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碩士論文

THESIS ON

由企業角度研究碳足跡標籤的導入-以宏碁與泰山為  
例

Implementing Carbon Footprint Labelling Scheme from  
A Business Perspective: Company Acer and Taisun,  
Taiwan-based companies as examples

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# DEDICATION

I thank my parents for giving me the love, understanding and support for my decision to return to Taiwan for my MBA education. It was an exciting decision for me personally, but it required unselfish support from both of my parents. I thank them for supporting my decision despite the countless days they have to be there without me.

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Thank Dr.P.D. Huang And Dr.Niven Huang for organizing the CSE competition and guiding students to see visions from all over the world and letting others see us. The vision I have seen through the competition and its relevant events inspired me to devote myself in and see the importance of sustainable development.

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Thank Jia-Chun Chen, Tina Wu, Winnie Chen, Lisa El-Himn, Anny Yang, and Auntie Qiu, Zen Chou, and all the other friends on the path of meditation and start up for being there for me whenever and giving me the continuous support.



# ABSTRACT

As consumers become conscious of the impacts of their purchase decision on the environment, environmental friendly products become increasingly popular. By indicating the amount of carbon dioxide produced and emitted throughout a product's life cycle, from material acquisition to manufacturing to consumption, carbon footprint label give consumers the information to make earth-friendly purchase decisions. Carbon footprint label also makes consumers the driver of a more sustainable future by incentivizing businesses to make lower GHG-content products to increase the competitiveness of products.

Carbon footprint label is becoming a popular practice around the world. Taiwan is also learning and doing carbon footprint labelling. This dissertation investigates how carbon footprint labelling is done in advanced countries including the United Kingdom, the United States, France, and Japan and multinational companies including Walkers, Walmart and Casino Group. Then it investigates how carbon footprint labelling is done in Taiwan and how Taiwan businesses approach carbon footprint labelling.

Two companies of different industry were interviewed to gain an in-depth understanding of how and why Taiwan businesses implement carbon footprint labelling. From the interviews, insights of the motivation, project planning, execution and questions encountered during the implementation of carbon footprint labelling were revealed. The dissertation then concludes by discussing the limitations that happened during the research and the suggestions for the development of Taiwan's carbon footprint label.

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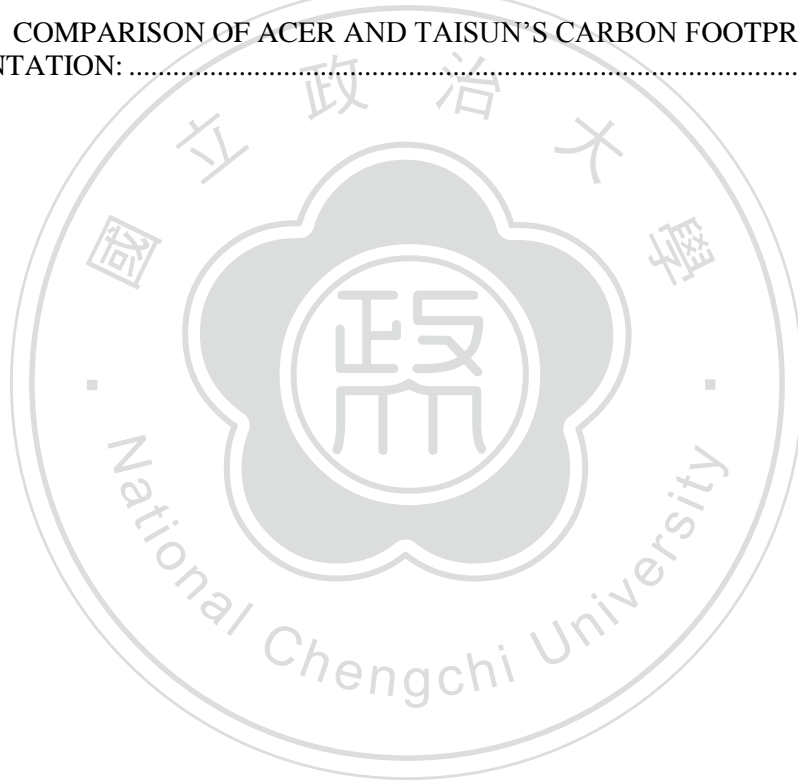
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# Chapter 1: Introduction

## Research Motivation and Purpose

### 1.1 Research Motivation

Global warming has become clearly the greatest threat that humans are faced with. Numerous mechanisms have attempted to alleviate the worsening situation, including the development of trade mechanism, system and operation improvement and other new green solutions. The efforts mostly come from governments and businesses; however, the greatest driver of economy is the consumers.

How do consumers play their roles in a world of changing climate and economy? As major constituents of the society, consumers' voice is what manoeuvres businesses. Through what kind of mechanism can the society engage consumers with the entire value chain and contribute to sustainable development? Businesses interact with consumers through selling their products and it is through this interaction, businesses hear consumers. Therefore, the kind of products businesses offer and the kind of image that businesses project is key determinants to a business's success.

With the elevating awareness of climate change, consumers are taking more considerations into their purchase decision. Other than price and quality, the new factor influencing consumers' choice is green-ness. Therefore, in addition to the pursuit of high quality and low cost, the new goal for businesses is to achieve the former two goals sustainably. Both quality and cost can be reflected by the product's physical features, such as competitive price, delicate packaging, advanced specifications, however, there is barely any way to reflect a business's performance in green-ness.



Hence, a communication tool must be developed in order to let businesses show their commitment in sustainable development. Carbon footprint label is the tool that consumers can see and evaluate when making purchase decisions and is what company uses to demonstrate its green-ness. Carbon footprint labelling is the practice of putting emission related information onto products' label, informing consumers of the total amount of carbon dioxide that will be emitted at the end of the entire life cycle of the product. Product life cycle is the new concept moving beyond emission associated with production, but further includes emission associated with material acquisition, post-production and post-consumption.

Material acquisition stage includes the process and resources needed to produce the raw material, for example, electricity and fertilizer. Fertilizer is a CO<sup>2</sup> intensive input and so is electricity. Post-production emission happens during consumption, and disposal. Disposal emission occurs when product gets thrown away, and needs to be processed either into the recycling stream or the elimination stage through incineration which further produces more CO<sup>2</sup>. Product life cycle concept takes into account of all the emission throughout the product's entire value chain to look at carbon emission and sustainability from a holistic point of view. By looking at carbon emission from this perspective, businesses can get new inspirations on how to improve product design and move towards sustainability.

Therefore, carbon footprint label is the communication tool allowing businesses to demonstrate its competitive edge, consumers to make wiser choices and businesses to continue to improve on their products and services to better meet the demands of their consumers. As businesses begin to implement carbon footprint label onto their products, others who have not started the practice will lose out the battle eventually. This thesis hopes to serve as a reference for businesses wanting to initiate

the carbon footprint labelling practice as this global trend becomes a standard. This paper differs from environmental related researches in the way that this paper looks at carbon footprint labelling from a strategic approach rather than a technical approach. The technical approach examines the measurement of carbon emission at different stages of the product's life cycle. This paper does not discuss how to measure carbon emission but discusses the considerations that businesses take at different stage of the implementing process from a strategic perspective and how carbon footprint labelling is done world-wide. Starting from the initial driving force of the carbon footprinting project, this paper investigates the various factors motivating companies to implement the practice, then the project design, execution steps, complementary marketing strategy development, performance evaluation and reinvention and improvement of products.

Two companies of different industry are investigated to provide insight and comparison of the considerations and steps taken during the implementation of carbon footprint labelling scheme. Acer and Taisun have been selected as the subjects. These two companies differ in industry and business model, products vary in complexity, value chain varies in composition, companies play different roles and as a result different approach and considerations. Acer, the world's number one supplier of PC, has a value chain mostly composed of suppliers attributed to its OEM business model. The manufacturing and resourcing areas of Acer are outsourced to different suppliers and partners. As a result, Acer plays a consultative and mentoring role in the carbon footprint assessment process. Furthermore, because of the complexity of the products, the carbon footprint assessment will be more complex than that of a bottle of water, as in the case of Taisun. Another difference comes from the high-tech nature of electronic goods where rapid technology advancement affects product

performance and consumer preference to a high extent; therefore, product life time is shorter than other consumer goods. Tai sun, a major player in the food and drinks industry, has recently released a series of environmental friendly products, most acknowledged is the popular Twist water. As a maker of food and drinks itself, Taisun is directly involved in the carbon footprint assessment and labelling process. Because of the simplicity of the product, the product life time will be longer than that of electronic goods. These product and business model difference results in different approach to implement carbon footprint labelling scheme.

## 1.2 Value of Carbon Footprint

Carbon footprint label offers both monetary and intangible value to businesses. This section discusses the numerous benefits of carbon footprint label. The most important strength of business is being able to hear the voice of consumers and align business capabilities with the commitment declared to consumers. The three circles that make up a business are voice of consumers, business capabilities and commitment to consumers. The degree of overlap of the three circles determines the degree of success of a business.

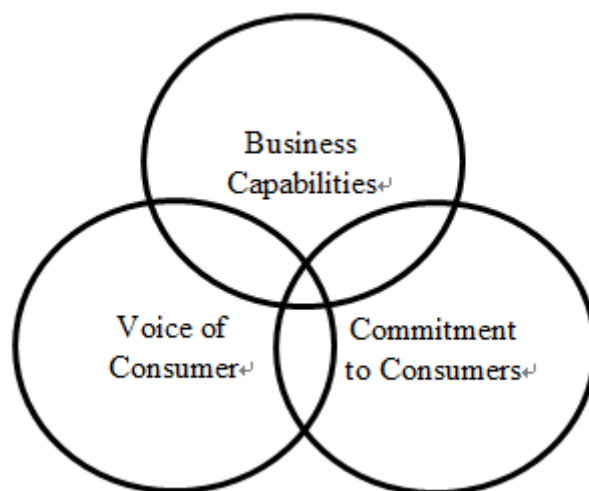


Figure.1.1 Three circles make up business

With increasing awareness of climate change, consumers are demanding for new business practices and products with lower environmental impacts. The new need challenges businesses' capabilities to deliver products requiring change in manufacturing process and communication language. To overcome this challenge in time and meet its commitment to consumers, businesses must adopt the new way of thinking and develop the new capabilities needed for the new demand. As mentioned earlier, the new factor affecting consumer choice is green-ness. 1) As climate change starts to impact the world and causes harm and dramatic loss both economically and socially, consumer demand for green products escalates rapidly. To meet consumer demand, businesses must shift toward sustainable practice to produce goods and services and build good corporate image. 2) Green-ness can be reflected by the corporate's overall image and its products or services. Therefore, having green products can build a good corporate image. 3) Next, cost reduction opportunities. Cost optimization has been the persevering goal all businesses are after; by assessing product carbon footprint, businesses can identify the hotspots for efficiency improvement and thereby reduce operating and manufacturing cost. Furthermore, as governments implement measures to reduce carbon emission, new kinds of litigation cost will get imposed on businesses. 4) Opportunities for improvement. As emission hotspots are identified, businesses can use the resulting data to make their next step, such as improving the manufacturing efficiency or transportation efficiency, so that both cost and emission reduction can be achieved.

## **1. Corporate image**

Corporate image is important to both the external public and internal employees and investors. According to Walkers (a UK subsidiary of PepsiCo), 44% of consumers surveyed stated that Carbon Trust Carbon Reduction Label used on the company's crisps makes them feel more positive about Walkers. Consumers consider the product maker's corporate image for two reasons 1) to lower moral hazard risk, the risk of buying products made immorally or contains harmful substances 2) consumer's belief is in alignment with the corporate image. Buying the product allows consumers to express their beliefs. For internal employees, corporate image attracts talents with the same belief and gives better career development opportunities. For external investors, a good corporate image means the business is doing well and is expected to get better and means higher stock price. Therefore, investors also want business with good corporate image. Having carbon footprint label on products informs consumers of the socially responsible behaviour of the corporate and builds and shapes the corporate image into a socially responsible brand.

## **2. Consumer demand**

Consumers are the major drivers of the economy and constitute the biggest portion of the society; therefore, it is crucial for businesses to offer products and services matching the needs of consumers. In a study done by Carbon Trust on consumer perception of carbon footprint label, 79% of the subjects surveyed agreed with the statement: "it makes me more aware of the environmental impact of the products and services I choose to buy" and 71% agree that the Carbon Reduction Label: "helps me to reduce the carbon footprint of my regular shopping items". Consumer perception of carbon footprint label is positive among shoppers.

According to a study done by TianXia (天下) magazine, the most important factors in Taiwanese consumer purchase decision are environmental-friendliness and price. The younger the consumer is, the more concerned this consumer is about price; the more senior, the more concerned the consumer is about environmental-friendliness. Among the subjects investigated, the 30+-year-old group is the only group that is more concerned about brand rather than environmental friendliness. Women and consumers above 50 years old put environmental-friendliness as the first priority for purchase decision. Furthermore, man puts price as the first priority while woman looks at environmental friendliness first. In addition, 84.7% of Taiwanese subjects surveyed first consider whether a product is water or electricity-conserving. This is also the highest consensus among subjects surveyed regardless of age, region, and sex. According to Mr.Zhang Yangqian, the blog chief editor of Delta Electronics Foundation, consumers are most concerned whether green products can help save money. The products which save water and electricity and can receive government subsidy are most favoured by consumers even if not for environmental reasons. As can be seen from this investigation, cost saving is a key factor associated with environmental friendly products in consumers' mind. Because utility comprises a significant portion of Taiwan consumers' daily income, therefore, consumers favour products that will help them save cost in the future.

### **3. Supplier Engagement**

Furthermore, consumers' engagement in sustainable development will lead to both environmental and economic benefits. When consumers demand for products and services that caused the least harm to the environment, while businesses meet consumers' needs, businesses are also helping to reduce harm on the environment. Labelling emission related information can first engage consumers in the supply chain and reach public commitment. When public commitment is reached, a sense of urgency will spread across the whole supply chain and compel all parties along the supply chain to follow through with emissions reduction measures. Second, consumers' engagement in emission reduction. According to GfK NOP, 67% of UK consumers surveyed are more likely to buy a product with low carbon footprint and 44% would switch to a lower-carbon product even if the product was not their first choice (LEK Consulting Carbon footprint report 2007). However, consumers often comment that not enough information is disclosed for them to make the sensible decision. Although they are concerned with carbon emission of the product, they do not have the necessary information to make the right choice. Therefore, having carbon footprint information disclosed allows businesses to differentiate from other substitutes and allow consumers to make their decision carbon-wisely.

#### 4. B2B demands

Due to the complexity of the value chain, most businesses outsource their material from and production to different suppliers. For each material and production procedure, there are numerous suppliers and partners to choose from. For these upper-stream players along the supply chain to win orders from their B2B partners, they need to play according to their partner's rule. These brand-companies are in turn need to play according to their consumers' rule. When consumers determines they want a low-carbon market, brand-companies need to produce products and services with low emission and upper-stream players need to provide low emission products and services to brand companies, so that the overall carbon emission can be lowered. As the graph illustrates, the end consumers are the major force pulling the brand companies and upper stream players. The size of the circles is relative to the size of the player in the market. Consumers are the largest proportion, then suppliers, then companies. Upper stream players are bigger in size than brand companies, because each brand company can have numerous suppliers to choose from. Therefore, becoming a competitive supplier to meet the needs of brand companies is the key to its survival. Suppliers with emission related information ready can save the time and cost businesses need to take in order to design their products and assess the overall product carbon footprint. Therefore, businesses will more likely to choose suppliers that have this information handy.

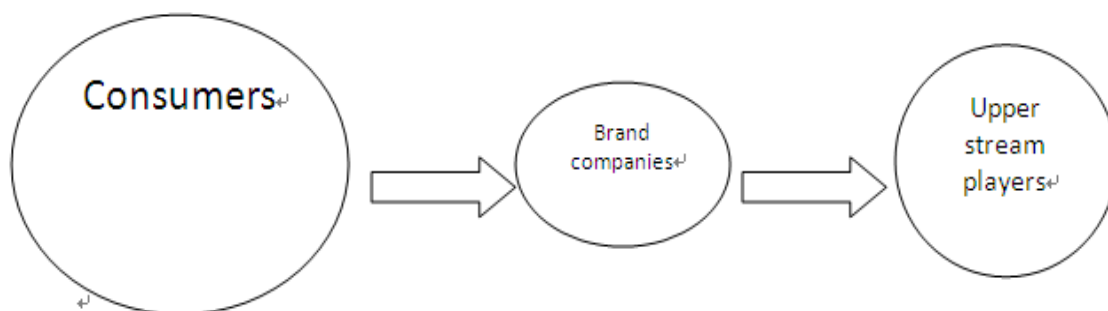




Figure.1.2 Forces driving implementation of carbon footprint labelling scheme

Wal-Mart, the largest retailer in the world, has announced clearly of its sustainable development goals. In the 2009 Sustainability Report, Mike Duke, CEO of Wal-Mart, stated that sustainability is not a philanthropic program; sustainability is completely aligned with their model, their mission and culture. Sustainability is built into their business because it is good for their business. To facilitate the adoption of a sustainable supply chain, Wal-Mart has provided the initial funding for the establishment of the Sustainability Consortium. The consortium is composed of universities that will collaborate with NGOs, governments, suppliers and retailers to develop a global database that will include product life cycle emission of all products. As a major client to the suppliers, Wal-Mart's strong bargaining power is able to drive supplier cooperation on the sustainable development initiatives.

## **5. Regulatory Risk**

As carbon related policies begin to kick into effect, more businesses will be faced with the barrier to production and operation. Kyoto protocol has been an important compulsory means reinforcing countries' engagement in the carbon reduction effort. Under the Kyoto protocol, each country must set reduction goals, and must act to achieve the goal. The cap and trade system assigns each country an emission quota; countries emitting over the quota will need to trade off the excess carbon emission with another country, whose carbon emission is within the assigned quota. The country quota then gets allocated to industries, and businesses will then be assigned a quota. Similar to the county wide system, businesses will need to manage their emission within the assigned quota, or they will need to trade or reduce their emission, or the worst scenario, cease operation. Industries with high emission level, such as food manufacturing, steel, aluminium, construction material, oil, need to be

extra careful with carbon emission management, because, if not handled well, these businesses might have to go out of business due to government restrictions. Carbon labelling informs the public, the business's effort in carbon reduction, and it is in alignment with government's development policy. In Taiwan, the carbon footprint labelling practice has been actively promoted by the government as one of the efforts to reduce emission. When companies engage in carbon foot printing, businesses are demonstrating their support for government policy and in turn, face less regulatory risk in the future, when official legislation comes into place. There is a possibility that carbon foot printing can become a compulsory practice when it becomes a major factor influencing consumer behaviour. By then, businesses which have never been exposed to the practice will then react slower and less readily and lose their competitive edge when they play in the new low carbon market. During their adoption to the practice, others who have completed and learned the practice will play agilely in the new market, and respond faster to the changing consumer need, while the late-comers go through the learning curve and get stuck with the time-consuming application process. The European Union's Emission Trading Scheme issued allowance to companies to manage their emission level within the allocated amount. If the business emits more than it's allowance, the business must buy allowance from others in order to proceed with its operation, or it can buy carbon credits, which is derived from investment in abatement practice within the country or outside the country in which the business operates. The carbon credit allows the company to emit over its allocated allowance. For example, a major food manufacturing enterprise was restrained from production capacity expansion due to its high emission level. This can have devastating effect on the business, as businesses want to produce more to meet consumers' demands. Therefore, it is faced with the

option to buy allowance from others, reduce emission through operational improvement or buy credits. All of these are new costs influencing businesses operation. Cost optimization has been an everlasting goal for businesses and implementing the carbon foot printing practice now will be a new way to save future costs. Leading companies such as General Electrics, Alcoa and Excelon have called for rapid enactment of abatement schemes as they want to prepare themselves better for the future regulatory risks and strengthen their competitive edge, by adopting the practice earlier than their rivals.

## **6. Carbon Taxation system**

A carbon tax is an environmental tax that is levied on the carbon content of fuels. Carbon taxes are one of the policy measures that can be used in reducing greenhouse gas emissions from fossil fuels. They help to address the problem of emitters of greenhouse gases not facing the full (social) costs of their actions. A number of countries have implemented carbon taxes or energy taxes related to carbon content and many have considered and proposed the implementation of carbon/energy taxes.

It is still a premature assumption that low carbon products are necessarily associated with a reduction in carbon tax. However, if both carbon tax and low carbon products are introduced, more understanding on the relationship between the two could be obtained and hopefully will make carbon footprint labelling and low carbon products an incentive for businesses to lower their cost.

## **7. Litigation Risk**

Carbon related litigation risks are similar to those in tobacco, pharmaceutical and asbestos industries. Five of America's largest power suppliers are being sued and demanded to lower their carbon emission. Following the 2005 Hurricane Katrina,

victims from Mississippi filed class action suit against operations of energy, fossil fuels, and chemical industries in the United States for causing the emission of greenhouse gases that contributed to the global warming. The victims claimed compensation and punitive damages from multinational companies including Shell, ExxonMobile, BP and Chevron. Other companies named in the suit include Honeywell and American Electric Power, with the residents charging that "the defendants' greenhouse gas emissions caused saltwater, debris, sediment, hazardous substances, and other materials to enter, remain on, and damage plaintiffs' property".

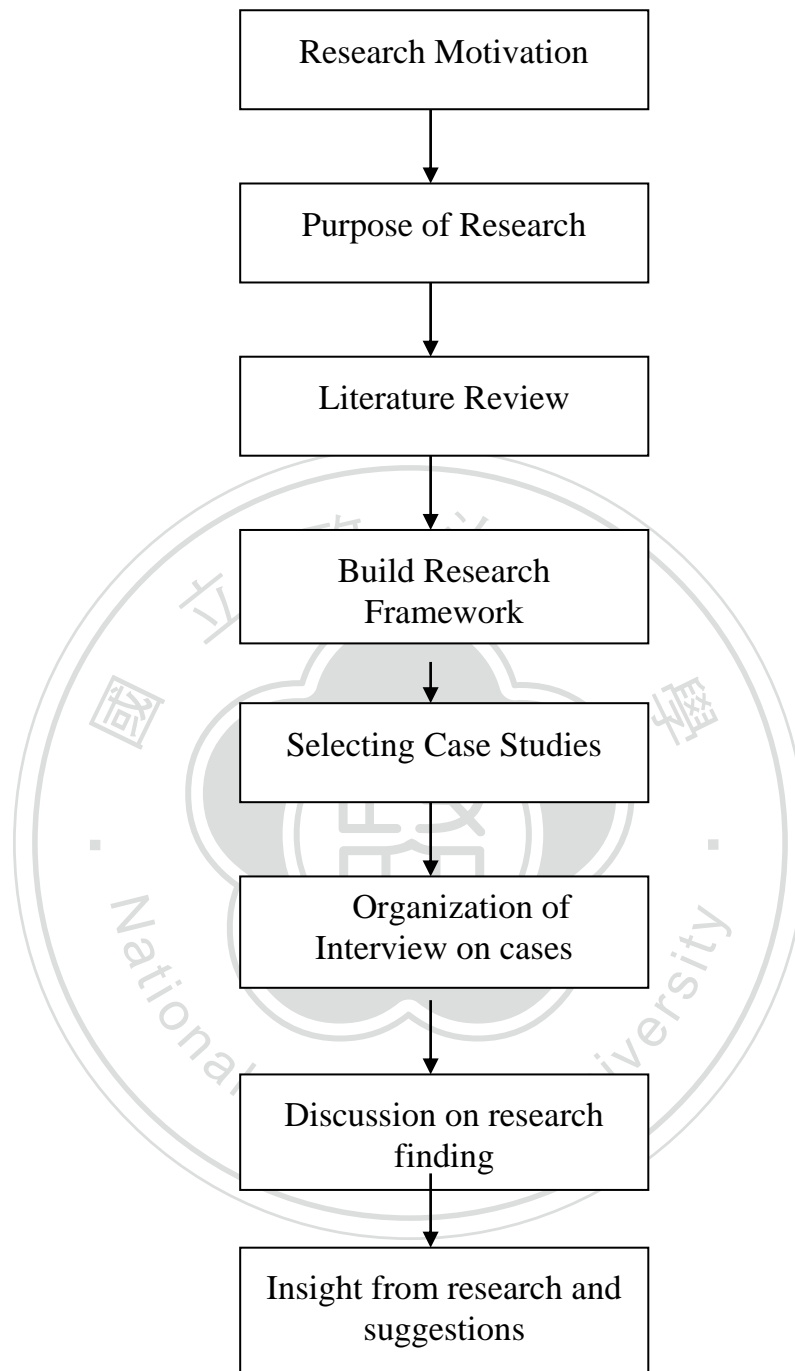


## 1.3 Research Purpose

- To investigate how carbon footprint labelling is done worldwide
- To investigate how Taiwanese companies implement carbon footprint labelling
- To provide organized information for companies doing carbon footprint labelling in the future
- To further the research on carbon footprint label in Taiwan as it may become a global trend
- To discover what can be learned from the world and apply to Taiwan



## 1.4 Research Process Flow Chart



# Chapter 2: A Review of the Literature

## 2.1 Carbon Footprint Labelling Background

### 2.1.1 Carbon footprint label

Carbon footprint is the concept of illustrating the impact of anthropogenic carbon emission through the image of a footprint. Just like a footprint on the sand, when a human walks by the sand, a footprint is left on the beach. When a human consumes a product, it also leaves something in the atmosphere, and that something is neither gravity nor mass, it is carbon dioxide. Usually carbon footprint is illustrated using the shape of a foot. Carbon footprint label contains the information on carbon emission associated with the product's entire life cycle. Typically, a carbon footprint label will indicate the amount of carbon dioxide that has been generated through out a product's life cycle in grams, kilograms, or etc.

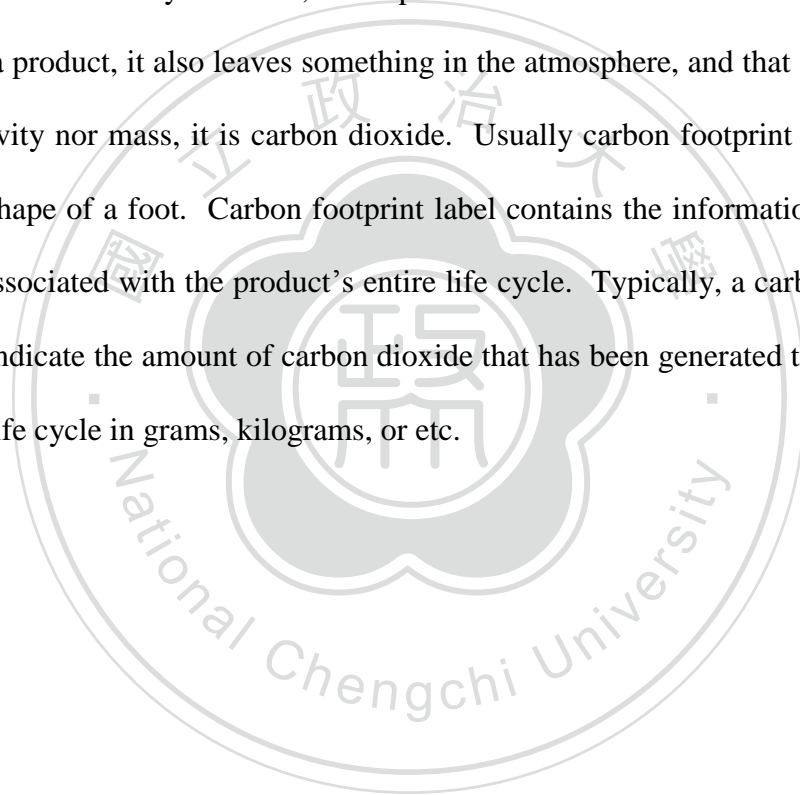




Figure.2.1 Taiwan's Carbon footprint label extracted from Taiwan Product Carbon Footprint Website, Environmental Protection Administration

### **2.1.2 Life Cycle Assessment (LCA)**

The life cycle of a product includes various stages, which are production of raw material, transformation of raw material, manufacturing of product, distribution and selling the product, consumption, and finally disposal of product's residue. Traditionally, product life cycle is a cradle-to-grave process, where the input going into making a product will all become waste at the end of the life cycle. However, the new concept, "cradle-to-cradle", is transforming inputs making a product into a new input for other uses. In the process, no waste is generated, in other words, the residual or output of a process become an input for another. The analysis compiles data on volumes and quantities of materials, energy and chemicals, and emission of pollutants and waste resulting from these various life stages. All



pollutants are expressed as CO<sup>2</sup> a equivalent, which is commonly accepted unit for global warming potential (GWP).

### **Guidelines of Life Cycle Assessment**

- 1. Life cycle inventory analysis:** Quantification and compilation of GHG emission of inputs and outputs of a given product throughout its life cycle.
- 2. Life cycle impact assessment:** Understanding and Evaluation of the magnitude and significance of the potential environmental impact of a product system.
- 3. Life cycle interpretation:**

Life cycle interpretation is a systematic technique to identify, quantify, check, and evaluate information from the results of the LCI and the LCIA, and communicate them effectively. Life cycle interpretation is the last phase of the LCA process. The life cycle interpretation consists of two parts:

1. Analyse results, reach conclusions, explain limitations, and provide recommendations based on the findings of the preceding phases of the LCA, and to report the results of the life cycle interpretation in a transparent manner.
2. Provide a readily understandable, complete, and consistent presentation of the results of an LCA study, in accordance with the goal and scope of the study

### **Illustration of Life Cycle Assessment**

Traditionally, the carbon emission to be included in the life cycle assessment is only the stages after the manufacturing stage. However, this way of accounting GHG has been challenged for ignoring the emission-intensive steps to producing the raw material for the product. For example, an orange juice made with imported California oranges might appear to have lower carbon emission than that with local oranges because of its more efficient manufacturing facility which uses less electricity. This way of calculating the carbon footprint is faulted in design because it fails to

consider the transportation of the raw material, California oranges to Taiwan. The transportation of heavy substance such as orange will account for a significant amount of GHG emission already. Therefore, it is crucial to assess the GHG emission starting from the cultivation and acquisition of the raw material as shown in the above picture. Another input for a can is aluminium. Aluminium is mostly produced by the Hall-Heroult Process in which a great amount of energy is needed to melt the material and as a result a significant amount of carbon dioxide is generated. Thus, that portion of GHG emission must be accounted in the life cycle analysis in order to obtain the holistic picture of a product's carbon footprint. Following the acquisition of the raw material, the raw material is transported to the manufacturing site to get processed into product. Product is also packaged at the location, then gets transported to distribution center and sold to consumers. This part causes most variance because it relies on the distance the product travels to reach its end-consumer. If the retail store is further away from the distribution center, then, the carbon emission from the transportation stage will be higher than that of a retail store near the distribution center. Following is the use/maintenance control of the product. For a drink, it will be storing the drink in cool environment, the electricity needed to maintain the low temperature. For a detergent, the water temperature used to wash the clothes will also result in different amount of carbon emission. At the last stage of a product life cycle is the use and disposal of the residue. When the final remainder of product is recyclable, it becomes an input for another process and as a result, emission will be reduced. However, when it has no further use, it needs to be picked up by garbage collecting truck and be buried in landfill, which in time will release GHG emission back into the atmosphere.

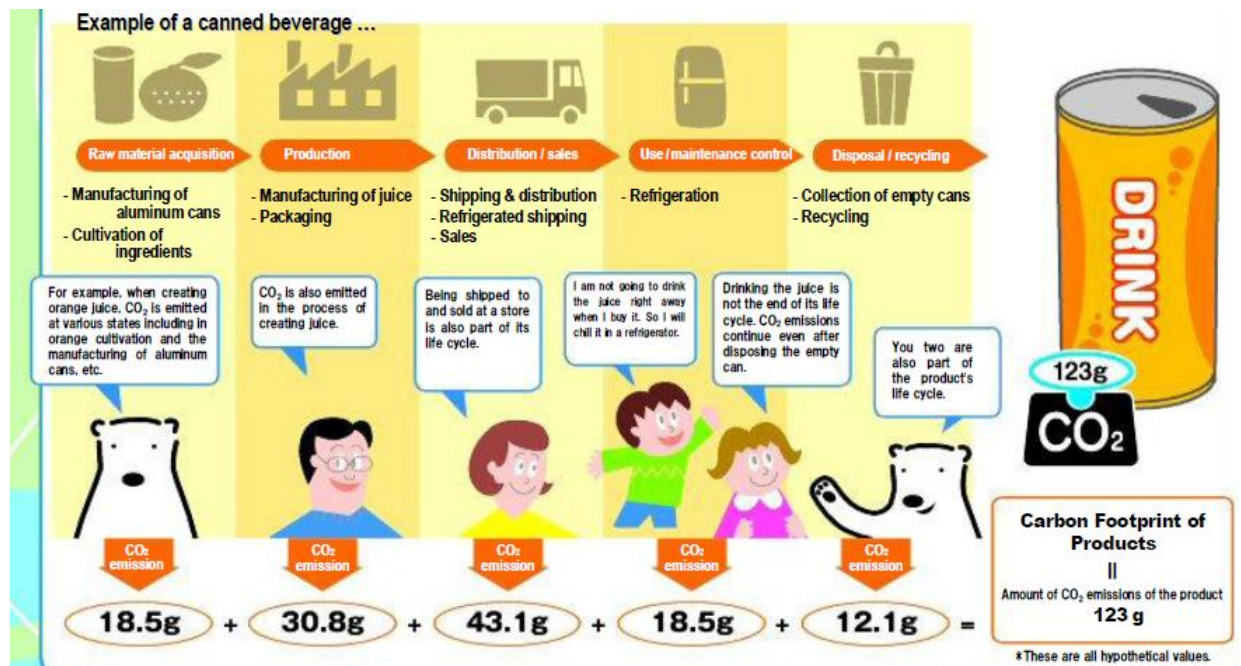


Figure.2.2 What is the carbon footprint of products by Japan Trade and Industry of Ministry of Economy

### Product Category Rules

Identifying the scope of carbon emission assessment is the ultimate key to making carbon footprint label a widely adopted practice. Since life cycle assessment is a brand new concept, there has not been a standard for the measurement scope. The inconsistency among measurement scope is one of the reasons why carbon footprint labeling is not widely practiced yet. For businesses, the inconsistency can have impact on competitiveness. For consumers, it can be misleading and falsifying. Therefore, setting an international standard for the scope of measurement is the key for global movement of goods. PCR is a guidance or set of rules for the collection of data and how calculation should be done to transfer the data to the climate impact and how to present the information. When the PCR for a product has been set, similar products from other brands with the same ingredient, manufacturing method, and distribution network can apply the existing PCR system and make the process more

efficient for other players in the market. The PCR sets the functional and declared unit, system boundaries, for each different stage of a product life cycle, cut-off rule, allocation rule, and calculation rules to ensure data quality. The system boundaries divide product life cycle into three stages: 1) Product stage 2) Building stage 3) End of life stage. The cut-off rule refers to the procedures that do not contribute more than 2 % of the total mass and 1 % of the total energy use may be omitted from the inventory analysis. However, they need to be declared and justified in order to ensure the validity of the data. The allocation rule states that if a production process generates more than one type of product, it is necessary to allocate the environmental impact (inputs and outputs) according to the product in particular in order to get product-based inventory data. When allocation is used, the economic reality and other relevant aspects shall be considered to determine if other allocation criteria would be more appropriate or lead to deviating results. A sensitivity analysis should be done if a deviation greater than 20% is foreseen. Different data sets shall be documented and reported, if different allocation options are relevant.

## **2.2 Global Status of Carbon Footprint Labelling**

### **2.2.1 The United Kingdom**

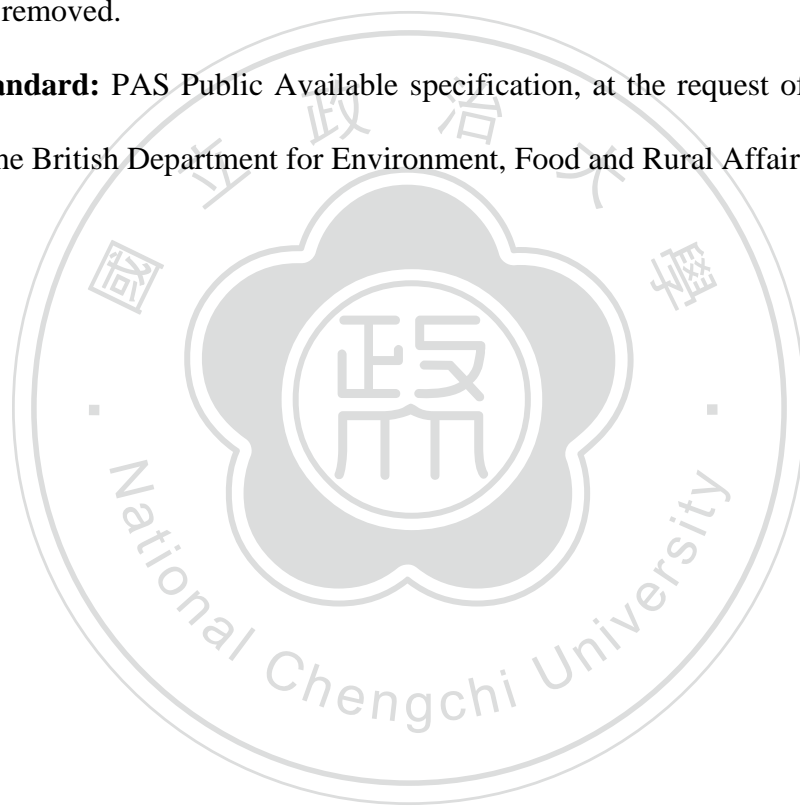
#### **1. Carbon Reduction Label**

The Carbon Reduction Label was created by the Carbon Trust, a not-for-profit company whose aims to accelerate the move to a low-carbon economy. Their work involves tasks as diverse as helping companies large and small to lower their carbon footprints, encouraging the development of new low-carbon technologies such as offshore wind and wave power and investing in the solutions of the future to develop the low-carbon economy. The first label to disclose carbon emission information on products was the Carbon Reduction Label, introduced in 2006 by the UK-based Carbon Trust organization. The label not only requires companies using the label to disclose the total carbon footprint of the product, but also requires companies to continue the reduction of product life cycle emission.

The purpose of the Carbon Reduction label in the words of Carbon Trust is “to encourage producers to cut the footprint of the things we buy and to help each of us make simple, no-cost changes that reduce our carbon footprint too.” The statement reflects Carbon Trust’s mission in engaging consumers into shaping the way business operates while consumers can feel good about their purchase decisions. Brands that want to wear the Carbon Reduction Label must conduct life cycle assessment in accordance with the PAS 2050, a set of measurement standard based on the ISO LCA and greenhouse gas accounting standards and is consistent with GHG Protocol and developed in 2007 by the Carbon Trust in partnership with the UK Department for Environment, Food and Rural Affairs (Defra) and BSI British Standards. The emission included contains the emission associated with raw material production,

transportation, packaging, through to manufacture, transportation, sale to the end user, use and disposal. Using the label comes with a commitment for emission reduction after 2 years when the license period expires. However, emission targets are agreed and set on a product-by-product basis. The license fee starts at around £5,000. The label is not a life-time certification; the emission assessment must be done every two years and reduction has to be achieved and independently certified to ensure companies strive to lower their carbon emission. If emission has not been reduced, the label is removed.

**British Standard:** PAS Public Available specification, at the request of the Carbon Trust and the British Department for Environment, Food and Rural Affairs.



## Registration Process

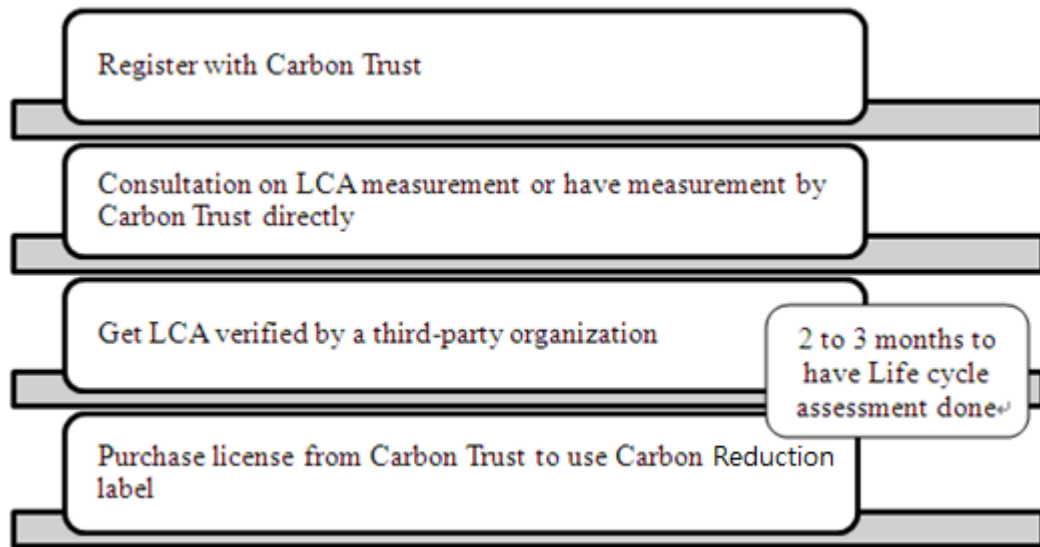


Figure.2.3 Registration Process of carbon trust's Carbon Reduction Label



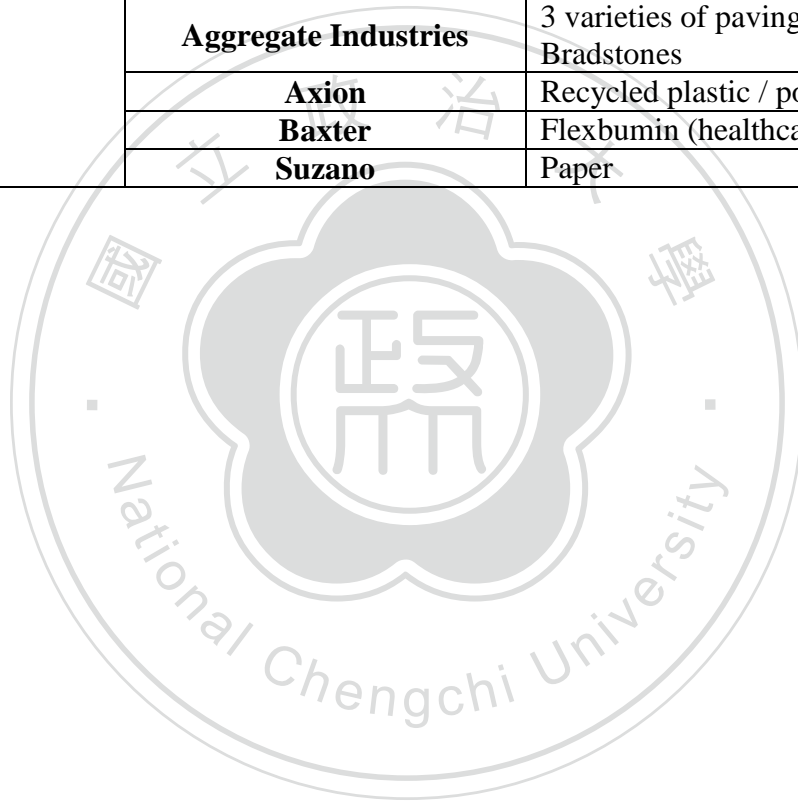
## 2. Participating companies

Table.2.1 Companies that have participated in Carbon Trust's carbon footprint labelling project

| <b>Retail</b> | <b>Goods</b>   | <b>Consumer goods manufactures</b> | <b>Goods</b>  |
|---------------|--|------------------------------------|---|
| <b>Tesco</b>  | <ul style="list-style-type: none"> <li>-Range of toilet paper and kitchen roll.</li> <li>-Jaffa Oranges / soft fruit.</li> <li>-Milk: Skimmed, Semi-skimmed, Whole.</li> <li>-Range of own brand laundry detergent.</li> <li>-Range of chilled and long life orange juice.</li> <li>-Range of light bulbs</li> </ul> | <b>Dyson</b>                       | Dyson Airblade™   |
|               |  | <b>Walkers</b>                     | All varieties of standard crisps sold in single packets   |
|               |  | <b>Tate and Lyle</b>               | 1kg bag of granulated cane sugar  |
|               |  | <b>PepsiCo</b>                     | Quaker oats and Oat so Simple   |
|               |  | <b>Morphy Richards</b>             | Range of Irons  |
|               |  | <b>Allied Bakeries</b>             | Kingsmill wholemeal, white and 50:50 loaves   |
|               |  | <b>British Sugar</b>               | <ul style="list-style-type: none"> <li>-A range of white granulated sugar - British Sugar - B2B</li> <li>-A range of white granulated sugar - Silver Spoon - B2C</li> </ul> |



|  |                             |  |
|--|-----------------------------|--|
|  | <b>Levi Strauss</b>         | A one off promotional bag  |
|  | <b>Haymarket</b>            | Magazines – Marketing and ENDS report  |
|  | <b>Continental Clothing</b> | -A range of over 800 t-shirts and other cotton apparel<br>-Woven bags (USA and Japan) and t-shirt internet retailing service |
|  | <b>Marshalls</b>            | Complete range of 2,500 paving products  |
|  | <b>Mey Selections</b>       | Scottish honey and shortbread  |
|  | <b>Sentinel</b>             | Central heating cleaning fluid   |
|  | <b>Stalkmarket</b>          | Biodegradable, disposable catering serving packaging   |
|  | <b>Aggregate Industries</b> | 3 varieties of paving products - Bradstones  |
|  | <b>Axion</b>                | Recycled plastic / polymer   |
|  | <b>Baxter</b>               | Flexbumin (healthcare)   |
|  | <b>Suzano</b>               | Paper  |



### 3. Achievement:

In 2009, nine out of 10 households in the UK bought a carbon labelled product and the average UK household spends £78 on carbon labelled products each year. Up to 2010, the Carbon Trust has worked with more than 90 brands and 5,000 individual product lines, helping them to measure and reduce their carbon footprint – and there are many more household names keen to add the Label to their products.

The total retail value of consumer goods sold in the UK bearing the Carbon Reduction Label has just reached £2 billion, and this figure rises to nearly £3 billion if business products, like CEMEX UK and Marshalls PLC., are included. This exceeded the total sales of organic products (£1.5 billion) or Fair trade products (£800m) and is largely due to the addition by Tesco, Britain's biggest retailer, of carbon labels to more than 100 of its own-brand products, including pasta, milk, orange juice and toilet paper. According to The Economist, A British consumer group, found that a fifth of British shoppers recognised the carbon footprint label, compared with recognition rates of 82% for Fair trade and 54% for organic labelling.



Figure.2.4 Actual Carbon Reduction Label on juice

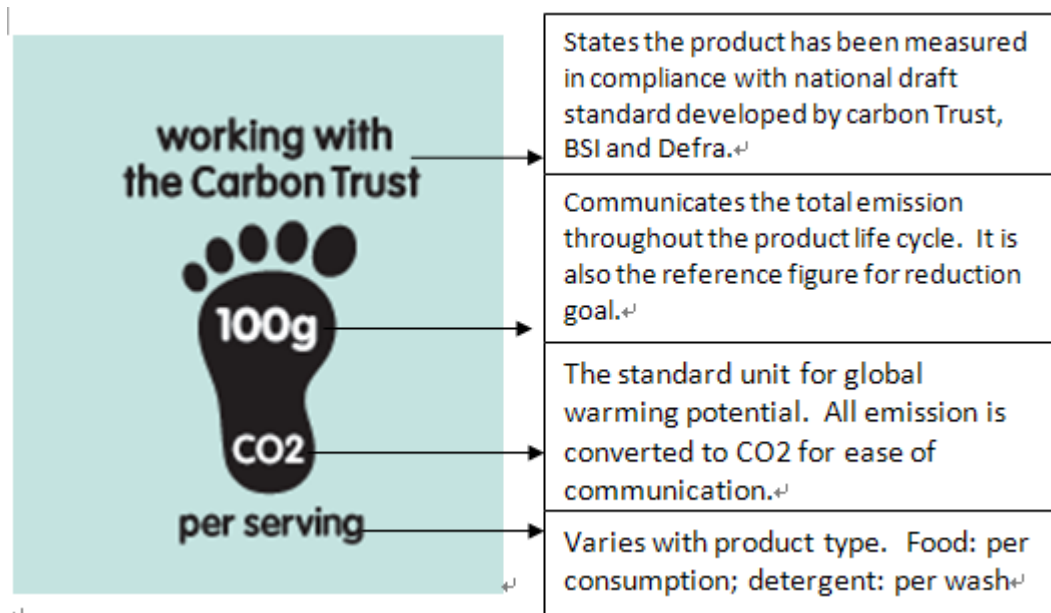
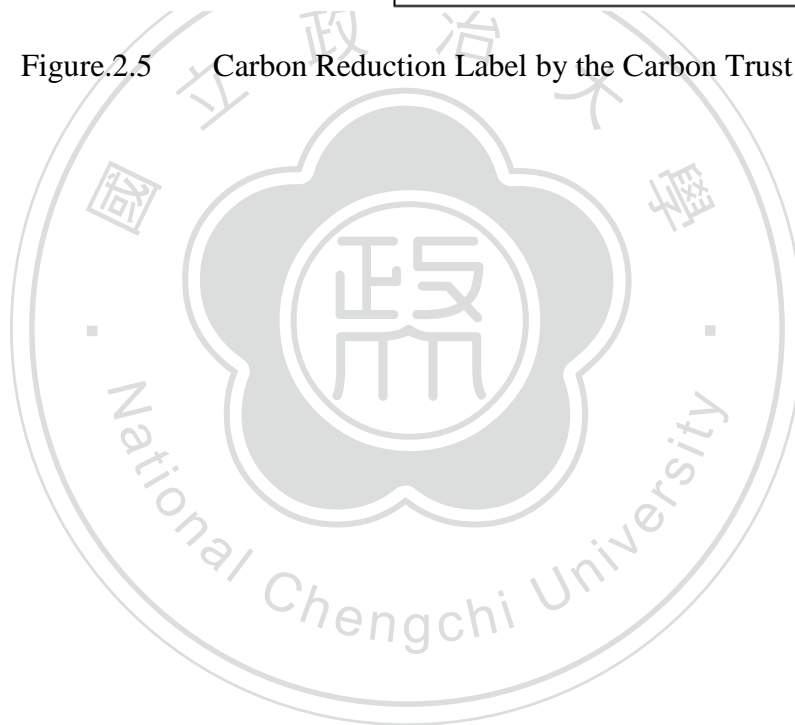


Figure.2.5 Carbon Reduction Label by the Carbon Trust



## **2.2.2 United States**

### **1. CarbonFree® Product Certification**

The CarbonFree logo is issued by a Washington based, not-for-profit organization called Carbonfund. The uniqueness of the CarbonFree label among others is that it comes with a carbon offsetting project, giving the product a carbon-neutral status. The method used for LCA is CarbonFree® Product Certification Carbon Footprint Protocol, which includes any recognized process-based standards such as the GHG Protocol, PAS2050 or ISO14000. Another uniqueness of the label is that it may or may not indicate the amount of the carbon content the product contains, depending on the applicant's preference. For subsequent products, the registration fee will be adjusted to \$500 USD per product. The carbon emission for each product is monitored on a quarterly basis. If the company has not reached its committed emission target, Carbonfund will offset what the company has not reduced, to keep the product carbon neutral. Carbonfund also offers a reduction incentive which is to waive the registration fee for the product for next year if the product carbon footprint (PCF) is reduced by 10%.

### **2. Reduction Projects to Select From**

a. Renewable energy and methane: this type of offsets support renewable energy development projects that help to reduce the amount of energy produced from emission-intensive sources like coal and oil. The project can be implemented within Annex I countries or between both Annex I and Annex II countries. An example of this type of project is the Chino Basin Dairy Farm Biodigester, which generates energy from local manure. The reduction of emission associated with each project is converted into different standards, such as Verified Carbon Standard (VCS) or credit that can be sold to or traded with countries, companies or on climate-related trade

centers, such as Chicago Climate Exchange. The resulting standard or credit must be verified by a third-party, such as Det Norske Veritas (DNV), First Environment or TUV in order to become valid. The renewable projects are of many different types that can be classified as the United Nations's Framework Convention on Climate Change's (UNFCCC) Clean Development Mechanism and Joint Implementation.

b. Energy efficiency and carbon credits: This category invests in projects which reduce the total amount of energy needed to be produced and consumed. Projects which develop efficient technology, such as fluorescent light bulb and LED lamps, are the types of projects offered in this category. For example, the New Zealand Compact Fluorescent Lightbulb (CFL) Project began in 2005 by following a Clean Development Mechanism (CDM) methodology to distribute an initial 62,000 CFLs. Between 2005 and 2007, the Project reduced around 75,000 tonnes of carbon dioxide equivalent emissions and has come up with the goal of expanding its distribution to 3 million CFLs to reduce an estimated 1 million tonnes of CO<sub>2</sub>. Another part of this category comes from the purchase of carbon credit on the climate exchange center. By purchasing the carbon credit, Carbonfund retires the credit which could otherwise be purchased by another company to use and gain permission to increase their GHG emission. This way, the credit will become ineffective, as a result, no emission could be generated from owning the credit.

c. Forestation and Avoided Deforestation: planting trees can sequester the atmospheric carbon dioxide in the tree body and soil and benefit the wild life, community and the entire ecosystem. Other than being a mitigation method, forestation projects also benefit economically and socially. It creates jobs, protects biodiversity, improves local environmental quality and maintains and expands wildlife habitats. Avoided deforestation includes preservation of forests from being

deforested. Forests are a carbon sink to store significant amount of carbon dioxide and often hosts of a variety of species and. According to Carbonfund, deforestation accounts for over 20 percent of global carbon dioxide emissions – more than the entire global transportation sector! Therefore, preservation of forests and forestation is crucial to maintain the level of atmospheric carbon dioxide.

### 3. Participating Companies:

Table.2.2 List of companies that have the CarbonFree label

| <b>Manufacturer</b>                    | <b>Product</b>   |
|--|--|
| Domino Sugar                           | EFG/Refined Sugar (Packaged) with CarbonFree® label  |
| Anvil Knitwear, Inc.                   | AnvilRecycled™ Tee   |
| <b>Florida Crystals</b>                | Organic Sugar (Packaged), Evaporated Cane Juice (Packaged), Golden Granulated Sugar (Tote) |
| <b>GBS Enterprises, Inc.</b>           | Mattress Protectors Twin, Mattress Protectors Twin Extra Long                              |
| <b>Grounds for Change</b>              | All Grounds for Change Coffee  |
| <b>INTEK America, Inc.</b>             | Paper Shredder, Lubrication sheet  |
| <b>LEI Electronics / Eco Alkalines</b> | Batteries  |
| <b>Monarch Beverages</b>               | Beverage: fruit juices   |
| <b>Motorola, Inc.</b>                  | Cell Phone, Wall Charger, Vehicle Charger Adapter  |
| <b>Nika Water</b>                      | Bottled water  |
| <b>Sunlyte LLC.</b>                    | CD, DVD and Bluray packaged discs  |
| <b>Tandus</b>                          | PowerbondCarpet  |
| <b>Tropical Traders Specialty Food</b> | Royal Hawaiian Honey's jars and tubs   |

#### 4. Label Design:

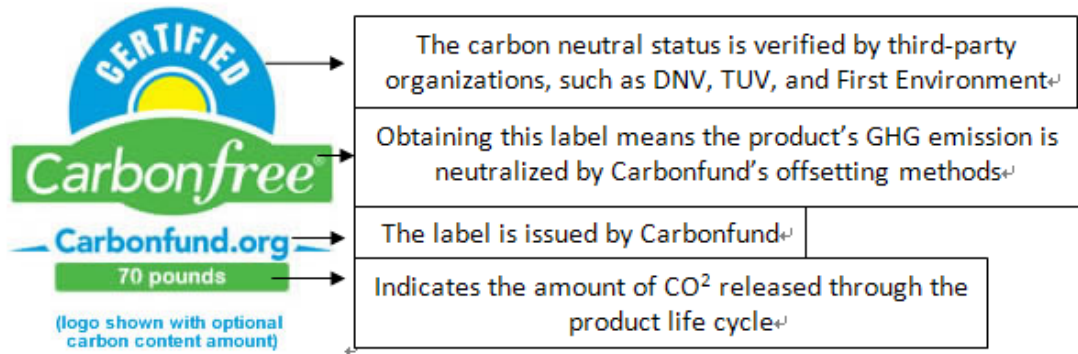


Figure.2.6 The Carbonfree label by Carbonfund

#### 5. Registration Process:

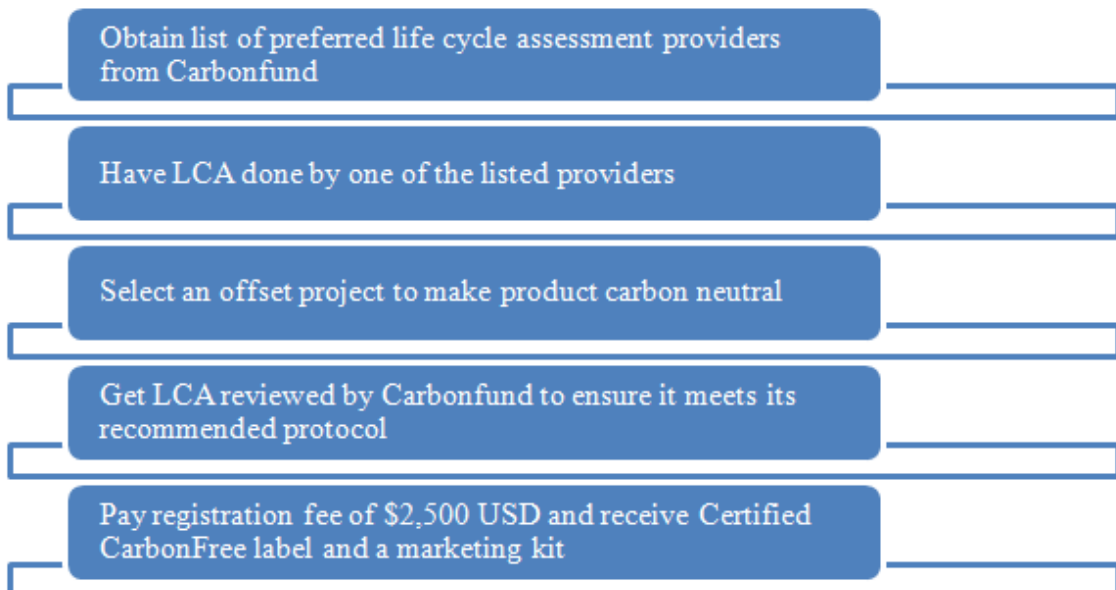


Figure.2.7 Registration Process for Carbonfree label

## 6. Overall Approach:

In the case of the United States, the government's clear stance on rejection of the ratification of Kyoto Protocol results in the absence of solid political power to make change to the current business-as-usual practice of the general public. Therefore, a non-governmental force is emerged to meet the global demands on United States' actions against climate change. Carbonfund's approach fulfils the role of the United States as an Annex I country to engage in Clean Development Mechanism and Joint Implementation projects, which provide financial and technological assistance for both developed and developing countries in projects that will lead to a lower carbon development.

In contrast with other countries' approach, sometimes by the government, others by an NPO, none has the approach like the Carbonfund. In which, the responsibility of mitigation is not only handled by the business which applies for carbon labels, but also by the Carbonfund which issues carbon label. Furthermore, Carbonfund also provides a marketing tool that facilitates the participating companies' marketing plans. The companies which have registered the CarbonFree label all have the label visible on their company website stating the product is carbon neutral.

However, this also gives room to another issue. If businesses know there is always going to be someone to clean after them for their product emission, they will not have the strong will to lower their own emissions. The way Carbonfund works lies in the fact that as long as businesses pay them the registration fee, Carbonfund will neutralize their emission for them. Another issue in Carbonfund's CarbonFree label is that applicants can choose to disclose their carbon emission information or not. This further reduces the strength of the force to make businesses reduce their carbon emission. Therefore, no matter how much emission is generated throughout the



product's life cycle, it will always appear to be carbon neutral. As carbon label is a communication tool to the public, CarbonFree label might become a tool to mislead the public into thinking the product is more environmental-friendly, while in fact, the product generates more GHG emission than other similar products.

Another issue with the CarbonFree label is that, applicants who register for the label will have to choose a supplier from Carbonfund's list of partners to conduct the Lifecycle Assessment. This will all depend on the ethical standards of Carbonfund, whether they will have any means to make its partner work according to their instruction. Finally, the last factor that makes Carbonfund's model worthy of discussion is that the LCA result conducted by Carbonfund's selected partner is approved by Carbonfund, not by a third-party organization who can review the result without any conflict of interest. Of the few countries that have investigated, the US's CarbonFree label is the only one which has not had any retail business cooperating with it.

## 7. Examples of CarbonFree labels on product website



Figure.2.8 Examples of Carbonfree labelled products

# 1. Japan

## Carbon Footprint Label

Since the fiscal year of 2008, The Ministry of Economy, Trade and Industry (METI) has been establishing, developing, and implementing the Carbon Footprint of Products (CFP) system and has launched the Pilot Project in April 2009 in cooperation with related ministries.

As an Annex I country, Japan has vowed to share the global mission of halving total global greenhouse gas emissions by 2050 from its current level of emissions. In the 2008 Action Plan for Achieving a Low-carbon Society document, one of the action plans was to make carbon visible to the public.

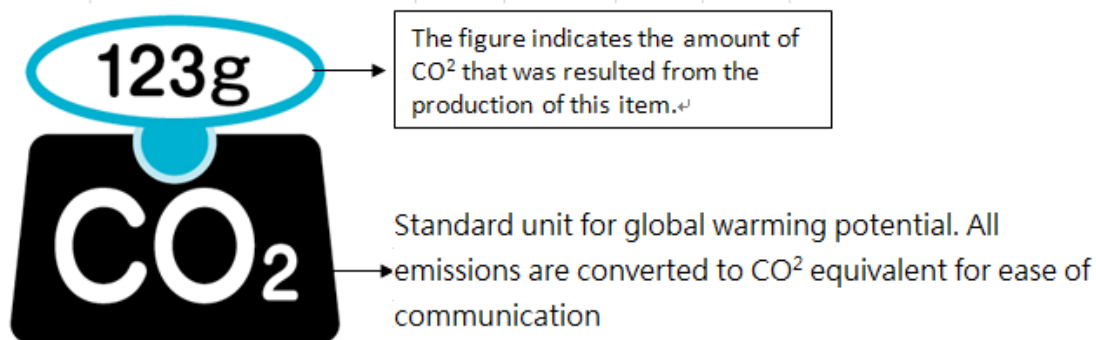
In section 3.Visualization, the two goals are to 1) disseminate the “carbon footprint” system, 2) create rules for carbon offsetting and carbon accounting. The first goal, to disseminate the carbon footprint system is to make as many goods, foodstuffs and services’ greenhouse gas information visible to consumers as possible. The short-term goal is to solidify the guideline for calculation, ensuring credibility and displaying of carbon footprint information. This involves developing a carbon footprint system that is in alignment with international standard, and contributes to the development of the system under the International Organization for Standardization (ISO).

The second goal, to create rules for carbon offsetting and carbon accounting is to determine the methods for calculating the amount of emissions to be offset and the amount of emissions reductions to be used in offsetting, the way to ensure the certainty of the reductions, the way to prevent double counting of the reductions, and etc. Basically, it involves selection of method for measuring, setting the reduction goal, verification of reduction result, avoidance of measurement errors. Part II of the

goal 2 is Carbon accounting, which makes disclosure of both greenhouse gas emissions and emission reductions from business activities converted into carbon equivalents mandatory to corporate environmental information disclosure. Implementation methods and rules will be examined during FY 2008, and the findings will be made public.

## 2. Japan's CFP label

Japan's CFP label design was chosen out of a public invitation which received 515 applications. The author made the label to look like a kitchen scale because he wants to make CO<sub>2</sub>, an intangible substance, to have its own weight that can be visualized and felt concretely by people.



### 1. Achievements

#### 1. Establishment of the Basic Rules on the Carbon Footprint of Products (CFP) System

- Launch Study Group on Rules for Calculation, Labeling and Evaluation of CO<sub>2</sub> (GHG) Emissions. The study group consisting of intellectuals discussed technical issues regarding the institutional design of the CFP system.

The study group developed two documents as the basic rules on the CFP system:

- (1) Basic Guideline of the Carbon Footprint of Products (CFP): Provide the calculation and communication method of the CFP as well as the background and purposes of the CFP system

(2) Guide of Establishing Product Category Rules (PCR): Provide common criteria to develop PCRs.

## 2. Promotion of Carbon Footprint of Products System

### - Launch Study Group for Development and Promotion of CFP Program

The study group consisting of intellectuals, companies and private organizations discussed issues regarding the practical application and promotion of the CFP system.

Companies which participated in the study group exhibited their products with the CFP label on a trial basis at an exhibition called “Eco-Products 2008”

### - Deciding the design of CFP Label

Ideas for the CFP label design were invited from the public and selected from the applications.

### - Exhibition at Eco-Products 2008 on a trial basis

Companies participated in the Study Group for Development and Promotion of CFP Program exhibited their products with the CFP label at “Eco Products-2008” on a trial basis and a survey on consumers’ attitudes toward this program was conducted.

In addition to the exhibition, some intellectuals gave lectures at seminars to raise awareness and promote the CFP system.

## 3. Contribution to Establishing the International Standard

### - Establish ISO CFP Mirror Committee

The committee consists of intellectuals, 26 industrial circles, consumer groups, accreditation bodies, certification bodies and government officials discusses and reviews Japanese policies for international standardization based on Japan’s experiences - such as the development of the basic rules on the CFP system - and other various trials, and proactively contributes to the discussions at ISO concerning international standardization of issues related to CFP.

## 2. For government: Establishment of CFP system

The CFP pilot project included Four Main Activities:

### (1) CFP Calculation & Labeling Pilot Program

The CFP calculation and labeling were set as standard and the process of CFP registration was also set as standard. PCR committee, consisting of academic scholars and consumers, was also established to review the calculation and labeling setting. At the Eco Products-2009, companies which have made it through the third-party verification stage can market their products with the CFP label. In addition to exhibiting at the Eco Products-2009, educational seminars were given by experts to raise public awareness on CFP.

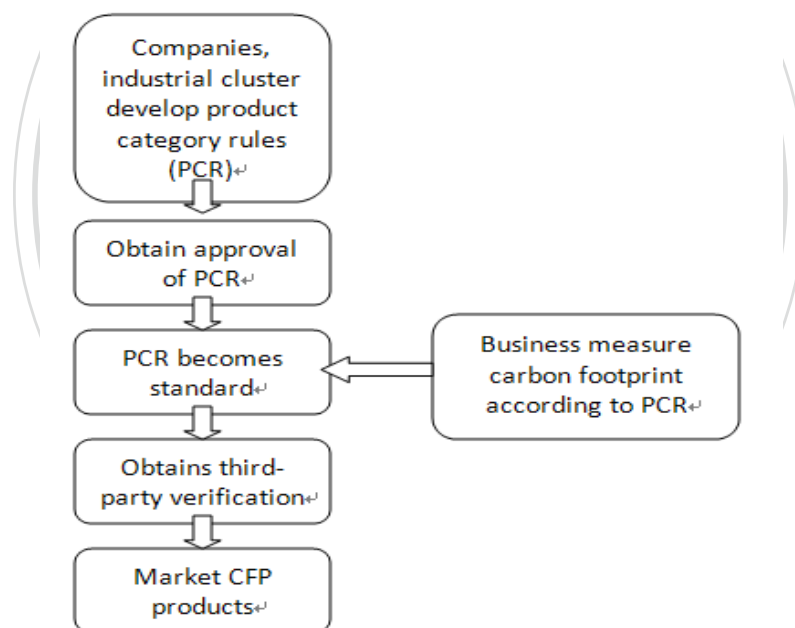


Figure.2.9 Registration of Carbon footprint label

### (2) Database construction

As companies participate in the pilot project, the measured GHG emission factor of each step of the life cycle is recorded in the database and the experimental database has been released and new items will continuously be added. The GHG Emission Factors Review Committee, consisting of third-party academic scholars, is

responsible in reviewing the database. The database is developed under the supervision of National Institute of Advanced Industrial Science and Technology (AIST) and verification by GHG Emission Factors Review Committee. The database was developed by collecting and arranging data from various sources such as documents and research materials to support the CFP Pilot Project in FY 2009. A new database which provides more detailed and exhaustive GHG emission factors is under construction. This new database is aiming to cover 1,500 or more items and will be released at the end of FY 2009.

### (3) Building Verification Scheme

Ensure credibility of CFP. As CFP becomes an important communication tool for business to consumers, it must be free of manipulation and bias. For business, having a transparent system gains trust from consumers and for consumers, they can rely on the CFP label when they make their purchase decision. Therefore, building a reliable verification scheme is important for both businesses and consumers.

### (4) Contribution to Establishing International Standard

Japan is actively involved in setting the ISO standard, which will become a widely adopted standard that can be used across the continents.

## **3. Implementation of CFP Label**

This flow diagram shows the process of implementing CFP label on products. Note that the inputs are two ways. First, there is the national government side initiating the plan. Alongside is the consumer voice that fuels the demand for CFP label. Second, on the bottom side, international standard provides input for building verification scheme which must be synced with Japan's national verification scheme. While companies conduct life cycle assessment, they provide the GHG emission factor to the database and facilitate database construction. In the center is the result of

the inputs from both side, the establishment of a CFP system. As companies deliver CFP labelled products to market, they constantly receive feedback from consumers through the governmental survey. This plan takes into international input, alongside with national political power and consumer power to generate a holistic picture, with a positive cycle fuelled by consumer demand, governmental support and business input.

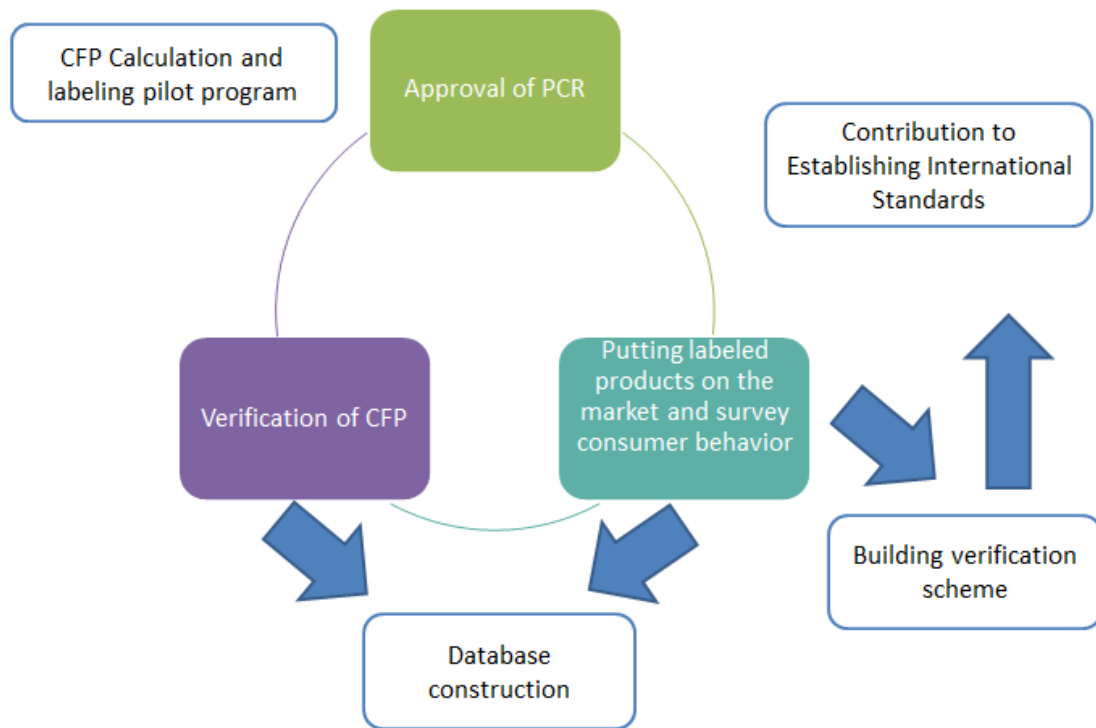


Figure.2.10 Implementation of Japan CFP

#### 4. For Business: Application procedure

The first step is apply for draft PCR development plan. Once the registration has been confirmed, applicant start to draft the PCR, then it has to pass through public opinion to move and PCR committee to the CFP calculation part which needs to be verified by PCR committee in order to finally market the product.

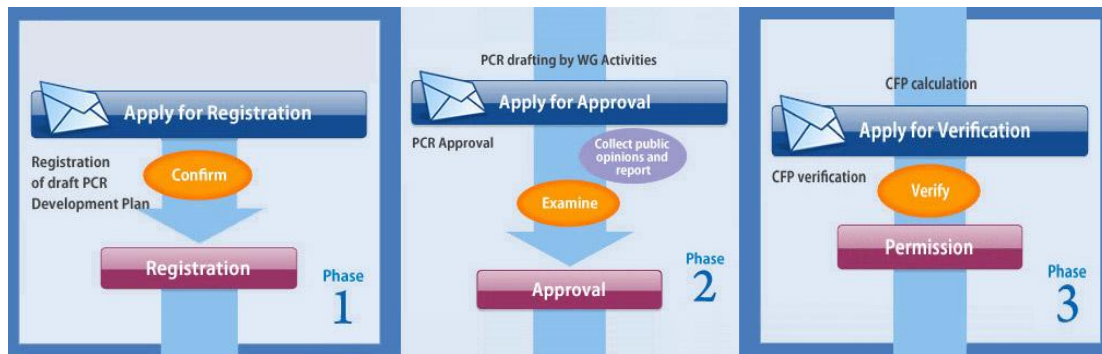


Figure.2.11 Application of Carbon Footprint Label

## 5. Overall Implementation Strategy

Japan's implementation of carbon footprint integrates three aspects: making a guideline, taking complementary actions (exposure, education & promotion), and making it an international standard. Japan's implementation considers the issue from political, educational and business perspective and identifies the need for integration of the three pillars in order to make carbon footprint labelling a sustainable practice. Currently, carbon footprint labelling is not a legally binding policy. It relies on the public and businesses to make it into a sustainable and widely acceptable practice.

When consumers demand for carbon footprint labelled products, their voice manoeuvres business's development direction. However, when consumers are not aware of carbon footprint label and do not care about climate change and carbon emission, businesses cease the engagement in carbon footprint labelling because it requires change in business-as-usual practice and incurs a short-term cost. Therefore, education, exposure, and promotion on carbon footprint labelling practice are all important in order to sustain the invisible hand to drive business's engagement.

Businesses need governmental, channel, and marketing support in order to maximize the benefit and sustain the practice of carbon footprint labelling. The survey also raises consumer awareness in carbon footprint labels, the feedback from the survey will then act as another input to stimulate companies to work further to make carbon



footprint labelling a nation-wide practice. METI's action plan on visualization on carbon emission is a well thought-out plan that sees the true driver of the labelling practice, which is the market demand, and uses complementary measure (exposure, education & promotion) to continue to fuel the demand for labelling practice. This is a picture on the brochure distributed at the Eco Products-2009 exhibition. The companies participated in the CFP pilot program were invited to exhibit their products with the CFP label at the Eco Products-2009 exhibition.

Below is the brochure for promotion of carbon footprint label. From the brochure, the key benefits of CFP label can be clearly seen. First, to businesses: it stimulates all parties along the supply chain to think about their emission and think about how to improve its current status. Second, to consumers: it reminds consumers that there is a new factor to consider when they make their purchase decisions. The two-way arrow in the centre indicates the mutual relationship between business and consumers. Though business and consumers are on two sides of the issue, one side's reaction will affect the other and the same for the other way around.

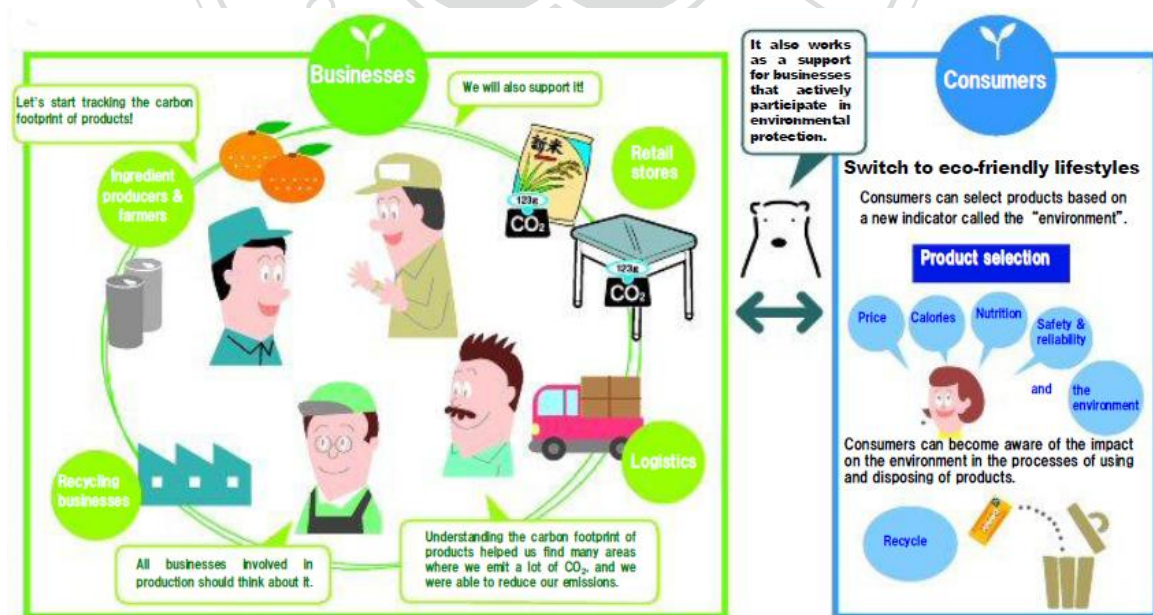


Figure.2.12 Carbon Footprint Brochure

## 6. Achievement:

Currently there are 50 products that have been approved for the PCR and 8 products have the CFP label on them. The products range from food to furniture to fire extinguisher.

## 7. Participants:

Table.2.3 List of companies that have participated in the Pilot Project:

| <b>Retail</b>           | <b>Consumer goods manufacturers</b> |
|-------------------------|-------------------------------------|
| • AEON • Seiyu          | • Sapporo                           |
| • Seven & i Holdings    | • KAGOME                            |
| • Lawson • JCCU (Co-op) | • Nestle                            |
| • Marui • UNY           | • Calbee                            |
| • FamilyMart • CGC      | • AJINOMOTO                         |
|                         | • Nissin Food                       |
|                         | • Nippon MeatPackers                |
|                         | • NISSIN SEIFUN                     |
|                         | • KAO                               |
|                         | • KIBUN FOOD CHEMIFA                |
|                         | • Lion                              |
|                         | • Unicharm                          |
|                         | • Panasonic                         |
|                         | • Toshiba Lighting & Technology     |
|                         | • KOKUYO Furniture                  |
|                         | • KOKUYO S&T                        |
|                         | • KOKUYO Store Creation             |
|                         | • Dai Nippon Printing               |
|                         | • Nihon Tetra Pak                   |
|                         | • TOYO SEIKAN                       |
|                         | • CHUO KAGAKU                       |

## 2.2.3 France

### 1. France Grenelle 2 Indice Carbone (Carbon Index)

“Grenelle 2: the bill on the national commitment to the environment” is a five-year plan for France’s nationwide sustainability with targets set between 2008 and 2050. It is also the first one in European Union to make environmental label a compulsory measure for both imported and local goods. One of the goals of the plan is to engage consumers into nationwide sustainable development through raising consumers’ awareness of their carbon footprint. The proposed bill would make environmental labels mandatory on all consumer products sold in France, including agricultural/food products, beginning January 2011.

The environmental label is estimated to cost as much as 5% of the final product price; the cost will be carried by either French consumers or retailers and producers who have agreed to share the burden. The plan aims to reduce carbon emission through the adoption of sustainable methods of production and consumption, and increase of consumers’ awareness of the environmental impact of products, which would include but not limited to carbon footprint.

Grenelle 2 is a legislative package which has been approved by the French Senate in October 2009, and was being reviewed by the National Assembly in April 2010. The Ministry of Ecology works on the implementation regulations, also known as Implementation Decrees, which should be published once the law has been approved by the National Assembly. To prepare for the implementation of Grenelle 2, French government has asked ADEME and AFNOR to form working groups. The Grenelle 2 consists of two principles 1) The emission will be cut off at the point of sale (the emission post-purchase will not be included in the label) 2) the label will not

be limited to carbon footprint (will include other environmental impact indicator such as biodiversity and water quality).

Agricultural and food products will be the first to fall under the Grenelle 2 as these though not account for significant portion of consumers' income, they are frequently purchased. Frequent and broad-scope (exposure to almost everybody) contact with the label will be the most efficient way to raise consumers' awareness of GHG emission and climate change.

Grenelle 2 emerged out of the Grenelle Forum (France's environment round table), the forum that brought together the government, local authorities, trade unions and non-governmental organizations to develop new policies focused on tackling environmental issues. The round table led to the adoption of The Grenelle: Act 1 on 21 October 2008 by the National Assembly and Grenelle 2, promulgated on 12 July, 2010. Grenelle Act 1 defines environmental targets for the coming years while Grenelle Act 2 focused on raising consumers' awareness of the relationship between consumption and environmental impact and providing the legal tools to implement the environmental targets set out in Act 1. Grenelle Act 2 also comes with an obligation to carry out an experimentation, which calls for volunteers from organizations (from companies or consortia of companies, trade unions, professional bodies, etc.) of all sizes and from every sector in order to create the a broad and diversified sample group on the basis of a requirements specification drawn up as a result of a series of meetings and consultations with different stakeholders (National Committee for Sustainable Development, Grenelle Environment Forum, ministries, the AFNOR ADEME platform [French standardisation body/French agency on environment and energy management] , the French National Consumer Council, etc.).

On 3 November 2010, the French Ministry for Ecology and Sustainable Development called for applications addressing companies to participate in a national experiment on the environmental labelling of consumer products. This experiment is foreseen in Article 228 of Grenelle II Law. The national experimentation operates for at least one year starting from 1 July, 2011 and collects information to optimise conditions for implementing environmental labelling/display.

The experimentation is led by the Minister for Sustainable Development (MEEDDM) in close collaboration with the DGCCRF (French office of fair trading, consumer affairs and fraud control). Article 85 of Grenelle II is an obligation for companies to disclose their carbon footprint on products, packaging and transportation services. It also sets the legal framework to avoid advertisement misleading and provide companies with a reliable method to assess the environmental impacts of their products. Casino and E.Leclerc are the early players of environmental labelling, however, the methodology used was different between the two. This shows that no nation-wide standard for methodology exists in France.

## **2. Parties involved:**

- French Senate: approval of the bill
- National Assembly: review of the bill
- The Ministry of Ecology: develops the implementation regulations (Implementation Decrees)
- Agency for Environment and Energy Management (ADEME): establish working groups
- AFNOR (the French agency for standardization): establish working groups
- Working Groups: consist of trade, retail and producers associations, NGOs, and representatives of the government

### **3. Overall Implementation Strategy**

France's approach of implementing carbon footprint label through formal legislation is unique among the countries that have initiated the practice. The top-down approach reflects France's strong commitment in achieving Grenelle Act II's nationwide sustainable development objective. With carbon footprinting becoming a mandatory practice, businesses are compelled to learn the practice and widely adopt it. Through the legal force, businesses will need to lower their carbon emission in order to remain competitive when carbon information from all competitors is revealed and comparison tool is developed. From consumers' aspect, legislation of Grenelle II is a strategy which uses legal force to facilitate awareness of climate change and GHG emission, and use the resulting consumer awareness to stimulate companies to lower their emission. From business's aspect, the legal force also compels businesses to change their business-as-usual behaviour and speed up the process of wide adoption of carbon footprint labelling and move towards nationwide sustainability goals. From the environment's aspect, as businesses compete within their sector for low GHG emission, the resulting reduction from the competition will ultimately benefit the environment and humans. This strategy requires strong commitment from the nation, government and business and it is not a frequently used strategy for the implementation of carbon footprint labelling. The good response of Casino Group's Carbon Index from the surveyed consumers and the awards given to Casino Group all act as positive inputs for Casino Group and others' engagement into carbon footprint labelling. The competition for the lowest GHG emission is the kind of competition where not only the players and consumers benefit from it, but mostly importantly the environment.

#### **4. Achievement:**

- Start in July 2011 with 168 companies and approximately 1000 products
- Supermarket chains: Casino and E. Leclerc.



## **2.3 Global Cases of carbon footprint labeling**

### **2.3.1 Wal-Mart**

#### **1. Introduction**

Wal-Mart, the world's biggest retailer, has announced to introduce the sustainability index (SI) in July 2009. The Sustainability Index was started in 2008, and kept quiet until 2008. If the project succeeds, it will revolutionize the retail industry and lead to wide-scale change in practice and reduction in carbon emission. As a pioneer in the industry, Wal-Mart expects to see environmental impact label to be an international standard and SI will have the possibility to be adopted by the government and become a de jure standard for the public and industry. The Sustainability Index measures the environmental impact of Wal-Mart's every product. Since Wal-Mart is not a manufacturer of the products it carries, the measurement will be done by its 100,000+ global suppliers network. As the largest retailer in the world, Wal-Mart has a strong bargaining power among suppliers. Therefore, to maintain cooperation with Wal-Mart, suppliers must play according to its game rule. Due to the overall goal of lowering carbon emission of every product it sells, suppliers with best practice of energy use and GHG management will be best favoured by and win cooperation with Wal-Mart.

#### **2. The SI is introduced in three phases:**

##### **Step 1: Supplier Sustainability Assessment**

Walmart provided their more than 100,000 global suppliers with a survey to evaluate their own sustainability. The survey, being rolled out in the international market, included questions with yes/no answers and those with free text answers, was taken by their top-tier suppliers by October 1, 2009. Examples of the questions in the



survey included whether the respondent has taken measures to reduce their environmental impact, what is the GHG emission that was last reported by the respondent. With the collection of insider's info from suppliers, Walmart is on the way to enhance transparency in their supply chain.

### **Step 2: Lifecycle Analysis Database**

As suppliers become aware of the GHG emission of their operation and manufacture of Walmart products, Walmart goes into the next phase of building up the lifecycle analysis database (LAD). The LAD is developed by Walmart along with the Sustainability Consortium to collaborate with suppliers, retailers, non-governmental organizations (NGOs) and government officials to conduct research and develop data and tools that will lead to research-driven product sustainability measurement and reporting. The Sustainability Consortium is composed of global partners from large multinational firms like Dell, Pepsi, competing retailers like Target and Costco, and academic institutions such as Arizona State University (ASU) and University of Arkansas (UA). The Consortium, administered by ASU and UA, will help develop a global database of information on products' lifecycles-from raw materials to disposal. Walmart provides the initial funding for and is one of the directors on board of the Sustainability Index Consortium.

### **Step 3: A Simple Tool for Customers**

As life cycle analysis database builds up and suppliers start to measure and disclose their GHG information, the information will get compiled and converted into a communication tool to inform consumers of the GHG emission associated with the lifecycle of the product and facilitate consumers' decision making.

### **3. Achievement**

Supplier Dana Undies, the world's largest privately-owned manufacturer of children's underwear, saved 71% off its annual energy bill by implementing energy efficiency best practices identified through Wal-Mart's Supplier Energy Efficiency Program.

### **4. Involving parties**

-More than 70 organizations, including NGOs, government agencies, academic institutions, suppliers, retailers and food service companies to conduct research and develop data, tools and protocols for a product sustainability measurement and reporting system (SMRS).

### **5. Key successful factors:**

Walmart will trigger the revolution of entire supplier ecosystem, these suppliers also supply products to other retailers, and working with Walmart will also make them more ready to work with other retailers in the future as environmental labelling becomes a standard.

- The largest retailer in the world has enough bargaining power to make suppliers play according to their rule
- Business model as a retailer; retailer has its own channels, and for suppliers, the most important thing is channel
- As a pioneer in the retail industry, Walmart will have the first-mover advantage

## 2.3.2 Walkers

### 1. Introduction

Walkers, the largest chip maker in the United Kingdom and the most popular crisps brand, is a subsidiary of Pepsi Co. that manufactures and distributed potato chips with brand names such as Lays. In 2006, they teamed up with Carbon Trust, a not-for-profit organization established by the UK government to facilitate companies reduce carbon emission and move towards sustainable practices. In their collaboration, Carbon Trust provided knowledge and consultations for Walkers in the emission life cycle assessment of Walkers' chips. At the end of the assessment, they identified the step where most CO<sub>2</sub> gets produced is during the production of the raw material, potato. Before the identification of emission hot spot, Walkers was using potato that were flown to UK from other countries which during the process would release a significant amount of CO<sub>2</sub>. Having identified the emission hot spot, Walkers started to use local potatoes that reduced the need for air transportation and as a result has lower emission level. A complete breakdown of the emission life cycle is as follows. Post the flow chart from link

### 2. Achievement:

Achieved its two-year carbon reduction target of 7%, realised a net savings of £400,000 on its bottom line as a direct result of its carbon footprinting and carbon reduction exercises.

## 2.3.3 Casino Group

### 1. Introduction

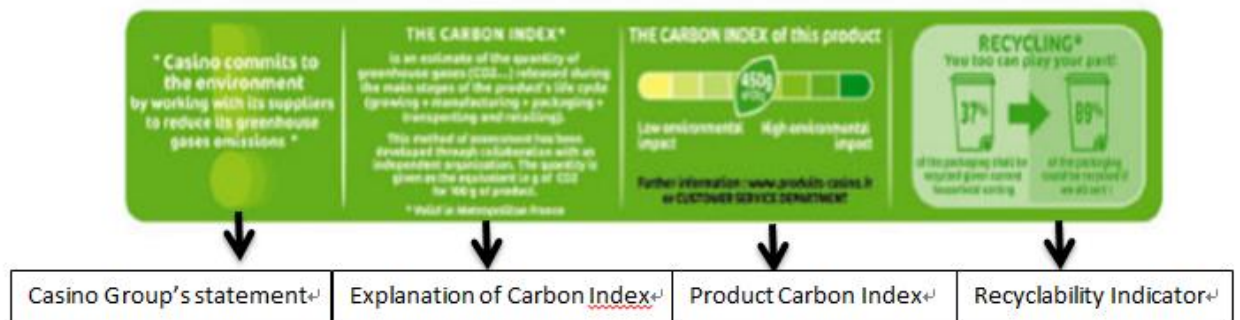
Casino Group, a French multinational corporation, is one of the world's leading supermarkets. It launched Carbon Index in 2006 and worked with specially trained consultants and ADEME to assess the environmental impact of their products. The index is expressed in grams of CO<sup>2</sup> equivalent per 100 grams of end product and offers a source of comparison between different products. The Casino Carbon Index is a measure of the greenhouse gases emitted throughout 5 key stages in the life cycle of each Casino brand product: production; manufacture; transport, from the field to the Casino warehouses; packaging, from raw material extraction to recycling; and distribution, from the Casino warehouses to the consumer's home. By December 2008, Casino Group had 26 of its brand-name products with Carbon Index label. The long term goal is to have 3000 products in total to be labeled with Carbon Index. Casino Group used an LCA methodology developed by environmental consultancy Bio Intelligence Service (Bio IS) in early 2006; however in the future, the methodology will be altered to incorporate UK's PAS 2050. Not only does Casino Group take environmental responsibility into their own operation, it also brings suppliers to the table to engage them in the labelling system. Casino Group also conducted consumer survey to gather consumers' perspective on the carbon index label. At the beginning of 2010, a survey of 1000 people found that: 84 % of the consumers consider the carbon index to be understandable; 81% think it is a useful way to protect the environment; and 42 % say that it is a way to help them daily to make the best choices. In June 2008, they hosted 500 suppliers of Casino-brand products at a forum designed to introduce them to this environmental labelling system. Casino Group provides suppliers with free software which contains the relevant

information for calculation of the Carbon Index that is attributable to their production decisions and purchases of raw materials. Since the introduction of Carbon Index in 2006, more than 20 metric tons of CO2 equivalent have been saved on products carrying the new information.

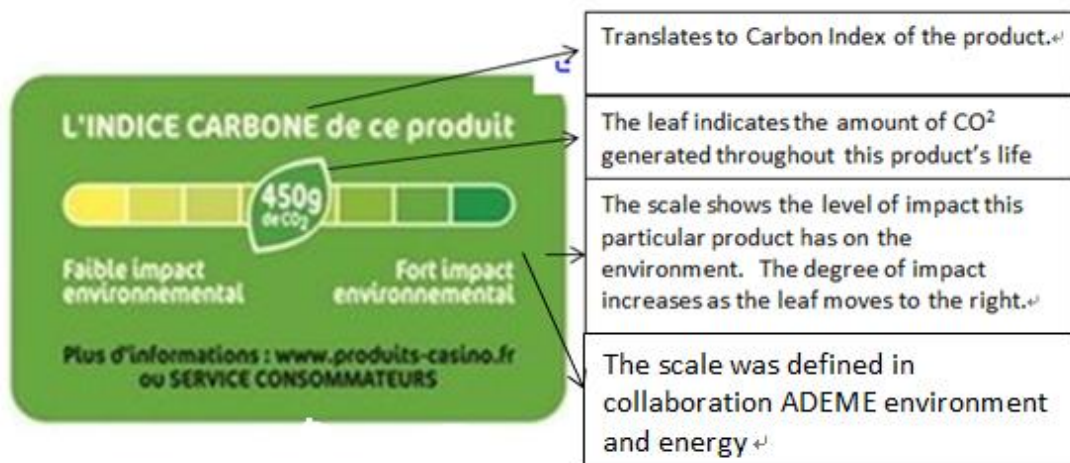


## 2. Label Design

Casino Group's Carbon Index has two sides. The front side indicates the below information. Below the leaf is the instruction to see the back for more information.



This label shows two sides of different colours. The light-green side shows the percentage of material that can be recycled using current household sorting. The dark-green side shows the percentage of material that can be recycled if all consumers sort their waste properly.



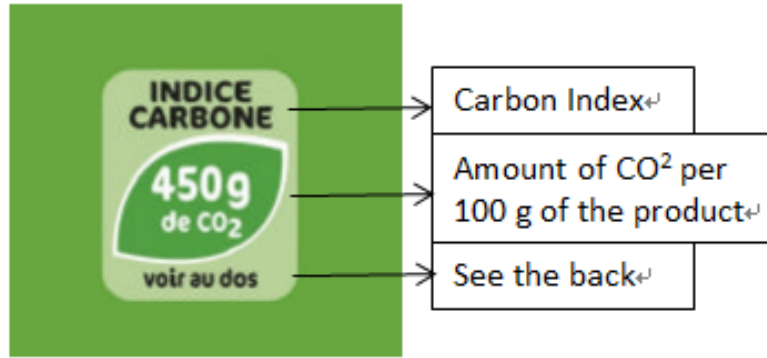


Figure.2.13 France's Indice Carbone

### 3. Recognition of the project

The Carbon Index initiative, the first of its kind in the retail sector has won the Group numerous awards. After receiving the honorary Marianne d'Or award by France's local authorities in late 2007, Casino Group was awarded a Business and Environment Prize in 2008 in the area of "Sustainable Development Initiatives" by France's Ministry of Ecology, Energy, Sustainable Development and Town and Country Planning.

### 4. Post-Carbon Index Actions

Following the life cycle assessment, the emission hot spots were identified: the refrigeration (accounted for 18% of GHG emission), goods transport (accounted for 16% of GHG emission), and packaging. The subsequent actions of Casino Group was to replace the old-generation refrigerant, deploy GPS and renew tractor unit fleet with new-generation units, and reduce packaging of goods.

## 5. Complementary measures

In addition to the consumer survey involving 1000 subjects, Casino Group also developed communication channels such as the website providing more detailed information on products which was not placed in the label because of insufficient space, in-store advertisement such as brochures and posters, and awareness building message in communication media such as inserts in flyers, magazines.

## 6. Key Successful Factors

- Is an early player in the new game
- Possesses its own channel
- Has complementary awareness-raising measures
- In alignment with government development goal





# Chapter 3: Research Methodology

## 3.1 Research Methodology

The thesis focuses on the strategy associated with carbon footprint labelling (CFL) from a top-to-bottom approach. The top-to-bottom approach is studying what and how the other countries do the implementation of carbon footprint labelling and then investigate how CFL is done in Taiwan and by two particular companies from different industries. Two companies of different industry are selected for in-depth interview to investigate whether similarity exists across different industry, where the difference happens and what the problems are for different industry. Acer is a Taiwan-based multinational high-tech company producing information technology and electronics corporation. Taisun is also a Taiwan-based company with products all around the world. Different from Acer, Taisun is a major food maker with popular products like water, sweet congee, and beverages. Due to the nature of the industry, the complexity and lifecycle of the products vary apparently; therefore, an investigation of Acer and Taisun is done to reveal how the difference will result in a different approach to implementation of carbon footprint labelling. Another difference arises from the composition of the supply chain and business operation. Taisun is a manufacturer itself; Acer is a brand company, which outsources its manufacturing to its supply chain; therefore, the way of doing carbon footprint labelling is different.

The research is done in two parts: 1) the investigation of global development of CFL through literature review 2) the investigation of two Taiwan-based companies through in-depth interview (chapter V). Literature review contains 3 parts which are 1) explanation of carbon footprint labelling and its measurement schemes 2) global

development of carbon footprint labelling 3) global cases of carbon footprinting.

Chapter V includes in-depth interview of Acer and Taisun.

The interviewee of Acer: Mr. Qiming (Richard) Lai, director of Corporate Sustainable Development Office.

The interviewee of Taisun: Mr. Yuping (Prine) Wang, director of food marketing. The source used in this thesis includes company website, financial report, sustainability report, government website, and interview information.

### **3.2 Interview Outline**

The interview was guided by the below interview outline. The interview is based on five parts: Motivation, Planning, Execution, Problems, and Performance

#### **Outline of Interview: Carbon footprint Labelling**

##### **Stage 1: Motivation**

**Passive:** Regulation

**Active:** Company vision, consumer voice, climate change, corporate image

##### **Stage 2: Project Planning**

Project Design and Product Selection

##### **Decision making (what are the factors involved)**

-Factors influencing decision: cost vs. benefit

-Limits: internal vs. external

-Internal: employee education, budget, influence on company strategy, impact on departments (similar products)

-External: influence on related parties (partners, competitors-giving negative pressures), government influence

### **Stage 3: Execution:**

What role does company X play in the project? What kind of product to do? What are the consideration factors for selection of product? How to make business partners engage in the project and what kind of benefit does company X offer. What kind of support/resource does company X need to provide? How does company X use the information? For product development or marketing purposes? How to make value out of the project?

#### **Marketing Project**

**Resource allocation:** which department, who's in charge, budget planning

**Cooperation:** who are the parties

**Cost composition:** what makes up the cost

**For exporting products:**

Transportation: air mileage is the greatest factor contributing to carbon emission

**For general goods: reaching consumers**

Storage condition

Travel distance to obtain goods: air flight

Distribution centers:

**Q1.** How does company X handle this?

**Q2.** Will the label give more competitive advantage to the product in its markets (local and exporting markets)

**Q3.** Consumer response to carbon labels: too much information or improve sales?

### **Stage 4: Problems Encountered**

### **Stage 5: Achievement**

### **Stage 6: Opportunities**

# CHAPTER 4: Industry Review

## 1. Taiwan Carbon Footprint Development

To combat against climate change and align with international development on climate change actions, Taiwan introduced the carbon footprint label on Dec 15 2009 and expected to introduce labeled products in March 2010. To encourage businesses to disclose product carbon footprint and implement labelling scheme, Environmental Protection Administration of Executive Yuan published the “EPA’s Key Points to Implementation of Carbon Footprint Labelling” and “Regulations for registration of carbon footprint label” and established the “Taiwan’s Product Carbon Footprint Information Website” which went online on May 10 of 2010. On the website, one can apply for carbon footprint certificate electronically. The pioneering period started from May 14 and end on December 31 2010. During this period, applicants with complete document portfolio were exempt from application screening fee and certification fee. Once the product has received carbon footprint certificate, businesses are allowed to disclose carbon footprint label and the carbon footprint value on the product, packaging, place or other marketing media.

The Carbon footprint label has two stages of development. The first stage is to confirm the calculation standard and method and establish the carbon footprint label institution. The principle strategy is to design a uniformed carbon footprint label and establish the carbon footprint registration/approval institution and reward for voluntary carbon footprint label. The second stage is to make carbon footprint label a common practice and develop low carbon footprint label (emission below base level emission). The principle strategy to drive the plans are to align the calculation and communication standard with ISO 14067 and establish product carbon footprint

database and develop low carbon label.

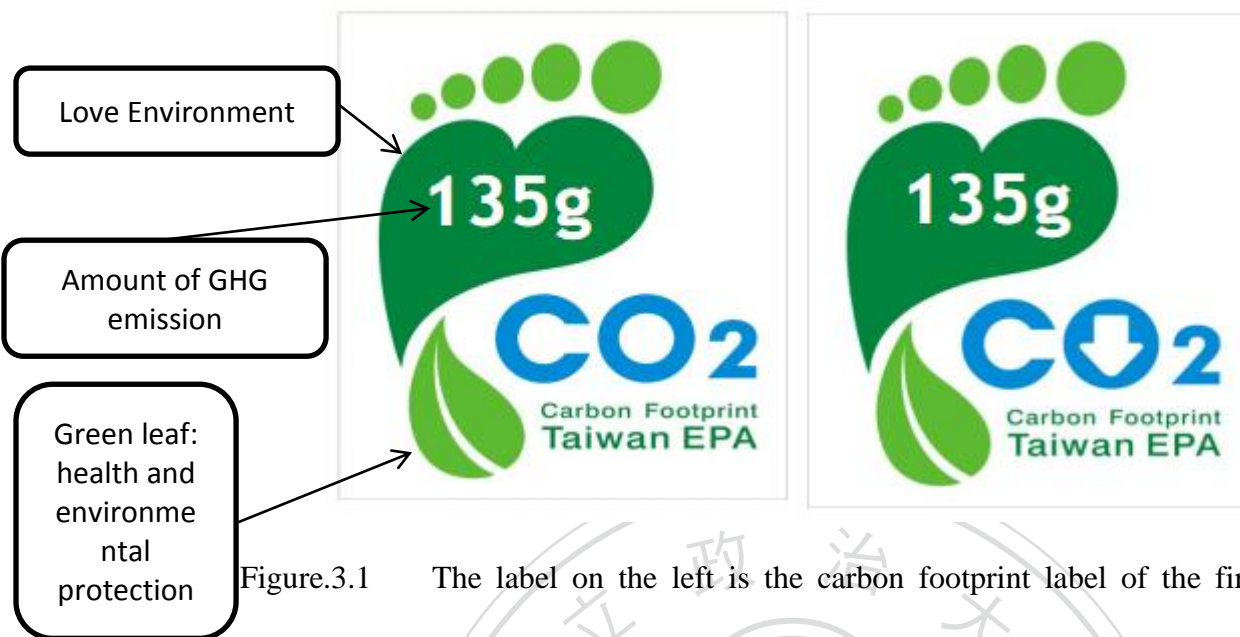
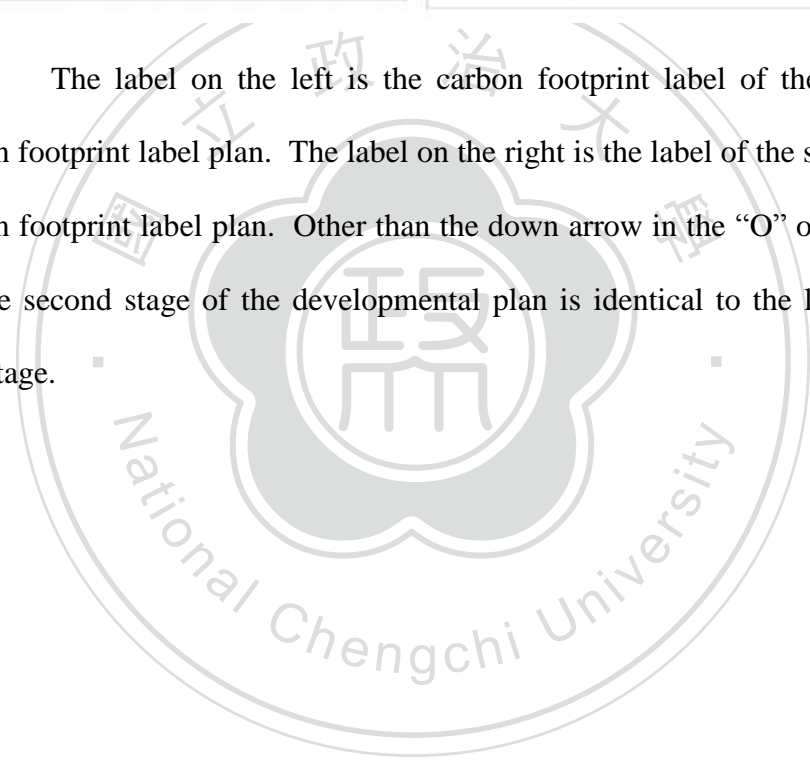


Figure.3.1 The label on the left is the carbon footprint label of the first stage carbon footprint label plan. The label on the right is the label of the second stage carbon footprint label plan. Other than the down arrow in the “O” of CO<sub>2</sub>, label for the second stage of the developmental plan is identical to the label for the first stage.



## 2. Steps to obtaining Carbon Footprint Label:

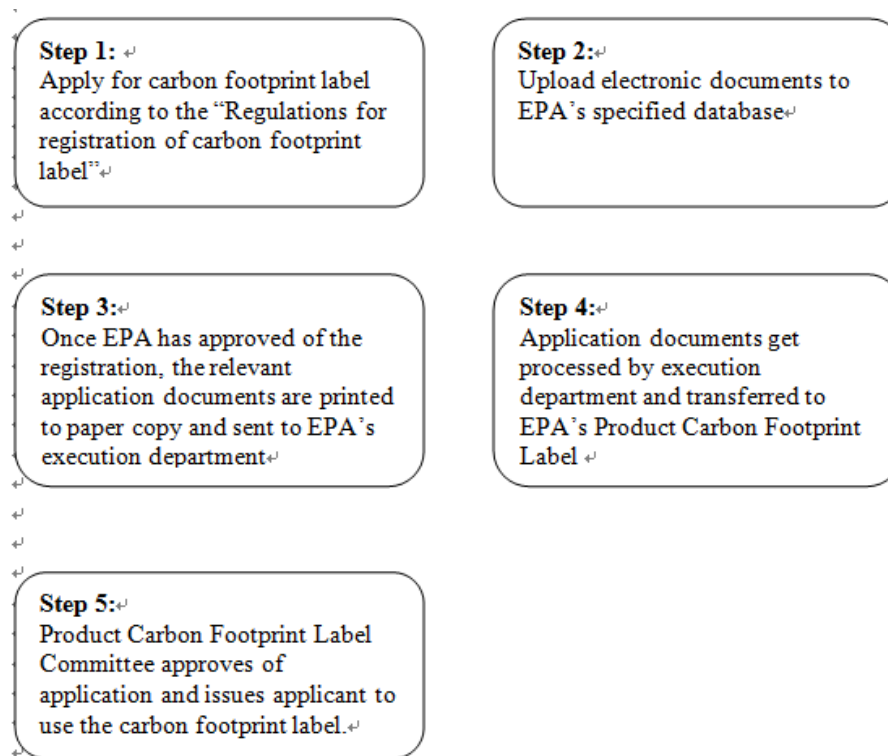


Figure.5.1 Registration of Taiwan's carbon footprint label

## 3. Steps to Implementing Carbon Footprint Label: Case of AU Optronics (AUO) TFT-LCD TV

### 1) Formation of task team:

The project involves product life cycle assessment; therefore, team background included environmental, research & development, supply chain management, product management, and operation department. The project manager is responsible for integration of tasks.

### 2) Setting the Scope:

The task team decides which product to implement carbon footprint labelling and separates the individual components of the product in accordance with the Bill of Materials (BOM) and starts setting the scope for LCA. Setting the scope refers to following the regulation in the LCA to define system boundary, functional unit, and

allocation procedure. Once the target and scope has been confirmed, life cycle assessment is done and evaluated. As in the case for TFT-LCD TV, the system boundary is Business to Customer (B2C).

### **3) Life cycle assessment**

Once the system boundary has been confirmed, the manufacturing map can be developed. The purpose of this step is to outline all the materials, active data and manufacturing process. Functional unit is breaking down product into individual components and using system boundary to identify the input and output of raw material, manufacturing and transportation. The major task during the life cycle assessment is to collect information to facilitate LCA's impact assessment analysis.

### **4) Allocation**

This case allocates emission according to the characteristics of raw material parts and defines the minimum calculation unit, and uniforms according to weight.

### **5) Calculation of life cycle assessment**

This cases uses Simapro 7.1 and IPCC AR4 GWP figures for calculation.

### **6) Third-party verification**

This case is verified with accordance of PAS 2050 and made into a carbon footprint report by SGS.

### **7) Product category Rule**

This case used the TFT-LCD Televisions product category rule established by AUO and published on Global Environmental Declaration Network, GENnet, with Environment and Development Foundation.

### **8) Third-party verification presents verification declaration report**

SGS provides verification declaration and assessment report. Principle content includes carbon footprint calculation standard reference, life cycle assessment tools,

certification level, product carbon footprint data and measurement unit, product life cycle carbon footprint composition, types of GHG throughout product life cycle and actual measurement barrier and etc.

**9) Instruction for carbon footprint label**

The content states that location for the label, color and information box must be done in accordance with EPA's regulation.





# CHAPTER 5: Case

## 5.1 Acer

### 5.1.1 Introduction

Acer, the Taiwan-based company and the world's largest maker of notebook, is one of the first to implement the carbon footprint label on electronic products. Acer Group established in 1976, is the first Taiwanese personal computer (PC) maker to market and distribute its products worldwide with the brand name “Acer”. In 2002, the manufacturing department was separated from branding department and became the new company, Wistron Corporations. Following the separation of the departments, the branding department is completely devoted to brand marketing. The distribution model is different from Dell’s direct sales business model, from Dell directly to customers, Acer works and shares profit with distributors. Acer is now the world’s top-five largest PC brand and the top-three seller of lap top. Other than the brand “acer”, it also owns Gateway, Packard Bell and e-Machine. Acer’s product line includes PC for both business users and general users. Acer’s major product is for general users and markets are in North America, Western Europe, and East Pacific Asia.

#### **Organization Structure:**

The chart below indicates where the CSR department is located in the overall organization structure. As can be seen the chart, the CSR department is directly below the Board of Directors, Chairman and CEO department; therefore it is under direct supervision of the board and chairman and placed at high priority.

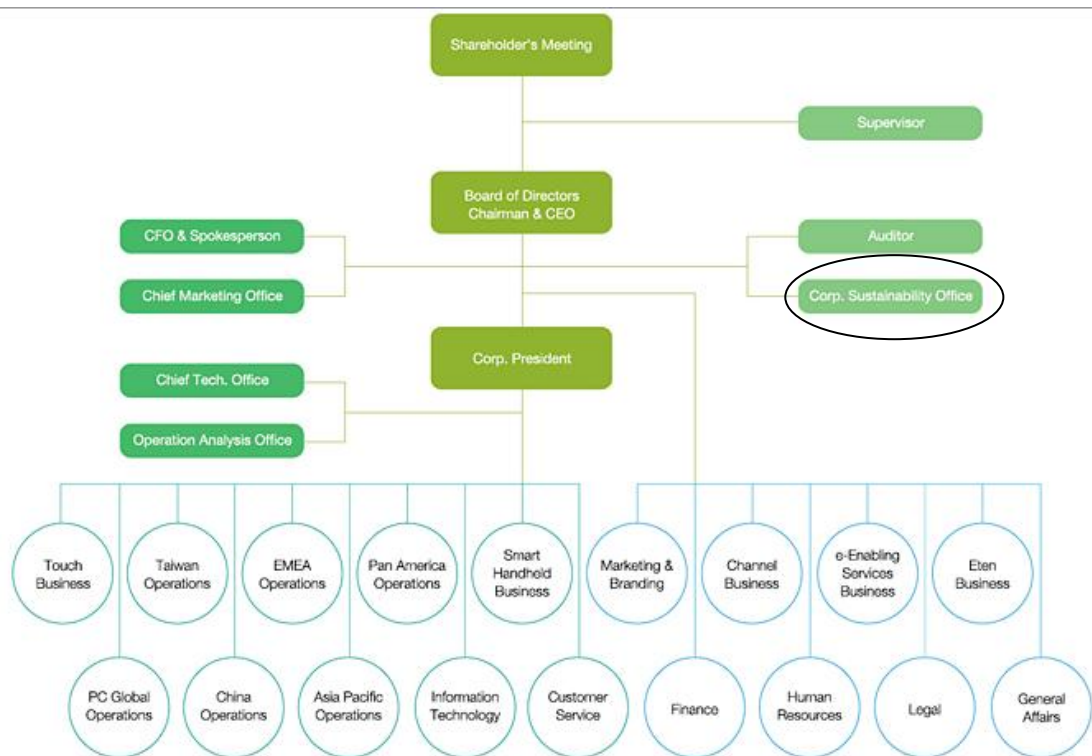


Figure.5.2 Acer Organizational Structure

### 5.1.2 Stage 1: Motivation

As a major player in the information and communication technologies (ICT) industry, Acer has customers from all around the world. This section discusses the motives for Acer to do carbon footprint labelling from the company's internal force and from the environment's external force, including the government and the stakeholders.

#### 1. Motivation:

Mr. J.T. Wang, the chairman of Acer, aggressively promotes the vision of sustainable development both internally within the company and externally with the media. Other than the direct push from the chairman, Acer also detected the trend for greener products, especially for its major market, Europe. Europe has stated that its keen interest in products with carbon footprint label and highly likely to make carbon footprint label mandatory. Having gone through the RoHS regulation, Acer has experience in improving the environmental friendliness of products. For the RoHS regulation, electronic goods makers are restricted from using lead, Mercury,

Cadmium, Hexavalent chromium, Polybrominated biphenyls, and Polybrominated diphenyl ether in their products. It sets upper limit for concentration of the above substances by weight of homogenous substances. In order to do this, Acer must make sure its suppliers follow the regulation and measure the concentration of their products to ensure its concentration does not exceed the allowed level. Having the experience of implementing the RoHS, Acer was more ready try out the carbon footprint labeling. Because Acer outsources its manufacturing to its suppliers, the major work of life cycle assessment is be done by its suppliers. According to Mr.Lai, doing carbon footprint labeling was a capacity building exercise to prepare its partners better for future requirements, in the event that carbon footprint labelling becomes mandatory.

In addition to leader vision and capacity building for suppliers, carbon footprint assessment also helps improve and design new products and new business model. It is also for company's internal value to identify innovation opportunities, develop new solutions and achieve cost reduction. How to play in the international market is also the key focus of doing carbon assessment; therefore, honest disclosure and identify hot spots, weaknesses are the goals of carbon footprint assessment.

## **2. Government's support:**

As a major player in the international electronic goods market, Acer was invited by the Environmental Protection Administration Executive Yuan R.O.C. (EPA) to do the carbon footprint labelling. To encourage participation in the pioneering project, government waived the screening and certification fee for carbon footprint labels if companies registered within the period of May 14-Dec 31 of 2010. In addition, products with carbon footprint label and gone through life cycle assessment are more likely to win orders from government projects.

### **3. Stakeholders (NGO and investors)**

A lot of times, Non-government organizations are the drivers of change to companies; however, in the case of Acer, NGOs were not involved. They were more focused on product safety such as the RoHS regulation. In regards to investors, the result of the life cycle assessment is of concern to them because when company's ability to manage their carbon emission is poor, there is a high possibility that the company will be subjected to carbon reduction regulation in the event carbon tax is imposed. When carbon tax is in place, the cost of operation will be increased if carbon management is done poorly and it will affect the company's overall profitability.

#### **5.1.3 Stage 2: Project Planning**

For implementation of a brand new project, it requires clear vision from the leader and before-hand planning to ensure smooth execution. This section discusses the leader's vision and style, partners involved in carbon footprint labelling, project design and selection criteria for product.

##### **1. Leadership:**

Mr.J.T. Wang offers employees a high degree of autonomy and has confidence in employees' strengths; therefore, employees do not need to report to chairman for this particular carbon footprint project. The department in charge was the product department and the product manager was in charge of executing the project. The project emerged when Mr.Wang clearly announced his goal in becoming a corporate socially responsible company. Having this vision in mind, the employees come up with projects that will meet this vision. According to Mr.Lai, CSR training is available to the entire company and he also travelled Malaysia the week prior to the interview to provide training for the human resource department on CSR.

Furthermore, Acer is also a member of the World Business Council for Sustainable Development (WBCSD). The WBCSD is a CEO-led global organization whose vision is to advocate sustainable practices among businesses.

## **2. Partners:**

Major executers: For this project, the major executers are the suppliers, the ones who provide raw material and do manufacturing. Acer provides education on its suppliers for two to three years and worked with Industrial Technology Research Institute, ITRI to provide consultation for suppliers. The cost of life cycle assessment will be covered by the suppliers themselves; Acer is not responsible for the cost incurred. Acer announces the plan to implement life cycle assessment and inform suppliers of consumer, distributor and market trend so that suppliers can be prepared for the coming trend. Acer receives the latest information on sustainable development from its international meeting. Due to the highly competitive nature of the supply chain, some suppliers even approached Acer proactively to promote its engagement in water footprint

Data verification: TUV, The life cycle assessment was done by suppliers; however, verification of data is done by TUV, the third-party organization to verify the data from life cycle assessment. The verification must meet government requirements and according to Mr.Lai, this part can cause the cost to rise.

## **3. Project design**

In the case of Acer, the situation is different from Taisun because Acer outsources its manufacturing to suppliers. Therefore, the execution would be different between the two companies. One key point of Acer's case is the level of bargaining power between Acer and its suppliers. Since Acer is the world's third largest PC vender as of May 2011, it enjoys strong bargaining power with its

suppliers. In order to win orders from Acer, suppliers must compete amongst themselves to meet the requirements from Acer. In the case of life cycle assessment, the more reliable and comprehensive the data the suppliers provide, the more likely the supplier will win order from Acer. However, if Acer is not a major player in the market, suppliers' will of meeting the requirement would be lower because meeting the requirement increases the cost and they do not receive an equivalent amount of return from working with this particular player. While Acer's suppliers start assessing life cycle carbon footprint, data will be generated and become important basis for the construction of carbon emission database. Once the database is established, assessing life cycle carbon footprint will become more convenient for other companies which want to implement the scheme as well.

For Acer itself, the life cycle assessment would be two parts 1) based on the carbon life cycle associated with its daily operation, for example, the electricity, fuel used, and etc. 2) the carbon footprint from the B2C part of the product life cycle. The B2C part will be composed of the transportation, packaging, marketing and storing. The marketing department provides market analysis data and product distribution and transportation information, which is the amount of carbon footprint during transportation to product's distribution site.

How it is done: Acer has a designated window for contact with suppliers' corresponding window to deal with CSR related activities. Once Acer has chosen its suppliers, these suppliers will need to do life cycle assessment of the raw materials they provide to Acer. The life cycle assessment is divided into two parts: B2B and B2C. Currently, Acer has around 22 suppliers. The auditing of carbon footprint can be done within a short amount of time; however, to receive the certification from EPA, it will require two to three months. The reason why auditing can be done fast is

because during the design, R&D and Production stage, auditing can be done before the product launching. Therefore, the data can be ready before the product is launched into the market. However, the time to obtaining the certificate can delay the marketing activities for the product.

#### **4. Product Selection: What are the selection criteria**

The considerations for selection are the complexity of assessment and completeness of information. The complexity of assessment refers to the complexity of the product and its manufacturing process; the more complex a product is, the harder it is to assess its carbon footprint. On the other hand, completeness of information will affect the quality of the life cycle assessment. As incomplete information cannot be used as a qualified source for consumers to make environmentally-wise decisions.

Product information: The model that received the carbon footprint certificate is model number AO532H, a small laptop. This model is no longer available on the market since the new model has been launched. The certificate was issued after the product is removed from the market.

##### **5.1.4 Stage 3: Execution**

Having designed the project and chose the product to implement carbon footprint labelling, the next step is to allocate the resource needed for the project, including capital and marketing resource.

##### **1. Cost:**

In regards to the budget allocated for this project, Acer has budget arranged for the CSR department and the budget of the project will fall within the allocated budget for the department. For confidentiality reasons, the verification fee by TUV is not disclosed.

## **2. Marketing:**

For electronic products, the marketing strategy would be emphasizing its energy-saving characteristics which would result in lower cost of usage for consumers. Compared to food products, electronic goods' greatest portion of emission comes during the usage stage of the life cycle. Therefore, making the electricity more efficient will be the key for electronic goods. On the other hand, consumers also care about cost-saving opportunity the most. Electronic goods are an interesting type of product which has a cost structure that not only consists of the price of the good, but also the cost of using the good after the good has been bought. Consumers are keen on saving money regardless of which part of the cost structure. They look at the price of the good, but also the electricity efficiency of the good to help determine how cost-efficient the good is. Knowing this in mind, the marketing strategy for environmental friendly products will be emphasis on its cost-saving opportunity. Typical claims for environmental friendly products will be packaged in message such as the 8-hour battery hour per charge. Having 8 hour of battery life every time when the battery is charged will reduce the frequency of charging the battery. Charging battery is the part where electricity is used and where cost is incurred on the consumers. Reducing the frequency of battery charging will result in reduction of carbon emission due to the electricity saved. To further the value of carbon footprint and its relations to environmental friendliness, the marketing strategy would be emphasizing on the amount of trees that could be saved from using this model. Using this kind of analogy is easily comprehensible and a direct way of understanding the relations between carbon footprint and the earth. Acer distributes its products through its vast sales network; therefore, retail cooperation on the carbon footprint label is also important for its success. However, retail side promotion was not done for this model.



### 5.1.5 Stage 4: Difficulties

During the implementation of carbon footprint labelling, Acer encountered a few problems discussed in the below section. Bottlenecks delaying the acquisition of the carbon footprint label were also identified and discussed.

The complexity of the manufacturing process makes electronic products extremely difficult to conduct the life cycle assessment. The source of raw material must be traced back to the oil extraction process which later becomes the casing for notebook and computers. Other than the plastic part of the notebook, there is also the metal components which make it difficult to trace the carbon emission. On the other hand, the complexity of the supply chain also leaves rooms of uncertainty.

Taiwan is a strong electronic products manufacturing base because of the high quality manufacturers offer. Therefore, the manufacturers are usually partners of multiple brand companies. When there are multiple brand companies sharing the carbon emission associated with their purchase order, difficulties arise because of their conflict of interest. Therefore, the amount of carbon emission allocated to each company is a source of conflict and problem. In contrast with sharing of resources, the more you get the better, sharing carbon emission is the opposite, getting less is better. Companies can argue with manufacturers why their share of carbon emission is greater than others while they all use the same facilities and are made in the same building. Manufacturers find this challenging as they do not want to ruin the relationship with any brand companies. Another problem comes from the scope of emission that needs to be included in the assessment. Some companies may only consider the emission associated with the manufacturing process, while others will trace all the way back to the production of the raw materials. When the scope is inconsistent, the ones that conduct a more complete assessment will in fact has higher

emission level and creates a negative and falsified image in the public. While the ones that have limited the scope to a certain stage of the life cycle will generate a lower emission image and mislead the public. With all these challenges in mind, acer nevertheless conducted the life cycle assessment and applied for carbon footprint certification.

## **1. Problems Encountered**

### 1) Absence of industry standard-no comparison with products

Since life cycle assessment is not a universal standard among the electronic goods industry, the result of life cycle assessment cannot be used as a source of comparison among different companies. Therefore, it cannot act as a tool for consumers for their purchase decision making either. This is not desirable for companies who have taken steps into making environmental friendly products because they cannot tell the consumers about a label which does not have apparent meaning at the moment. The comparison would be applicable when the company does internal comparison between products of the same series and therefore uses the same scope and measurement method.

### 2) Suppliers have multiple partners-hard to allocate the amount to one specific company

Acer's suppliers are often partners of other similar electronic goods companies and the manufacturing facilities are also used for other clients' orders as well. Here is the problem: one factory produces orders from 5 clients, each with different manufacturing process and components; how to identify how much each order contributes to the total GHG emitted at the end of the month? Other than the complexity of allocating GHG emission, another issue comes from the strength of bargaining power among different clients. When there is a client with an order of

larger volume, if the client wants to display a lower emission status, the client might bargain for a low allocation of GHG emission and the supplier will have little resistance toward this request because the client has high bargaining power. Therefore, the allocation leads to a complicated situation that involves bargaining power of numerous parties.

3) Cost of assessment increases as information gets more complete

As mentioned in the previous point, the more complex the assessment is, the more cost it would incur as more labor and time must be incorporated to really track the GHG emission of each process and component. Furthermore, as more labor and time is put into the process, in the end, the GHG emission might increase as a result.

4) Multiple GHG emission database to choose from

The life cycle assessment for Acer suppliers is to refer to an existing database which has the GHG emission for component and process associated with the products. Since there is more than one database, suppliers can choose from the databases to use as reference. This is of convenience for suppliers, but results in inconsistency in the result of the life cycle assessment. For example, if supplier A uses database 1 for model 1, then next time, supplier A uses database 2 for model 1, the result will be different between the two models although the components and processes are the same.

5) For electronic goods: improved function vs. reduced emission

Because electronic goods differentiate by its function, therefore, function is the key feature consumers look at during their purchase decision making. A concern arises when a product with integrated multiple function but same amount of GHG emission as the previous model vs. a product with lower GHG emission but same function as the previous model; Which one would be more desirable?

#### 6) Carbon footprint label vs. export competitive edge

Acer has a market share of 11.2% in world wide PC, with especially high market share in Europe. If the carbon footprint label becomes mandatory on all electronic products, unless Acer manufactures its products in Europe, Acer will lose its competitive edge due to the distance the products travel from Asia to European market. The logistics will comprise a significant portion of GHG emission if the products were to be made in Asia and shipped to Europe. According to Mr.Lai, the carbon footprint of product logistics from Taiwan to United States will be done this year.

#### 7) Conflicting view on carbon footprint label

As a major vendor of electronic goods, Acer has the pressure to act as the leader in forefront development. Acer's investors and foreign market consumers also expect Acer engage in sustainable development. However, the external expectation is not widely instilled within the organization. Therefore, communication of the vision of sustainable development is an important step to making carbon footprint labelling a widely accepted practice. Furthermore, engagement in CSR activities does not offer immediate result, it will take time to reflect on the company's performance and corporate image. Therefore, some employees do not detect the urgency of this matter.

#### 8) Room for reduction is limited since the product is already energy-efficient

For electronic goods, the major emission not only comes from production but also consumption of energy. Therefore, the ways to reduce GHG emission will be from these two parts. Currently, most electronic goods, especially notebooks, have increased their battery hour to their maximum level; therefore, limited improvement can be done on battery hour.

## 2. Bottlenecks

In the ICT industry, there are two major bottlenecks, one is the complexity of its supply chain and the other is the time-consuming process for obtaining carbon footprint label for short product life cycle electronic goods.

### 1) Bottleneck: Complexity of ICT industry-difficulty for data collection

Because life cycle assessment is not yet an industry standard, not all suppliers are doing the assessment of their GHG emission. As a result, suppose there are 30 suppliers, even though 29 of 30 suppliers have completed life cycle assessment of their part, the one remaining supplier, who hasn't started, cannot provide the GHG emission of his part, as a result, complete life cycle assessment of the finished product cannot be done. The problem with life cycle assessment is that it requires input from all parts along the supply chain. Even though the life cycle assessment might be 99% complete, lacking that one single 1% is crucial to developing the complete life cycle assessment result. On the other hand, since Taisun handles manufacturing itself, it has the ability to implement the practice to all of its supply chain; therefore, there will not be one part of the supply chain not implementing the practice while others are waiting for it. Because Acer does not have total control over its suppliers and it relies on suppliers to produce its goods, it must convince suppliers one-by-one to audit the GHG emission of their parts.

### 2) Bottleneck: Application and Certification takes a long time

In the case of Acer, model AO532 was taken off the market soon after its receipt of carbon footprint label. The reason was because a new version of the model was introduced because PC has more frequent updates and technology advancement than business notebook. On the other hand, after life cycle assessment has been completed, the processing time to get approval to use the carbon footprint label is one to two

months. Therefore, even though a product is ready to be launched into the market, it has to wait for one to two months to receive the carbon footprint label from EPA then launch the product along with the label into the market. For high-tech products, the key is latest technology. Because high-tech industry competes on the speed of innovation and technology development, whenever a new technology is developed, it must be introduced to the market as soon as possible before competitors do. One step slower than others will result in dramatic loss of market position and share. Therefore, the cost of waiting for the carbon footprint label is too high for high-tech industry players. The situation that will be more appropriate for Acer will be to obtain carbon footprint label on business notebook models because these model emphasize more on stability and reliability rather than innovative and cool features. Coupling short product life cycle with long processing time, carbon footprint label cannot fully exert its value and efforts put in for obtaining the carbon footprint label are all wasted.

### **5.1.6 Stage 5: Achievement**

The benefits of carbon footprint label to Acer and suppliers are discussed in this section.

#### **Benefits of Carbon Footprint Label: to Acer**

##### **1. To Acer:**

- 1) Unlike Taisun, this project did not market carbon footprint label aggressively and the product went off the market soon after the new model was released. Therefore, the achievement of this product cannot be determined from its sales performance. The benefit of life cycle assessment results in improvement on product development. Through identification of emission hot spots, Acer can innovate the process and material and reduce the cost for making the product.
- 2) Another benefit is since the government is promoting the carbon footprint label;

therefore, companies which have the label are more likely be the targets for government-led procurement.

## **2. To suppliers:**

On the other hand, improvement also comes from suppliers. While suppliers investigate the GHG emission of their parts, they seek for better materials with lower GHG emission because they want to provide low GHG content materials to Acer in order to win order.

Therefore, doing the life cycle assessment is good for both Acer and its suppliers to innovate on process and material application and overall is good for the earth to lead to a lower GHG future.

### **5.1.7 Opportunities**

Having done carbon footprint labelling, and encountered difficulties during the process, Acer has identified the following opportunities for Acer to enhance the success of carbon footprint label.

#### **1) Focus: Models for business users**

Because the AO532 model was for general consumer, not for business users, it has a high turn-over rate. The difference between the model for different users is the duration of product life time. For business users, new models tend to be introduced slower because business care about the stability and reliability of the model rather than other features; therefore, frequent innovation is not needed. On the other hand, general consumers look for cool new features; therefore, a high turn-over rate happens on these kind of models.

## 2) International Market

Although awareness in carbon footprint label is at its infancy stage, countries such as U.K. and Japan are actively promoting carbon footprint labelled products. According to a report by the Carbon Trust (2011), nearly half of consumers would avoid brands that are not taking steps to reduce their carbon footprint. This figure has doubled from last year when only 22% of shoppers said they would shun brands that did not measure or reduce their carbon footprint. More than a fifth (21%) of consumers also indicated the will to pay more for brands that label their products with the carbon impact and 47% are more likely to choose low carbon labelled goods over non-labelled.

## 3) Comparison within own product line

Since the measurement method, database, and scope of measurement are all inconsistent among companies, the place where comparison would be of value would be comparison within the same product line. When comparison within the same product line is made, consumers are aware of the improvement in carbon management and it will be a good communication tool to demonstrate Acer's commitment towards lowering GHG emission.

## 4) Water and Plastic footprint

Water is also key to human's survival and until recently, has been proved to be a finite natural resource; therefore, the next step would be investigating the water footprint of products. Another is the plastic footprint. Plastic is made from oil, and oil again is a finite resource and used extensively in manufacturing of Acer's products; therefore, Acer is also interested in investigating the plastic footprint.

## 5) Carbon footprint to all products



6) Selection of more environmental friendly materials

By knowing the GHG emission of each component, Acer can make more environmental friendly decisions in regards to material selection.

**Promotion Action Plan:**

- 1) Although both Taisun and Acer did the carbon footprint labelling, apparent difference can be seen between their marketing strategies. Because Acer's products are electronic goods; therefore, the focus will be the cost-saving opportunities of green products. Prior to introducing the carbon footprint label, cost-saving opportunity was already the principle marketing strategy for Acer, thus, regardless of the carbon footprint label, the marketing strategy remains unchanged for Acer. On the other hand, carbon footprint label created a differentiation value for Taisun's twist water because it was the only water carrying the label in Taiwan. Therefore, Taisun could use this claim for its commercial, packaging and other marketing activities.
- 2) Retail cooperation: Because Acer does not own distribution channels and cannot directly inform consumers of the carbon footprint label, it becomes crucial for distributors to be educated on the carbon footprint label and actively promotes it.

## 5.2 Taisun

### 5.2.1 Introduction

Taisun, established in 1960, is a major food manufacturer in Taiwan with specialization and revenue coming from three major areas which are food, animal feed and oil. Of the three product lines, the greatest portion is oil (~50%), then animal feed (20~30%) and food of around 20%. Taisun has 21.82% share in Family Mart, the second largest convenience store in Taiwan with 27% market share, next to the largest chain 7-11 of 50% market share. The principle products under food business are beverages, congee and pure water; these occupy the production capacity of Taiwan facility by 80%.

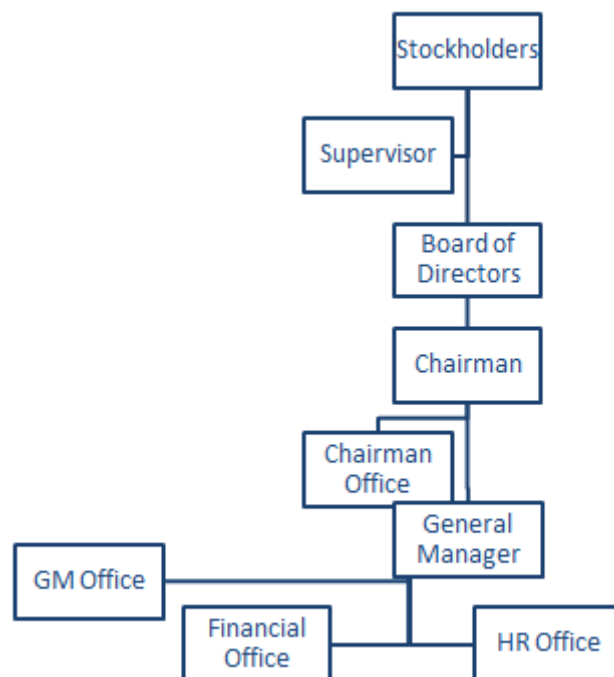


Figure.5.3 Organization Chart of Taisun



Figure.5.4 Taisun Business Departments

### 5.2.2 Stage 1: Motivation

Taisun has been a pioneer in introducing green food products to the market. It is also the first food company to put carbon footprint label on its products. This section discusses the motivation behind Taisun's carbon footprint label project including the company's internal force and external force from the government.

#### Stage 1: Taisun Motivation

1. **Taisun motivation:** Corporate Social Responsibility (CSR) is an important vision in Taisun. The leaders announce development of CSR at core meetings and this vision is spread to the entire company and permeates throughout Taisun. Both YuanJian (遠見) and Tian Xia (天下) magazines have invited the Taisun to the participate in the CSR award. The chairman of Taisun wanted to develop environmental-friendly product at the same time, to move the company into a green company and establish the CSR image. Other than the Twist Water, the Pure Water (Taisun ChunShui) was the first product in Taiwan to implement the food tracking

code (ShiPin ZhuiSuMa). The food tracking code along with the expiry date on the water bottle allows consumers check the company which produces the water, the result of raw material testing, production line sanitization report, and final product testing report. The true benefit of having the carbon footprint label was not seen until it was ranked the top seller among bottled water when it was introduced to the market in March 2010.

Comment: As can be seen from Taisun's activities, it has been a pioneer in offering more socially responsible products to consumers.

## **2. Motivation: Government support**

The government was also supportive of the development of carbon footprint labeling. The government was initiating the carbon footprint labelling scheme, and needed to implement the scheme on a few companies as demonstration. Therefore, the EPA approached and selected a few companies which it has good cooperation experience with before.

### **5.2.3 Stage 2: Project Planning**

This section discusses the leadership style of Taisun's president, the project design and product selection of carbon footprint label product. Under the leadership of President Mr.Zhan Yuelin, Taisun's corporate culture allows employees to have freedom and authority to do their work and do not need to ask for approval for every stages during their product development. The initial idea is given by the leader, then the product team will develop the project along with the cost-benefit analysis and present to the top management team. Following the feedback from the top management team, the product team then proceeds to work with engineers and for development of bottle shape, the rigidity and pattern.

## **1. Leadership style:**

According to Mr. Wang, President Zhan is highly demanding about others and himself. He is always ahead of everyone else and has strong belief in integrity and honesty. Once someone has made a promise, one must do one's best to accomplish it.

## **2. Parties involved**

Cooperating parties: Plastic Industry Development Center, BSI and EPA

EPA only authorized two companies for certifying life cycle assessment, with one of them being BSI.

## **3. Project design**

The leader wanted to develop an environmental friendly product, most of GHG emission comes from packaging for beverage industry. Therefore, the part of product to improve environmental performance would be the plastic bottle. The idea was to create a bottle which is softer and lighter, but able to withstand pressure during water storage and transportation. Over-packaging of products though sometimes deliver a more attractive appearance, it in fact results in more burden on the society and the earth as a whole. The inspiration for the twist water came from the chairman's cousin who visited Japan and saw a twistable water bottle in 2009 September, then the following March, in 2010, Twist water went on the market. The twistable idea was developed by a product specialist and the slogan was chosen from a consumer questionnaire to put on the bottle and in the commercial. The resulting slogan was "twist water, AiDiQiu" translated into English is "twist, love earth". On the bottle, the carved pattern is ripples crossing over each other, not only is this design elegant in appearance it also has the functional benefit of making twisting easier.

The idea was to create a bottle which is softer, but able to withstand pressure during water storage and transportation. The production process and ingredients play

important roles in the design of bottle. For example, some beverages require heat processing, in this case, the bottle must be heat tolerant. Meanwhile, beverages containing sugar will need more rigid container; therefore, the twistable bottle might not be applicable for complex beverages which require extensive processing and contain too much ingredients.

Having identified the carbon lifecycle of bottled water, Taisun discovered that the raw material procurement accounts for the greatest share of emission. Therefore, reducing the use of the raw material would be the best means to reduce carbon footprint. Reducing the weight of packaging can be done through two ways, first, reduce the content volume, water, or reduce the other component of bottled water, the plastic bottle. Water is sold at set volumes, the volume cannot be modified, and therefore, the only option would be the plastic bottle.

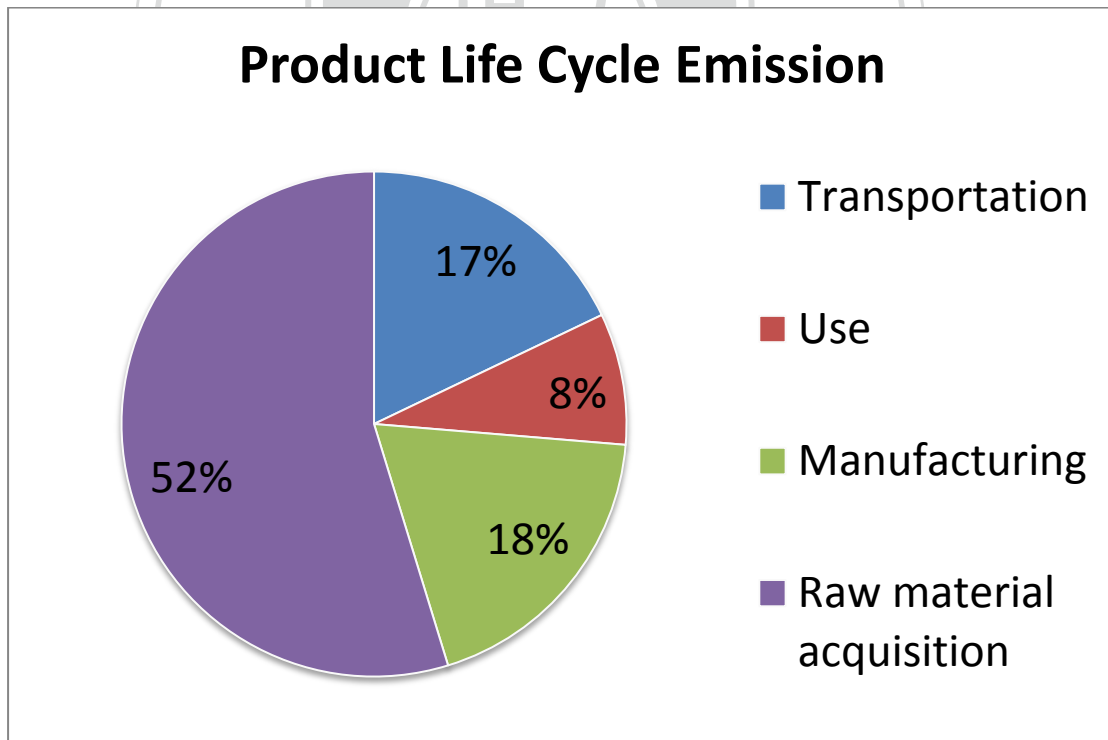


Figure.5.5 GHG emission at different stages of life cycle of Twist Water

#### 4. Product design

The Twist Bottle: reduced plastic material by 43%, CO<sup>2</sup> emission by 50g, weight from 20g to 14g and increased recycling space by 70%.



Figure.5.6 Taisun Twist Water

#### 5. Product Selection: Why chose water to do carbon footprint labelling?

Answer: Bottled water has a very large market size, with about one billion water sold each year. Assuming one bottle is \$10 NTD (water price range 10~40), then the total annual revenue of the water market would be \$11 billion.

#### 6. Product nature

Water is a fast moving consumer good (FMCG) therefore, the product life time is long in the way that it does not get updated or upgraded for better performance. Therefore, even if the carbon footprint label can take a couple of months to implement, it still will not affect the product's performance. Unlike high-tech products, technology constantly moves forward and evolves; if a new model goes on the market,

the previous model will be taken off the shelf. Therefore, the carbon footprint label application period must compete with the speed of technology advancement. If a model does not get updated fast, then it is acceptable to apply for carbon footprint labeling. If the product advances quickly, then by the time the carbon label is implemented, the product is off the market already.

#### **5.2.4 Stage 3: Execution**

This section discusses the resources allocated to the carbon footprint labelling project including research and development, capital budget, and marketing resources.

##### **1. Research and Development**

Taisun worked with plastic industry development center, to develop the twist bottle. Following the design of the bottle, it has to go through pressure testing to assess its functionality for water storage and processing, restoration of bottle after twisting, and transportation. Design and bottle appearance was outsourced to Glory Trade.com.tw (XiaoZhiYanFa) and bottle shape development was outsourced to Plastic Industry Development Center. A new injection blow moulding skill was developed and a new die (manufacturing tool) was introduced.

##### **2. Carbon footprint label:**

After the entire production flow process of Twist water was confirmed, life cycle assessment was done and carbon label was registered. Taisun worked with plastic industry development center, life cycle assessment was done by BSI, using the sigma pro software for the database, and the verification of the LCA was done by BSI.

##### **Q. How to make sure the resulting product will have a lower GHG emission?**

Prior to confirming the production flow process, Taisun needs to check with BSI's reference data for each production step. Once it has checked with BSI and confirmed



the new process has lower GHG emission, the production flow process can be confirmed. Therefore, the resulting product will have a lower GHG emission.

### 3. Cost: total around 90 million NTD

Table.5.1 Cost composition of Twist Water

| Marketing Expense<br>(advertisement,<br>sponsorship, school<br>promotion, celebrity<br>endorsement) | Carbon footprint<br>labelling<br>registration and<br>consultation | Research and<br>Development/Production |
|---|---|--|
| Around 70 Million NTD   | Around 0.2 Million<br>NTD   | Around 10 Million NTD                  |

The complexity of life cycle assessment will have impact on the cost of carbon footprint labelling implementation. On the other hand, since the bottled water does not involve too much technological development, the investment in research and development of this project is lower than those of electronic products. However, if the content of the beverage requires development of new flavour, the R & D investment will be increased.

### 4. Marketing:

Unlike GMP and CAS labels, the carbon footprint label is not a commonly recognized standard, it needs complementary education on the public to raise awareness of GHG emission and the relationship between consumer decision and effect on the world.

Slogan: twist, love earth, was selected out of a consumer survey to best represent the product with a catchy slogan.

Selling Point: more environmental friendly, and is fun. Since climate change is not a commonly accepted and recognized status in Taiwan, Taisun has integrated the fun element into the product, to make the product both fun and environmental friendly.

TV commercial: The TV commercial with celebrity twisting the bottle and singing the commercial music.

Individual website: an individual website was set to share Twist water's brand story, the carbon footprint label, news, media and Twist water blog.

(Public, Schools, Government cooperation)

## **5. Marketing Activities:**

- Lucky draw for Twist Water's limited T-shirt every week
- Sponsored the Love Earth event hosted by Taiwan Institute for Sustainable Energy (TAISE)
- Initiated the donation event: for every bottle sold, Taisun donated 1 dollar to the love earth foundation. The foundation is a capital fund for participants (from school, business, NPO or government organizations) who share their stories relevant to climate change and earth protection through blogs. During this period of time, the slogan changed to "Together, let's love earth". Together in Mandarin can have two meanings, one of the meaning is together, the other is "one dollar". Therefore, the slogan implies both meaning. To love earth together and to use one dollar to save the earth.

- Beach cleaning day: cooperated with Environmental Protection Agency (EPA) to clean up the JinShanXiangZhongJiao ShaZhuWan beach (Close to Danshui and frequented by surfers)
- Cooperated with Taipei City Department of Transportation’s “Carless Event” to host a “Hula Hoop Twist Bottle event” which the winners receive coupons for purchase at Family Mart convenience store.
- Cooperated with the famous Spring Shout Event (hosted in Kenting every spring). Worked with the initiators of the Spring Shout Event to build outdoor art from Taisun Twist Water bottles. Below is a guitar built from Taisun Twist bottles displayed at the Spring Shout Event.



Figure.5.7 The guitar made of Twist Water bottle

#### 5.2.5 Stage 4: Difficulties

This section discusses the problems that Acer encountered during the implementation of carbon footprint label.

## **Problems Encountered**

I) Environmental Friendliness only a marketing tool but not allow comparison marketing

Since carbon footprint labelling is a demonstration project, only a few companies have implemented the practice. Therefore, to ensure the fairness of market competition, Taisun is not allowed to use carbon footprint labelling as the key differentiator from other competitors. Since BaiLan detergent introduced a comparison commercial to attack its competitor Kao YiChiLing, comparison marketing has been banned. The carbon footprint labelling is the major competitive advantage of Twist water; however, Taisun is banned from using it as a competitive advantage to differentiate itself from others. EPA bans Taisun from using the label as comparison tool with other brands. Therefore, it cannot indicate or mention the GHG emission of competing product.

II) Lack government support

It is within EPAs plan to lower emission, but only promotes consumer lifestyle emission reduction not product selection emission reduction. Government does not promote buying green products. Although EPA promotes and supports this project, but there is not corresponding strategy to bring up the industry.

III) Lack of distributor support, product goes off shelf

The major distribution channel, 7-11, has decided to take Taisun Twist water off the shelf because of Coca Cola's "Shui Sen Huo" water. The "Shui Sen Huo" water is also lighter weight, thinner, softer and twistable. Furthermore, it also features a bottle built with 30% of the material from plants.

Table.5.2 Comparison between Taisun Twist Water and Coca Cola's Shui Sen Huo

| <b>Taisun Twist Water</b>   | <b>Shui Sen Huo</b>   |
|---|---|
| Plastic Use: Use of plastic reduced by 43% (compared with Taisun Pure Water). Drinking Twist Water will reduce an equivalence of 0.1 million barrels of oil per year as compared to Taisun Pure Water.                                  | Plastic Use: use of plastic reduced by 31% (compared with Coca Cola's I LOHAS pure water). The oil saved from drinking "Shui Sen Huo" is able to fly around the world 30 times for Boeing 747 planes. |
| CO <sup>2</sup> reduction: 50g (as compared with Taisun Pure Water)<br>The annual market for bottled water is 1.1 billion, if the bottled water bought is Twist Water, it will reduce around 55,000 tonnes of CO <sup>2</sup> per year. | CO <sup>2</sup> reduction: no emphasis on CO <sup>2</sup> reduction   |
| Space use: increase recycling space by 70% (before twisting and after twisting)   | Space use: twistable and easy for recycling. However, does not compare space use difference between before and after  |

Coca Cola is an internationally renowned and highly valued brand; therefore, carrying Coca Cola's products can add value to 7-11 brand value. On the other hand, Taisun is a Taiwan-based company, its brand image and value is not as desirable as that of 7-11. "Shui Sen Huo" also has a remarkable commercial starring popular actor, Hiroshi Abe. Taiwanese market follows Japanese trend closely; therefore, Japanese products are very popular in Taiwan. With a Japanese style marketing strategy (Japan's actor, filmed in Japan and by Japanese makers), it received overwhelming feedback from the market, and was ranked the number one seller in Japan. In addition, Shui Sen Huo also cooperated Taipei Zoo, FamilyMart, a.mart, RT-mart and Formosan Black Bear Conservation Association to host the "Saving Formosa Black Bears" event at the 2010 Taipei International Flora Exposition, a grand international exposition of flowers. The event includes exhibiting works of bear sculpture by emerging artists using the "Shui Sen Huo" plant bottles. This marketing event has garnered support from NPO organization, such as Formosan Black Bear Conservation

Association and three major distribution channels. Exposure at the grand national exposition resulted in 30, 000 participants and 4000 fans on Facebook event page.

Compared with Taisun, the difference of Coca Cola's "Shui Sen Huo" was having gathered support from distribution channels, which are the key to sales of the products. Taisun was also involved in many activities in affiliation with the government and public; however, it lacked support from distribution channels.

#### I) Absence of public education and industry standard results in misunderstanding

Mr.Wang stated that since the carbon footprint label was not fully clear to the public; therefore, consumers might misunderstand the products with the label are in fact less environmental friendly than others because they have the carbon footprint label, which states the amount of carbon emission the product has. When other products do not have the carbon footprint label, consumers are misled into thinking since these products do not have carbon footprint label, they do not produce any environmental impact. Therefore, wide-scope public education is needed to ensure consumers understand what the label is. On the other hand, industry standard must also be developed so that consumers can make comparison among different brands and companies will have the driver to lower their emission so that they can remain competitive in the market. Industry standard includes making carbon footprint labelling a requirement for all kinds of products within an industry and making the assessment method consistent among different companies.

#### II) Difference in assessment method results in different scope of measurement

For example, for the assessment of a can of orange juice, if company A includes measuring the emission associated with growing orange while company B only includes the emission associated with processing the orange into juice, the result of GHG emission will obviously be lower for company B because one major step of the

life cycle assessment is omitted. As a result, the result of the assessment will not facilitate consumers purchase decision making, and worse, it will mislead public into encouragement of higher GHG emission.

### III) Fun vs. environmental friendliness

Environmental friendly the selling point or the innovative marketing and packaging?

When Twist water was first released, it was the number one seller in bottled water market; however, after a while, its performance declined. The possible reasons for this phenomenon are the 1) introduction of a competing product(LOHAS water), 2)market returns to normal after the hype of the innovative marketing and new product, 3) distributor no longer promotes the product and places it in spot light sections in the store, 4) 7-11 introduced 7 select H2O, the private label brand which emphasizes cost friendliness during economic down time. The selling point of the Twist water is that it is more environmental friendly because its bottle is softer and twistable and therefore, it will be increase recycling efficiency, reduce the material use, and generates less GHG emission during production process. However, since the marketing strategy of the product was very innovative and popular, a lot of attention was diverted to the innovative marketing rather than the original claim of the product, which is being environmental friendly.

### IV) Price-sensitive market

The Twist Water was sold for \$18 NTD while the “Shui Sen Huo” is sold for \$17 NTD. The one dollar difference for a FMCG can be the key to consumers’ decision making element. The additional cost associated with carbon footprint labelling project must be balanced with the price of the product. Therefore, this made it difficult for Taisun to lower the price of Twist Water.

### V) Attacks on environmental claim

Because of Twist Water's claim on being environmental friend, it has caused controversial reactions among the public. While some consumers like Twist water for its reduction of GHG emission by making the bottle lighter, others challenge that the best practice for the environment is to not sell bottled water at all. Some see Taisun's activity as a way of "green-washing" consumers and wrote a letter to Mr. Shen Shih-Hong, the Minister of Environmental Protection Administration, to express his views on Taisun twist water's environmental claim. In his statements, he mentioned regardless of the reduction of material used and GHG emission reduced from the Twist water, production of the bottled water still releases GHG emission. Claiming Twist water is more environmental friendly is misleading consumers into buying bottled water rather than bringing their own cup and drinking fountain water.

### **5.2.6 Stage 5: Achievement**

Twist water received instant popularity in the market and also won award from Food Bev magazine.

#### **1. Sales performance of Twist Water:**

Prior to implementing the carbon footprint labelling project, Taisun did not realize the benefits the project could bring. Following the success of Twist, Taisun saw that bringing environmental friendly product to market can result in unexpected benefits. The internal sales goal of Twist water was 2.5 million boxes. One box has 24 bottles; therefore, the expected sales was 60 million bottles. The estimated change in market share was double of the previous market share. According to Mr. Wang, the market share increased by 7%, from 3% to 10%. When Twist Water was introduced to the market in March 2010, it was the number one seller among bottled water products.



## **2. Awards:**

Taisun Twist bottle is the only product in Taiwan to receive the award by Food Bev media as one of the 20 future-friendly containers to the world.

## **3. Market response:**

Taisun water was the number one seller in the market two months after its release in March.

## **4. Internet search and social media**

Google Search of Taisun Twist water amounts to 34,300 results as of July 9, 2011. Yahoo Search amounts to 37,500 results as of July 9, 2011. Taisun's link to "Taisun Twist Water Twist out goods, Prize for every bottle" has 916 people clicked "like" and 151 people shared the link.

## **5. Improvement:**

- Through the life cycle assessment, identification of emission hot spot was made which are transportation and packaging.
- Relationship between packaging and transportation also affects GHG emission: the lighter the bottle is, the more effective it is to transport the products as the same capacity can now carry more bottles than before.
- Product value proposition: the bottled water market is very competitive, and since the content does not differ between different brands, it is difficult to differentiate product from other competing items. By doing the carbon footprint labelling, Twist water makes a different impact on consumers' purchase decision.
- New marketing strategy: the carbon footprint labelling has created different value proposition to consumers; therefore, a new marketing style can be derived from this new value.

## 5.2.7 Future Plan

This section discusses what Taisun will do in the future to enhance the value of carbon footprint label. One is to further reduce carbon footprint of products and the other is to enhance the promotion methods.

The carbon footprint label is valid for only two years; therefore, companies will need to re-register for the label after it has expired. Re-registration also becomes a compulsive force to incentivize companies to lower their emission, so that every carbon label comes with successive reduction. The improvement for bottled water is 5 gram as a reduction mile stone; therefore, if reduction is not apparent then companies would not want to register for carbon footprint label again.

### 1. Reduction Action Plan:

- 1) As can be seen from the life cycle assessment, material acquisition contributes greatest to the emission. Therefore, to further reduce product GHG emission, material reduction would be the goal.
- 2) The second major contributor to GHG emission is processing. Therefore, the next goal would be to enhance the efficiency of production; to make more bottles per hour.
- 3) The third part for improvement will be reducing consumer emission. For consumer, improving recycling efficiency is one of the steps to lowering emission. Other parts contributing to consumer emission are the distance consumer travel to obtain the product and the storage condition needed for consumers (refrigerator).
- 4) Through the process improvement and material use efficiency improvement , Taisun hopes to reduce price of Twist water. Price is also an important factor during consumer decision making; therefore, to encourage consumers to buy green products,

Taisun aims to reflect the cost saved from operational improvement back to consumers.

5) Moving reduction goal beyond packaging to transportation: How to maximize the efficiency of transportation from factory to distribution centers and sites.

6) Expanding carbon footprint labelling to all products: once seeing the performance of Twist water, Taisun starts to gain confidence in this area. The long term goal would be applying the label to all products.

## **2. Promotion Action Plan:**

1) The government though promoted carbon footprint label, no corresponding education was available. For example, a commercial explaining carbon footprint label on the TV would be a good way to mass market the label. However, the government is not doing this because it is not a wide industry standard yet. Doing so will threaten those who have not started the practice and affect the market operation.

2) Channel support: Taiwan has a very high density of convenience store; however, to place products in the convenience store, manufacturers must compete aggressively. Products with high demand would be selected for shelf space at convenience stores. Fortunately, Taisun has 21.85% share in FamilyMart, the second largest convenience chain store with 2599 locations in the entire Taiwan and has 27% market share, Taisun can distribute its products through FamilyMart. In addition, as climate change increasingly affects people's life, distributors would also sense the demand for green products. The goal for Taisun is to convince the distributors to create a green product section.

3) Cooperating partners support: Taisun has cooperation with hotel resort; therefore, it would also be a good channel for distribution of Taisun's selected

products. Especially with the growing trend of green hotels and green travel, Taisun Twist water would be a good complementary product for the green theme.

### **5.3 Case Conclusion**

Through investigation of how carbon footprint labelling is done worldwide, how foreign-owned companies implement carbon footprint labelling, and how Taiwanese pioneers implement carbon footprint labelling through in-depth interview with Acer and Taisun, the SWOT analysis of carbon footprint labelling is summarized below.

#### **1. Strengths:**

The investigation of carbon footprint label can be summarized into the below SWOT analysis. The strength of carbon footprint label comes from the elevating awareness of climate change and increasing demand for low carbon products. Another one is because it is a very new practice in Taiwan, early players of this new scheme is likely to benefit from improved corporate image with more innovation and environmental friendliness. Furthermore, since not a lot of businesses have started the practice, businesses which have done carbon footprint labelling will differentiate themselves from others by having the label on their products. The label can create marketing value for businesses to create the buzz and develop innovative marketing strategy. The best thing about carbon footprint labelling is that it engages consumers into the supply chain and makes consumers the pull force to make suppliers and businesses lower their carbon emission.

#### **2. Weakness:**

The weakness of carbon footprint label is mostly increased short-term cost for carbon footprint auditing. However, the cost for carbon footprint labelling is expected to decrease as database for GHG emission is established and as employees become familiar with the application and assessment process. The increased cost also causes

Taisun to raise the product price and therefore, it was less price-competitive than Coca Cola's "Shui Sen Huo" water.

Another weakness is because life cycle assessment takes time to finish and application and certification also needs time to process; therefore, products with high turn-over rate are less suitable for carbon footprint labelling. The two bottlenecks in obtaining the carbon footprint label for ICT industry are the complexity of supply chain and processing time of application.

Another weakness is that new training and learning is needed for every employee in the company and during this period of time, employees may have concerns and resistance towards the carbon footprint labelling scheme. It will be the leader's role to convey the purpose of carbon footprint label clearly to the entire company and have everyone engage in the company's new vision.

### **3. Threats:**

One benefit of carbon footprint label at this moment is its uniqueness and creates opportunity for businesses to differentiate from competitors; however, as competitors learn about the purpose and value of carbon footprint, they will start applying and using the label on their products as well. Although this reduces the benefit of carbon footprint label on the aspect of differentiation, it is a long-term benefit for all businesses to start assessing their carbon footprint and label their products so that consumers can make more environmental friendly decisions and businesses have the drive to lower their GHG emission.

Another threat comes from the possible attacks on the claim of being environmental friendly while there are other ways to lower GHG emission. Controversy on the actual purpose of carbon footprint label has been heatedly discussed; some see the carbon footprint label as a marketing tool to "green-wash"

consumers, while others see it as the commitment business actually makes to reduce the impact of their operation on the earth.

The last threat comes from the relationship between logistics and GHG emission. As the distance the product travels to reach its consumer increases, the GHG emission also increases because transportation causes GHG emission. This has direct influence on Taiwan because of Taiwan's export-based economy. For businesses with clients outside of Taiwan, the distance the product travels to the country is increased. If carbon footprint label were to become a standard for all industries and product green-ness were to become the most important factor for purchasing-decision making, the only way to maintain the competitiveness of products would be producing the products locally to supply the local market. This would require businesses to outsource manufacturing to factories all around the world in order to serve their clients and this would definitely increase the cost of operation for businesses.

#### **4. Opportunity:**

1) Carbon footprint label has become a differentiation selling point for businesses and this could evolve into series of products with gradual improvement in every new model. This way, consumers can always expect the lower carbon footprint model that will be developed and offered by the company.

2) Another opportunity comes from selling carbon footprint labelled-products to countries which have high awareness of climate change and high consumer demand for environmental friendly products. For example, United Kingdom is one of the most aggressive nations in promoting sustainable development; therefore, consumers have strong favour for carbon footprint labelled products. As climate change leads to more damages in the world and creates more unexplainable phenomena, consumers

will begin to see the importance of reducing GHG emission. Therefore, it is expected that products that are carbon footprint labelled will receive elevating attention and preference by consumers.

3) New opportunity also emerges when businesses bundle the concept of carbon footprint label, low carbon products with cost-saving benefits. For food products, especially foods with packaging, which can result in waste, can be a great incentive for Taiwanese consumers because garbage comes with cost. To encourage waste reduction and recycling, Taipei city government imposed a new law for residents to use a specified garbage bag to throw garbage, the price of the bag varies; the larger the volume, the higher the price. Therefore, this acts as a natural incentive for consumers to lower waste production and increase recycling.

## 5. SWOT Analysis

Table.6.1 SWOT Analysis of Carbon Footprint

|  |   |
|--|---|
| <p><b>Strength</b></p> <p>Rising climate change awareness</p> <ul style="list-style-type: none"> <li>● Innovative approach in Taiwan</li> <li>● Differentiation from competitor</li> <li>● Contribution to society and environment</li> <li>● Increased cost efficiency</li> <li>● Improved corporate image</li> </ul> | <p><b>Weakness</b></p> <ul style="list-style-type: none"> <li>● Increased monetary/time cost from life cycle assessment</li> <li>● Monetary/time cost for label registration</li> <li>● Not suitable for products with short product life cycle</li> <li>● Difficulty increases as supply chain becomes complicated</li> <li>● New learning period is needed</li> </ul>   |
| <p><b>Threat</b></p> <ul style="list-style-type: none"> <li>● Competitors learn and copy</li> <li>● Attacks from emphasis on environmental proposition</li> <li>● Long-distance transportation for export may affect trade performance</li> </ul>  | <p><b>Opportunity</b></p> <ul style="list-style-type: none"> <li>● Base on carbon footprint further develop lines of innovative products. E.g. a series of low carbon footprint product, with reduction goal for each new model</li> <li>● Sell to countries with high awareness for environmental protection</li> <li>● Deliver new value proposition</li> <li>● Draw connection between carbon label and cost-saving opportunity</li> </ul> |

# Chapter 6 Conclusion

## 6.1 Managerial Implication

This section discusses the lessons learned from the international practice on carbon footprint labelling initiatives and suggestions for Taiwan's carbon footprint label development.

### 1. Comparison of Acer and Taisun's approach of carbon footprint labelling

Acer and Taisun have both done the carbon footprint labelling. The implementation process is summarized in the below table.

Table.5.3 Comparison of Acer and Taisun's Carbon Footprint Label implementation:

|                  | <b>Acer</b>   | <b>Taisun</b>   |
|------------------|---|---|
| Motivation       | <ul style="list-style-type: none"> <li>● Leader's own vision</li> <li>● Government support</li> <li>● Trend</li> <li>● Market demand (France Grenelle 2 policy)</li> <li>● Exercise for suppliers to meet future requirements</li> <li>● Stakeholder concern</li> </ul>   | <ul style="list-style-type: none"> <li>● Leader's own vision</li> <li>● CSR image</li> <li>● Government support</li> </ul>  |
| Project Planning | Parties involved: <ul style="list-style-type: none"> <li>● Suppliers do life cycle assessment</li> <li>● Acer works with Academia Sinica and provides consultation</li> <li>● BSI verified life cycle assessment</li> </ul> Project design: <ul style="list-style-type: none"> <li>● Bargaining power of the business is the key</li> <li>● Pioneer to establish</li> </ul> | Parties involved: <ul style="list-style-type: none"> <li>● Plastic Industry Development Center, TUV and EPA</li> </ul> Project Design: <ul style="list-style-type: none"> <li>● Plastic bottle is most GHG intensive part</li> <li>● Content selection: lighter bottle is only applicable to simple content (sugar and processing)</li> <li>● Inspiration from</li> </ul> |



|              |   |   |
|--------------|---|---|
|              | <p>database to become industry standard</p> <ul style="list-style-type: none"> <li>● Auditing is fast, but receiving label takes 2 to 3 months</li> <li>● Complexity of product and completeness of information are the key factors for selection of product for CFL</li> </ul>   | <p>Japanese water bottle</p> <ul style="list-style-type: none"> <li>● Water: \$11 billion NTD market, long product life cycle, simple product, no innovation needed</li> <li>● Plastic material: reduced by 43%</li> <li>● CO<sup>2</sup>: reduced by 50g</li> <li>● Weight: from 20 g to 14 g</li> <li>● Recycling space: increased by 70%</li> </ul>  |
| Execution    | <p>Cost</p> <ul style="list-style-type: none"> <li>● Verification by BSI was \$100K NTD.</li> </ul> <p>Marketing</p> <ul style="list-style-type: none"> <li>● Bundling with cost and energy saving feature is the marketing strategy for electronic products</li> <li>● Product was removed from the market before it received the carbon footprint label</li> <li>● No extensive marketing done</li> </ul> | <p>Cost</p> <ul style="list-style-type: none"> <li>● Entire project budget: 90 mill. (marketing, R&amp;D, application of carbon footprint label)</li> </ul> <p>R&amp;D</p> <ul style="list-style-type: none"> <li>● Pressure testing for water storage and processing</li> <li>● Restoration of bottle after twisting</li> </ul> <p>Carbon footprint label</p> <ul style="list-style-type: none"> <li>● Life cycle assessment done and verified by BSI</li> </ul> <p>Marketing</p> <ul style="list-style-type: none"> <li>● Combine fun and environmental friendliness</li> <li>● Cooperation with government activities, blog, donation, music festival</li> </ul> |
| Difficulties | <ul style="list-style-type: none"> <li>● No industry standard-no comparison</li> <li>● Allocation problem base on supplier chain complexity</li> <li>● Cost of assessment increases as information gets more complete</li> <li>● Various database to choose from -</li> </ul>   | <ul style="list-style-type: none"> <li>● No industry standard</li> <li>● No comparison marketing</li> <li>● No government promotion of labelled products</li> <li>● No distributor support: Coca cola's new product was introduced and won support from Family Mart, a.mart, and</li> </ul>   |

|             |  |   |
|-------------|--|---|
|             | <p>inconsistent information</p> <ul style="list-style-type: none"> <li>● Function vs. emission</li> <li>● Carbon label vs. export competitive edge</li> <li>● External expectation vs. internal comprehension not met</li> <li>● Limited emission reduction opportunity</li> </ul> <p>Bottleneck</p> <ul style="list-style-type: none"> <li>● Complexity of supply chain vs. information completeness</li> <li>● Receipt of carbon footprint label takes time</li> </ul> | <p>RT-mart</p> <ul style="list-style-type: none"> <li>● Absence of public education: misunderstanding of the label</li> <li>● Difference in assessment method</li> <li>● Fun vs. environmental friendliness</li> <li>● Price sensitive market</li> <li>● Attack on Environmental claim</li> </ul>   |
| Achievement | <p>To acer</p> <ul style="list-style-type: none"> <li>● Identification of emission hotspot→efficiency improvement</li> <li>● Government-led procurement</li> </ul> <p>To supplier</p> <ul style="list-style-type: none"> <li>● Material innovation for lower carbon supplies</li> </ul>  | <p>Sales performance</p> <ul style="list-style-type: none"> <li>● #1 seller</li> <li>● Market share increased by 7%</li> </ul> <p>Internet popularity</p> <ul style="list-style-type: none"> <li>● Google search: 34,300 results</li> <li>● Yahoo search: 37,500</li> <li>● Taisun facebook link: 916 likes, 151 shared the link</li> </ul> <p>Improvement</p> <ul style="list-style-type: none"> <li>● Emission hotspot identified</li> <li>● Transportation efficiency improved</li> <li>● New value proposition</li> <li>● New marketing strategy</li> </ul> |
| Future Plan | <ul style="list-style-type: none"> <li>● Focus on long product life cycle items: model business users</li> <li>● International market demand</li> <li>● Comparison within own product line</li> </ul>  | <ul style="list-style-type: none"> <li>● Carbon label valid for 2 years, re-registration comes with successive GHG reduction</li> <li>● Acquisition of material accounts for most GHG emission:</li> </ul>  |

|  |  |  |
|--|--|--|
|  | <ul style="list-style-type: none"> <li>● Water and plastic footprint</li> <li>● Carbon footprint to all products</li> <li>● Selection of more environmental friendly materials</li> </ul> <p>Promotion</p> <ul style="list-style-type: none"> <li>● Active promotion of labelled products through distribution channels</li> </ul> | <p>Material reduction</p> <ul style="list-style-type: none"> <li>● Production efficiency improvement</li> <li>● Reducing consumer emission: reduce consumer travel distance, improve storage condition</li> <li>● Price adjustment</li> <li>● Transportation efficiency (factory to stores)</li> <li>● Carbon footprint to all products</li> </ul> <p>Promotion</p> <ul style="list-style-type: none"> <li>● Hotel resort cooperation</li> </ul> |
|--|--|--|

## 2. Carbon footprint labelling Initiation

Carbon footprint labelling is done differently among countries; some are initiated and promoted by governments, while others are initiated by businesses. As the case in Taiwan, carbon footprint labelling is mostly initiated and actively supported by government. The government offers incentives such as free application fee and increased opportunity for government cooperation, however, the key step is not supported by the government. As seen from Taisun and Acer, no comparison marketing is allowed and public education is absent to inform consumers of carbon footprint label. Government promotion of green products would also be beneficial for the move towards making carbon footprint label an industry standard.

France's Grenelle 2 law makes carbon footprint a mandatory requirement for both local and imported products sold in France. By making carbon footprint a legal requirement, businesses need to start measuring their carbon footprint and inform consumers of the impact they make on the environment. Only when all businesses are doing carbon footprint labelling, consumers can use the carbon footprint as a tool to

facilitate purchase decision making. Having one company doing the carbon footprint label does not mean anything to the industry nor to the consumers because consumers do not know whether the company which has done the carbon footprint labelling has higher footprint or lower footprint than others which have not done it. When consumers do not know the meaning of carbon footprint label, misunderstanding occurs and the value of carbon footprint label is not fully appreciated.

Currently, Taiwan's carbon footprint label is managed and issued by the EPA. The label indicates the amount of carbon footprint the product has and the major purpose of the label is to inform consumers of the environmental impact the product causes. By using the label this way, it fulfils its fundamental value, to inform, through informing consumers of the impact their purchase decision makes on the environment, company aims to present to consumers the lowest amount of carbon footprint.

The next level is to further reduce carbon footprint through not only within business's normal practice, but to expand to reduction projects outside of the company's operation. As in the case of United States' Carbon Free label, in order to obtain the label, business must choose a reduction project at the time they register for the Carbon Free label. The reduction projects can also promote the development of environmental friendly technology and projects which will encourage the development of new environmental friendly industry and future. In contrast with Taiwan's government-led implementation of carbon footprint, the U.S.'s approach is non-government organization and business led. Businesses proactively take initiatives to put Carbon Free label on their products, whereas some cases in Taiwan are stimulated by the government. When U.S. businesses put carbon footprint label

on their products, they will have a page on their company website designated for introduction of carbon footprint label.

Japan's government-led carbon footprint labelling scheme implementation joins resources from academics, business and government to establish carbon footprint database. This way, the database will become a valuable resource for others who want to measure their carbon footprint and will reduce the entry barrier for carbon footprint labelling and encourage businesses to initiate carbon footprint labelling. Expositions are also organized to promote labelled products and to provide incentives for businesses to engage in carbon footprint labelling.

UK's Tesco included user instruction in the carbon footprint label to further reduce the carbon footprint of the product during the consumption phase. This way, consumers can also do their job in the fight against climate change.

## 6.2 Research Limitation

### 1. Confidentiality

Some questions relating to the budget was not disclosed for confidentiality reasons.

### 2. Interview with distributor could not be done

Because carbon footprint labeling is a new practice, very few companies are aware of it and doing it. Furthermore, an interview with one of the major convenience stores could not be done because the attempt to reach the person in charge was not successful. Interviewing with the convenience store would be an important source for future development of carbon footprint label. Convenience stores are a major distribution channels for products such as FMCG and food. These products are also very likely to have carbon footprint label in the future. Having distributors' support is

very important to the success of green products. As seen in the case of Taisun, since Twist water was not strongly supported by 7-11, the leading convenience store chain in Taiwan, Twist water could not enjoy the benefit of carbon footprint label for a sustained period of time. If an interview were to be done on 7-11, questions such as what is the distributor's view towards green products and what is the strategy for choosing the products to place in the stores, will 7-11 introduce a green product section in the future to meet the growing demand for green products, would contribute to the development of carbon footprint labeling significantly. Distributors also have direct contact with consumers, they know the consumers's response towards green products directly. When the answers to those questions are found, as businesses promote carbon footprint products, they will know how to approach distributors and what their concerns are.

### 3. Information not suitable for disclosure but is valuable

During the interview, some private information was shared; however, it was not appropriate to disclose the information in this paper.

### 4. Acer's product performance could not be evaluated, because carbon footprint label was not marketed apparently and product went off the market soon after its launch.

Because AO532 was a personal PC model, the high turn-over rate of newer technology rapidly replaced the model with a newer version. Therefore, the performance of carbon footprint label could not be evaluated fully. On the other hand, carbon footprint label is not used primarily as a communication tool with consumers; rather it is an exercise for its suppliers and a preparation for possible future trend. For electronic goods, green products are packaged with claims of cost-saving opportunities rather than low GHG potential status.

5. Long term performance of carbon footing label could not be evaluated for both cases because it is a very new area and products are no longer available on the market. Both Twist Water and AO532 are removed from the market, each by different reason; therefore, the long term effect of carbon footprint label could not be evaluated for both cases. For a new strategy like the carbon footprint label to enter into effect, it will take time for it to be reflected on the corporate image, sales growth, market share growth and long term sustainability of the business. However, both cases were not given sufficient time to examine the long-term benefit of the carbon footprint label and for this reason, businesses may shy away from implementing carbon footprint labelling.

### 6.3 Conclusion

Carbon Footprint label is a new concept around the world, and is an even newer concept to Taiwan's market. In order to realize the benefit of carbon footprint label and for carbon footprint label to become a general standard, joint effort from the government, business, consumers and academic institutions is needed. Through government's support, whether legal or non-legal, businesses can start trying out the new concept and raise consumer' awareness of the label. As consumers become familiar with the carbon footprint label, market demand will then become the driving force stimulating businesses to put carbon footprint label on their products. When carbon footprint label becomes an industry standard, businesses will seek to lower their product carbon footprint so that the carbon footprint label will make them competitive. As a result, the rapid increase of overall atmospheric GHG will be slowed down and worsening climate change can be alleviated.

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