. When searching for resources, we focused on documents that were published by or recognized by environmental authorities such as the U.S. Environmental Protection Agency (EPA) or ISO. We searched for resources such as guides pertaining to EMSs and EPDs, as well as tools for understanding and managing the emissions of organizations. We also did an online search for case studies focusing on EMSs and EPDs. We chose to review the case studies with practices similar to our previously researched standards and resources in order to provide examples on effective uses.

3.3   Website Development

We compiled information from the national standard, interviews, and research to create a website of resources for SMEs to move towards carbon neutrality. The website includes definitions, resources, guidelines, standards, and EMS and EPD case studies. Each category of information was made into a separate page on the website. Additionally, we chose Google Sites as the platform for our website because it is user friendly and provides previously developed templates. Furthermore, the website could be easily updated by the entity responsible for the website upon the completion of our project. We created two equivalent versions of the website, one in English and one in Spanish, to ensure that the website is comprehensible to SMEs in Costa Rica. Upon completion of the website, management was given to GIZ to distribute it to SMEs at their discretion and ensure that the website information remains up-to-date.

Chapter 4: Results and Discussion

Our project goal was to create a platform of information that organizations could use as a central location of resources to help further the national goal of carbon neutrality. We used research and interviews to determine the appropriate resources, guides, and standards to provide to organizations. We evaluated which of these resources were needed by SMEs to initiate their development and implementation of environmental management systems (EMSs) and environmental product declarations (EPDs). We then synthesized the information to form the components of our website.

4.1   Definitions of Key Terms

For SMEs to develop and implement environmental management systems and environmental product declarations, they must first develop a strong foundation through an understanding of the basic concepts related to the topics of EMSs and EPDs. If they lack full understanding of each step of the process, it will affect their efficiency and success in completing the process and the comprehensiveness of their final product. Thus, we synthesized information from our research to provide SMEs with relevant background material. We developed a list of key terms comprised of the words and acronyms that are commonly used throughout EMS and EPD literature. Our list, which is provided on the *Definitions* page of the website, includes terms such as environmental management system, environmental footprint, greenhouse gas inventory, product category rule, life cycle assessment, and environmental product declaration. Our definitions of these terms can be found in the Glossary of this report, and screenshots of this webpage are included in Appendix F and Appendix G. With the definitions of the commonly used words and phrases, the website users will have a better understanding of the relevant concepts and practices that they aim to implement.

4.2   Standards and Certifications

Standards provide consistent criteria and requirements for the development and implementation of successful EMSs and EPDs. In order to provide SMEs with the standards to begin the process of developing and implementing an EMS or EPD, we first determined which standards were relevant. To do this, we compiled responses from our interviews with the five organizations and supplemented this information with knowledge from our research. There are national and international standards that relate to moving an organization towards carbon

neutrality; many organizations use one or a combination of these standards. For many of these standards, a certification is available, which is the documentation of verification of compliance with a standard. Certifications can be beneficial for marketing purposes. Other benefits associated with complying with the standards include improved efficiency of processes, reduced environmental impacts, and improved relationships with consumers (INTECO, 2009). Detailed information regarding the available standards and certifications is provided in section 2.4.

From our interviews, we determined that all five organizations followed the ISO 14000 series of standards, which reinforces the wide acceptance of these standards amongst organizations. All of the participating organizations based their environmental management systems on the ISO 14001 standard. In addition to the ISO standards, two of the participating organizations have also used the PAS 2060 standard as a guideline to help them measure, reduce, and compensate for their greenhouse gas emissions. These standards provide guidelines and requirements that relate to minimizing the environmental impacts of the organization, but they do not directly discuss carbon neutrality.

At the time of the interviews, none of the organizations had begun complying with a specific carbon neutrality standard because of the relatively recent popularity of the concept of carbon neutrality and the recent release of the INTECO carbon neutrality standard. Although the organizations had not begun complying with the INTECO standard, it is an important resource and guideline for SMEs since many of these organizations produce and sell their products within Costa Rica. In addition, this standard is currently one of the only standards that defines carbon neutrality, which makes it a useful standard for organizations to follow in their carbon neutrality process (Representative from INTECO, personal communication, November 14, 2011).

In addition to researching which standards organizations follow, we found that certifications were often available to organizations once they had complied with the standards. Four of the five interviewed organizations did not consider completing the certification process for the INTECO carbon neutrality standard since they export their products. An INTECO carbon neutrality certification would not be very beneficial for organizations that export their products in terms of marketing since the INTECO carbon neutrality standard is not yet internationally recognized. Furthermore, some organizations had obtained certifications for their EMSs. From our interviews, we determined that four of the organizations were currently certified under the ISO 14001 standard for environmental management systems. The one organization that was not

currently certified had been certified in the past. This organization continued to maintain its environmental management practices according to ISO 14001; however, it stopped the auditing process that is necessary to receive the certification due to the high cost associated with this process. In addition to the ISO 14001 certification for organizational EMSs, one organization had chosen to have some of its products certified by the Rainforest Alliance because of the marketing benefits associated with this certification. These standards and certifications are important tools for SMEs attempting to develop EMSs because of the guidance they provide.

4.3   Environmental Management Systems

An environmental management system is a program designed by an individual organization to develop environmentally conscious corporate policies and practices. Through our research and interviews, we determined that there are certain steps that can be taken to develop this system. Details on the practices related to these steps are found in a variety of resources, which are presented in the following sections.

4.3.1   Developing and Implementing an EMS

Developing an effective EMS is a complex process. Therefore, we developed a set of guidelines outlined in this section that can be used to help organizations with developing and implementing an EMS. From our interviews, we learned that it takes months and sometimes years to completely plan, develop, and implement an environmental management system. According to the Greenhouse Gas Protocol, an EMS management team should be formed before an effective environmental management system can be developed. This team often consists of a leader and team members who focus on the process of developing an EMS. The first steps this team takes include stating the goals and intentions of the organization and developing a policy on the environmental responsibility of the organization. Next, the team often establishes organizational and operational boundaries as defined in the Greenhouse Gas Protocol. Then, the process of implementing an EMS can begin (Greenhouse Gas Protocol, 2011b).

The main concept behind many environmental management systems is the three-phase approach of measuring, reducing, and compensating for emissions and resources, as demonstrated by our interviews. It is important to measure the environmental footprint of an organization before beginning reduction plans so that the organization can demonstrate the yearly decrease in its environmental footprint. In the first phase of an EMS, measurements focus

on water usage, waste production, energy consumption, and greenhouse gas emissions since they are large components of the environmental impacts of an organization. In terms of greenhouse gas emissions, completion of a greenhouse gas inventory is a logical first step. A greenhouse gas inventory involves systematically measuring the greenhouse gas emissions of the entire organization to demonstrate its environmental impact with regard to climate change. Through our interviews, we found that all five organizations had already taken this step in implementing their own EMS. Additionally, each organization had evaluated its water usage, waste production, and energy consumption. Once an organization has completed these measurements, the next phase is to reduce environmental impacts in order to improve the sustainability of the organization.

With respect to greenhouse gas emissions, the reduction phase of an environmental management system is important to an organization becoming carbon neutral. Thus, all of the organizations that we interviewed have implemented projects and programs in different aspects of their organization depending on their industry type. As an example of an industry-specific action that could be taken, manufacturing organizations can reduce their emissions through the use of more efficient and cleaner energy in their processes. Through our interviews, we found that reduction of greenhouse gas emissions is an important component of an environmental management system; however, there are other environmental impacts of an organization that should also be considered.

With respect to reducing environmental impacts other than emissions, we determined from our interviews that managing water usage, waste production, and energy consumption are important to an EMS as well. As such, all of the organizations we interviewed have implemented programs to begin to reduce these impacts. In terms of water consumption, each organization either recycles a portion of the water used in its processes or has adjusted its processes to use less water initially. Similarly, four of the organizations have recycling programs to process either the waste they create through their manufacturing processes or the general waste produced by employees and local consumers. Energy reduction is related to emission reduction since the generation and use of energy can emit greenhouse gases. Therefore, if less energy or cleaner energy is used by the organization, there will be a reduced level of greenhouse gases emitted from its energy consumption. All of the interviewed organizations had begun implementing programs to improve fuel or energy efficiency in their facilities or processes. Each of these

components is necessary in a comprehensive environmental management system; however, some of these aspects are not directly related to the carbon neutrality of an organization.

After organizations have measured and begun programs to reduce their emissions, the third phase of an EMS is to compensate for the remaining emissions in order to achieve carbon neutrality. All of the interviewed organizations either already participate or wish to participate in some form of compensation program. Currently, two of the organizations are involved with offsetting their emissions through investing in FONAFIFO to support forest areas that act as carbon sinks. Another form of compensation in which each organization expressed interest was carbon credits. Four of the participants stated that if Costa Rica had internationally verified carbon credits available, their organization would be interested in purchasing them. Carbon credits purchased by an organization must be internationally verified in order for the claim of carbon neutrality by the organization to be recognized in other countries. However, Costa Rica has yet to develop a carbon market that is globally recognized, which is one reason why many Costa Rican organizations have yet to purchase Costa Rican carbon credits. International recognition of carbon neutrality can serve as a marketing tool for the organization, which could improve the competitiveness of the organization in consumer markets.

As part of our research, we were interested in determining the motivation for organizations to implement an EMS or calculate their product footprint. The participants from all of the organizations we interviewed stated that their organizations were interested in calculating their environmental footprints for internal purposes. These purposes included implementing programs to reduce their impacts and designing their processes to have lower impacts. The participants from two of the organizations reported that their organization was also interested in measuring and reducing their environmental footprints for external purposes. These organizations were interested in attracting new consumers and retaining the interest of current consumers through the marketing of their environmental practices. The use of measurements and systems for marketing or external purposes often require a certification by a third party, such as those by ISO, the Rainforest Alliance, or INTECO. Thus, in order to effectively help organizations implement a proper EMS, it is important to understand their reasons for mitigating their environmental impacts.

In order to help organizations with the process of developing and implementing an environmental management system, we created a set of guidelines. This set of guidelines outlines

the general steps an organization should take to complete the process of EMS development. The guidelines for developing and implementing an environmental management system, as presented on our website, can be found in Appendix D. In addition, many of the more complex steps within the guidelines also provide access to supplemental resources that provide more detailed instructions.

4.3.2 Informational Resources for an EMS

Through our research, we compiled a number of resources that can help SMEs with different components of the process for developing an EMS. This process is explained in the steps contained in our guidelines. These resources include guides and standards that focus on planning, developing, and implementing successful environmental management systems. Table 4-1 provides a list of the resources that we compiled. These resources are also located on the *Resources* page of the website.

4.3.3 Examples of EMS Implementation

In addition to standards and resources, information on previously implemented EMSs can assist organizations in understanding how to properly design and implement a useful environmental management system. The EPA provides examples from various organizations in the United States private sector that present the processes used, benefits gained, and lessons learned from each of these cases. A link to these case studies is provided on the *EMS and EPD Examples* page of the website. Three organizations that demonstrated good practices, according to the EPA, were CSX Corporation, Louisiana Pacific, and Mott's Aspers Plant.

CSX Corporation is a transportation company stationed in Jacksonville, Florida. After joining the Responsible Care Program in 1997, the company developed an EMS. The environmental management system of this organization focuses on recycling and reusing many of its resources. Some of these resources include batteries, oil, cross ties, locomotives, rail cars, rails, paper, and aluminum. According to the EPA, the system of CSX Corporation is successful not only because of its recycling projects, but also because it has a well-designed management system. This system includes setting goals and objectives along with annually evaluating its EMS for compliance with their corporate environmental policy. This organization is constantly looking for ways to improve its EMS and has won many awards from the EPA for its efforts (EPA, 2011c).

Table 4- 1. Resources for EMS Development

Resource		Description
EPA - Environmental Management System PDCA Model – Plan (EPA, 2011b)		Provides a Plan, Do, Check, Act Model Plan that discusses the steps of developing and implementing an EMS; provides links to How to Develop an EMS, Costs & Benefits, and Frequent Questions
EPA – Environmental Management System: An Implementation Guide for Small and Medium-Sized Organizations (EPA, 2011b)		Outlines aspects pertaining to an EMS – its importance, key concepts for its development, beginning steps for its planning, all of the elements that should be included, and a step-by-step guide for its development
ISO 14001 Standard (ISO, 2011b)		Outlines the specifications for the development of a successful and implementable EMS
ISO 14001 Environmental Management Systems – An easy-to-use checklist for small businesses – Are you ready? (ISO, 2011l)		Provides a sixteen part checklist that helps organizations understand and incorporate each aspect of the ISO 14001 standard; helps organizations identify areas for improvement
Understanding and Implementing an Environmental Management System: A Step-by-Step Guide for Small and Medium-Sized Organizations (Department of Environmental Conservation, 2011)	Step 1: The Basics	Helps organizations to understand and integrate environmental problems into organizational level decision making and learn about possible benefits of developing an EMS
	Step 2: EMS Development and Implementation Guide	Helps organizations to begin the process before the actual EMS is designed (ie. developing an EMS team, developing an EMS manual, planning and implementing the EMS)
	Step 3: EMS Template	Provides a template for documentation of an effective EMS and states that Step 1 and parts of Step 2 must be thoroughly understood before using this template
Documentation on emission metrics	IPCC Industry Averages (IPCC, 2011)	Provides global averages of emission factors from a variety of common activities
	National Averages (IMN, 2009)	Provides national averages of emission factors from a variety of common activities in Costa Rica; published by the Instituto Meteorológico, a division of MINAE
Greenhouse Gas Protocol (Greenhouse Gas Protocol, 2011)	Standards	Provides requirements for complying with the Greenhouse Gas Protocol regulations
	Calculation Tools	Provides spreadsheets and documents for effectively calculating greenhouse gas emissions

Louisiana Pacific is a supplier of building materials, and it has developed an environmental management system in order to minimize the negative effects of its pollution on the environment. Its system focuses on evaluating sources of pollution and determining solutions to reduce pollution from these sources. Louisiana Pacific has also developed programs related to waste and water reduction and recycling. The EMS of this organization was deemed successful by the EPA because of the proper management of the EMS and the appropriate training of personnel according to an unplanned inspection from the EPA (EPA, 2011d).

Mott's Aspers Plant from Aspers, Pennsylvania produces and packages apple juice, applesauce, and other beverages. This organization spent eighteen months developing an environmental management system that evaluated the environmental impacts of its processes and then developed programs to counteract the negative impacts. In order to evaluate which processes were most harmful to the environment, the organization developed a team, performed a site assessment, and determined which processes caused the most negative environmental effects. From this analysis, Mott's Aspers Plant determined that solid waste and water were the biggest contributors to its negative environmental impacts. Therefore, this organization devised reduction and recycling programs to lessen these impacts (EPA, 2011e).

4.3.4   EMSs: Conclusion

Guidelines, resources, and case studies provide SMEs with the relevant knowledge to develop their own environmental management systems. Although we have provided the necessary means, the SMEs still need to develop their own EMS team and budget the required funds to support the implementation of an EMS within their organizations. After an organization develops its EMS and meets the INTECO carbon neutrality standard, it could be certified by a third party verifier as a carbon neutral organization. Once an organization is certified as carbon neutral, it could use the brand "Made C-Neutral in Costa Rica" on its products, even though individual products may not be carbon neutral.

4.4   Environmental Product Declarations

While environmental management systems apply to organizations as a whole, environmental product declarations apply only to individual products. However, EPDs can be helpful to the assessment of the environmental impacts of organizations as well. Prior to developing an EPD, there are tasks that must be completed, such as the development of product

category rules (PCRs) and the completion of a life cycle assessment (LCA) (International EPD Cooperation, 2008b). The resulting EPD could be used to help organizations assess the environmental footprint of each of their products. This could potentially lead to the design or adjustment of their manufacturing processes to reduce the environmental effects of their product. Therefore, EPDs can be a helpful tool for SMEs to use on a product level, which could ultimately help with the evaluation of the organization as a whole.

4.4.1 Developing and Implementing an EPD

We were interested in determining how much progress the large organizations had made towards creating EPDs so that we could better help SMEs. From the information we gathered, we developed a set of guidelines outlined in the following paragraph that can be used to help organizations with developing and implementing EPDs. From the interviews, we determined that different organizations were approaching the implementation process in different ways and at different paces. Only two of the organizations had evaluated the environmental footprints of at least one of their products. This is partially because it is common to implement an EMS on an organizational level before individual products are addressed. Organizations that are beginning to implement an EMS generally focus on aspects of a product life cycle over which they have operational control. This means that the organization can control the process or choose the vendor for a service, such as transportation. Therefore, during EMS implementation, organizations do not include aspects over which they have no operational control, such as how much energy their suppliers consume. However, since these components are only a part of the LCA necessary to create an EPD, most organizations have yet to sufficiently extend their assessments to create EPDs.

To assist organizations with producing a complete EPD, we developed a set of guidelines for creating the document. First, product category rules need to be developed in order to evaluate which parts of the product life cycle should be included in the life cycle assessment. While completing the LCA, there are different parts of the product life cycle that must be examined, such as the materials used, how the product is transported, the amount of energy consumed, and the emissions from the production process (International EPD Cooperation, 2008b). Furthermore, additional data must be collected to include in the EPD, such as the EPD program and its operator's contact information, PCR identification, product description, environmental and human health effects of materials used, and the organization developing the declaration

(ISO, 2006). Finally, the document can be developed and verified by an independent verification body. EPDs should be updated as specified in the standards in order to maintain their validity. For a more comprehensive list of the steps necessary to create an EPD, refer to Appendix E. These guidelines are available on the *Steps Towards Implementation* page of the website, which SMEs may use to create their EPDs.

4.4.2   Informational Resources for an EPD

Many resources are available to assist organizations with the process of producing EPDs. In the beginning stages of using PCRs and LCAs, organizations could access information from the International EPD System and GEDnet. Further details on these EPD programs are discussed in section 4.4.3. However, there are instances in which organizations may be unable to generate a complete LCA due to the complexity of the related calculations and measurements as well as the lack of data available for certain aspects of the life cycle. From our interviews, we found that organizations can only calculate some of their emissions from direct measurements, such as the amount of fuel used by their trucks or the amount of electricity that is consumed by their facility. For sources of emissions that cannot be directly measured throughout the product life cycle, organizations must rely on the averages and estimates of emission factors, such as those referenced in Table 4-1. Additionally, there is a lack of information related to product use and disposal in Costa Rica, which poses a challenge for Costa Rican organizations in their creation of EPDs. However, sources such as the emission factors from the Instituto Meteorológico can help to address this issue by improving the accuracy of the calculations associated with the assessment of the product life cycle (IMN, 2009). In the final stage of developing the actual EPD, the documents from the International EPD System and ISO 14025 are appropriate references to help organizations understand the best formats for communicating the LCA data. These references, which can be found on the *Standards and Certifications* and *EPD and EMS Examples* pages of the website, can be helpful for organizations that are conducting the necessary steps for completing an EPD for a product.

4.4.3   Examples of EPD Implementation

In order to supply SMEs with examples of how environmental product declarations had been previously implemented, we researched case studies of EPDs in other countries. Due to the nearly universal acceptance of ISO standards, all of the EPD examples that we found were based

on the ISO 14025 standard for EPD creation. Therefore, we determined through our research that there were few differences in the fundamental formats of EPDs. The differences found in the EPDs themselves were related to the specific industry, product, organization, or implementation of the EPD. The differences related to the industry or product type are accounted for by PCRs, which must be developed, extensively reviewed, and verified. Differences in the implementation of EPDs are generally due to the EPD programs that produce the documents.

There are multiple EPD programs that exist in other countries that could provide insight into EPD implementation and serve as examples for Costa Rican organizations. Successful programs that have gained wide acceptance among industries and consumers include the Swedish Environmental Management Council's International EPD System, the Japanese Environmental Management Association for Industry's Eco Leaf program, and the Global Environmental Declaration Network. All of these resources are frequently referenced throughout numerous articles we encountered during our literature review (Manzini, 2006; Lee, 2001; Rebitzer, 2004; Zackrisson, 2008).

The Swedish Environmental Management Council developed the International EPD System in 1998, which has since become a forerunner in the development and organization of environmental product declarations. Numerous organizations around the globe have become members of the International EPD System, which provides a centralized and widely used model for other environmental product declaration programs. This program has been effective due in part to its attentiveness to the needs of the markets that it serves, as well as its compliance with international standards and its widely accepted communication system (The Swedish Environmental Management Council, 2011; International EPD Cooperation, 2008b). The extensive information provided in the documentation of this program could be helpful to Costa Rican organizations that aim to use EPDs.

Another international example of an EPD program that provides awareness of potential methods for improving the communication of EPDs is Japan's EcoLeaf Program. The Japanese Environmental Management Association for Industry, in collaboration with Japan's Ministry of Economy, Trade, and Industry, developed the EcoLeaf Program in 2002 (Japanese Environmental Management Association for Industry, 2003). The EcoLeaf Program has a unique approach to the presentation of the EPD results: they are presented in three different formats. Each format of information presentation targets a different audience. The *Product Data Sheet*

(PDS) displays all of the raw data that have been collected, which are then used as input to complete the life cycle assessment. The *Product Environmental Information Data Sheet* (PEIDS) presents the results of the LCA based on the information from the PDS. The *Product Environmental Aspects Declaration* (PEAD) gives simplified information from the PEIDS demonstrating the main environmental impacts of the product. These three formats allow people with different levels of expertise in environmental management to obtain the information that they need. Once the EPD for a product has been verified, the product is issued an EcoLeaf registration number, which allows the consumer to retrieve any format of data sheet from EcoLeaf's online database (JEMAI, 2003; JEMAI, 2002). The EcoLeaf Program provides an example of one solution to the challenge of communicating information through EPDs.

Finally, the Global (Type III) Environmental Declaration Network (GEDnet) is one system that provides a way for environmental product declaration programs to share information regarding their best practices. The GEDnet includes members from Japan, Canada, Germany, Norway, Denmark, South Korea, Italy, and Sweden. One of the advantages of participating in a larger network of organizations that are working towards implementing EPDs is the access to shared information. The organizations compile libraries and databases of PCRs, which is an important step in the development of EPDs. The GEDnet has accumulated an extensive library of verified PCRs. The analysis required to determine the appropriate PCRs for a new product category can be expensive (GEDnet, 2011; Manzini, 2006). Therefore, if Costa Rican organizations can take advantage of previously accepted Product Category Rules, the cost of implementing EPDs would decrease. These EPD programs, found on the *EMS and EPD Examples* page of the website, can provide knowledge and insight for Costa Rican organizations that are interested in implementing EPDs within their own organizations.

4.4.4 EPDs: Conclusion

Through the utilization of the guidelines, resources, and case studies outlined above, organizations can develop and implement their own EPDs. An EPD will allow organizations to track their environmental footprint on the product level and communicate these data to consumers and stakeholders. The analysis of the products could lead to an evaluation of their processes in order to improve the environmental practices of the organization as a whole. As a tool to help fulfill their environmental responsibility, organizations could utilize our website to create their EPDs and EMSs.

4.5   Components of the Website

Our final product was a website that contained resources, contact information, and guidelines for small and medium-sized enterprises in order to help SMEs develop and implement EMSs and EPDs. The blue and green color scheme of this website was chosen to reflect the countryside of Costa Rica as a demonstration of the environment that organizations are working to protect. A picture of the countryside is shown on the banner on all of the webpages. Screenshots of our webpages can be found in Appendix F and Appendix G. A navigation bar is located on the left side of the website for ease of access to the different pages. The website contains the following pages: *Home, Definitions, Steps Towards Implementation, Resources, Standards and Certifications, EMS and EPD Examples, Local Environmental Authorities,* and *About the Website Creators*. There is also a link located at the bottom of the website that allows the users to switch between the English and Spanish versions of the website.

The website pages were separated based on the topic that they cover. All of the headers on the website pages that refer to other online resources are attached to the hyperlink that directs users to the online resource. Table 4-2 lists and describes each page of the website.

4.6   Conclusion

Through our research and interviews, we compiled information about the current standards, certifications, and environmental management practices of organizations in Costa Rica. We supplemented this information with additional resources to create a website containing information, resources, and guidelines for SMEs interested in developing and implementing EMSs and EPDs. Our website aimed to assist organizations with the process of becoming carbon neutral.

Table 4- 2. Website Pages

Webpage	Description
Home	Introduces users to the purpose, goal, and benefits of the website
Definitions	Discusses the definitions and acronyms that provide basic knowledge of the materials within the webpages (discussed in section 4.1)
Steps Towards Implementation	Provides the sets of guidelines we created for developing and implementing EMSs and EPDs (discussed in sections 4.3.1 and 4.4.1)
Resources	Provides resources that organizations can follow for EMS and EPD development (discussed in sections 4.3.2 and 4.4.2)
Standards and Certifications	Provides relevant standards and certifications that organizations can comply with for EMS and EPD creation (discussed in Table 2-1)
EMS and EPD Examples	Provides access to case studies focusing on examples of both EMSs and EPDs (discussed in sections 4.3.3 and 4.4.3)
Local and Environmental Authorities	Provides contact information of organizations and personnel in Costa Rica who are able to assist SMEs with becoming carbon neutral
About the Website Creators	Provides information about where we study, what we are studying, why we created the website, and the entity responsible for maintaining the website

Chapter 5: Recommendations and Conclusions

The goal of our project was to create a central location for information and resources in order to help small and medium-sized enterprises with the process of becoming carbon neutral. Through research and interviews, we gathered information on the necessary resources to provide to SMEs. We developed a set of guidelines to assist SMEs in taking steps towards implementing and developing EMSs and EPDs. Also, we found resources, including standards, certifications, guides, and calculation tools, that organizations could utilize to assist them with the process of becoming carbon neutral. We determined that a website containing these findings could be an effective method of communicating this information to SMEs.

There were different options for providing information to SMEs, such as a printed manual or a website. One benefit of a printed manual is that there would be no technical issues with accessing the manual. However, there are several limitations with a printed manual. First, updating the manual would be more challenging because it would need to be reprinted with each revision. Not only is this time consuming and expensive, it is also not environmentally friendly. Additionally, the manual would not be easily accessible and would be difficult to distribute, as the manual would have to be purchased or obtained from a particular source. In contrast, a website would be more easily accessible for SMEs than a manual. A website would provide direct access to resources and documents through links, and it would be easy to update with current information. Therefore, we concluded that the most effective method for relaying information was through a website containing all of the relevant components for the organizations to use.

The website we created will remain useful only if it has relevant and recent information. To help ensure that the website remains useful for SMEs, we provided our sponsor, GIZ-CYMA, with access to update and maintain the website. One possible way for GIZ-CYMA to keep the website up-to-date in the long term is to collaborate with larger organizations who are working with EMSs and EPDs. Through this collaboration, GIZ-CYMA could update the website with information obtained from organizations about the processes and practices they have found to be successful.

The website we provided to SMEs covers many of the available resources; however, it is not exhaustive because there is a vast amount of information available. Based on the results of our study, we believe that the website provides useful information to assist SMEs with their

efforts to develop and implement environmental management systems and environmental product declarations. Future research should consider conducting a study in which SMEs evaluate the website on aspects such as whether the resources provided are comprehensive, the content is understandable, the information is up-to-date, and the website is user friendly. This study would help to ensure that the website meets the needs of the SMEs that it is intended for.

5.1 Future Directions

In addition to website resources, another important step to help organizations move towards carbon neutrality could be the training of organizations. According to Sammalisto and Brorson (2008), training is important to the effectiveness of implementing an environmental management system. This study shows that training is not only important to the implementation process, but also to the attitude of the supervisors and workers involved. Furthermore, through the training about EMSs, the participants developed an increased understanding of current environmental issues (Sammalisto & Brorson, 2008).

In Costa Rica, training could begin at the organizational level; representatives from organizations could be taught about responsible environmental practices and how to begin the implementation of an environmental management system (INTECO, 2009). INTECO has planned such a training session at the organizational level on the Greenhouse Gas Protocol. In January of 2012, representatives from the World Resources Institute will be in Costa Rica to train representatives from more than thirty organizations (Representative from INTECO, personal communication, November 14, 2011). The next step is to train organizations on how to achieve carbon neutrality and minimize environmental footprints on the product level. This training could focus on topics such as environmental product declarations, life cycle assessments, and product category rules. Training could be implemented through conferences, informational sessions, and online training tools. The purpose of these training sessions would be to help organizations gain the knowledge and understanding necessary to achieve organizational and product level carbon neutrality in Costa Rica.

Additionally, there is potential for future research to be completed in relation to the feasibility of the "Made C-Neutral in Costa Rica" brand (Dobles, 2008). One relevant issue is whether Costa Rican consumers would buy products with the brand. According to Leire and Thidell (2004), consumers' opinions and knowledge of product-related environmental information can greatly affect the success of labeling schemes, such as the one proposed in Costa

Rica. Therefore, studies could be conducted in Costa Rica to determine whether consumers are interested in environmentally friendly products, whether they would understand the credibility of the brand, and if they would be willing to pay more for products that have a C-Neutral brand. These topics will affect the level of interest of the organizations with regard to the carbon neutrality certification. If it is not profitable for organizations to become certified and obtain this brand, it could limit the amount of resources the organization is willing to use to develop and implement EMSs and EPDs. Therefore, these studies would help organizations make informed decisions regarding the carbon neutrality certification. Participation in the national carbon neutrality certification by organizations is important to Costa Rica becoming carbon neutral by 2021.

5.2 Conclusion

In conclusion, we aimed to assist with the carbon neutrality goal of Costa Rica. To do so, we created a website that provides a central platform of information to help small and medium-sized enterprises join large organizations in the goal of reaching net zero carbon emissions. With information in a central location, it will be easier for SMEs to access resources in order to initiate their process of meeting the INTECO carbon neutrality standard. By following the steps outlined in the EMS and EPD guidelines, organizations will be able to move towards becoming carbon neutral. As more organizations begin meeting the carbon neutrality requirements, Costa Rica will hopefully be able to move closer to its national goal of becoming the first carbon neutral nation by 2021.

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Appendix A: Descriptions of Standards and Certifications

The International Organization for Standardization (ISO), which releases numerous standards regarding different aspects of manufacturing and industry, is an essential resource for standards worldwide (ISO, 2011a). Specifically, the ISO 14000 series of standards are those applicable to environmental management. The ISO 14001 standard gives detailed requirements for the development and implementation of an environmental management system (ISO, 2011b). The ISO 14040 standard and ISO 14044 standard contain the information for evaluating the total environmental impact of a product or service through assessment of its actual and potential impact during its complete production life, from raw material acquisition to manufacturing and transportation (ISO, 2011g; ISO 2011h). These data can be used to help organizations design products with reduced environmental impacts, or they can be incorporated into programs and claims such as eco-labeling and environmental product declarations (ISO, 2011c).

Within the ISO 14000 environmental standards, the procedures and requirements for different types of environmental labeling are outlined in the ISO 14020 series of standards. Basic guidelines are given in the ISO 14020 standard; these guidelines encompass nine general principles regarding environmental claims and labeling (ISO, 2011c). There are also details provided that relate to the three types of labeling:

1. Type I: Developed by a third party; discussed in ISO 14024 which serves as a guide for gaining a seal of approval for the product (ISO, 2011e);
2. Type II: Developed by the producer for its goods and services; discussed in ISO 14021 (ISO, 2011d); and
3. Type III: Developed by the producer, is third party verified, and covers a full life cycle assessment; discussed in ISO 14025, which outlines the formatting and technical aspects of the creation of labels (ISO, 2011f).

Products may have multiple declarations from different organizations depending on the criteria used in the evaluation of the product. Using these assessments, information can be gathered that assists not only the government, but also the manufacturers and industries that market these products and regulate their impacts. EPDs are an essential part of national standards that help to regulate environmental footprints. To ensure that there is a standard procedure for environmental claims, ISO 14020 provides the standard terms and symbols to be used. In all of

the ISO documents, it is stressed that the claims should contain "accurate, verifiable, and relevant information" (ISO, 2011c).

The ISO 14064 standard (Parts 1, 2, and 3) presents tools designed to supply resources for reducing and trading greenhouse gas emissions. This standard provides requirements and guidelines for organizational and product level greenhouse gas inventories and reporting, as well as for the verification of these data. The ISO 14064 standard used the Corporate Standard of the Greenhouse Gas Protocol as its foundation (ISO, 2011i; ISO, 2011j; ISO, 2011k). The Greenhouse Gas Protocol, which first began in 2001, is used across the world to assist with completing greenhouse gas inventories. This program is the result of the collaboration between the World Resources Institute and the World Business Council for Sustainable Development. The Greenhouse Gas Protocol provides governmental and organizational leaders with a tool for comprehending and controlling their greenhouse gas emissions. This protocol involves multiple standards on both the corporate and product level, providing resources for mitigating climate change in different stages (GHG Protocol, 2011a).

In greenhouse gas inventories, including those described in ISO documents and Greenhouse Gas Protocol standards, there are three required scopes that help organizations assess and reduce their emissions. The first of these scopes involves the organization directly, because it is based on its own processes, which the organization can fully regulate. The second scope is indirectly related to the individual organization, because it involves energy used by the organization, which is produced by an outside vendor. Finally, the third scope is also indirectly related to the organization, because it involves the aspects of the product life cycle after the product leaves the organization, such as transportation, usage, and disposal. These indirect emissions are often difficult to quantify, but they must be estimated, in addition to calculating direct emissions, in order to approximate the total amount of greenhouse gases that the product life cycle is generating. These three scopes are important to understand, because they are discussed in many standards regarding organizational environmental footprints (ENCC, 2007; GHG Protocol, 2011a).

One international specification that is already being used by some organizations to assess greenhouse gas emissions in the life cycle of products is known as Publicly Available Specification (PAS) 2050. PAS 2050 was published by the British Standards Institute and was revised in 2011. It helps organizations create a method to assess the greenhouse gas emissions

during the life cycle of their products, including raw materials, manufacturing process, transportation, and distribution. PAS 2050 also identifies energy and cost saving points in the life cycle of the product being assessed. Furthermore, it helps organizations plan how to reduce emissions and report their plan and assessment in a responsible manner (BSI, 2011a). PAS 2060 is another specification published by the British Standards Institute that has been used by some organizations in Costa Rica. It explains how to measure, reduce, and offset current greenhouse gas emissions (BSI, 2011b). However, PAS 2060 does not follow the emissions throughout the life cycle of products as accurately as PAS 2050. For this reason, PAS 2050 is the preferred specification for organizations since the latest revisions have increased its accuracy and application feasibility (BSI, 2011a).

For many of the relevant standards, certifications are available to demonstrate the compliance of an organization. Other than the certifications for the previously addressed standards, other specialized certifications are also available. One such certification is through the Rainforest Alliance. This certification is available for agriculture, forestry, tourism, and forest carbon products and services. The certification demonstrates the social, economic, and environmental sustainability of the product or service. Organizations can apply to be certified by the Rainforest Alliance, which serves as a third party verifier. In a manner similar to other certification processes, the Rainforest Alliance has trained specialists who audit the organization and review the information to determine whether the organization complies with the necessary standards. If the organization meets the requirements, it is granted the seal of the Rainforest Alliance, which can be used on the certified products (Visser, 2007; Rainforest Alliance, 2011). Since these standards and certification are the basis for many EMSs and EPDs, it is important to assist organizations with understanding them as a part of the resource we provide.

Appendix B: Interview Questions - INTECO

1. Review of project goal
   a. Collaboration with GIZ
   b. Project focus/goal
      i. What we're using INTECO standards and pilot program information for: how organizations can meet standard
      ii. Create guideline for developing environmental product declarations (EPDs) for products for small and medium-sized enterprises (SMEs)
2. Details of the pilot program
   a. Requirements from companies participating in pilot program
   b. Reasons companies are participating
3. Is there any documentation that you could share with us?
   a. Guidelines for the pilot program
   b. Participating organizations
4. What is the progress of the pilot program?
   a. Current initiatives already being done by organizations to meet standards
   b. Challenges from organizations
   c. Comparison of perspectives from small, medium, and large organizations
5. Aspects of program that we could assist with?
   a. EPDs
   b. Platform of information

Appendix C: Interview Questions - Large Organizations

The standardized questions that we addressed in the interviews consisted of the following:

1. Does your organization have any ISO certifications? / Does your organization have any other type(s) of environmental certification?

2. What steps have already been taken by your organization with respect to environmental management systems?

3. Are you familiar with the newly released INTECO standard, "Management System to Demonstrate C-Neutrality. Requirements."?

4. Did your organization request to participate in INTECO's new pilot program?

5. Has your organization already evaluated its carbon footprint? Does your organization have systems in place to continuously or annually measure carbon emissions?
   a. If so, what systems of measurement have your organization utilized?
   b. Which have been found to be the most accurate and feasible?

6. Does your organization have a system or plan for reducing carbon emissions?
   a. For remaining emissions, does your organization have a plan for participating in carbon markets or utilizing carbon offsets?

7. Based on Table 2-1, what stage would you say your organization is currently in?

8. Which components of the product life cycle are included in the measurement systems of your organization?

9. Does your organization plan on using EPDs more for internal purposes (managing and tracking environmental impacts) or external purposes (marketing)?

10. Do you have any additional comments or information on this topic that we should know?

Appendix D: Guidelines for Developing and Implementing an EMS

- Create a corporate environmental policy for the organization
    - Create an environmental management team
    - Clearly state the goals and intentions of the organization
    - State the policy on environmental responsibility of the organization
- Establish organizational and operational boundaries (see GHG Protocol for instructions on defining the operational boundary of the organization based on equity share, operational control, and financial control)
- Complete greenhouse gas inventory
    - Direct calculations/measurements (i.e. fuel consumption - how many liters of fuel do the vehicles consume; energy consumption - direct measurement from electricity meter)
    - For sources that cannot be directly measured, calculate emissions through the use of emission factors
        - Industry averages from the IPCC (Intergovernmental Panel on Climate Change, 2011)
        - National averages from MINAE (Instituto Meteorológico Nacional, 2011)
    - Resources: GHG Protocol
        - Corporate standard (Greenhouse Gas Protocol, 2011b)
        - All standards (GHG Protocol, 2011a)
        - Calculation tools (GHG Protocol, 2011a)
- Evaluate greenhouse gas inventory and develop a program to reduce emissions
- Measure
    - Water used
    - Waste produced
    - Raw materials used
    - Energy consumed
- Eco-design processes to help reduce impacts
- Compensate remaining emissions
    - Carbon offsets and carbon credits
    - FONAFIFO (Fondo Nacional de Financiamiento Forestal, 2011)

Appendix E: Guidelines for Developing and Implementing an EPD

- Develop or use product category rules (PCRs) for the products of the organization to help determine which parts of the product life cycle should be included in the life cycle assessment (LCA)
    - International EPD System (International EPD Cooperation, 2008a)
    - GEDnet (2011)
- Complete life cycle assessment of product
    - Consider material use, transportation, energy consumption, production process emissions, in addition to other aspects
- Collect additional data necessary for the EPD
    - Organization making the declaration
    - Product description and identification
    - Specification of materials and their potential environmental and human health effects
    - Program and its operator's contact information
    - PCR identification
- Develop an EPD
    - Refer to International EPD System (International EPD Cooperation, 2008a)
    - Follow ISO 14025 (ISO, 2006)
- Have EPD verified by a third party
- Update EPD as necessary to maintain validity

Appendix F: Website Screenshots – English

Website URL – English: https://sites.google.com/site/environmentmanagementresource/
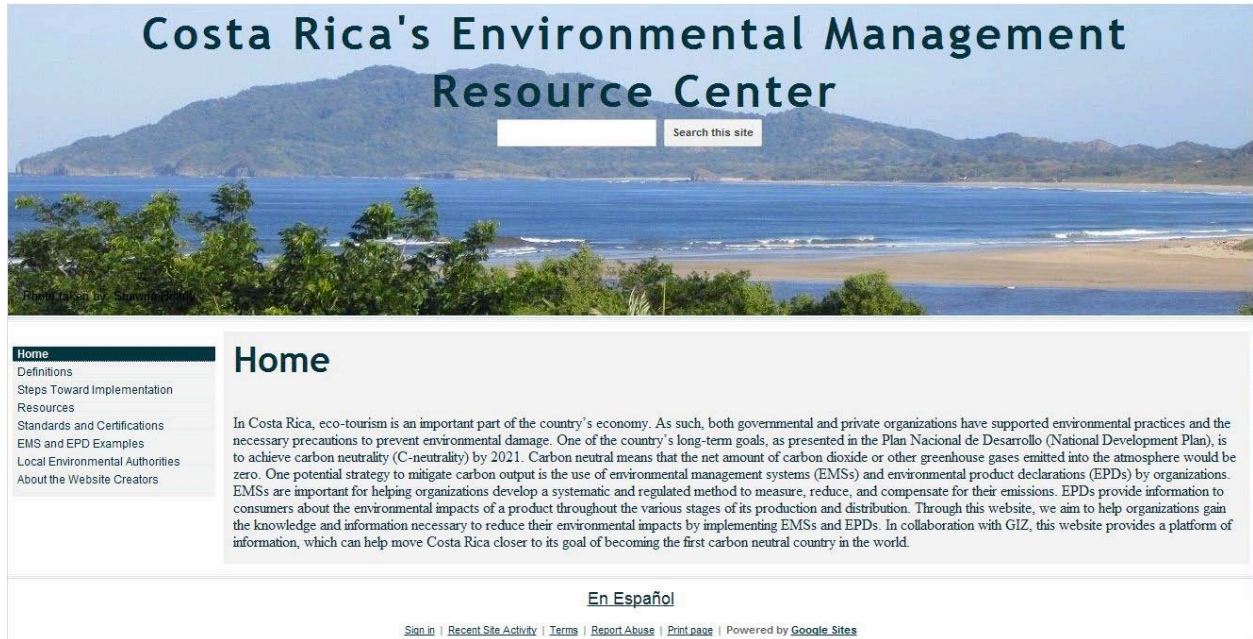
Figure F- 1. Homepage – English

Costa Rica's Environmental Management Resource Center

Search this site

Photo taken by: Shawna Brady

Home
Definitions
Steps Toward Implementation
Resources
Standards and Certifications
EMS and EPD Examples
Local Environmental Authorities
About the Website Creators

Definitions

Costa Rica Ministry of the Environment and Energy (**MINAE**) – The government organization that formed the ENCC and that performs environmental services including management of national parks

Environmental Management System (**EMS**) - The collection of processes and practices that enables an organization to reduce their environmental impact and increase their operating efficiency

Environmental Product Declaration (**EPD**) - A document that provides information to consumers about the product's environmental impacts from 'cradle to grave' as analyzed by a life cycle assessment

Greenhouse Gases (**GHG**) - A gas that absorbs and emits radiation through the infrared spectrum and contributes to the greenhouse gas effect

Greenhouse Gas Inventory - A systematic approach used by organizations to calculate their total greenhouse gas emissions

Green-washing – A term used when an organization or product appears to be environmentally friendly without substantial evidence

International Organization for Standardization (**ISO**) – An organization that publishes internationally approved standards regarding manufacturing and industry

Life Cycle Assessment (**LCA**) – The analysis of a product, from production to disposal, based on its environmental impact

National Strategy on Climate Change (**ENCC**) - A plan designed by the government organization of MINEA to outline the Costa Rican national goal of carbon neutrality by 2021 (only available in Spanish) (summary PDF in English)

Product Category Rules (**PCR**) - A set of rules based on the type of product which define the criteria included in an LCA or EPD

En Español

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Figure F- 2. Definitions – English

Photo taken by Shawne Brady

Steps Toward Implementation

These guidelines outline the general steps an organization could take to begin to plan and implement an EMS or EPD.

EMS Implementation Steps:

- Create a corporate environmental policy for the organization
  - Create an environmental management team
  - Clearly state the goals and intentions of the organization
  - State the policy on environmental responsibility of the organization
- Establish organizational and operational boundaries (see GHG Protocol for instructions on defining the operational boundary of the organization based on equity share, operational control, and financial control)
- Complete greenhouse gas inventory
  - Direct calculations/measurements (i.e. fuel consumption - how many liters of fuel do the vehicles consume; energy consumption - direct measurement from electricity meter)
  - For sources that cannot be directly measured, calculate emissions through the use of emission factors
    - Industry averages from the IPCC
    - National averages from MINAE (Spanish only)
  - Resources: GHG Protocol
    - Corporate Protocol Standard
    - Corporate Protocol Standard (PDF)
    - All GHG Protocol Standards
    - Calculation tools
- Evaluate greenhouse gas inventory and develop a program to reduce emissions
- Measure
  - Water used
  - Waste produced
  - Raw materials used
  - Energy used (that hasn't already been measured using the GHG Protocol)
- Eco-design processes to help reduce impacts
- Compensate remaining emissions
  - Carbon offsets
  - Carbon credits
  - FONAFIFO

EPD Implementation Steps:

- Develop or use product category rules (PCRs) for the products of the organization to help determine which parts of the product life cycle should be included in the life cycle assessment (LCA)
- Develop or use product category rules (PCRs) for the products of the organization to help determine which parts of the product life cycle should be included in the life cycle assessment (LCA)
  - International EPD System
  - GEDnet
- Complete life cycle assessment of product
  - Consider materials used, transportation, energy consumption, production process emissions, in addition to other aspects
- Collect additional data necessary for the EPD
  - Organization making the declaration
  - Product description and identification
  - Materials specification with its potential environmental and human health effects
  - Program and its operator's contact information
  - PCR identification
- Develop an EPD
  - Refer to International EPD System
  - Follow ISO 14025
- Have EPD verified by a third party
- Update EPD as necessary to maintain validity

En Español

Figure F- 3. Steps Towards Implementation – English

Costa Rica's Environmental Management Resource Center

Resources

- **GEDnet**
  The Global (Type III) Environmental Declaration Network, is a system that provides a way for EPD programs to share information regarding their best practices. GEDnet has an extensive library of verified PCRs, which valuable examples for organizations who are making their own EPDs.

- **ISO 14001 Environmental Management Systems - An easy-to-use checklist for small businesses - Are you ready?**
  Provides a sixteen part checklist that helps organizations understand and incorporate each aspect of the ISO 14001 standard; helps organizations identify areas for improvement.

- **New York State (USA) Department of Environmental Conservation**
  Understanding and Implementing an Environmental Management System: A Step-by-Step Guide for Small and Medium-Sized Organizations
  - **Step 1: The Basics**
    Helps organizations to understand and integrate environmental problems into organizational level decision making and learn about possible benefits of developing an EMS
  - **Step 2: EMS Development and Implementation Guide** Helps organizations to begin the process before the actual environmental management system is designed (ie. developing an EMS team, developing an EMS manual, planning and implementing the EMS)
  - **Step 2: EMS Development and Implementation Guide** Helps organizations to begin the process before the actual environmental management system is designed (ie. developing an EMS team, developing an EMS manual, planning and implementing the EMS)
  - **Step 3: EMS Template** Provides a template for documentation of an effective EMS and states that Step 1 and parts of Step 2 must be thoroughly understood before using this template

- **U.S. Environmental Protection Agency (EPA)**
  - **EMS Information**
    Provides a Plan, Do, Check, Act Model Plan that discusses the steps of developing and implementing an EMS; provides links to How to Develop and EMS, Costs & Benefits, and Frequent Questions
  - **Introduction to EMS Training** Online training tool for anyone who wants an overview of EMS
  - **Business Advantages of an EMS** Information on how and why an EMS could benefit your business
  - **An Implementation Guide for Small and Medium-Sized Organizations** Outlines the importance of an EMS, key concepts for developing an EMS, beginning steps of planning an EMS, all of the elements that should be included in an EMS, and a step by step guide for complete development of an effective EMS
- **Industry averages from the Intergovernmental Panel on Climate Change (IPCC)**
  Provides global averages of emission factors of greenhouse gases from a variety of common activities

- **National averages from the National Meteorological Institute (IMN)** (Spanish only)
  This PDF provides the national averages of emission factors of greenhouse gases for the emitting sectors in Costa Rica: Energy, Industrial processes, Agriculture, forestry and other land uses, and Waste

- **Greenhouse Gas Protocol**
  An international accounting tool to understand, quantify, and manage greenhouse gas emissions.
  - **Corporate Protocol Standard**
  - **Corporate Protocol Standard** (PDF)
  - **All GHG Protocol Standards**
    Provides requirements for complying with the Greenhouse Gas Protocol regulations
  - **Calculation tools**
    Provides spreadsheets and documents for effectively calculating greenhouse gas emissions
  - **Management Institute**
    Online training on the principles, concepts, and management techniques to credibly and accurately account for greenhouse gas emissions, as well as a location for networking and professionalizing.

En Español

Figure F- 4. Resources – English

Standards and Certifications

ISO 14001
Outlines the specifications for the development of a successful and implementable environmental management system

ISO 14020
Outlines the procedures and requirements for different types of environmental labeling; basic guidelines given that encompass nine general principles regarding environmental claims and labeling

ISO 14021
Outlines the process of developing self-declarations of environmental practices or products; includes type II label, which are developed by the producer for their goods and services

ISO 14024
Serves as a guide for gaining a seal of approval for a product; includes type I labels, which are developed by a third party

ISO 14025
Outlines the formatting and technical aspects of the creation of labels; includes type III labels, which are developed by the producer and third party verified and cover a full life cycle assessment

ISO 14040
Provides the principles and framework needed to complete a life cycle assessment for a product; defines the phases of an LCA

ISO 14044
Provides the requirements and guidelines for the completion of the LCA of a product

ISO 14064
Provides resources for reducing greenhouse gas emissions and trading carbon credits

Greenhouse Gas Protocol
Collaboration of World Resources Institute and the World Business Class for Sustainable Development; provides a tool for comprehending and controlling greenhouse gas emissions

- **Corporate Protocol Standard** (PDF)
- **Project Protocol** (PDF)
- **Land Use, Land-Use Change, and Forestry Guidance Protocol** (PDF)
- **Grid-Connected Electricity Projects Protocol** (PDF)
- **All GHG Protocol Standards**

INTE 12-01-06:2011
Sistema de Gestion para demostrar la C-Neutralidad (Management System to Demonstrate C-Neutrality)
These requirements were produced by INTECO and define organizational carbon neutrality for Costa Rica. To obtain a copy of this standard, contact INTECO.

PAS 2050
Specification of methods to assess greenhouse gas emissions in the life cycle of products, produced by the British Standards Institute (BSI).

PAS 2060
Specification that explains how to measure, reduce, and compensate for current greenhouse gas emissions, produced by the BSI.

Rainforest Alliance
Provides certifications for agriculture, forestry, tourism, and forest carbon that relate to products and services that are sustainable with regards to their social, economic, and environmental practices

En Español

Figure F- 5. Standards and Certifications – English

Costa Rica's Environmental Management Resource Center

Search this site

Photo taken by: Shawna Beddie

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- Resources
- Standards and Certifications
- **EMS and EPD Examples**
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EMS and EPD Examples

These examples and case studies are useful references of EMSs and EPDs that have already been completed.

- **The U.S. EPA provides some case studies of EMSs in the private sector including:**
  - Transportation
  - Construction
  - Agribusiness

- **International EPD System**
  This system was developed by the Swedish Environmental Council. It provides a centralized and widely used model for other EPD programs and has extensive documentation about EPDs and EPD programs.

- **Eco-Leaf**
  This EPD program was developed by Japan's Environmental Management Association for Industry (JEMAI) in collaboration with Japan's Ministry of Economy, Trade, and Industry. This program has a unique approach in the presentation of the EPD results: they are presented in three different formats. Each format for information presentation target a different audience, from raw data to the basic environmental impacts of the product.

En Español

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Figure F- 6. EMS and EPD Examples – English

Costa Rica's Environmental Management Resource Center

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Local Environmental Authorities

FONAFIFO
Fondo Nacional de Finaciamiento Forestal (National Forestry Financing Fund)
This program promotes responsible forest management through loans to SMEs as well as funding the Payment for Environmental Services Program.

GIZ
Deutsche Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation)
An international organization that works with other organizations in producing and performing political, economic, ecological, and social programs. One of these programs in Costa Rica is CYMA.
Contact Information:
Website Contact Form
Office in Costa Rica Address:
Agencia GIZ Costa Rica
Apartado 8-4190
1000 San José, Costa Rica

CYMA (Spanish only)
Competitividad y Medio Ambiente (Competitiveness and the Environment)
This program works with governmental and private organizations to decrease the negative impacts of society on the environment.

MINAET (Spanish only)
Ministerio del Ambiente, Energía y Telecomunicaciones (Ministry of the Environment, Energy, and Telecommunications)
This organization is often referred to as MINAE for short, and is a governmental organization of Costa Rica. MINEA has many programs and subsections including IMN and FONAFIFO.

INTECO (Spanish only)
Instituto de Normas Técnicas de Costa Rica (National Standards Institute of Costa Rica)
This is a private, nonprofit legal entity recognized by the government as the National Agency for Standardization.
Contact Information:
Phone: (506) 2283-4522
Fax: (506) 2283-4831
Email: info@inteco.or.cr

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Figure F- 7. Local Environmental Authorities – English

Figure F- 8. About the Website Creators - English

Appendix G: Website Screenshots – Spanish

Website URL – Spanish: https://sites.google.com/site/recursosgestionambiental/

Figure G- 1. Homepage – Spanish

Centro de Recursos de la Gestión Ambiental de Costa Rica

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Photo taken by: Shawna Beadle

Definiciones

Ministerio del Ambiente y la Eenergía de Costa Rica (MINAE) – La organización del gobierno que formó el ENCC y que cumple servicios ambientales incluyendo la gestión de parques nacionales

Sistema de gestión ambiental (SGA) – La colección de procesos y prácticas que permite a una organización reducir su impacto ambiental y aumentar su eficiencia operativa

Declaración de producto ambiental (DPA) – Un documento que proporciona información a los consumidores sobre los impactos ambientales de productos de "cuna a la tumba" como analizado por una evaluación del ciclo de vida

Gases de efecto invernadero (GEI) – Un gas que absorbe y emite radiación en el aspecto infrarrojo y contribuye al efecto de gases de efecto invernadero

Inventario de gases de efecto invernadero – El enfoque sistemático utilizado por las organizaciones para calcular sus emisiones totales de gases de efecto invernadero

Marketing verde engañoso – Un término se utiliza cuando una organización o producto parece ser ecológico sin evidencia sustancial

Organización Internacional de Normalización (ISO) – Una organización que publica normas que están aprobados internacionalmente en materia de fabricación e industria

Evaluación del ciclo de vida (ECV) – El análisis de un producto, desde su producción hasta su eliminación, basado en su impacto ambiental

Estrategia Nacional sobre Cambio Climático (ENCC) - Un plan diseñado por la organización del gobierno de MINEA para esbozar el objetivo nacional costarricense de neutralidad de carbono para el 2021

Regalas de categoría de producto (RCP) – Un reglamento según el tipo de producto que definen los criterios incluidos en un ECV o DPA

In English

Figure G- 2. Definitions – Spanish

Centro de Recursos de la Gestión Ambiental de Costa Rica

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Fuente taken by: Shawna Beng

Pasos hacia la implementación

Estas pautas describen los pasos generales que una organización podría tomar para comenzar a planear e implementar un SGA y DPA.

Los pasos de la implementación de SGA:
- Crear una política ambiental de corporativa para su organización
  - Crear un equipo de gestión ambiental
  - Indicar claramente los objetivos e intenciones de la organización
  - Declarar la política en la responsabilidad medioambiental de la organización
- Establecer límites organizativos y operacionales (véase Protocolo de GEI para instrucciones sobre cómo definir su límite operacional basado en capital accionario, control operacional, y control financiero)
- Realizar inventarios de gases de efecto invernadero
  - Los cálculos/mediciones directos (por ejemplo, el consumo de combustible – cuantos litros de combustible que los vehículos consumen; el consumo de energía – medición directa del contador de electricidad)
  - De fuentes que no puede ser medida directamente: calcular las emisiones mediante el uso de los factores de emisión
    - Promedios de la Industria del IPCC (sólo en inglés o en eslovaco)
    - Promedios nacionales del MINAE
  - Recursos: Protocolo sobre gases de efecto invernadero (GEI)
    - Norma protocolo corporativo
    - Todas las normas de Protocolo de GEI (sólo en inglés)
    - Herramientas de calculo (sólo en inglés)
- Evaluar el inventario de gases de efecto invernadero y desarrollar un programa para reducir las emisiones
  - Agua utilizada
  - Residuos producidos
  - Materias primas utilizadas
  - Energía utilizada (que ya no ha sido medido en Protocolo de GEI)
- Eco-diseño de procesos para ayudar a reducir impactos
- Compensar las emisiones restantes
  - Compensaciones de carbono
  - Créditos de carbono
  - FONAFIFO

Los pasos de la implementación de DPA:
- Desarrollar o utilizar reglas de categoría de producto (RCP) para sus productos para ayudar a determinar cuáles partes del ciclo de la vida del producto debería incluirse en la evaluación del ciclo de vida (ECV)
  - Sistema de DPA Internacional
  - GEDnet (sólo en inglés)
- Completar la evaluación del ciclo de vida del producto
  - Considerar material utilizado, transporte, consumo de energía, emisiones de proceso de producción, además de otros aspectos
- Recoger datos adicionales necesarios para el DPA
  - Organización de hacer la declaración
  - Descripción e identificación del producto
  - Especificación de materiales con sus efectos potenciales del medio ambiente y la salud humana
  - Programa y la información del operador
  - Identificación de RCP
- Desarrollar un DPA
  - Consultar la Sistema de DPA Internacional
  - Seguir ISO 14025 (sólo en inglés, francés y ruso)
- Tener la verificación para DPA por un tercero
- Actualizar según sea necesario

In English

Figure G- 3. Steps Towards Implementation – Spanish

Centro de Recursos de la Gestión Ambiental de Costa Rica

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Photo taken by: Shawna Belich

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Recursos

- **GEDnet** (sólo en inglés)
La Red de Declaración (tipo III) Medioambiental Global, es un sistema que proporciona una manera para programas DPA para compartir información sobre sus mejores prácticas. GEDnet tiene una biblioteca extensa de RCPs verificados, que son ejemplos valiosos para las organizaciones que están haciendo sus propios DPAs.

- **ISO 14001 Sistemas de gestión ambientales – Una lista fácil de usar para pequeñas empresas - ¿Está listo?** (Sitio web sólo está disponible en inglés, francés o ruso. Lista está disponible en español.)
Proporciona una lista de dieciséis parte que ayuda a las organizaciones a comprender e incorporar cada aspecto de la norma ISO 14001; ayuda a las organizaciones a identificar áreas de mejora.

- **Departamento del Estado de Nueva York (Estados Unidos) de Conservación del Medio Ambiente**
Comprensión e implementación de un sistema de gestión ambiental: una guía paso a paso para organizaciones pequeñas y medianas (sólo en inglés)
  - **Paso 1: Conceptos básicos** (sólo en inglés)
  Ayuda a las organizaciones a comprender e integrar los problemas ambientales a nivel de la organización para la toma de decisiones y aprender acerca de los posibles beneficios de desarrollo de SGA
  - **Paso 2: Guía para desarrollo e implementación de SGA** (sólo en inglés)
  Ayuda a las organizaciones a iniciar el proceso antes de que el sistema de gestión ambiental sea diseñado (por ejemplo, desarrollar un equipo de EMS, desarrollar un manual de SGA, planificación e implementación de la SGA
  - **Paso 3: Plantilla de SGA** (sólo en inglés)
  Proporciona una plantilla para la documentación de un SGA efectivo y afirma que Paso 1 y parte de Paso 2 debe ser entendido completamente antes de utilizar esta plantilla

- **Agencia de protección ambiental (EPA) de Estados Unidos**
  - **Información de SGA** (sólo en inglés)
  Proporciona un Plan Modelo para Planificar, Hacer, Verificar, y Actuar que describe los pasos para desarrollar y aplicar SGA; proporciona enlaces de Como desarrollar un SGA, Costos y beneficios, y Preguntas frecuentes
  - **Introducción a la formación de SGA** (sólo en inglés)
  Herramienta de formación en línea para aquellos que quiera una visión general de SGA
  - **Ventajas comerciales de un SGA** (sólo en inglés)
  Información sobre cómo y por qué un SGA puede beneficiar su negocio
  - **Una guía de aplicación para organizaciones pequeñas y medianas** (sólo en inglés)
  Describe la importancia de un SGA, conceptos claves para el desarrollo de un SGA, pasos de inicio de la planificación de un SGA, todos los elementos que deben incluirse en un SGA, y una guía paso a paso para completar el desarrollo de un SGA efectivo

- **Promedios de la Industria del Panel Intergubernamental sobre Cambio Climático (IPCC)** (sólo en inglés o en eslovaco)
Proporciona promedios globales de los factores de emisión de gases de efecto invernadero de una variedad de actividades comunes

- **Promedios nacionales de la Instituto Meteorológico Nacional (IMN)**
Este PDF proporciona los promedios nacionales de factores de emisión de gases de efecto invernadero para los sectores emisores en Costa Rica: energía, procesos industriales, agricultura, silvicultura y otros usos de la tierra, y residuos

- **Protocolo de gases de efecto invernadero** (sólo en inglés)
Una herramienta de contabilidad internacional para entender, cuantificar, y gestionar las emisiones de gases de efecto invernadero.
  - **La norma protocolo corporativo** (sólo en inglés)
  - **La norma protocolo corporativo** (PDF) (en español)
  - **Todas las normas de Protocolo de GEI** (sólo en inglés)
  Proporciona los requisitos para cumplir con las regulaciones del Protocolo de gases de efecto invernadero
  - **Herramientas de cálculo** (sólo en inglés)
  Proporciona hojas de cálculo y documentos para calcular efectivamente las emisiones de gases de efecto invernadero
  - **Instituto de gestión** (sólo en inglés)
  Formación en línea sobre los principios, conceptos, y las técnicas de gestión para tener en cuenta creíble y correctamente para las emisiones de gases de efecto invernadero, así como una ubicación para la creación de redes y la profesionalización

In English

Figure G- 4. Resources – Spanish

Centro de Recursos de la Gestión Ambiental de Costa Rica

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Photo taken by: Shawna Beach

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Normas y certificaciones

ISO 14001 (Sitio web sólo está disponible en inglés, francés o ruso. Norma está disponible en español.)
Describe las especificaciones para el desarrollo de un sistema de gestión ambiental exitosa y aplicable

ISO 14020 (Sitio web sólo está disponible en inglés, francés o ruso. Norma está disponible en español.)
Describe los procedimientos y requisitos para los distintos tipos de etiquetado ambiental; directrices básicas que abarcan nueve principios generales en relación con reclamos y etiquetado ambientales

ISO 14021 (Sitio web sólo está disponible en inglés, francés o ruso. Norma está disponible en español.)
Describe el proceso de desarrollo de auto-declaraciones de practicas o productos ambientales; incluye etiqueta tipo II, que son desarrollados por el productor para sus bienes y servicios

ISO 14024 (Sitio web sólo está disponible en inglés, francés o ruso. Norma está disponible en español.)
Sirve como una guia para obtener un sello de aprobación de un producto; incluye las etiquetas del tipo I, que son desarrollados por un tercero

ISO 14025 (Sitio web y norma están sólo disponible en inglés, francés o ruso)
Describe el formato y los aspectos técnicos de la creación de etiquetas; incluye etiquetas tipo III que son desarrollados por el productor y el tercero verificador y cubren una evaluación completa del ciclo de vida

ISO 14040 (Sitio web y norma están sólo disponible en inglés, francés o ruso)
Proporciona los principios y el marco necesario para completar una evaluación del ciclo de vida de un producto; define las fases de un ECV

ISO 14044 (Sitio web y norma están sólo disponible en inglés, francés o ruso)
Proporciona los requisitos y directrices para la realización de la ECV de un producto

ISO 14064 (Sitio web y norma están sólo disponible en inglés, francés o ruso)
Proporciona recursos para reducir las emisiones de gases del efecto invernadero y el comercio de créditos de carbono

Protocolo de gases de efecto invernadero (Sitio web sólo en inglés. Norma está disponible en español.)
Colaboracion del Instituto de Recursos Mundiales y el Clase del Negocio Mundial para el desarrollo sostenible; proporciona una herramienta para comprender y controlar las emisiones de gases de efecto invernadero

- La norma protocolo corporativo (PDF)
- Protocolo de proyecto (PDF) (Norma está sólo disponible en inglés o japonés)
- Protocolo de uso de la tierra, cambio de uso de la tierra y silvicultura orientación (PDF) (Norma está sólo disponible en inglés)
- Protocolo de proyectos de electricidad conectado a la red (Norma está sólo disponible en inglés o japonés)
- Todas las normas de protocolo de GEI (Sitio web está sólo disponible en inglés)

INTE 12-01-06: 2011
Sistema de Gestion para demonstrar la C-Neutralidad.
Estos requisitos fueron producidos por INTECO y definir el carbono neutralidad de la organización. Para obtener una copia de esta norma contacto INTECO

PAS 2050
Especificación de métodos para evaluar las emisiones de gases de efecto invernadero en el ciclo de vida de productos, producidas por el Instituto de Normas Británicos (BSI)

PAS 2060
Especificación que explica cómo medir, reducir y compensar las emisiones actuales de gases de invernadero, producidas por el BSI

Rainforest Alliance
Ofrece certificaciones para agricultura, silvicultura, turismo y carbono forestal que se refieren a productos y servicios que sean sostenibles en relación con sus prácticas sociales, económicas y ambientales

In English

Figure G- 5. Standards and Certifications – Spanish

Centro de Recursos de la Gestión Ambiental de Costa Rica

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Photo taken by: Shawna Derry

Ejemplos de SGA y DPA

Estos ejemplos y estudios de casos son referencias útiles de SGAs y DPAs que ya se han completado.

- **La Agencia de Protección Ambiental (EPA) de Estados Unidos proporciona algunos estudios de casos de SGAs en el sector privado, incluyendo:**
  - Transporte (sólo en inglés)
  - Construcción (sólo en inglés)
  - Agroindustria (sólo en inglés)

- **La Sistema Internacional de DPA**
  Este sistema fue desarrollado por el Consejo Sueco de Medio Ambiente. Proporciona un modelo centralizado y utilizado ampliamente para otros programas de DPA y tiene documentación extensa sobre DPAs y programas de DPAs.

- **Eco-Leaf** (sólo en inglés o japonés)
  Este programa de DPA fue desarrollado por la Asociación de Gestión Ambiental de Japón para la Industria (JEMAI) en colaboración con el Ministerio de Economía, Comercio e Industria de Japón. Este programa tiene un enfoque único en la presentación de los resultados de la DPA: se presentan en tres formatos diferentes. Cada formato para la presentación de la información dirigido a un publico diferente, de los datos en bruto a los impactos básicos ambientales del producto.

In English

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Figure G- 6. EMS and EPD Examples – Spanish

Centro de Recursos de la Gestión Ambiental de Costa Rica

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Photo taken by: Shawna Bondi

Las autoridades ambientales locales

FONAFIFO
Fondo Nacional de Financiamiento Forestal
Esta promueve gestión sostenibles de bosques a través de préstamos a los SMEs y la financiamiento del programa de Pago por Servicios Ambientales.

GIZ (Sólo en inglés o alemán)
Deutsche Gesellschaft für Internationale Zusammenarbeit (Cooperación Alemana para el Desarrollo)
Una organización internacional que trabaja con otras organizaciones en la producción y realización de programas políticos, económicos, ecológicos y sociales. Uno de estos programas en Costa Rica es CYMA.
Información de contacto:
Forma de Contacto de sitio web
Officina en Costa Rica:
Agencia GIZ Costa Rica
Apartado 8-4190
1000 San José, Costa Rica

CYMA
Competitividad y Medio Ambiente
Este programa trabaja con organizaciones gubernamentales y privadas para reducir los impactos negativos de la sociedad sobre el medio ambiente.

MINAET
Ministerio del Ambiente, Energía y Telecomunicaciones, MINAE para abreviar, es una organización gubernamental de Costa Rica.MINEA tiene muchos programas y subsecciones incluyendo IMN y FONAFIFO.

INTECO
Instituto de Normas Técnicas de Costa Rica, es una entidad jurídica privada y sin fines de lucro reconocida por el gobierno como el organismo nacional de normalización
Información de contacto:
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In English

Figure G- 7. Local Environmental Authorities – Spanish

Figure G- 8. About the Website Creators - Spanish