



2014
**ASEM SMEs
Eco-Innovation Consulting
in the Philippines**

Final Report for Eco-Innovation Consulting Project

Submitted by
Ecowise

2014



<Contents>

Chapter 1. Business Outline	1
Section 1. Concept of Eco-Innovation	1
Section 2. The necessity of ASEM SMEs Eco-Innovation Consulting Business	3
Section 3. Summary of the Philippines	5
1. General details of the Philippines	5
2. Present conditions of Philippine company	5
a. Distribution of companies according to size	5
b. Classification standard for size of companies	6
c. Present distribution status according to region	6
d. Present condition of industrial classification	7
e. Distribution of Philippines manufacture industry	8
Section 4. Environmental issues for Philippines	9
1. Air pollution	9
2. Water and marine pollution	9
3. Hazardous waste	9
4. Disposal of waste matter	9
5. Energy in use	10
6. Lack of resources and ecological pollution	10
Chapter 2. Goals and Promotion contents	10
Section 1. Goals	10
Section 2. Detail Promotion Contents and Methods	11
1. Implementation the customized consulting for SMEs	11
a. Constructing the consulting promotion system	12
b. Supporting to discover SMEs for consulting	14
c. Recruiting and selection of participant companies	15
d. First assessment and final selection for participants	17
e. Precision diagnosis and drawing the consulting project	18
2. Holding the overseas workshop	91
a. Holding a business conference and first workshop	91
b. Holding final workshop	95
3. Making a report and promotion	99

a. Submission of consulting report	99
b. Discovering the best practice	100
c. Satisfaction survey and result analysis	107
d. Promotion effort for result diffusion	113
Chapter 3. Business Result and Expectation Effectiveness	116
Section 1. Business Result	116
Section 2. Expectation Effectiveness and Henceforth Task	128
1. Expectation effectiveness	128
2. Henceforth task	128

[Table List]

[Table 1] Classification standard for size of companies	6
[Table 2] The number of Philippines companies	8
[Table 3] First application list for Eco-innovation business	15
[Table 4] Final company list for Eco-innovation business	18
[Table 5] Precision diagnosis company list for Eco-innovation business	18
[Table 6] First business conference participating company list	91
[Table 7] Second business conference participating company list	92
[Table 8] participating company list for first workshop	94
[Table 9] Eco-innovation final workshop program	96
[Table 10] Making the report in phase and submission	99
[Table 11] Summarizing the Philippines Eco-innovation consulting result	116

[Image List]

[Image 1] Purpose and scope of Eco-innovation	2
[Image 2] Eco-Innovation consulting support business outline	4
[Image 3] Distribution of companies according to size	5
[Image 4] Present distribution status according to region	6
[Image 5] Present conditions of Philippine company	7
[Image 6] Distribution of Philippines manufacture industry	9
[Image 7] Philippines Eco-innovation business outline	11
[Image 8] Phase of business contents and schedule	11
[Image 9] Consulting business promotion system	12
[Image 10] Business tie-up with Philippines DTI	12
[Image 11] Business support by Philippines DOST	13
[Image 12] Conclusion of a business agreement with PCAPI	13
[Image 13] Business negotiation with Philippines DENR	14
[Image 14] Business meeting with related organization	14
[Image 15] Eco-innovation publicity(post on DENR website)	15
[Image 16] Consulting business application	16
[Image 17] Understanding present condition of SMEs and checklist	17
[Image 18] CSM Philippines Inc. manufacturing process	24
[Image 19] Jhaz Foot Wear manufacturing process	35
[Image 20] Oryspa Spa Solutions manufacturing process	42
[Image 21] Manufacturing process of A.M. Rieta Chemicals Manufacturing	50
[Image 22] Bugong Foods Corp manufacturing process	59
[Image 23] Chocovron Global Corporation manufacturing process	66
[Image 24] ESCABA Food Product, Inc manufacturing process	73
[Image 25] Balayong Summit Inc manufacturing process	77
[Image 26] Hocheng Philippines Corporation manufacturing process	82
[Image 27] Saffron Philippines, Inc. manufacturing process	85
[Image 28] First business conference	91
[Image 29] Second business conference	93
[Image 30] First workshop	94
[Image 31] Final workshop	96
[Image 32] Final workshop welcome speech	97
[Image 33] Eco-Innovation Leader	98
[Image 34] Award an Eco-Innovation Leader certification	98
[Image 35] Final inspection of CSM Philippines	103

[Image 36] Satisfaction survey for Eco-innovation	107
[Image 37] Assessment the improvement	107
[Image 38] Assessment the improvement and understanding the participants	108
[Image 39] Helped area by Eco-innovation consulting business	108
[Image 40] Improvement for project processing	109
[Image 41] Consideration things for project	109
[Image 42] Appropriate project period	110
[Image 43] Re-attendance intention for Eco-innovation	110
[Image 44] Recommendation intention for Eco-innovation	111
[Image 45] Survey paper	111
[Image 46] Advertisement article of Eco-Innovation	112
[Image 47] Advertisement article of Eco-Innovation	112
[Image 48] Philippines Eco-innovation homepage	114

Chapter 1. Business Outline

Section 1. Concept of Eco-Innovation

The idea of eco-innovation is fairly recent and is closely related to the concepts of “environmental innovation” often linked with environmental technology, eco-efficiency, eco-design or sustainable innovation. The most common use of the term “eco-innovation” is to refer to innovative products and processes that reduce environmental impacts. In general, the concept is defined as Eco-Innovation Observatory (EIO) based on European Union initiatives: the Environmental Technologies Action Plan (ETAP) and Europe INNOVA.

Based on the Sustainable Manufacturing and Eco-Innovation: Framework, Practices and Measurements: Synthesis Report (OECD, 2009): the concepts of sustainable manufacturing and eco-innovation are increasingly adopted by industry and policy makers as a way to facilitate more radical and system-wide improvement in production processes and products and incorporate environmental performance.

In addition, eco-innovation can be understood and analyzed according to its targets (the main focus), its mechanisms (methods for introducing changes in the target) and its impacts (the effects on environmental conditions). Current eco-innovations in manufacturing tend to focus primarily on technological advances. Organizational or institutional have often driven their development and were complemented by the necessary non-technological changes. Sets of indicators can help firms gain a more comprehensive picture of environmental effects across their value chain and product life-cycle. Companies along the supply chain, including small and medium-sized enterprises (SMEs), would make more use of clear and consistent sustainable manufacturing indicators. A measurement approach can capture the overall trends and characteristics of eco-innovation while further progress in benchmarking and indicators could help improve understanding of the nature, drivers/barriers and impacts of eco-innovation as well as raise awareness within the industry and among policy makers.

Eco-innovation aims to create both economic, environmental value, and business models. It acts as a value driver, enabler of green technologies, and solutions. Moreover, it is important to understand better how policy can influence and facilitate the emergence of new business models that are effective in driven eco-innovation (The Future of Eco-Innovation: The Role of Business Models in Green Transformation: OECD, Background Paper: 2012).



[Image 1] Purpose and scope of Eco-innovation

The purpose and scope of eco-innovation can be divided into four target areas: improvement of the system, change in processes, introduction of new products and the greening of the business. Different categories are considered to introduce eco-innovation processes whereby specific activities are proposed to enhance a company's environmental performance.

Improving the system part of a company serves to introduce innovations that deals with the structure and function of the organization and the policies enforced. The interventions proposed will lead to change in management, organization, policy and even the "culture" of the company towards "greening the business". Changing the system or how the company handles business is necessary to accept new technology for improving production processes, products and how the company conducts business. Incorporating environmental management, environmental education, and green procurement are example activities of eco-innovation for business.

Changing the production process aims at resource efficiency and lowering pollution towards clean production and increased safety. Eco-effectiveness seeks the efficient use of resources through assessment and analysis of energy, water, waste products and materials through the production process to generate less pollution. Eco-innovation targets products and services which are available in the market that have a low carbon footprint, whereby the product life-cycle has a low environmental impact. Environmental regulations continuously promote products with eco-design with the carbon labeling, RoHS, REACH as part of product eco-innovation.

The end target is for the business to eco-innovate to become a “green company” which is environmentally conscious to align its system, production process and products that incorporate activities that improve environmental performance of a company towards sustainable growth and continuous improvement.

Section 2. The necessity of ASEM SMEs Eco-Innovation Consulting Business

Developed countries such as the European Union, United States and Japan have recently implemented strict environmental regulations regarding resource management and cleaner production based on life cycle analysis of marketed products. The environmental policy was modified from the “end of the pipe” (EOP) pollution control to advanced pollution prevention of major companies and even small and medium enterprises (SMEs) that either increase production expenditures through expensive pollution control, pollution tax and product restrictions based on harmonized product standards.

Since SMEs have less capital compared to large companies, small businesses are not able to adjust and adapt to the “green growth” of the advanced developed markets. SMEs are reluctant to invest in “green technology” due to lack of capital, inaccessible green information and fear of change. Such limiting factors cause SMEs to be non-competitive in the global market.

To level-off the playing field in the global market SMEs need assistance in pursuing green competitiveness in a free trade environment. ASEM Eco-innovation consulting businesses can help SMEs, especially in Southeast Asia, to strengthen green business development through technology transfer, promoting green management and cleaner production processes. In order to comply with international standards and harmonization, environmental regulations and product standards the consultancy assistance can focus on improving the use of resources, energy efficiency, proper waste disposal and reduction of carbon emissions towards "greening the business to be competitive in the global market and lowering production cost of local businesses".

The Philippine SMEs Eco-Innovation Project is supported by ASEM SMEs Eco-Innovation Center(ASEIC) and aims to support local SMEs to significantly address existing environmental problems and business constraints through eco-innovation approaches such that they can improve their environmental performance while reducing production cost to make them competitive in the global market.

Selected participants will be given green management consulting to identify and address environmental gaps in the business such as pollution prevention, energy efficiency, water conservation, waste disposal and green management procedures through eco-innovation processes of capability building and introduction of new technology and better environmental management systems.

Other consulting activities would include building an environmental net between companies and eco-innovation workshops to educate SMEs to raise awareness on regulations and laws that affect the business and to comply with set standards to meet the global requirements needed to be globally competitive.



[Image 2] Eco-Innovation consulting support business outline

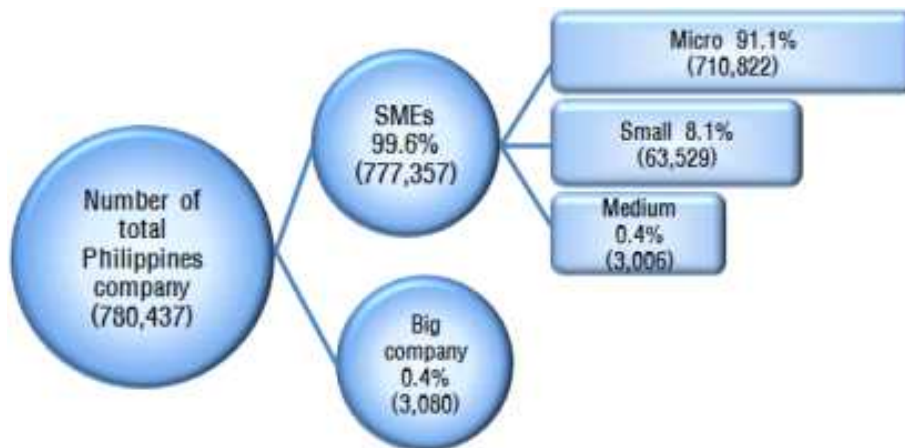
Section 3. Summary of the Philippines

1. General details of the Philippines

Climate	Subtropical	National area	300,000km ² (1.3 times bigger than the Korean Peninsula)
Population	102 million('11)	Capital city	Manila(11.4 million)
Joined International Organization	UN, IMF, WTO, APEC, IBRD, ADB, ASEAN, etc.		
Industrial Structure	('10) Service 54.8%, Manufacturing 31.1%, Agriculture 13.9%		
Main exports	('10) Semiconductor and components, transport equipment, garment, copperware		
Main imports	('10) Semiconductor and components, electronics, steel manufactures, machinery and transportation equipment		
Natural resources	copper, gold, nickel, oil, lumber		
Economic strength	Abundant natural resources and labor		
Economic weakness	Income disparity in region and social stratum, delicate export structure		

2. Present conditions of Filipino companies

a. Distribution of companies according to size



[Image 3] Distribution of Philippines companies according to size

- SMEs : 99.6% of all Filipino companies.
- Micro enterprise : Assets less than 3 million peso, less than ten employees.(91.1% among SMEs)
- Small business : Assets bigger than 3 million peso and less than 15 million peso,

less than 100 employees.(8.1% among SMEs)

-Medium business : Assets greater than 15 million peso and less than 100 million peso, less than 200 employees.(0.4% among SMEs)

-Major business : 3,080 companies, assets bigger than 100 million peso, more than 200 employees.(0.4% among overall Philippine companies)

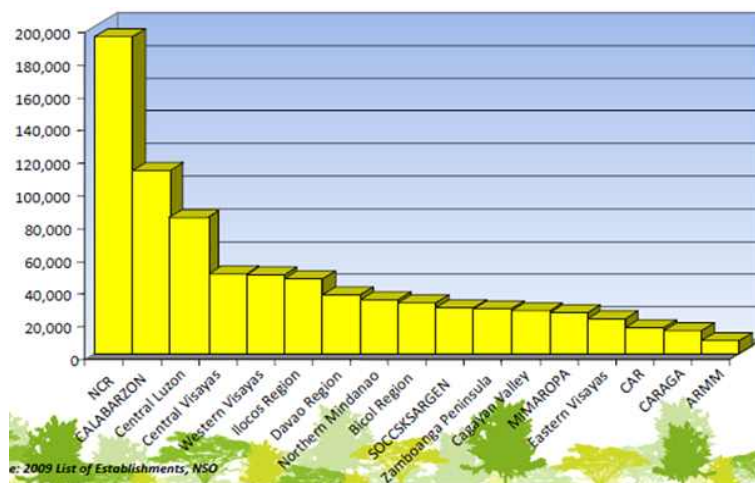
b. Classification standard for size of companies

Filipino companies are classified by assets and number of employees.

[Table 1] Classification standard for size of companies

Type	Assets	Employee
Micro	less than P3,000,000 (80million won)	1~9
Small	P3,000,000 ~ 15,000,000 (80million~400million won)	10~99
Medium	P15,000,000 ~ 100,000,000 (400 million~2.8 billion won)	100~199

c. Present distribution status according to region



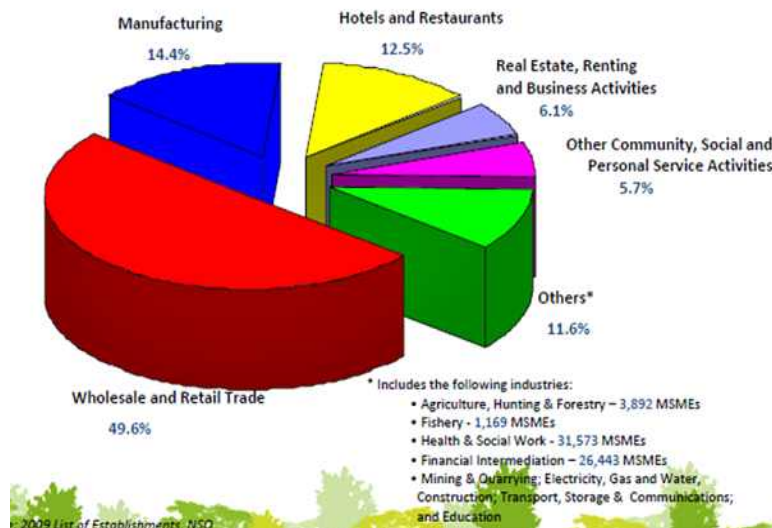
*NCR=Metro Manila(Including 13 cities, Manila, Makati, Quezon, etc.)

[Image 4] Present distribution status according to region

About 200,000 companies are concentrated in Metro Manila which is the regional economic center of the Philippines. In second place is Calabarzon, two hours away

from Metro Manila, and is developed in the resort industry. The third place is Central Luzon with a population of 11 million. Metro Manila includes 14 cities and 3 barangay.

d. Present condition of industrial classification



[Image 5] Present conditions of Philippine company

The biggest industry of the Philippines is wholesale and retail trade which accounts for 49.6%. The second industry is manufacturing which accounts for 14.4% and the third is tourism, such as hotels and resorts, which accounts for 12.5%. Rest of them are agriculture, forestry, fishery, healthcare, financial intermediation, mine and quarrying, electrical, gas, waterworks construction, and transport industry. These only account for 11.6% which shows that the basic industry of Philippine is not enough. Real estate and social service accounts for 6.1% and 5.7% respectively.

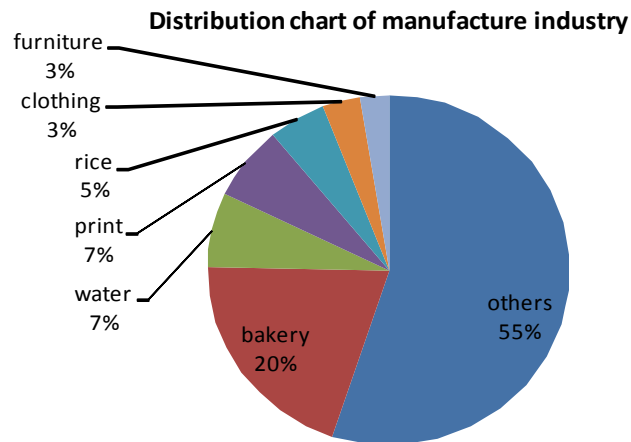
[Table 2] The number of Philippine companies

by Size and Industry, 2006

Industry Sector	TOTAL	%	MICRO	%	SMEs	%	LARGE	%
Agriculture, Hunting & Forestry	4,199	0.5	2,631	0.4	1,447	2.4	121	4.7
Fishery	1,447	0.2	890	0.1	529	0.9	28	1.1
Mining and Quarrying	319	0	217	0	87	0.1	15	0.6
Manufacturing	117,346	15	105,083	14.6	11,278	18.7	985	37.9
Electricity, Gas and Water	1,399	0.2	559	0.1	736	1.2	104	4
Construction	2,488	0.3	1,352	0.2	1,063	1.8	73	2.8
Wholesale and Retail Trade	391,448	50	373,721	51.9	17,494	29	233	9
Hotels and Restaurants	97,975	12.5	90,121	12.5	7,805	12.9	49	1.9
Transport, Storage & Communications	9,405	1.2	7,035	1	2,256	3.7	114	4.4
Financial Intermediation	23,312	3	18,679	2.6	4,524	7.5	109	4.2
Real Estate, Renting & Business Activities	45,722	5.8	40,936	5.7	4,357	7.2	429	16.5
Education	11,857	1.5	6,699	0.9	4,952	8.2	206	7.9
Health and Social Work	31,443	4	29,996	4.2	1,364	2.3	83	3.2
Community, Social & Personal Service Activity	44,705	5.7	42,272	5.9	2,386	4	47	1.8
TOTAL	783,065	100	720,191	100	60,278	100	2,596	100
% of TOTAL	100		92		7.7		0.3	

e. Distribution of Philippine manufacture industry

Mainly the tourist industry is developed and manufacturing is vulnerable in the Philippines. According to Philippines Statistics Authority research, Confectionery products account for 20.3% of the Filipino industry, and bottled water, print, and rice polishing industry are next. Others are plastic packaging, concrete structures, and machine repair.



[Image 6] Distribution of Philippine manufacture industry

Section 4. Environmental issues for Philippines

1. Air pollution

Air pollution is now a serious problem in urban areas. The main cause is carbon monoxide, nitric oxide, and sulfur oxide which is shown at high levels in urbanized zones, industrial areas, and construction areas.

2. Water and marine pollution

About 30% of diseases in 1996~2000 are caused by inadequate sewage scheming. Water pollution is very high in populated and industrial areas due to a lack of sewage disposal systems. Coastal areas also show serious water pollution, and even red tides. Honda Bay shows very high levels of mercury. Most companies discharge waste water even though there are special water protection areas such as Laguna Lake.

3. Hazardous waste

About 168,000^{m³} of toxic hazardous waste has accumulated in and around Metro Manila. These kinds of toxic hazardous wastes are from the chemical, food, textile, engineering industry.

4. Disposal of solid waste

In 2000, 19,700 tons of solid waste accumulate per day, but in 2010, it was about 10 million ton - 500 times more than 2000, because there are not enough purification facilities, and waste is not discharged in an eco-friendly manner. Politically it is encouraging to use eco-friendly products and regulate the use of

plastic products.

5. Energy in use

It was planned to expand the ton of oil from 69.5 million to 83.6 million in 2014 as the use of energy has increased. There has been a lot of concern from companies and households to reduce the electricity rates due to its high cost and inefficient supply.

6. Lack of resources and ecological pollution

In the Philippines, deforestation, soil erosion, and soil contamination by chemical fertilizer and pesticides, heavy metal contamination are serious problems. It is now a crisis of biodiversity in accordance with the industrial development, and pollution is occurred because of production-oriented mineral harvesting.

Chapter 2. Goals and Promotion contents

Section 1. Goals

ASEM SMEs Eco-innovation consulting business is operated by ASEM SMEs Eco-Innovation Center(ASEIC), supports the SMEs in ASEM member states. It pursues SMEs to strengthen the capacity of green management so that SMEs gets environmental improvement and economic effects.

The purpose of Eco-innovation consulting businesses is to strengthen the green management of SMEs. This corresponds with the mission of ASEIC, which is to support SMEs in green innovation, and to serve as a bridge among ASEM members for mutual green growth. Through this project, participants receive green management counseling and expect to prevent environmental pollution and reduce production expenses.

Eco-innovation aims to diagnose the system, process, product, and business for the SMEs to strengthen the green competitiveness. First of all, it aims to construct green management system through recognition improved of green management system, and establishes the clean production system such as diagnosis of energy efficiency, waste management, and raw material management. That examines the scope of Eco-innovation in the product or business, as well as the economic viability through Eco-innovation.

The Eco-innovation consulting business first understands the overall structure of companies, and suggests methods of improvement for the companies who do not

have enough information and capabilities for green management. Participating companies are expected to gain competitiveness in terms of economic, environmental, and social activity.

Philippines Eco-innovation

- ▶ Name of Business: Philippine SMEs Eco-Innovation Consulting Business
- ▶ Period of Business: The day of conclusion of a contract – 31/Oct/2014
- ▶ Purpose of Business: For the Philippines SMEs which is one of ASEM member, green competition improvement, spread of awareness of Eco-Innovation and Outcome
- ▶ Target Company: 10 of Philippine SMEs
- ▶ Business Scale: Host the Seminar and Recruit the Company
 Provide the customized consulting to Philippines SMEs
 Host the workshop for building the international network



[Image 7] Philippine Eco-innovation business outline

Section 2. Details of Promotion Contents and Methods

1. Implementating the customized consultation for SMEs

Filipino Eco-innovation consulting proceeds in the following order.



[Image 8] Phase of business contents and schedule

a. Constructing the consulting promotion system

For Eco-innovation consulting, the Philippine public organizations such as DENR, PCAPI, DTI, PCCI, and DOST cooperated each other to support SMEs. PCAPI also participated in consulting and education related Eco-Innovation.

Network with local organizations



[Image 9] Consulting business promotion system

DTI serves to promote the trade and industry for SMEs. DTI helped to recruit the companies and provided various support including funding. The director of DTI Calabarzon was interested in Eco-innovation, so she wanted to expand the region from Cavite and Laguna to other region.



[Image 10] Business tie-up with Philippines DTI

DOST is one of the government agencies that spreads technology to SMEs. The main task of DOST is business incubation, technical support, funding, technology deals, and Eco-innovation consulting. DOST has provided test analysis, funding, and technical analysis for the participants. They are interested in facilitating technology transfer from Korea to the Philippines.



[Image 11] Business support by Philippines DOST

Ecowise Inc, an agency of ASEIC, has collaborated with Pollution Control Association of the Philippines, Inc(PCAPI) for environmental business. PCAPI has been established in 1980 for Philippine environmental management.

PCAPI acts as a bridge between the government and companies for pollution prevention. PCAPI has many Filipino companies as members, so they provide information about environmental regulations and legal amendments. They have provided regular education for the pollution control officers on a regular basis. Every member of the company can get benefits from a regular forum or environmental business. Through these activities, Filipino companies are able to receive the environmental information, and improve the recognition of pollution.

PCAPI has a friendly relationships with other government agencies and organizations, and also has helped to recruit the company for Eco-innovation.



[Image 12] Conclusion of a business agreement with PCAPI

Department of Environment and Natural Resources(DENR) is the national government agency who deals with overall environmental issues in the Philippines. DENR has 10 central offices and 6 bureaus. Ecowise met General Secretary of Climate change office to discuss Eco-innovation business. DENR is the ministry responsible for managing climate change, air pollution, soil erosion, and water pollution and provides the mechanism for environmental information and pollution prevention. They also help with administrative matters and provide information about environmental regulations.



[Image 13] Business negotiation with Philippine DENR

b. Supporting to discover SMEs for the consulting

DENR, DTI, PCCI has helped to recruit participating companies for Eco-innovation consulting business.



[Image 14] Business meeting with related organization

In particular, the staff of DTI Cavite and Laguna actively promoted the Eco-innovation to local companies. They posted the Eco-innovation consulting contents at the website of DENR.



[Image 15] Eco-innovation publicity(post on DENR website)

c. Recruitment and selection of participating companies

(1) Recruitment of the participating companies

With a support of DENR, DTI, and PCCI, 10 applications were submitted in the Cavite and Laguna region and 12 companies were selected as candidates.

[Table 3] First application list for Eco-innovation business


No	Name of company	Staff	Product	Employees	Region
1	ESCABA Food Product, INC	Perla D. Escaba	MACAPUNO	61	Laguna
2	MAKILING ORGANIC PRODUCT	Clarke Nebrao	TURMERIC	32	Laguna
3	JHAZ FOOTWEAR	NEPHTAU	SHOES	30	Laguna
4	CSM Philippines Inc	Enrico Manrique	Bone China	100	Laguna
5	LA CARLOTA FOOD Enterprise	Manny Cauntay	Pork skin food	13	Laguna
6	Sustalicious Food and Beverage Product	Violy A.Saliqumka	Water and Juice	4	Laguna
7	ORYSPA SPA SOLUTIONS	Edwin Frawas J.Quimana	Personal care	20	Laguna
8	CHOCOVRON GLOBAL CORPORATION	MARISSA G.YALA	POLVORON Product	42	Laguna
9	MACO'S Meat Products, Inc	Evelyn H. Viterbo	Meat Product	154	Laguna
10	Bugong Foods Corp	Armando Ergviza	Marinated Chicken	25	Laguna

11	Balayong Summit Inc	Joshua Marasigan	Bread	120	Cavite
12	Cafe Amadeo Development Cooperation	Ma. Agnes M. Madlansacay Gerry Bunyi	Coffee	11	Cavite
13	Myrna's Miraculous Mushroom	Myrna T. Alonsagay	Mushroom	12	Cavite
14	Delfa's Food Products	Isabel N. Punzalan	Food	16	Cavite
15	Vamana Enterprise	Marissa Caanqued	Bag	24	Cavite
16	A.M. Rieta Chemicals Trading Manufacturing	Francis Rieta	Cosmetic product	160	Cavite
17	Covenant Community Service Cooperative	Elmer Valencia	Clothing	1200	Cavite
18	Hocheng Philippines Corporation	Phillip Rocales	Ceramic product	620	Cavite
19	Royal Tern Ceramics Philippines INC	Romy Calub / Rey Plamiano	Ceramic product	350	Cavite
20	Pasadako Multi Purpose Cooperation	Robento Cnyana	Clothing	8	Cavite

(2) Selection of first participating companies

To select the final 10 companies, the applications, level of commitment, and the company's environmental issues are considered.

Intentions to Participation

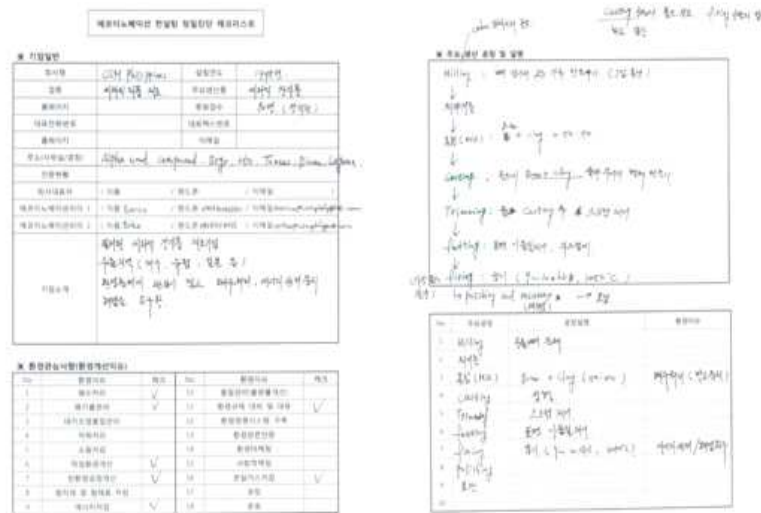
Intentions to Participation (for SMEs only)			
Project Name	ASEM Eco-Innovation Consulting Project for SMEs in Philippines		
Company name	CSM Philippines Inc.		
Registration NR		Year of Registration	2010 1994
Type of Industry	Manufacturing / Handicrafts		
Main Product	Bone china / Porcelain		
NR of full-time employees	80-100	Sales Volume (USD)/Year	\$ 1M / yr.
Address Details			
Country	Philippines		
Street Address (Postal Code)	Alhambra compound, Brgy. Sto. Tomas, BSM, Laguna		
Contact Personnel (Name/Tel/Fax/e-mail)	Enrico Manrique / 80416 / enrico@esmphilippines.com 0918 942 2210		
Attachment : ① Purpose of Participation ② Participating firm's information			
We are submitting our expression of participation for ASEM Eco-Innovation Consulting Project for SMEs in Philippines in accordance with your Project Information Document dated [Insert Date].			
We hereby declare that all the information and statements made in this documentation are true and except that any misinterpretation contained in it may lead to our disqualification.			
Authorized Signatures: 			
Name and Title of Signatory: Enrico Manrique / Executive Assistant			
Name of Firm: CSM Philippines Inc.			
Address: Alhambra compound, Brgy. Sto. Tomas, BSM, Laguna			
Day - May 2015			

[Image 16] Consulting business application

d. First assessment and final selection for participants

(1) The First diagnosis

The first diagnosis was made for SMEs in the region of Cavite for the period from May to June. At the first diagnosis, the environmental issues, commitment, and potential improvement were examined.



[Image 17] Understanding present condition of SMEs and checklist

(2) Final selection

The candidates were evaluated in four categories, commitment (20 points), environmental issues (25 point), potential for improvement (30 points), and improvement effectiveness. 13 companies who got the highest scores were initially chosen, and finally 10 companies were selected.

[Table 4] Final company list for Eco-innovation business

No	Name of Company	Commitment (20점)	Environmental issue (25점)	Potential improvement (30점)	Improvement effectiveness (25점)	Total
1	CSM Philippines Inc	20	25	26	25	96
2	Saffron	20	25	28	22	95
3	Hocheng Philippines Corporation	17	25	25	25	92
4	JHAZ FOOTWEAR	15	25	26	23	89
5	ORYSPA SPA SOLUTIONS	17	23	24	22	86
6	ESCABA FOOD PRODUCT, INC	17	24	22	22	85
7	Bugong Foods Corp	18	23	20	21	82
8	A.M. Rieta Chemicals Trading Manufacturing	18	22	19	22	81
9	CHOCOVRON GLOBAL CORPORATION	17	20	22	20	79
10	Balayong Summit Inc	16	20	23	18	77
11	Covenant Community Service Cooperative	14	20	19	20	73
12	MACO'S MEAT PRODUCTS, INC	15	16	20	18	69
13	Cafe Amadeo Cooperative	11	14	17	14	56

e. Precision diagnosis and drawing the consulting project

(1) The precision diagnosis

Precision diagnosis was made for 10 companies. The period of precision diagnosis was done between July 14th and 26th, and the consultants visited each company to advise ways for environmental improvement, energy saving, working place management, and environmental management.

[Table 5] Precision diagnosis company list for Eco-innovation business

No	Name of company	Staff	Product	Employees	Region
1	Jhaz Footwear	Nephtali Moneda	Shoes	30	Laguna
2	CSM Philippines Inc	Enrico Manrique	Ceramics	80	Laguna
3	Oryspa Spa Solution	EDWIN FRANUS J. QUIMPTNA	Spa and cosmetics	20	Laguna
4	A.M. Rieta Chemicals Trading Manufacturing	Francis Rieta	Cosmetics	160	Cavite
5	Bugong Foods Corp	Hernando Hernandez	Seasoning chicken	25	Laguna
6	CHOCOVRON GLOBAL CORPORATION	Marissa Yala	Chocolate cookie	42	Laguna
7	ESCABA Food Product, Inc	Perla D. Escaba	Fruit jelly	61	Laguna
8	Balayong Summit Inc	Joshua Marasigan	Bakery	120	Cavite
9	Hocheng Philippines Corporation	Phillip Rocales	Ceramic product	620	Laguna
10	Saffron Philippines	Dante Dacanay	Dyeing garment	248	Cavite

(2) Consultation

Participants' requests for consultation were made in the area of energy and water conservation, corresponding with the environmental regulations, waste management, wastewater treatment, working place improvement, and funding.

(a) JHAZ FOOTWEAR

Project	Consulting task	Consultant
Incineration of much waste rubber	<ul style="list-style-type: none"> -10% of raw material is turned to waste. -Waste rubber incinerated in open place leads to pollution. -Discovering new profit model by recycling the waste with local government, shoes association, and the company. -Review the plan to use the recycled waste as flooring. 	Yun-Keun Choi/ Hangwan Kim
Health problem of employees as the use of organic solvent	<ul style="list-style-type: none"> -In the process, employees use the solvent by their hands directly. -Protecting the skin of employees by providing the tool(brush). 	Yun-Keun Choi

(b) CSM Philippines Inc

Project	Consulting task	Consultant
Recycle the waste heat	<ul style="list-style-type: none"> -Plan to recycle waste heat from kiln for casting process. Kiln and casting uses LPG, and are 22m away from each other. Plan to analyze economics and flow of the process for recycling the waste heat. 	Chulwon Lee/ Hyewon Lee
Violation of environmental regulations	<ul style="list-style-type: none"> -Treatment of waste water is not enough, so receive the fine from the government, and the government also summons a representative. -Plan to apply the treatment technology for cloudiness of waste water. 	Yun-Keun Choi
Other violation of environmental regulations	<ul style="list-style-type: none"> -Violation of air pollution and waste has been discovered by diagnosis. -Consultant of PCAPI provides the information of environmental regulations and suggest solution. 	Jeremiah

(c) Oryspa Spa Solutions

Project	Consulting task	Consultant
Constructing environmental management system	<ul style="list-style-type: none"> -CEO of company is interested in environmental management system, and wants to introduce related system. -Establish the environmental policy, plan, management, and system. -Staff of company will implement it after receiving the environmental management consulting by consultant. 	Yun-Keun Choi/ Hangwan Kim
Recycle the rainwater	<ul style="list-style-type: none"> -Plan to recycle the rainwater on new buildings. (Interested in eco-friendly building) -Construct the system for recycling the rainwater. 	Yun-Keun Choi
Secure energy through solar equipment	<ul style="list-style-type: none"> -Much of water in use for spa equipment, and need water to be hot. -Use the boiler for boiling the water. Secure the heat source by solar equipment. 	Chulwon Lee/ Hyewon Lee

(d) A.M. Rieta Chemicals Trading Manufacturing

Project	Consulting task	Consultant
Block the heat from the steam pipe	<ul style="list-style-type: none"> -Steam pipe is connected to the diesel boiler and steam pipe which is made of steel. -Heat from steam pipe makes the temperature go up in the working place. -Block the heat through insulation of steam pipe. 	Chulwon Lee/ Hyewon Lee
Block the unnecessary steam supply	<ul style="list-style-type: none"> -Steam pipe is connected to the diesel boiler and three mixers. -The valve of steam pipe needs to be blocked as unnecessary steam is supplied to mixer. 	Chulwon Lee/ Hyewon Lee

(e) Bugong Foods Corp

Project	Consulting task	Consultant
Obeying the environmental regulations through improving of waste water treatment	<ul style="list-style-type: none"> -Waste water treatment from the process is not obeying the water treatment criterion. -CEO and pollution control officer got pressure to treat waste water and wanted to improve the way of treatment. -Had an experience paying the fine as the waste water. -Plan to treat the waste water by applying microorganism. 	Yun-Keun Choi/ Hangwan Kim

(f) CHOCOVRON GLOBAL CORPORATION

Project	Consulting task	Consultant
Replacement with high efficiency air conditioner	<ul style="list-style-type: none"> -Need to keep room temperature stable. -High energy consumption due to the inefficiency of air conditioner. -Examination to replace it with high efficiency air conditioner. -Need to analyze economics and technology. 	Chulwon Lee/ Hyewon Lee
Environmental management system introduction	<ul style="list-style-type: none"> -Need to set up Environmental management process by introducing environmental management system. -Need to build a process for environmental policy, purpose, expertise, management, and monitoring, etc. 	Yun-Keun Choi

(g) ESCABA Food Product, Inc

Project	Consulting task	Consultant
Recycle the underground water	<ul style="list-style-type: none"> -Want to recycle the Waste water and underground water. -Plan to purify the underground water through ground-water treatment facility. 	Yun-Keun Choi/ Hangwan Kim
Improvement of waste water treatment	<ul style="list-style-type: none"> -Stricter environmental regulations was applied to the company because the company reused waste water. -Treatment of waste water with aeration and microorganism. 	Yun-Keun Choi/ Hangwan Kim

(h) Balayong Summit Inc

Project	Consulting task	Consultant
Improvement of working place sanitation	<ul style="list-style-type: none"> -Poor sanitation status of bakery processing due to insects. -Solving the sanitation problem by introducing insect repelling apparatus. 	Yun-Keun Choi
Improvement of water-cleaning facility	<ul style="list-style-type: none"> -Poor water-cleaning facility in bakery processing. -Replacing water-cleaning facility and filter. 	Hangwan Kim
Applying environmental management system	<ul style="list-style-type: none"> -Need to have environmental management system which has the environmental policy, expertise, and monitoring system. 	Yun-Keun Choi

(i) Hocheng Philippines Corporation

Project	Consulting task	Consultant
Ceramic waste treatment	-Ceramic waste is now dumped to underground. -Review the way to recycle the ceramic waste as a construction material and road flooring.	Hangwan Kim
Constructing GHG inventory	-Lots of kilns are for ceramic processing, and these expel much GHG. -Constructing the GHG inventory which has energy and GHG management system.	Chulwon Lee/ Hyewon Lee

(j) Saffron Philippines



Project	Consulting task	Consultant
Dyed waste water treatment	-High chromaticity of waste water from working place. -Had an experience paying the fine for the waste water. -Plan to solve the problem by applying technology which decreases chromaticity of waste water.	Yun-Keun Choi/ Hangwan Kim
High water consumption	-Need a way to decrease the water consumption by dyeing processing. -Suggest to decrease water consumption by analyzing annual consumption and reviewing the water supply line.	Yun-Keun Choi/ Hangwan Kim

(3) Interim check, and final inspection(Implementation of consulting)

Explain the consulting direction of progress to each company for solving the consulting project, and ask to apply the improvement(suggesting the consulting solution to each company, and checking how it goes). Interim check was implemented between September 18th and 30th to find out the progress of improvement by visiting each company. Final inspection was done between October 14th and 31st.

1. Name of company : CSM Philippines Inc.

① General information of company

Name of company	CSM Philippines Inc.		
Category	Small and medium size enterprise		
Address	Alpha wood compound, Brgy. Sto. Tomas, Binan, Laguna		
Type of business	Bone China Manufacturing Industry	Main product	Ceramics
Employees	100	Certification	
Eco-innovation leader			
	Enrico		Erika
Company introducing	Philippine manufacturing company who produces ceramics in Laguna Philippines. CSM Philippines Inc produces the ceramics made of bone of animal, now export the products to Europe and America. CSM is interested in reducing energy consumption.		

② Products and Process

- A cottage industry, producing ceramics made of bone of animal.
- Dust, waste, and waste water occurred from the processing of intermediary products where animal bone and clay are mixed.
- Exporting now to many countries. Focusing on international market more than domestics.



[Image 18] CSM Philippines Inc. manufacturing process

③ Explaining main process

No	Main process	Explaining of process
1	Milling & filtering	Material selection by milling and filtering of bones.
2	Mixing and creating a form	Mixing with clay and powder of bone, and swelling in the form.(molding process)
3	Removing of scrap	Removing of scrap on the outside of products.
4	Oven-heating the product	Heat the product at 1200° C in oven.

④ Summary of precision diagnosis

- High energy consumption at the process, and much waste occurred. Plan to reuse the energy from the process for casting.
- Need to have a solution for micro dust from the process.

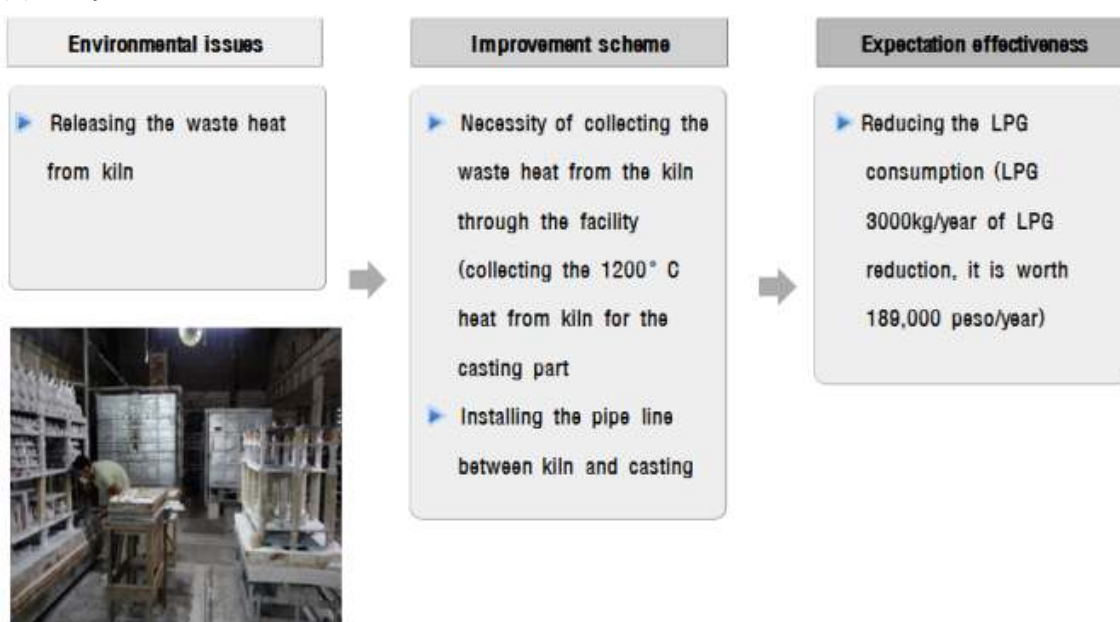
Project	Main issues	Seriousness		
		low	mid	high
Recycle the waste heat	-Plan to collect the waste heat from kiln to recycle for cast. Kiln and cast uses LPG as heat resource, and distance between kiln and cast is 22m. Recycle the waste heat after analyzing economics.			■
Waste water violation of environmental regulations	-Receive the penalty as waste water treatment is not obeying the criterion, and representative is also summoned by government. -Plan to apply the technology can replace cloudiness.			■
Other violation of environmental regulations	-Violation of air pollution and waste has been discovered by diagnosis. -Consultant of PCAPI provides the information of environmental regulations and suggest solution.		■	

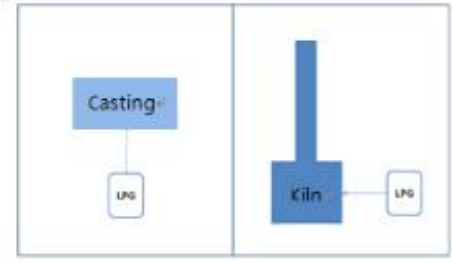
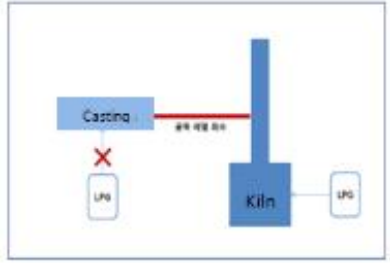

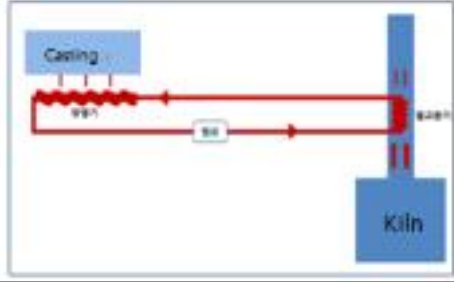
⑤ The purpose of consulting

Main area	Purpose	Accomplishment		Etc.
		Before	After	
Recycle the waste heat to cast	1. Analyzing economics and technology of recycling the waste heat for cast 2. Apply the technology	1. Release heat to atmosphere 2. LPG used for casting	1. Reducing LPG consumption for cast by recycling the waste heat (Aim to reduce by 50%)	1. Preceded by analyzing economics and technology
Waste water regulatory non-compliance	1.Improvement of TSS(total suspended solid) 2.Improvement of cloudiness	TSS (1256mg/l) Color (2500PCU)	TSS (70mg/l) Color (150 PCU)	Urgent task
Analyzing the air and waste regulations	1.Reviewing the environmental regulations	1.Non-identified air regulation 2.Non-identified waste regulation	1.Environmental regulation training (one time) 2.Waste regulation training (one time) 3.Diagnostic report	Necessity of reviewing the environmental regulations

⑥ Consulting benefits and improvement

(1) Recycle the waste heat



Comparing before and after	
Subject	Recycle the waste heat from kiln
<p>Before</p> <ul style="list-style-type: none"> - Kiln: Three kilns for ceramics by LPG in CSM Philippines. One of them is small size and less frequently used and is for sample products. Kiln is used four times per week, and it uses 75kg of LPG for 10 hours. The temperature of kiln is 1250°C. - Casting: Three castings are in CSM Philippines for drying, and those use LPG. Every casting is used six times per week, and each day uses 15kg of LPG for 5 hours. The temperature of casting is about 200°C. 	<p>After</p> <ul style="list-style-type: none"> - Collecting the waste heat from chimney of kiln: Install the waste heat recovery at the chimney of kiln, so collect the heat released outside. - Flow of collected heat: collected heat moved through pipe and pump to casting. - Use of collected heat: release the heat through radiation pipe at casting.
 <p>[Image 1] before</p>	 <p>[Image 2] after</p>
<p>Problem</p> <ol style="list-style-type: none"> 1. Heat is released to outside through chimney. 2. Room temperature is increased by heat of kiln. 3. Much of LPG used for casting and molding. 	<p>Improvement scheme</p> <ol style="list-style-type: none"> 1. Collecting the waste heat for casting as a heat source. 2. Waste heat can be used for casting instead of LPG.
	 <p>[Image 3] Structure of waste heat recovery</p>

Expectation effectiveness

1. Calculating the effectiveness(analyzing the effectiveness of waste heat)

- 1) Calculation formula: temperature of radiant heat=temperature of waste heat at kiln*efficiency of heat recovery*preservation rate of heat flowing.
- 2) Grounds
 - (1) Temperature of waste heat at kiln(about 1000°C)
: Normally it will be a 10% difference only unless the height of kiln is not over tens of meters, 20% difference is accepted in conservative approach.
 - (2) Efficiency of heat recovery(50%)
: The efficiency of heat recovery is now over 60%, the newest is more than 70%. Philippine local heat recovery company answered, it is over 70%. 50% efficiency is accepted in conservative approach.
 - (3) Preservation rate of heat flowing (60%)
: Typical preservation rate of pipe with insulation is over 70%. 60% preservation rate is accepted in conservative approach.
- 3) Temperature of radiant heat : 300°C
- 4) Conclusion
: Even the calculating is in a conservative way, it is proved that enough heat for casting is earned from kiln of chimney through waste heat recovery. The operating time of casting per day is only 50 % compared to kiln, so collected heat can cover the using of LPG, if kiln and casting is operating in the same time.

2. Calculating of reduced annual consumption

- 1) Calculation formula: reduced annual consumption=annual consumption of LPG for casting*weekly operating time of kiln/weekly operating time of casting operating day of casting*price of LPG.
- 2) Grounds
 - (1) annual consumption of LPG for casting: 4,500kg
 - (2) weekly operation day of kiln: 4 days
 - (3) weekly operation day of casting: 6 days
 - (4) price of LPG : 63 peso
- 3) Annual cost saving: 189,000 peso, 4,653,180 won
(basis of Oct 27, 2014, 1 peso -> 24.62 won)
- 4) Conclusion: 3,000kg of LPG reduced annually, it is worth 189,000 peso.

3. Calculation of payback time

- 1) Calculation formula: payback period=investment/annual cost saving.
- 2) Grounds
 - (1) Investment: 500,000 peso
: Local equipment supplier answered 400,000 peso cost would be occurred for one month construction. Additional 25% cost in conservative approach with considering the reduce of construction day.
 - (2) Annual cost saving: 189,000 peso

3) Payback period: 2.65 years

4) Conclusion: payback can be done in less than three years, even though it is calculated in conservative approach.

4. Calculating annual GHG reductions

(1) Calculation formula: annual GHG reductions = Σ (annual LPG reduction * LPG net heat * emission fact of GHG * Global Warming Potential)

(2) Grounds

a. Annual LPG reduction: 3,000kg

b. LPG net heat: 47.3MJ/kg

c. LPG CO₂ emission fact: 63,100kgCO₂/TJ

d. LPG CH₄ emission fact: 1kgCH₄/TJ

e. LPG CO₂ emission fact: 0.1kgN₂O/TJ

f. CO₂ Global Warming Potential: 1

g. CH₄ Global Warming Potential: 21

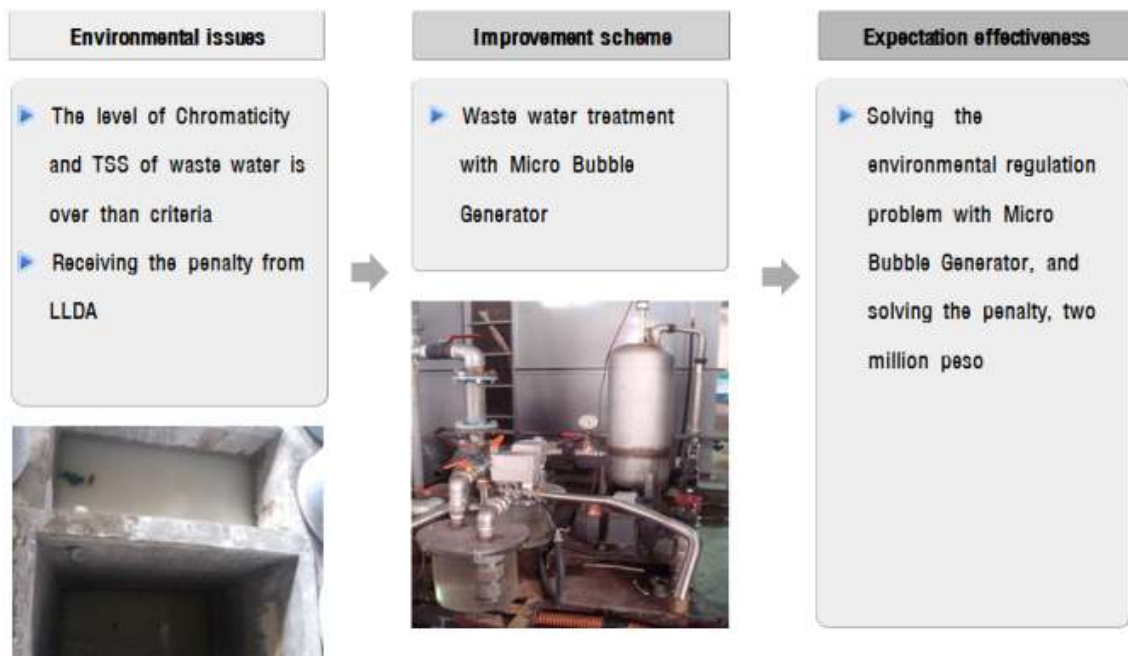
h. CO₂ Global Warming Potential: 310

(3) Annual GHG reduction: 8,961kgCO₂e




(4) Conclusion

: Annually 8,961kg CO₂e can be reduced through waste heat recovery, it is the same as the amount of 3,235 trees absorb GHG.

(2) Treatment of cloudiness and TSS of waste water



Comparing before and after

Subject	Treatment of cloudiness and TSS of waste water	
<p>Before</p> <ol style="list-style-type: none"> 1. Cloudiness and TSS(total suspended solid) of waste water is over the criterion, so receive the fine by LLDA (Laguna Lake Development Authority). 2. Low efficiency coagulant used for waste water shows low rates of low treatment effect, so pay the fine. 	<p>After</p> <ol style="list-style-type: none"> 1. Micro bubble generator sprays the micro bubble to treat the waste water, it is appropriate to treat high cloudiness of waste water. CSM Philippines does not have additional place for waste water facility, so recommend to use this technology. 	
<p>Problem</p> <ol style="list-style-type: none"> 1. Receive the penalty by LLDA. (10,000 peso/day fine) 2. They cannot expand waste water facility by their own will as they rent the place. 	<p>Improvement scheme</p> <ol style="list-style-type: none"> 1. Reducing the cloudiness and TSS by installing the Micro bubble generator. 2. Analyzing the economics and technology of Micro bubble generator, then treat waste water with this facility. 3. Reviewing the possibilities the facility could be moved or expanded. 4. Apply the technology by collaborating with Korean company. 	

Expectation effectiveness

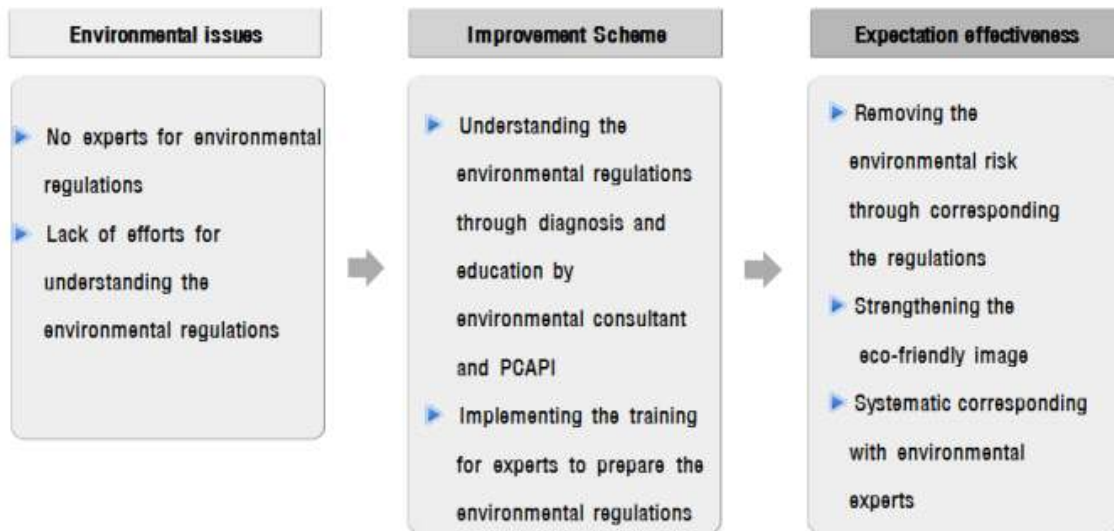
1. Calculating the effectiveness



Receive the 10,000 peso/day penalty by LLDA(Laguna Lake Development Authority). Fines accumulation from April to October is about two million peso. This facility could save two million peso for fine, then in the future more cost will be saved.

2. The period of payback

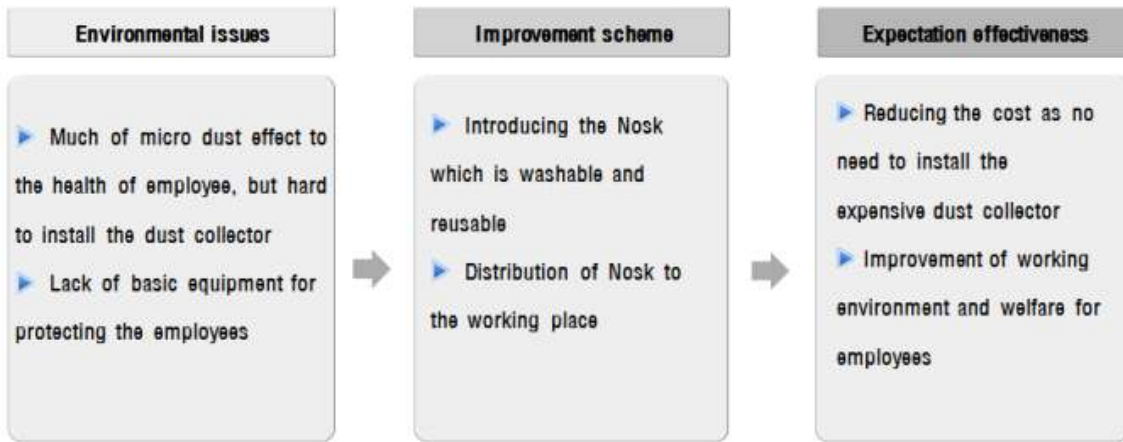
The cost of Micro bubble generator is 500,000 peso. The penalty is over two million peso for seven months, so it is economically feasible to treat the waste water with this facility. For the future, the economic benefits increased as the facility stays in use. The period payback is less than one year.



(3) Identify the environmental regulation for working place and training



Comparing before and after	
Subject	Identify the environmental regulation for working place and training
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. Waste and air environmental regulations are applied to the company, but the staff doesn't know about it. 2. Got pressure about unannounced inspection by LLDA. 3. Receive the penalty for not responding appropriately. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Suggest to respond to environmental regulations through environmental regulation training by environmental consultation of PCAPI. 2. Constructing environmental regulation monitoring system. Implementation of environmental monitoring by PCO (pollution control officer). 3. Identify the trends of environmental regulations through regular education.
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. Absence of expert of environmental regulations. 2. Lack of effort to respond the environmental regulations. 3. No education or training for PCO(pollution control officer) and staff. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Possible to know about environmental regulations through diagnosis and education of environmental expert. 2. Implementation of training for professionals to prepare environmental regulations. 
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Release the pressure of environmental inspection(wider range of company activities by decreasing the potential environmental risk). 2. Enhancement of company image. 3. Training of environmental experts and responding systematically. 	

(4) Treatment of dust through providing personal protection equipment





Comparing before and after	
Subject	Treatment of dust by personal protection equipment
<p>Before</p> <ol style="list-style-type: none"> Much of dust is from the processing as ceramics are made of bone of animal and clay. Micro dust is harmful if it is going to lung through respiratory. It is hard to wear a mask as the temperature of working place is high. 	<p>After</p> <ol style="list-style-type: none"> Looking for the alternatives for protecting the micro dust. Distribution of nosk which is protecting the employees' respiratory system. 
<p>Problems</p> <ol style="list-style-type: none"> Dust accumulate in the employee's body through breathing. Hard to install high efficiency dust collector. Employee needs personal protection equipment, however no alternative for cotton mask in the Philippines. 	<p>Improvement scheme</p> <ol style="list-style-type: none"> Introducing Nosk which is easy to wear. Nosk is washable and wearable, so employee can easily adapt. Employee prefers Nosk as it is easy to communicate. Distribution of large quantity of Nosk.

Expectation effectiveness

1. Possible to improve the working environment without installing expensive dust collector.
2. Improvement of working environment and healthcare.
3. Prevention of occupational disease which leads to improve welfare

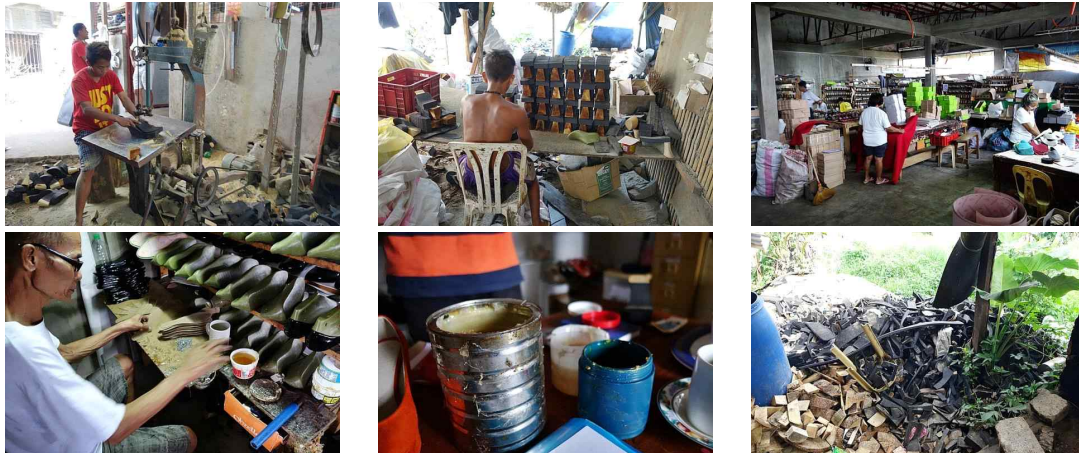
2. Name of company : Jhaz Foot Wear

① General information of company

Name of company	Jhaz Foot Wear		
Category	Small and medium size enterprise		
Address	BRGY. Kanluzoung Bukal, Liliw, Laguna		
Type of business	Footwear	Main Product	Women Shoes
Employees	30	Certification	
Eco-innovation leader			
	Nephtali Moneda	Elvira Moneda	
Company introducing	Producing women's shoes, and providing the products to local market, Asia, and Europe. Located in Liliw municipal, and produce the products at shoes factory. Products are sold at the Liliw local market. Small company as cottage industry produces waste rubber and toxic chemical substances.		

② Products and Process

- Interested in recycling waste rubber from the processing. 10% of rubber is occurred as waste. Most of waste rubber is incinerated, so it causes serious air pollution.
- Chemical substance, which is binding substances for product, is not managed appropriately.



[Image 19] Jhaz Foot Wear manufacturing process

③ Explaining main process

No	Main process	Explaining of process
1	Raw material preparation	Inspection of materials such as lumber, rubber, and leather.
2	Forming	Cutting the lumber and rubber after cutting(forming). Manufacturing the rubber with lumber.
3	Binding and backstitch	Folding the rubber after attaching the leather, then sewing.
4	Binding with shoe insert and bottom	Attaching the shoe inserts.

④ Summary of precision diagnosis

○ Jhaz Foot wear is interested in treatment of waste rubber from the process. Most of them just being incinerated, so it needs to improve the way to treat the waste rubber.

○ Worrying about employees' health problem as they use organic solvent (bond and chemical substances).

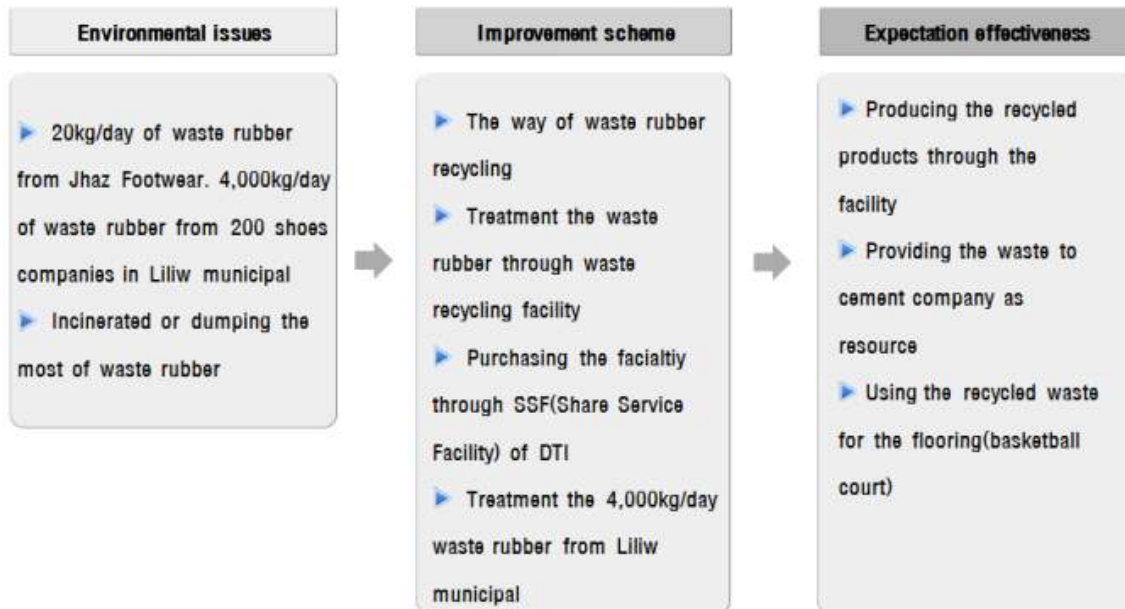
Project	Main issues	Seriousness		
		low	mid	high
Much of waste rubber occurred and incinerated	<ul style="list-style-type: none"> -About 10% of raw material is occurred as waste. -Waste rubber is incinerated in open space so it leads to more pollution. -Making such a council with local government, shoes association, and company for finding the way to recycle the waste together and develop a profit model. -Review the way to reuse the recycled rubber as flooring of sports facility. 			■
Health problem because of using the organic solvent	<ul style="list-style-type: none"> -Employees who is in attaching process, use their hands to brush the bond or organic solvent for attaching. -Protecting the skin of employee by providing the tool(brush). 			■


⑤ The purpose of consulting



Main area	Purpose	Accomplishment		Etc.
		Before	After	
Recycle the waste rubber	<ul style="list-style-type: none"> 1. Seeking to recycle the waste together. 2. Local government and other association treat the waste together 	Dumping and incinerating the waste (600kg/month)	Industrializing the profit business of recycling the waste rubber (100% Recycling)	Need effort of company, local government, and association for improving
Improving working environment	Installing the ventilation facility at the working place	Being exposed to organic solvent	One ventilation system installed to air out the space	Improvement of environmental health of employees
Improving the operating method	Constructing and improving the operating method of the toxic chemical substances management system	No toxic chemical substances management system, directly use the substances by hands	<ul style="list-style-type: none"> Providing the education and manual for toxic chemical management system, Providing the equipment of toxic chemical substances 	Improvement of operation method and system of toxic chemical substances management

⑥ Consulting benefits and improvement

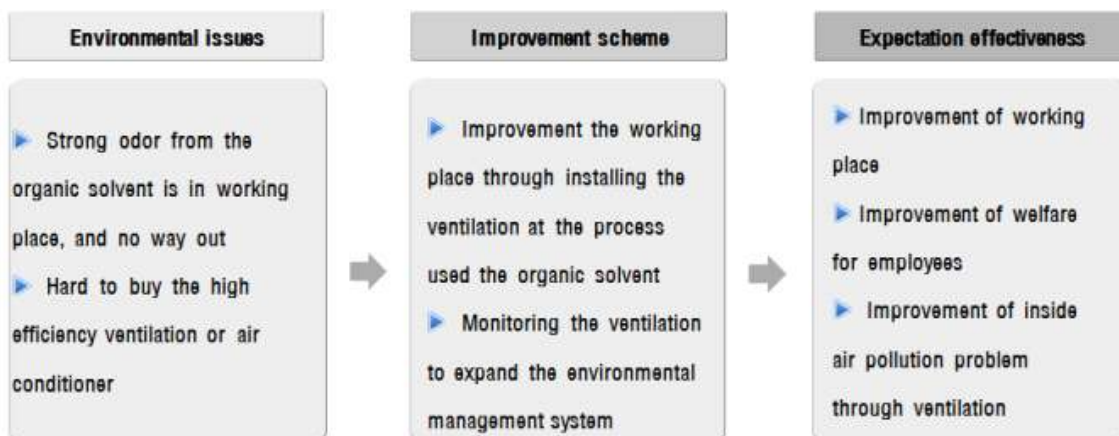
(1) Recycle much of the waste rubber





Comparing before and after	
Subject	Collect and recycle much of the waste rubber
<p>Before</p> <ol style="list-style-type: none"> 1. 20kg of waste rubber is accumulated per day after cutting the rubber material. 2. About 4,000 kg of waste rubber is accumulated from 200 shoes companies of Liliw. 3. This waste rubber is incinerated or dumped. 	<p>After</p> <ol style="list-style-type: none"> 1. Make a plan to recycle the waste rubber. 2. Suggest to treat by buying the waste recycle facility. 3. Liliw's local government buys the waste recycle facility, then treats the waste rubber of 200 companies. Recycled rubber can be sold. 4. Implement SSF(share service facility) consulting so that Liliw local government can buy waste recycle facility. 5. Receiving the word of DTI that the funding will be provided for waste recycle facility.

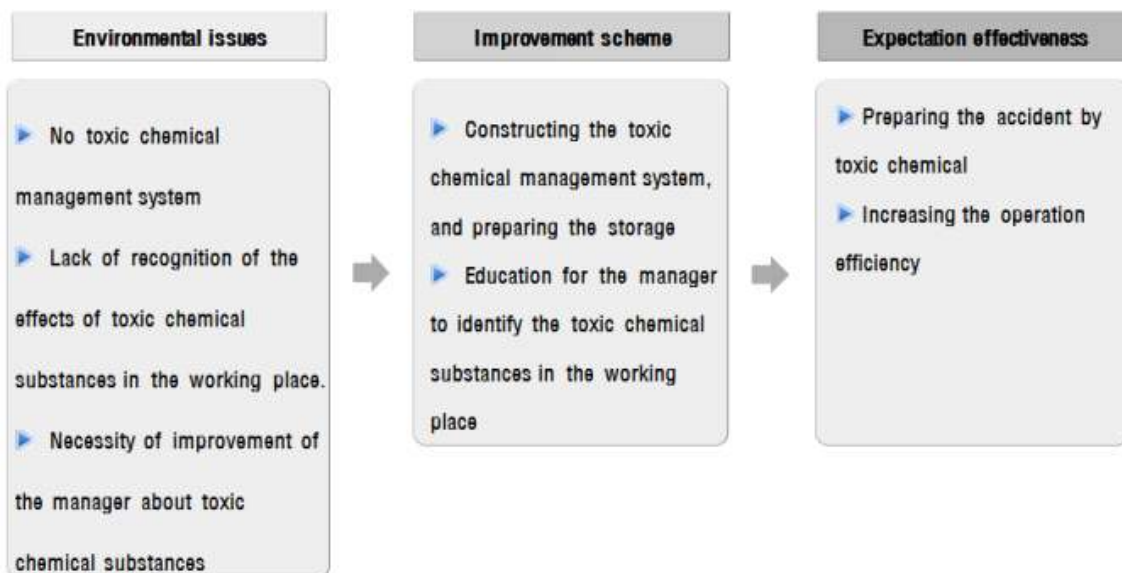
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. Serious environmental pollution by incinerating and dumping of waste rubber. 2. Lack of dumping place is the big problem for Liliw local government, and it possibly leads groundwater contamination and soil pollution. 3. Local governmnet unable to treat much of waste rubber. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Treatment of 4,000 kg of waste rubber through waste recycle facility. 2. Making the profit by products from waste recycle facility(discovering the mutual profit). 3. A margin of recycled products can be used for public waste treatment. 
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Decreasing the environmental effect of existing waste treatment method(dumping, incinerating). 2. Making a profit off recycled rubber (105,084 peso will be the profit as 4,000kg of waste is recycled). 3. Liliw local government can use the profit as common fund of waste treatment. 4. Making a profit by providing the waste rubber as an energy resource to cement company(cement company is just two hours away from Liliw city). 5. Sharing the profit through flooring of public institution(flooring of basketball court). 	

(2) Air out organic solvent at the working place



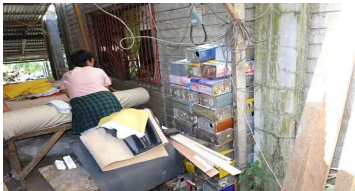
Comparing before and after	
Subject	Air out organic solvent at the working place
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. To attach the leather and rubber, bond is used. 2. Odor of organic solvent affects the health of employee at small working space. 3. Operation efficiency is decreased by odor of organic solvent. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Ventilation is installed to air out odor of organic solvent (install the fan for ventilation). 2. Installing the ventilation by boring the wall near the bond attachment process. 
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. Health problem of employee because of small space and no air flow. 2. Hard to get high efficiency air conditioning or ventilation. 	<p style="text-align: center;"><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Installing the ventilation(the fan). 2. Installing the ventilation near the bond attachment process. 3. Ventilation monitoring.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Improvement of working environment(Solving the health problem of employee). 2. Improvement of working efficiency and welfare. 3. Solving the problem of working environment and air pollution. 	

(3) Improvement of treatment method for toxic chemical substances





Comparing before and after	
Subject	Improvement of the way to treat toxic chemical substances
<p><u>Before</u></p> <ol style="list-style-type: none"> No information about the chemical substances being used at working place. No Material Safety Data Sheet(MSDS) as the bond and chemical are received from a supplier who is not sure where it comes from. Lack of awareness about the improvement of toxic chemical substance treatment. 	<p><u>After</u></p> <ol style="list-style-type: none"> Preparing the MSDS by asking the supplier who provides the bond and toxic chemical. Education for how to manage the toxic chemical. Separating the toxic chemical through separate storage.



<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. No toxic chemical management system. 2. No storage and management method for toxic chemical substances. 3. Lack of awareness about the toxic chemical management and the effect on employees. 4. Necessity to improve the awareness of staff of toxic chemical substances. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Constructing the management system for storing and discarding the toxic chemical substances. 2. Preparing separate storage for toxic chemical substances. 3. Education staff about the toxic chemical substances (management, identification). 4. Preparing the MSDS for working place.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Preparation for toxic chemical accident. 2. Concern for the health of employees. 3. Improvement of working efficiency. 	

3. Name of company : Oryspa Spa Solutions

① **General information of company**

Name of company	Oryspa Spa Solutions		
Category	Small and medium size enterprise		
Address	251 D Chipezo Kve Calamba City, Laguna		
Type of business	Cosmetics	Products	Bath care, Cosmetics
Employees	20	Certification	
Eco-innovation leader			
	Sherill Quintana		Edwin Quintana
Company introducing	Producing the bath and spa products, offices in the Philippines and Singapore. Interested in Korean environmental technology and products. CEO of the company has concern for environmental management and marketing.		

② Products and Process

- Producing a small quantity of bath and spa products, and supplying the products to local Filipino stores.
- Exporting the products abroad, and having the Singapore office.
- Doing the basic product quality control.



[Image 20] Oryspa Spa Solutions manufacturing process

③ Explaining main process

No	Main process	Explaining of process
1	Mixing the raw material	Implementing raw material inspection. Mixing the materials according to the ratio.
2	Adding to container	Implement individual packaging with plastic containers who have the mixed materials.
3	Quality test	Implementing the quality test for each product(color, texture, odor).
4	Packaging (individual packaging)	Product packaging and labeling.

④ Summary of precision diagnosis

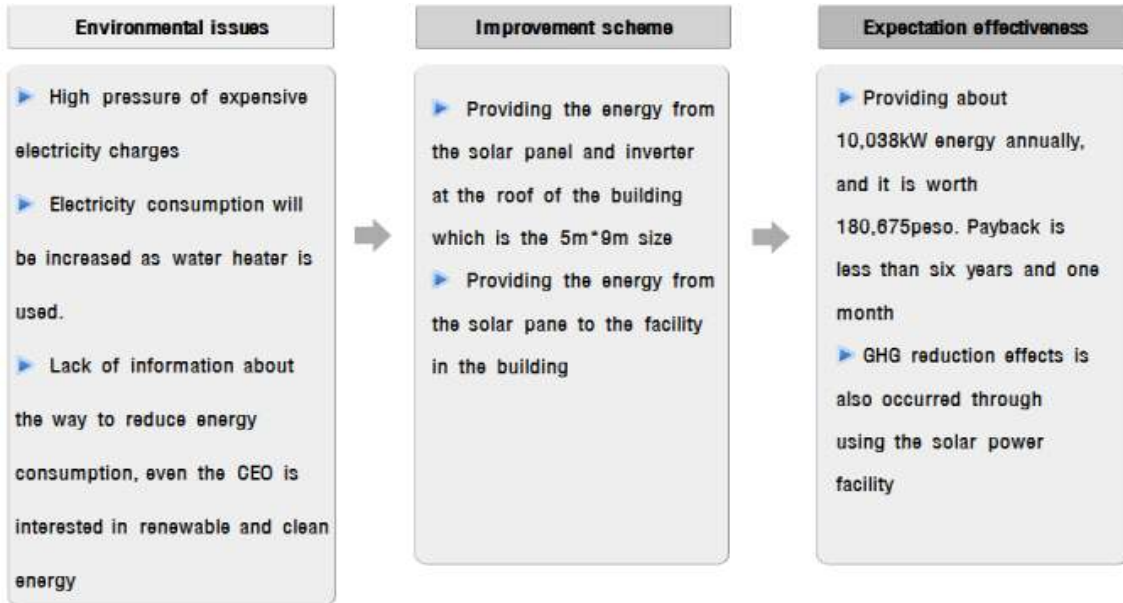
Project	Main issues	Seriousness		
		low	mid	high
Constructing the environmental management system	-The representative of the company is interested in environmental management and wants to construct environmental management system. -Constructing environmental management system such as, policy, purpose, plan, management, and internal audit. -The construct make the basic framework, and the staff will implement it.	■		
Recycling the rainwater	-Recycle the rainwater on the new building (interested in eco-friendly building). -Constructing the system which is collecting and recycling the rainwater.	■		
Securing the energy source by solar facility	-Need hot water as the spa facility in the working place uses much hot water. -Boiler used for boiling the water. Securing the heat source for boiler through solar facility.		■	

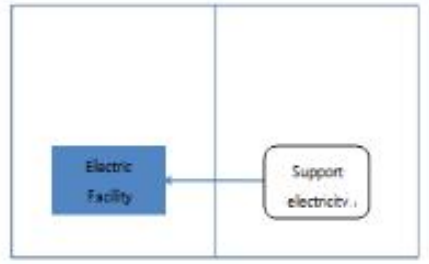
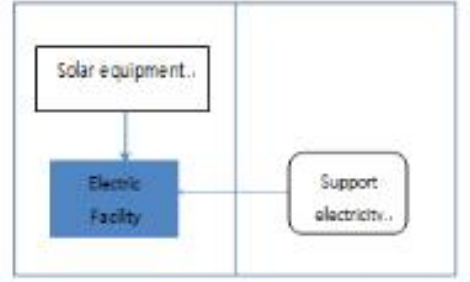
⑤ The purpose of consulting

Main area	Purpose	Accomplishment		Etc.
		Before	After	
Introducing the environmental management system	Documentation of purpose, policy, process of environmental management	No environmental management system	Implement education about environmental management systems and documentation of 10 categories	
Recycle rainwater	Collect rainwater through pipe	Not collecting the rainwater	Recycling 100% of rainwater	Certified of eco-friendly building
Reducing energy consumption	Introducing a solar facility to replace the energy resource of spa facility	Using the boiler for boiling the water	Reducing boiler use by introducing solar facility (about 50%)	Certified of eco-friendly building

⑥ Consulting benefits and improvement

(1) Introducing solar equipment

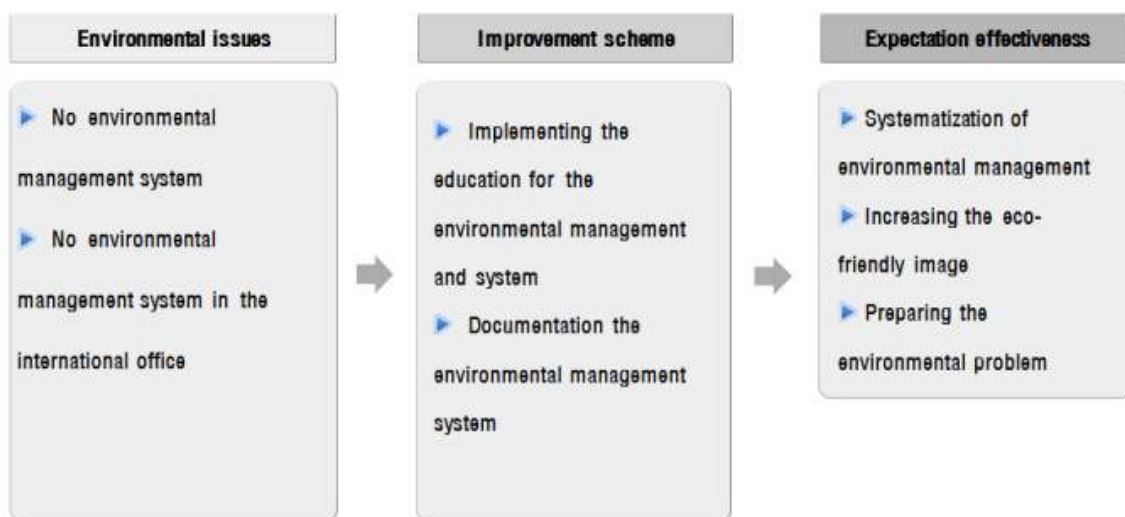



Comparing before and after	
Subject	Introducing solar equipment
<p><u>Before</u></p> <ul style="list-style-type: none"> - 99% of the company's energy consumption of is electricity. - Spa facility will be operational in 2015, so 2.5kW capacity of electric water heater is installed. - Electricity is supplied by local electric power company. 	<p><u>After</u></p> <ul style="list-style-type: none"> - Installing the solar equipment : 25 panel at 250W capacity installed on the roof. - Installing the inverter : invert the voltage to 220V. - Using the generated electricity: using the generated electricity for electric water heater and other electric facilities. Electricity from local electric power company is used as backup power. 

<u>Problem</u>	<u>Improvement scheme</u>
<ol style="list-style-type: none"> 1. Electric charges of 18peso/1kW are fairly expensive. 2. Expecting the electric charges to increase with the operation of electric water heater. 3. CEO is positive about using solar energy or clean energy, but unable to foresee the energy saving benefit. 	<ol style="list-style-type: none"> 1. Install the solar panel at the concrete roof of Oryspa Solution building which is 5m*9m size. Securing the maximum capacity by installing the maximum number of 1m*1.7m size of panel. 2. By installing the inverter, invert the voltage to the normal value. 3. Provide the electricity to electric water heater and other facilities which use electricity. 4. Service from electric power company is kept for backup power.
<p><u>Expectedated effectiveness</u></p> <ol style="list-style-type: none"> 1. Calculating the capacity of solar generating facility <ol style="list-style-type: none"> 1) Formula: capacity of facility=area of installation place/area of one panel*capacity of each panel. 2) Grounds <ol style="list-style-type: none"> (1) Area of installation(5m*9m) : concrete part of roof is the rectangle with 5m width and 9m height. (2) Area of one panel(1m*1.7m) : Philippine local company answered that their panel is little bit smaller than 1m*1.7m. (3) Capacity of one panel: 250W : Standard of panels provided by local Filipino company. 3) Installed capacity(6.25kW) : Installing the 25 panels in 5 by 5. 4) Conclusion: Possibility confirmed for installing a 6.25kW capacity solar generating system that can cover the electricity for electric water heater. 2. Calculating the annual energy saving <ol style="list-style-type: none"> 1) Calculation formula: annual cost saving=solar facility installed capacity*annual generating amount by solar installed capacity*electricity price. 2) Grounds <ol style="list-style-type: none"> (1) Solar facility installed with a capacity of 6.25kW (2) Annual amount generated by installed solar capacity: 1,606kWh/kW : Local Filipino companies answered that the average is 1,620kWh/kW. Applied the number acknowledged by UNFCCC. (3) Electricity price: 18peso/kWh 	

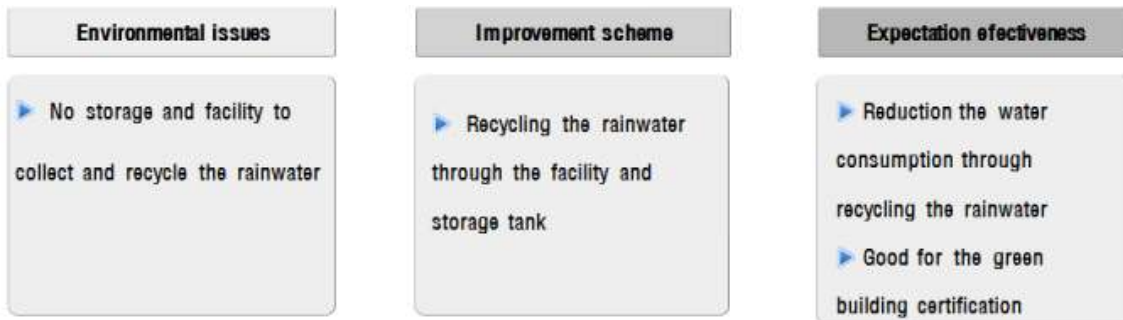
- 3) Annual cost savings: 180,675peso
- 4) Conclusion: Annually 10,038kW electricity is generated by solar facility, so it saves 180,675 pesos per year.
- 3. Calculation of payback time**
- 1) Calculation formula: period of payback=investment/annual cost saving.
- 2) Grounds
- (1) Investment: 1,100,000peso
: Local companies said that the cost is 1,000,000 pesos including the inverter and other costs.
10% additional costs for maintenance are added in conservative approach.
- (2) Annual cost savings: 180,675peso
- 3) Payback time: 6.09 year
- 4) Conclusion: Expecting the payback is possible in six years and one month.
- 4. Calculating annual GHG reductions**
- 1) Calculation formula: annual GHG reductions=annual electricity reductions*GHG emission factor of electricity.
- 2) Grounds
- (1) Annual electricity savings: 10,038kWh
- (2) Emission factor of electricity: 0.7878kgCO₂e/kWh
: Applying the number acknowledged by UNFCCC.
- 3) Annual GHG reductions: 7,907kgCO₂e
- 4) Conclusion: Annually 7,907kg CO₂e can be reduced through solar generating facility, it is the same as the amount of 2,854 trees absorbing GHG.


(2) Construction of environmental management system and strategy establishment



Comparing before and after	
Subject	Construction of environmental management system and strategy establishment
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. No environmental management system (No pollution control officer, monitoring system, environmental purpose and strategy, internal audit). 2. Plan to have environmental management system to promote this system in marketing. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Constructing environmental management system (environmental policy, purpose, strategy for management, system and internal audit). 2. Environmental management manual, procedure. 3. Education for the work. <div style="text-align: center;">  </div>
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. No environmental management system (no environmental management, education, purpose, policy, staff who has the right and responsibility for the environmental working). 2. Oryspa has the office in the Philippines and other countries but with no environmental management system, so environmental purpose, strategy, and policy doesn't reach to the branch offices. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Implementing education about environmental management. 2. Implementing education about the requirements of environmental management system. 3. Constructing the environmental management system (establishing the environmental purpose, policy, management system, monitoring, and internal audit). 4. Documentation of environmental management system process.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Systematization of the environmental process so it keeps operating even when the staff is changed. 2. Promoting the environmental management system construction (improving the eco-friendly image of the company). 3. Preparing for environmental risk. 	

(3) Recycle rainwater



Comparing to before and after	
Subject	Recycle rainwater
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. Discharging the rainwater to bottom of the building. 2. Using the ground water for cleaning the building and growing food. 3. Interested in green building as they build a new building. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Installing the water catchment system at the cornerstone of the building. 2. Possible to collect the rainwater through installing the simple water catchment. 3. Storing the rainwater at the storage tank.
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. Much rainwater can be collected because of tropical weather, but they didn't make use of the situation. 2. Possible to recycle the rainwater by installing the simple rainwater catchment. 3. Installing the rainwater catchment when constructing the new building. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Recycling the rainwater through collecting the rainwater. 2. Possible to recycle the rainwater through rainwater catchment and a storage tank. 
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Reducing the water in use through recycling the rainwater(reduction of rainwater for cleaning the building and growing the food). 2. Helpful for eco-friendly building certification. 	



(4) Implementing the eco-friendly marketing



Comparing before and after	
Subject	Implementing eco-friendly marketing
<p><u>Before</u></p> <ol style="list-style-type: none"> Lack of evidences for eco-friendly products in the company. No method and strategy for eco-friendly marketing, so they couldn't do the activity for eco-friendly marketing. 	<p><u>After</u></p> <ol style="list-style-type: none"> Showing the effort of environmental management by the company such as constructing the environmental management system, green building, Eco-innovation consulting business. Promoting these kinds of efforts on the homepage and products.
<p><u>Problem</u></p> <ol style="list-style-type: none"> Hard to prove eco-friendly of products and the company. Hard to implement eco-friendly marketing as no strategy and method for eco-friendly marketing. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> Actively promoting the environmental management activities on the products and homepage. Proving their eco-friendly through environmental management system, green building certification.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> Reinforcing the eco-friendly image of the company. Sales increasing through eco-friendly image. Resolution in relationship of overseas clients. 	

4. Name of company: A.M. Rieta Chemicals Trading Manufacturing

① General information of company

Name of company	A.M. Rieta Chemicals Trading Manufacturing		
Category	Small and medium size enterprise		
Address	Kalavann Road, Advincula Ave, San Sebastian, Kawit, Cavite		
Type of business	Cosmetics	Products	Shampoo, Soap, lotion
Employees	160	Certification	
Eco-innovation leader			
	Francis Rieta		Christopher Miranda
Company introducing	Producing and providing cosmetics and bath products which are produced by OEM process. Interested in energy efficiency.		

② Products and Process

○ A.M Produces bath products such as soap and shampoo, and uses some tanks which release heat, and Eco-innovation aims to decrease the amount of heat from the tank.



[Image 21] Manufacturing process of A.M. Rieta Chemicals Manufacturing

③ Explaining main process

No	Main process	Explaining of process
1	Storage of raw material.	
2	Mixing the raw material.	Mixing the fragrance, pigment, and water, etc.
3	Drying the products and separating.	
4	Packaging.	

④ Summary of precision diagnosis

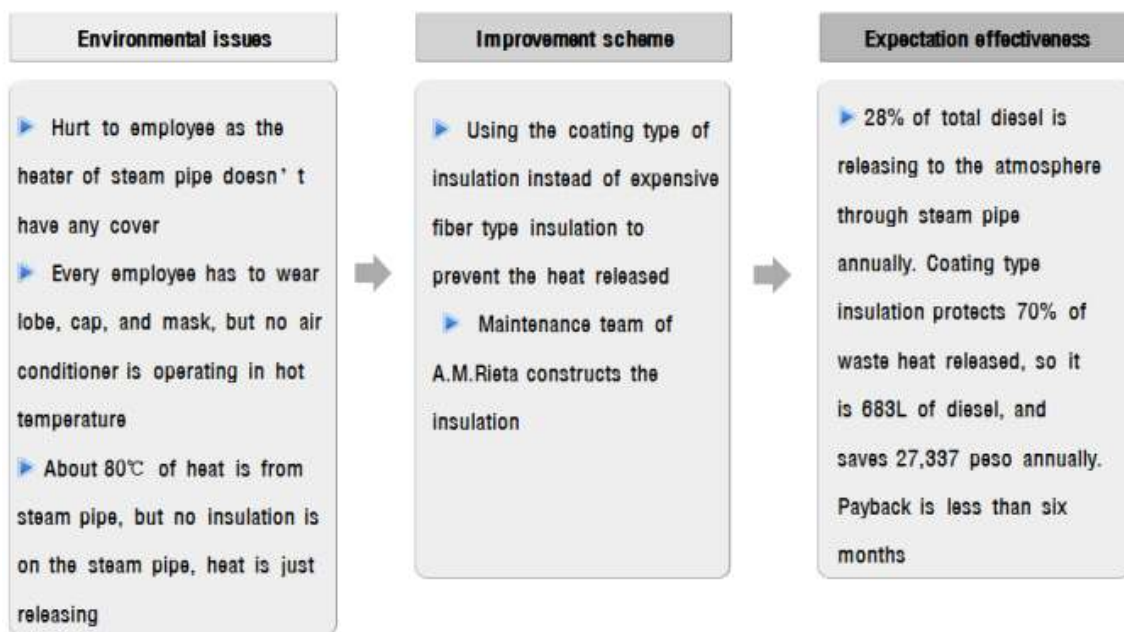
Project	Main issues	Seriousness		
		low	mid	high
Preventing the heat of steam pipe released	-Steam pipe, made of metal, is installed from the diesel boiler to mixer. -Increasing the temperature of the working place as steam pipe releases the heat. -Preventing release of heat through insulation.			■
Preventing the unnecessary steam released	-Steam pipe is connected between diesel boiler and mixer. There are three mixers. -Control valves of steam pipe not separated, so unnecessary steam is produced.		■	

⑤ The purpose of consulting

Main area	Purpose	Accomplishment		Etc.
		Before	After	
Improving the working environment by preventing the heat from releasing	Reducing the heat released through the insulation of mixers and pipe		Decreasing by 5% the temperature of the working place	
Preventing the unnecessary steam from flowing	Preventing the unnecessary steam from flowing by installing the valve at each mixer	Unnecessary steam flowing	Decreasing by 5% unnecessary steam	

⑥ Consulting benefits and improvement

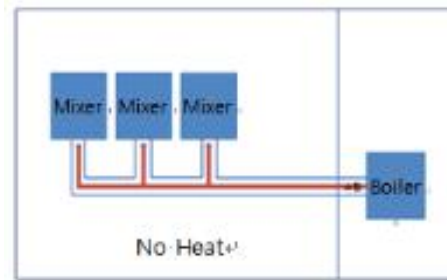
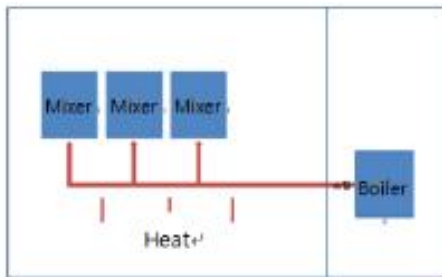
(1) Energy reduction through steam pipe insulation



Comparing before and after	
Subject	Energy reduction through steam pipe insulation
<p><u>Before</u></p> <p>-Mixing Vessel: this is the dissolution facility, A.M. Rieta Chemicals Trading Manufacturing has three mixing vessels. Among three of them, two vessels have been operated 300 days in the year and 2.5hours per day. The two vessels use 80°C of steam, but they are not operating simultaneously. One vessel was just installed recently, so it is not operating yet.</p>	<p><u>After</u></p> <p>- Insulating the steam pipe with insulated coating.</p>

-Boiler: A.M. Rieta Chemicals Trading Manufacturing has one diesel boiler for providing the steam to mixing vessels. It is possible to control the temperature of the boiler.

-Steam pipe: it is the stainless pipe that brings the steam from the outside boiler to the inside mixing vessel.



Problem

1. Employees get scalded on their hands by steam pipe.
2. Employees who is working inside need to wear mask, cap, robes. However no air-conditioner installed, so employees complain about the hot temperature.
3. Outside temperature of steam pipe is 80°C, confirming that steam pipe is not insulated at all.



Improvement scheme

1. Insulating the steam pipe through insulator.
2. Using the insulator in liquid form instead of fiber type insulator which is expensive and hard to have simple construction.
3. Increasing the insulating effect with the coating type insulator.
4. Every insulation installation will be implemented by a maintenance team of A.M. Rieta Chemicals Trading Manufacturing Maintenance.

Expectation effectiveness

1. Calculating the annual heat radiation amount of steam pipe before improvement

- 1) Calculation formula: annual heat radiation amount=heat conductivity of stainless pipe*area of steam pipe*temperature gap between inside and outside of steam pipe*daily operating hours*annual operating days/thickness of steam pipe.
- 2) Grounds
 - (1) Heat conductivity of stainless: 90kj/mhK
 - (2) Area of steam pipe: 0.971m²
: Diameter of central part of steam pipe*circular constant*length of steam pipe.
 - (3) Temperature difference of inside and outside of steam pipe: 1K
 - (4) Daily operating hours: 5 hours
 - (5) Annual operating days: 300 days
 - (6) Thickness of steam pipe: 0.00356(m)
- 3) Annual heat radiation amount: 36,807,856kj
- 4) Conclusion: 36,807,856kj of heat energy is wasted per year. It is the same amount as 683 L of diesel, and it increases the temperature of inside working place. Annual diesel consumption is about 2,400L, so about 28% of diesel is wasted through steam pipe.

2. Calculating annual energy reduction amount

- 1) Calculation formula: annual cost saving=annual heat radiation amount/total heat radiation amount of diesel*insulator efficiency*price of diesel.
- 2) Grounds
 - (1) Annual heat radiation amount: 36,807,856kj
 - (2) Total heat radiation amount of diesel: 37.7MJ/L
 - (3) Insulator efficiency: 70%
: Normally insulator efficiency is higher than 80%
Local Filipino company said their insulator has 90% efficiency.
 - (4) Price of diesel: 40peso/L
- 3) Annual cost saving: 27,337peso
- 4) Conclusions: Expecting to save 683L of diesel yearly, which is worth 27,337 peso.

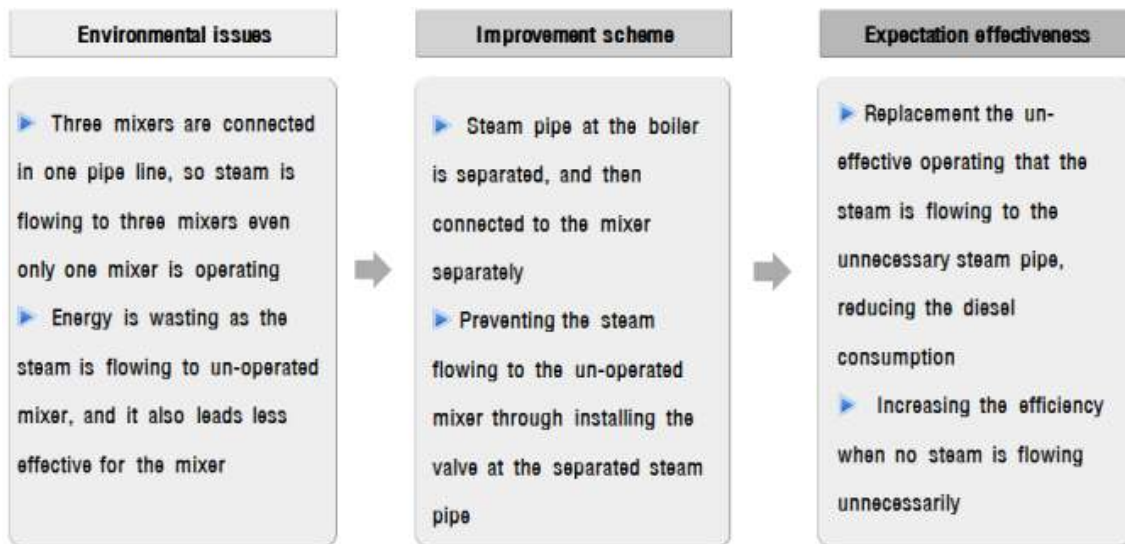
3. Calculating the payback time

- 1) Calculation formula: payback time=investment/annual cost saving.
- 2) Grounds
 - (1) Investment: 10,000 peso
: About 8L of coating type insulator is needed for coating the steam pipe, but 10,000 pesos is applied in conservative approach, even though 16L of coating type insulator is the same price. Maintenance team of A.M. Rieta Chemicals Trading Manufacturing will construct this, so no more labor cost.
 - (2) Annual savings
: 27,337 peso
- 3) Payback time: 0.37 year
- 4) Conclusion: Expecting payback in six months.

4. Calculating the annual GHG reduction

- 1) Calculation formula: annual GHG reduction= Σ (annual diesel reduction*heat value of diesel*emission factor of GHG*global warming potential).
- 2) Grounds
 - (1) Annual diesel reduction: 683L
 - (2) Heat value of diesel: 35.3MJ/L
 - (3) CO2 emission factor of diesel: 74,100kgCO2/TJ
 - (4) CH4 emission factor of diesel: 1kgCH4/TJ
 - (5) N2O emission factor of diesel: 0.1kgN2O/TJ
 - (6) Global warming potential of CO2: 1
 - (7) Global warming potential of CH4: 21
 - (8) Global warming potential of N2O: 310
- 3) Annual GHG reduction: 1,794kgCO2e
- 4) Conclusion: Annually 1,794 kgCO2e can be reduced through steam pipe insulation, it is the same as the amount of 648 trees absorbing GHG.

(2) Energy reduction through steam pipe separation

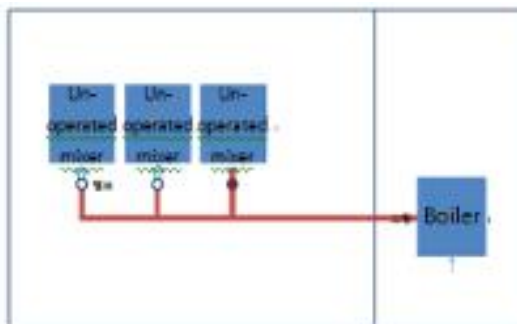


Comparing before and after	
Subject	Energy reduction through steam pipe separation
<p><u>Before</u></p> <ul style="list-style-type: none"> - Mixing Vessel: this is the dissolution facility, A.M. Rieta Chemicals Trading Manufacturing has three mixing vessels. Among three of them, two vessels have been operated 300 days in year and 2.5 	<p><u>After</u></p> <ul style="list-style-type: none"> - Additional installation of steam pipe: adding the steam pipe to each mixing vessel, so each pipe can connect to the boiler. - Installing the valve near the boiler:

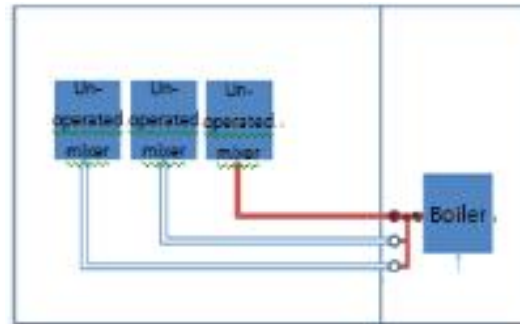
hours per day. The two vessels use 8 0°C of steam, but the two vessels are not operating simultaneously. One vessel is just installed recently, so not operating yet.

-Boiler: A.M. Rieta Chemicals Trading Manufacturing has one diesel boiler for providing the steam to mixing vessels. It is possible to control the temperature of the boiler.

-Steam pipe: it is the stainless pipe that brings the steam from the outside boiler to inside mixing vessel. The pipe from the boiler is separating at the front of each mixing vessel.



installing the on-off valve at each steam pipe. Installing the valve as close as possible to the boiler, so preventing the steam flowing to unnecessary steam pipe.



Problem

1. Only one mixing vessel is operating at time, but steam is flowing to every mixing vessel.
2. Hard to provide steam quickly to the operated mixing vessel.
3. Steam is also flowing to unnecessary steam pipe, so loss is incurred.

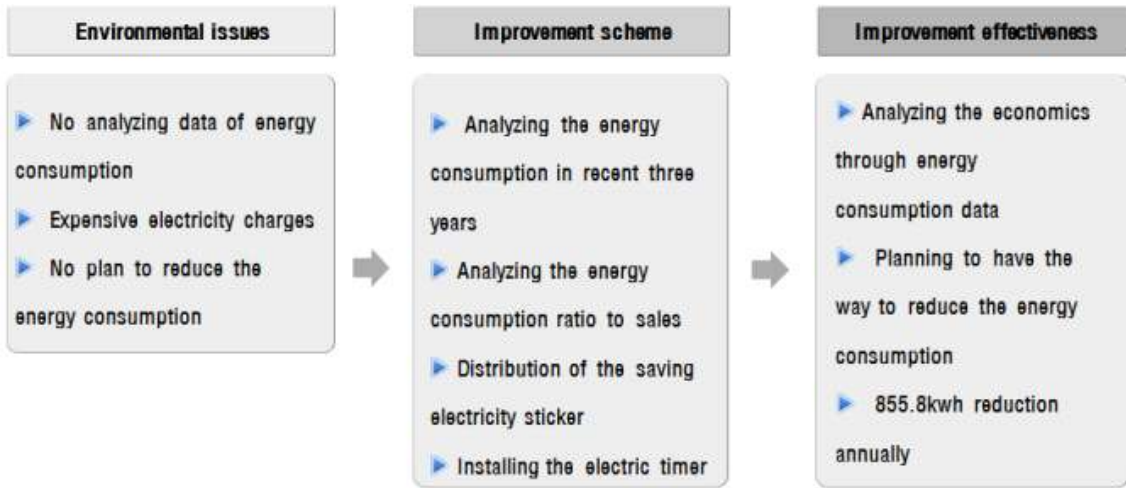
Improvement scheme



1. Steam pipe is separating at front of the boiler, so that the pipe is connected to each mixing vessel.
2. Preventing the steam from flowing to unnecessary pipe by installing the on-off valve at the spot on the image above.

Expectation effectiveness

1. Quick steam supply to mixing vessel: Provide the steam to mixing vessel faster as no leaking of steam to the pipe.
2. Raising the efficiency of production: Decreasing the time for filling out steam to the surface of the mixing vessel, so it leads to increase of production efficiency.
3. Energy loss reductions: Reduction of the waste of steam flowing to unnecessary pipe, so diesel consumption is decreased.



(3) Campaign for water and energy reduction



Comparing before and after	
Subject	Campaign for water and energy reduction
<p><u>Before</u></p> 	<p><u>After</u></p> 
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. Unable to identify the use of electricity and energy. 2. Necessity of power saving effort because of expensive electric charges. 3. No specific plan to save the electricity and energy. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Analyzing the annual electricity consumption data from 2010 to 2013. 2. Calculating the use of electricity which is worth 10,000 pesos of sales. 3. Distribution of power-saving sticker to promote the power-saving movement. 4. Preventing the unnecessary use of electricity by installing an electrical timer.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Analyzing how much electricity is used for sales of 10,000 peso. 2. Building the purpose for power saving and attracting participation from executives. 3. Reduction effect of 855.8 kwh of electricity. 	

5. Name of company: Bugong Foods Corp

① General information of company

Name of company	Bugong Foods Corp		
Category	Small and medium size enterprise		
Address	BGY.Masiit, Calavan, Laguna		
Type of business	Food manufacture	Product	Seasoning Chicken
Employees	25	Certification	
Eco-innovation leader			
	Hernando Hernandez		Aileen Castiuo
Company introduction	Seasoning the chicken from big company, then delivering to the big company again. Interested in treatment of waste water. The company is near at the Laguna lake, so receiving the regular inspection of waste water by LLDA(Laguna Lake Development Authority). The primary environmental problem is the waste water treatment. Planning to do chain business.		

② Products and Process

○ Supply the chicken to the big company after seasoning. Waste water is discharged without any specific waste water treatment. Ground water is used as household water, but want to filter the ground water for the progress of products.

○ Seasoning the chicken after cleaning and deveining. The main environmental issue is to treat the BOD(biochemical oxygen demand) and COD(chemical oxygen demand) of waste water under the criterion.



[Image 22] Bugong Foods Corp manufacturing process

③ Explaining main process

The process with supplied chicken includes the cleaning, seasoning, packaging, and delivering.

No	Main process	Explaining of process
1	Cleaning the products and mixing the seasoning	Cleaning the raw chicken and, separating the viscera and other things inside. Then seasoning to the chicken.
2	Fermentation after packaging	Packaging the seasoned chicken, then fermentation at the refrigerator.
3	Delivering after individual packaging	Delivering the chicken after fermentation to the store.

④ Summary of precision diagnosis

Project	Main issues	Seriousness		
		low	mid	high
Regulatory compliance through improving the waste water treatment	<ul style="list-style-type: none"> -The waste water of process is not following the criterion. -CEO and PCO(pollution control officer) got pressure to treat the waste water, so they want to improve. -Experienced paying the penalty because of crack down on waste water treatment. -Planning to treat the waste water through microorganism. 			■
Water in use reduction	<ul style="list-style-type: none"> -Necessity to reduce the water in use for cleaning process. -Preparing the way to reduce the water in use. 	■		

⑤ The purpose of consulting


Main area	Purpose	Accomplishment		Etc.
		Before	After	
Waste water treatment regulatory compliance	Managing the BOD, COD of waste water	BOD(195mg/l) COD(204mg/l)	BOD(50mg/l) COD(100mg/l)	
Reduction of water in use	Reduce the amount of water for cleaning process		10% of the amount of waste water for cleaning process	

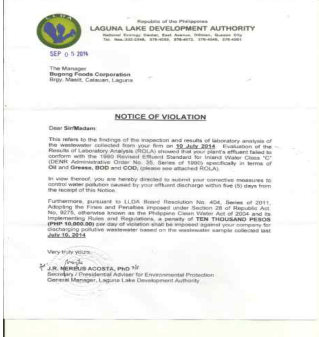
*BOD : biochemical oxygen demand, COD : chemical oxygen demand

⑥ Consulting benefits and improvement

(1) Waste water treatment through microorganism

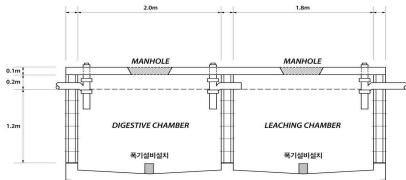


Comparing before and after	
Subject	Waste water treatment through microorganism
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. Got a fine by LLDA because of BOD and COD of waste water is over the criterion. 2. Hard to improve the way for treatment as it is too expensive. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Applying the microorganism for waste water treatment. 2. Reduced the effect of BOD, COD. 

<p>Problem</p> <ol style="list-style-type: none"> 1. Hard to improve the way for treatment as it is too expensive. 2. No waste water treatment technology for small size. 	<p>Improvement scheme</p> <ol style="list-style-type: none"> 1. Applying the microorganism for waste water treatment. 2. Evaluated the possibility for applying (evaluation finance and technology). 3. Implementing the test of microorganism.
<p>Expectation effectiveness</p> <ol style="list-style-type: none"> 1. Reducing the pressure of a penalty as the BOD and COD of waste water is reduced (fine is 10,000 pesos/day). 2. Developing a waste water treatment model that can be applied to small size companies at the Laguna region (The company is relatively small so no need to have big size of waste water treatment facility). 	

(2) Supporting design of waste water septic tank



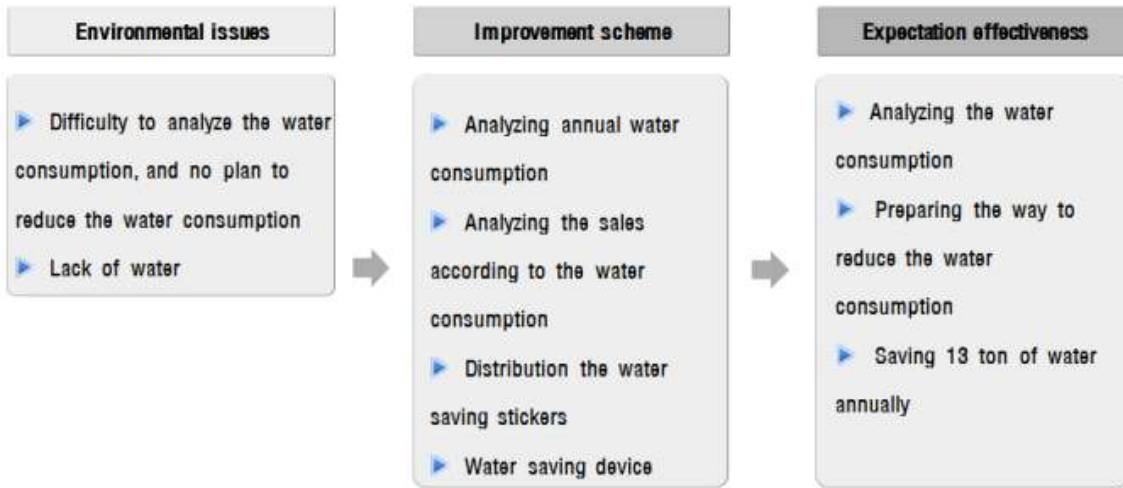
Comparing before and after	
Subject	Supporting design of waste water septic tank
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. Bugong has a waste water septic tank, but it is only for storing waste water. Redesign is needed for waste water treatment by microorganism. 2. Necessity to install aeration at the bottom of septic tank. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Designing the septic tank which can store the waste water for two days. 2. Installing the aeration at the bottom of septic tank so that the tank can treat the microorganism.
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. Existing tank is only for storing the waste water, so the tank design needs to change the design for inserting the microorganism. 2. Necessity of installing aeration at the bottom of septic tank. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Redesigning the septic tank to install the aeration. 
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Efficiency improvement of waste water treatment by installing aeration. 2. Minimizing the investment by redesigning of existing facility. 	



(3) Replacement of the disinfectant for process



Comparing before and after	
Subject	Replacement of the disinfectant for process
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. Carrying out the chlorine disinfection for cleaning the facilities. 2. Chlorine disinfection is effective for sterilization, but also effects to raw material(chicken) and the microorganism for waste water treatment. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Replaced the disinfectant with the eco-friendly disinfectant which does not affect the chicken. 2. Easier to do waste water treatment especially for COD part.
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. Disinfection for process or cleaning affects the chicken (raw material). 2. Disinfection affects the waste water treatment of microorganism (making the COD higher). 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Introducing the eco-friendly natural disinfectant. <div style="text-align: center;">  </div>
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Decreasing the effects to chicken by using the eco-friendly natural disinfection. 2. Less effects to the waste water treatment by microorganism. 	

(4) Water reduction through water saving device





Comparing before and after	
Subject	Analyzing the amount of water in use and Promoting
<p><u>Before</u></p> <p>1. Wasting the water during the process.</p> 	<p><u>After</u></p> <p>1. Water saving by installing the water saving device.</p> 
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. No data of annual water consumption, and no efforts to decrease the water consumption. 2. No specific way to decrease the water consumption. 3. Lack of water for the process. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Analyzing the annual water consumption data between 2010 and 2013. 2. Calculating the water consumption for sales of 10,000 pesos. 3. Distribution of water saving sticker for promoting the water saving movement. 4. Prevented unnecessary water consumption by installing the water saving device.

Expectation effectiveness

1. Analyzing the amount of water in use for the sales of 10,000 pesos.
2. Building the purpose for power saving and attracting participation from executives.
3. Reduction effect of 13 tons yearly which is the same as 1% of annual water consumption.

6. Name of company: Chocovron Global Corporation

① General information of company

Name of company	Chocovron Global Corporation		
Category	Small and medium size enterprise		
Address	LA Filipina Cmpd, National HighwayI, Landayan San Pedro, Laguna 4023		
Type of business	Food manufacturer	Product	Chocolate Cookies
Employees	62	Certification	
Eco-innovation leader			
	Marissa Yala	Hanna Abala	
Company introduction	Producing chocolate cookies, and exporting the products to Asia and North America. CEO of the company who was engineer is interested in energy and environmental management, especially energy efficiency and recycle.		

② Products and Process

○ Producing cookies made of milk, butter, chocolate. Air conditioner is always operating to maintain the temperature because they need to keep the temperature of the products (Interested in energy management and reduction as a lot of energy is consumed in the process.



[Image 23] Chocovron Global Corporation manufacturing process

③ Explaining main process

Processing the chocolate cookies made of flour and chocolate. Process includes the heating, drying, and mixing, so it leads to energy consumption. Air conditioner is always operating to maintain the temperature of the working place, so it also consumes a lot of energy.

No	Main process	Explaining of process
1	Storage of raw materials	Import inspection for flour, milk, chocolate, and butter.
2	Separating and adding to the process, mixing, and drying	Separating the raw material for each process. Adding the flour after mixing and drying.
3	Forming after process	Ovening the products after forming.
4	Coating the chocolate after drying	Implementing manual labor for coating the chocolate on the cookies and breads.
5	Packaging after drying	Individual packaging and whole packaging.

④ Summary of precision diagnosis

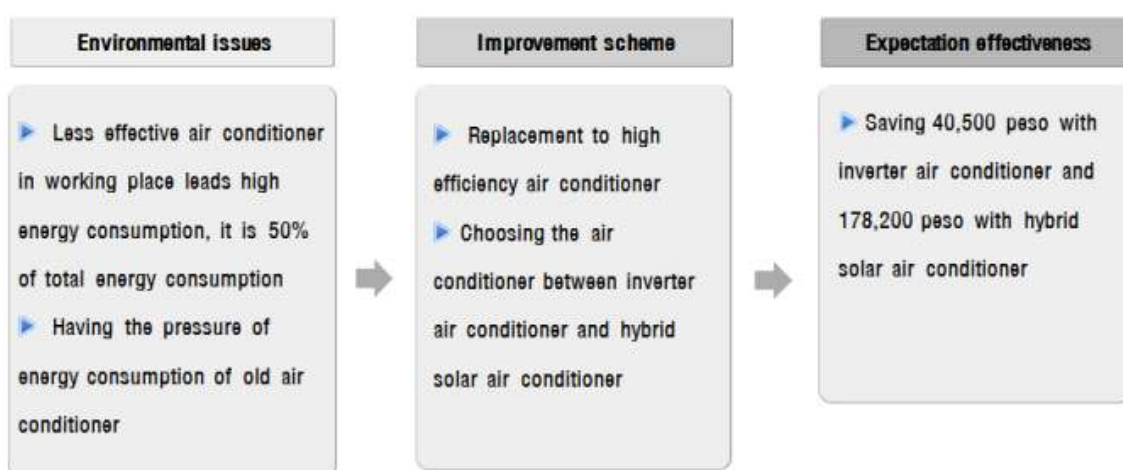
Project	Main issues	Seriousness		
		low	mid	high
Replacing the high efficiency air conditioner	<ul style="list-style-type: none"> -Necessity of maintaining the room temperature because of the characteristics of the products. -High energy consumption because air conditioner is always operating. -Reviewing to replace with a high efficiency air conditioner. -Examining the economics and technology. 			■
Problem of flour dust from mixing process	<ul style="list-style-type: none"> -Dust collector is operating at the mixing process, but it is sometimes not operating for discharging the flour. -Solving the problem through installing the cover at the mixing process. 		■	

⑤ The purpose of consulting

Main area	Purpose	Accomplishment		Etc.
		Before	After	
Introducing the high efficiency air conditioner	Analyzing the technology and economics of high efficiency air conditioner		Saving 20% of electronic charge by introducing high efficiency air conditioner	Examining to introduce the high efficiency facility
Introducing the environmental management system	Environmental management education / Process of energy management	No environmental management education and process	Implementing two times the environmental management education / documentation the energy management process in 10 categories	
Power saving through the electric timer	Reducing the unnecessary power consumption by installing the electric timer		5% reduction of unnecessary power consumption	

⑥ Consulting benefits and improvement

(1) Introducing high efficiency air conditioner



Comparing before and after	
Subject	Introducing high efficiency air conditioner
<p><u>Before</u></p> <ul style="list-style-type: none"> - 90% of total energy charges in the company are electricity in the company, and 260kWh/day of electricity is expended. - Three air conditioners are in inside work place, and those are always operating due to the process which produces the chocolate products. 	<p><u>After</u></p> <ul style="list-style-type: none"> - Operating with high efficiency air conditioner.
<p><u>Problems</u></p> <ol style="list-style-type: none"> 1. Daily energy consumption of three air conditioners inside the work place is about 150kWh, and it is 50% of total energy consumption. 2. Presuming the three seven years old air conditioners are low efficiency. 3. Maintenance costs of air conditioner is a burden to Chocovron Global Corporation. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Replacing the existing three air conditioners, and installing three high efficiency air conditioners. 2. Choosing between inverter air conditioner and hybrid solar air conditioner.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Calculating the annual energy cost saving <ol style="list-style-type: none"> 1) Formula: annual saving cost=annual electric consumption of air conditioner*ratio of electric reduction of high efficiency air conditioner*electric charges. 2) Grounds <ol style="list-style-type: none"> (1) Annual electric consumption of air conditioner(45,000kWh) (2) Ratio of reduction of high air conditioner <ol style="list-style-type: none"> a. Inverter air conditioner electric saving rates: 5% <ul style="list-style-type: none"> : Normally the rates is 10~15% Local Filipino company said it is over 15% conservative approach with consideration to the technology of local company and operating method difference. b. Hybrid solar electric saving rates(22%) <ul style="list-style-type: none"> : According to the proven data of a local Filipino company it is 67.5% According to the Filipino selling company it is 45~55% when it continues operated. Because of a lack of objective data and the difference in installing environment, only half of minimum number is accepted in a conservative approach. 	

(3) Electric charges: 18peso/kWh

3) Annual cost savings

- a. Annual cost savings of inverter air conditioner: 40,500peso
- b. Annual cost savings of hybrid solar air conditioner: 178,200peso

4) Conclusions

- a. Presuming 2,250kWh of electricity saving annually with inverter air conditioner and savings of 40,500 peso.
- b. Presuming 9,900kWh of electricity saving annually with hybrid solar air conditioner and savings of 178,200 peso.

2. Calculating the payback time

1) Calculation formula: $\text{payback time} = \text{investment} / \text{annual cost savings}$

2) Grounds

(1) Investment

- a. Installation cost of inverter air conditioner: 120,000 peso
- b. Installation cost of hybrid solar air conditioner: 200,000 peso

(2) Annual cost savings

- a. Annual cost savings with inverter air conditioner: 40,500 peso
- b. Annual cost savings with hybrid solar air conditioner: 178,200 peso

3) Payback time

- a. Payback time for inverter air conditioner: 2.97 year
- b. Payback time for hybrid solar air conditioner: 1.13 year

4) Conclusions

- a. Payback is possible in years with inverter air conditioner in conservative approach.
- b. Payback is possible in years with hybrid solar air conditioner in conservative approach.

3. Calculating the annual GHG reduction

1) Calculation formula: $\text{annual GHG reduction} = \text{annual electricity saving} * \text{GHG emission factor of electricity}$.

2) Grounds

(1) Annual electricity savings

- a. Annual electricity saving with inverter air conditioner: 2,250kWh
- b. Annual electricity saving with hybrid solar air conditioner: 9,900kWh

(2) GHG emission factor of electricity: 0.7878kgCO₂e/kWh

: Applied the number acknowledged by UNFCCC.

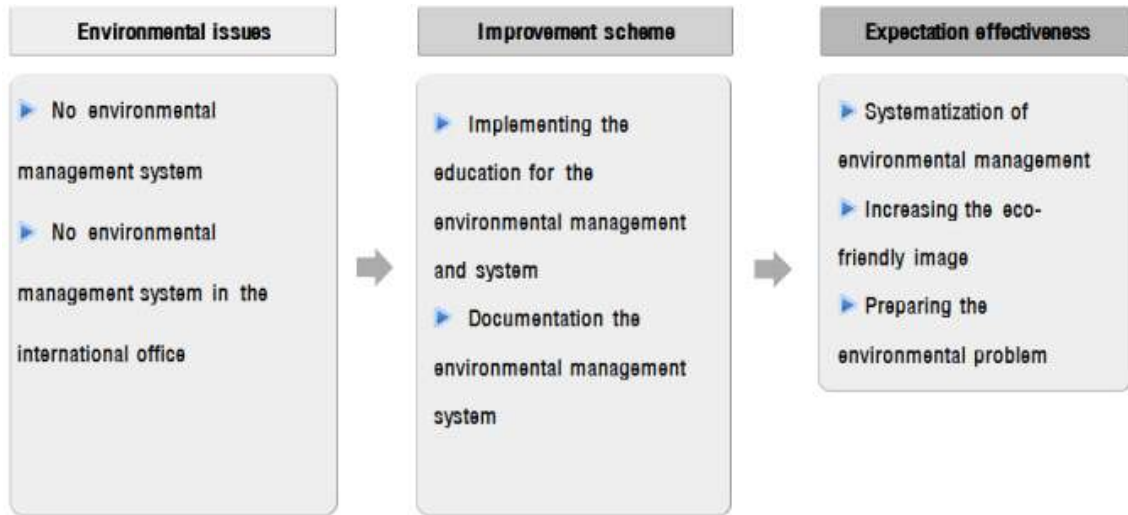
3) Annual GHG reduction


- a. Annual GHG reduction with inverter air conditioner: 1,772kgCO₂e
- b. Annual GHG reduction with hybrid solar air conditioner: 7,799kgCO₂e

4) Conclusions

- a. Annually 1,722kg CO₂e can be reduced through inverter air conditioner, it is the same as the amount of 639 trees absorbing GHG.
- b. Annually 7,799kg CO₂e can be reduced through hybrid solar air conditioner, it is the same as the amount of 2,815 trees absorbing GHG.

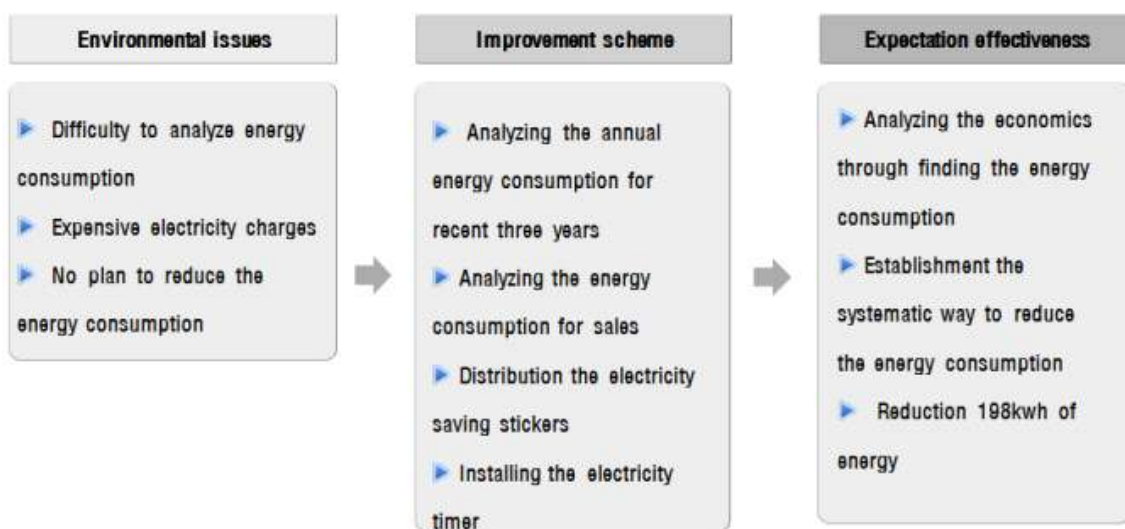
(2) Constructing the environmental management system





Comparing before and after	
Subject	Construction of environmental management system and strategy establishment
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. No environmental management system(No pollution control officer, monitoring system, environmental purpose and strategy, internal audit). 2. Plan to have an environmental management system to promote this system with marketing. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Constructing environmental management system (environmental policy, purpose, strategy for management, system and internal audit). 2. Making the environmental management manual and procedure. 3. Education for the work. 

<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. No environmental management system (no environmental management, education, purpose, policy, staff who has the responsibility for the environmental work). 2. The offices in the Philippines and other countries don't have an environmental management system, so environmental purpose, strategy, and policy do not reach the branch offices. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Implementing education about environmental management. 2. Implementing the education about requirement of an environmental management system. 3. Constructing the environmental management system(establish the environmental purpose, policy, management system, monitoring, and internal audit). 4. Documentation of environmental management system process.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Systematization of the environmental process so it keeps operating even though the staff is changed. 2. Promoting the environmental management system constructing(improving the eco-friendly image of the company). 3. Preparing the environmental risk. 	


(3)Energy reduction movement



Comparing before and after	
Subject	Energy reduction promotion / activity
<p><u>Before</u></p> 	<p><u>After</u></p> 
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. No data for electricity and energy consumption. 2. Power saving required to reduce electricity charges. 3. No specific plan to reduce the electricity and energy consumption. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Analyzing the annual electricity consumption data between 2011 and 2014. 2. Calculating the electricity consumption for the sales of 10,000 pesos. 3. Distribution of power saving sticker to promote the power saving movement. 4. Preventing unnecessary electricity consumption by installing the electric timer.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Analyzing how much electricity is needed to make the sales of 10,000 peso (About 309 kWh of electricity was used for sales of 10,000 peso in 2013). 2. Building the purpose for power saving and attracting participation from executives. 3. 198 kWh reduction effect annually. 4. 92kgCO₂ of GHG reduction effect annually. 	

7. Name of the company: ESCABA Food Product, Inc

① General information of company

Name of company	ESCABA Food Product, Inc		
Category	Small and medium size enterprise		
Address	BRGY. STA. ANA. San Pablo City, Laguna		
Type of business	Food production	Products	Coconut and fruit jelly
Employees	61	Certification	
Eco-innovation leader			
	Lorida		Robert Dorado
Company introducing	Producing fruit jelly company establishment in 40 years. Had experienced with environmental consulting in 2000.		

② Products and Process

- Supplying the fruit jelly to the local market and mall.
- Every process is operated manually.



[Image 24] ESCABA Food Product, Inc manufacturing process

③ Explaining main process

No	Main process	Explaining of process
1	Raw material storage and inspection	Verifying and cleaning the materials such as fruit, sugar, syrup, etc.
2	Neutralization and boiling	Boiling with sugar after storing the fruit in the water.
3	Adding to the container	Adding the fruit, sugar, and syrup to the container.
4	Sealing and boiling	Sealing the container and boiling(elimination of bacteria).

④ Summary of precision diagnosis

○ Producing the fruit jelly with fruit. Much of water is used for cleaning the materials and working place, and leads to waste water.

Project	Main issues	Seriousness		
		low	mid	high
Recycle the ground water	-Necessity of recycling the waste water and ground water as much water as needed for the process. -Preparing the plan to recycle the ground water through verifying the ground water facility and the pipe.		■	
Improvement of waste water treatment	-Stricter environmental regulation needed as much of waste water is recycled. -Treatment of waste water with microorganism and aeration.	■		

⑤ The purpose of consulting

Main area	Purpose	Accomplishment		Etc.
		Before	After	
Improvement of ground water	Improvement of hardness and manganese of ground water	Hardness (479mg CaCO ₃ /L) maganese (0.08mg/l)	Hardness (193 mg CaCO ₃ /L) maganese (0.05mg/l) Securing additional 20% of total water	

⑥ Consulting benefits and improvement

(1) Recycling the ground water

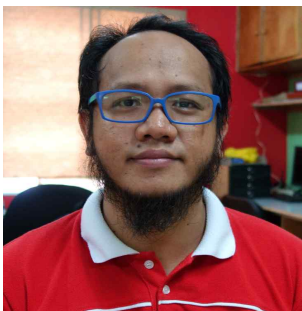

Comparing before and after	
Subject	Recycling the ground water
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. Water and ground water is used for process, and the ratio of ground water is 60%. 2. Using the ground water after filtering decreases water consumption. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Recycling the ground water after improvement of hardness and manganese.
<p><u>Problems</u></p> <ol style="list-style-type: none"> 1. Ground water is just discharging, even the amount of used ground water is large. 2. Lack of technology to improve the hardness and manganese of ground water. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Recycling the ground water after improving the hardness and manganese of ground water. 2. 5,760m³ of ground water reduced annually.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. 5,760m³ of ground water reduced annually. 2. Cost reduction through water consumption reduction. 	

(2) Improving the waste water through microorganism

Comparing before and after	
Subject	Waste water treatment through microorganism technology
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. Receiving a penalty from LLDA because Biochemical Oxygen Demand and Chemical Oxygen Demand is over than the criterion. 2. Holding the improvement plan as the cost of the technology is too great. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Applying waste water treatment of microorganism. 2. Reducing the effect of BOD, COD. 
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. Unable to improve the waste water treatment as the cost is too expensive. 2. No technology of waste water treatment for small scale waste water tank. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Introducing the waste water treatment of microorganism. 2. Evaluating the applicability (technology and economics). 3. Implementing the test of microorganism.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Releasing the pressure of a penalty by reducing the BOD and COD of waste water (fine is 10,000 peso/day). 2. Development of a waste water treatment model that can be applied to small size companies at the Laguna region (The company is relatively small, so no need to have big size of waste water treatment facility). 	

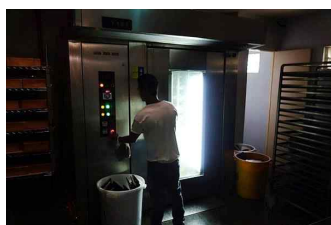
8. Name of the company: Balayong Summit Inc

① General information of company

Name of company	Balayong Summit Inc		
Category	Small and medium size enterprise		
Address	Lot 2 Blk4, Ph3, First Cavite International Estate LangKaan Dasmariñas City		
Type of business	Food Manufacturing	Product	Baked good
Employees	160	Certification	
Eco-innovation leader			
	Joshua Marasigan		Marasigan
Company introducing	Producing the baked goods, and delivering to the 16 stores. Environmental issues such as energy consumption and indoor environment control.		

② Products and Process

- Process of ovening and mixing the flour has high energy consumption.
- Plastic container is used for packaging.



[Image 25] Balayong Summit Inc manufacturing process

③ Explaining main process

No	Main process	Explaining of process
1	Storing the raw material	Flour, sugar, yeast.
2	Mixing and fermentation of the materials	Fermentation for one hour.
3	Shaping	Forming the products.
4	Fermentation and ovening	Fermentation for four hours and then ovening.

④ Summary of precision diagnosis

- High consumption of energy and water.
- Necessity of environmental improvement because of the poor working place and sanitary facility.
- Need for alternatives for plastic package which is under environmental restrictions.

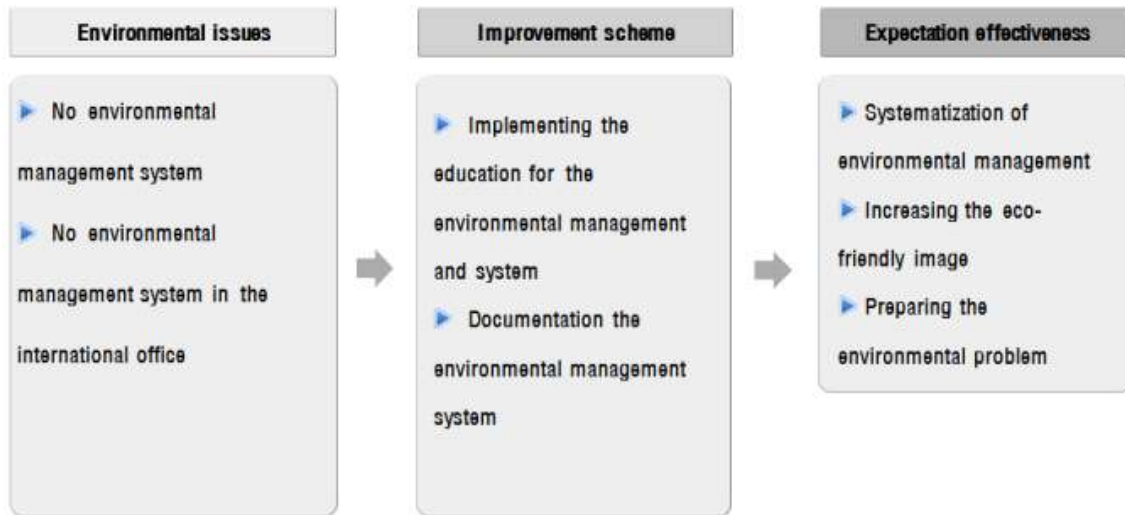
Project	Main issues	Seriousness		
		low	mid	high
Improvement of sanitary facility	-Sanitary problem because of many flies in the process. -Solving the sanitary problem by introducing insect repellent facility.			■
Improvement of water-cleaning facility	-Inadequate water-cleaning facility for the bakery process. -Providing clean water by replacing the facility and filter.		■	


⑤ The purpose of consulting

Main area	Purpose	Accomplishment		Etc.
		Before	After	
Constructing the waste treatment system	Education and recognition improvement of waste treatment		Education about waste treatment more than once	
Introducing environmental management system	Environmental management education, establishment of procedure for environmental and energy management	No education and procedure for environmental management	More than 10 procedures of environmental and energy management, environmental management education	

⑥ Consulting benefits and improvement

(1) Construction of environmental management system and strategy establishment



Comparing before and after	
Subject	Construction of environmental management system and strategy establishment
<p><u>Before</u></p> <ol style="list-style-type: none"> No environmental management system (No pollution control officer, monitoring system, environmental purpose and strategy, internal audit). Plan to have environmental management system to advertise this system. 	<p><u>After</u></p> <ol style="list-style-type: none"> Constructing environmental management system (environmental policy, purpose, strategy for management, system and internal audit). Environmental management manual, procedure. Education for the work. 

<p><u>Problem</u></p> <ol style="list-style-type: none"> 1.No environmental management system (no environmental management, education, purpose, policy, staff with responsibility for the environmental work). 2.Has offices in the Philippines and other countries but no environmental management system, so environmental purpose, strategy, and policy doesn't come delivered to the branch offices. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Implementing the education about environmental management. 2. Implementing education about the requirement of environmental management system. 3. Constructing the environmental management system(establishment the environmental purpose, policy, management system, monitoring, and internal audit). 4. Documentation of environmental management system process.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Systematization of the environmental process so it keeps operating even when the staff is changed. 2. Promoting the environmental management system construction(improving the eco-friendly image of the company). 3. Preparing for environmental risk. 	

(2) Establishment of the waste management system

Comparing before and after	
Subject	Establishment of the waste management system
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. Waste from the process is stored. 2. No waste treatment. 3. Lack of a place for storing the waste as the waste disposal company does collect the waste. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Separating the waste of process in groups. 2. Establishing the waste recycling system. 3. Establishing the waste recycling procedure and education.

<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. Lack of space for the waste. 2. Increasing the cost for waste treatment. 3. Inadequate waste treatment technology. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Separating the waste as recyclable and non-recyclable. 2. Recyclable waste is treated through waste disposal company. 3. Establishing the procedure for waste treatment.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Reduction of waste treatment cost by recycling the waste. 2. Possible to recycle the waste. 	

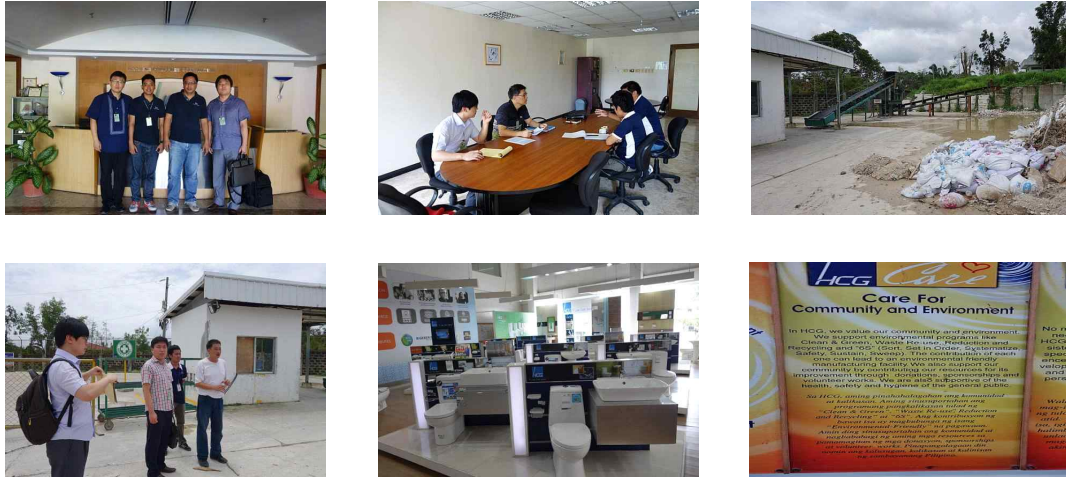
9. **Name of the company:** Hocheng Philippine Corporation

① **General information of company**

Name of company	Hocheng Philippines Corporation		
Category	Small and medium size enterprise		
Address	Lot 2 Blk4, Ph3, First Cavite International Estate LangKaan Dasmariñas City		
Type of business	Bathroom Ceramics	Products	sink, toilet ceramics
Employees	620	Certification	
Eco-innovation leader			
	Philip Rocales		Alex Abenes
Company introducing	Producing the ceramic product of bath and sink for the toilet. Hocheng is the number 1 sales company in the Philippines, and exports to Asia and Europe.		

② **Products and Process**

- Hocheng produces the ceramic sink and bath for the toilet, and exporting abroad. About 9 % of loss is occurred through waste, and most of them are not recycled.



[Image 26] Hocheng Philippines Corporation manufacturing process

③ Explaining main process

No	Main process	Explaining of process
1	Preparing the raw materials	Preparing the clay and gypsum.
2	Forming and drying	Adding the materials to the form and then drying.
3	Painting	Painting and polishing the products.
4	Drying at the oven	Drying the products with high temperature.

④ Summary of precision diagnosis

- Hocheng is interested in the way to treat and recycle the waste from the process. Necessity of education for improvement of waste recycling.
- Hocheng has the environmental issues of waste water treatment and working place.

Project	Main issues	Seriousness		
		low	mid	high
Final disposal of ceramic waste	-Dumping the ceramic waste, but the problem is the landfill is decreasing. -Necessity of the plan to recycle the ceramic waste as a flooring for the road or as construction material.			■
Management of the energy and GHG emission	-Many kilns for producing the ceramic lead in emission of GHG. -Establishment of a GHG and energy management system by constructing a GHG inventory.		■	

⑤ The purpose of consulting

Main area	Purpose	Accomplishment		Etc.
		Before	After	
The way of ceramic waste	Understanding the technology for recycling the ceramic waste	Dumping the ceramic waste / lack of landfill space	Analyzing the technology and economics of ceramic waste recycling	Research of ceramic waste technology and evaluating the applicability
Realizing the amount of energy and GHG emission	Realizing the amount of energy and GHG emission from the process	Only simple energy management system	Constructing the GHG inventory system	Using the inventory system for social responsibility report

⑥ Consulting benefits and improvement

(1) Recycling the ceramic waste

Comparing before and after	
Subject	Recycling the ceramic waste
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. Defective products and sample products of process is discharged as ceramic waste. 2. Dumping the ceramic waste because there is no specific ceramic waste technology. 3. Lack of space for dumping this much of waste. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Make a connection with ceramic disposal company (recycling the ceramic waste after crushing). 2. Analyzing the ceramic waste disposal technology.
<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. There is no options for ceramic waste disposal, so they dump at the open storage. 2. Lack of skill in ceramic waste disposal. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Make a connection with ceramic disposal company (recycling the ceramic waste as a construction material after crushing). 2. Analyzing the technology and economics of the ceramic waste disposal facility.

Expectation effectiveness

1. Waste disposal cost would be reduced through ceramic waste recycling.
2. Discovering the technology or appropriate model of ceramic waste recycling(possible to recycle the ceramic waste as a construction material).

(2) Managing the GHG by constructing a GHG inventory

Comparing to before and after	
Subject	Managing the GHG by constructing a GHG inventory
<u>Before</u> 1. Hocheng has good energy management system, but no system for calculation and management of GHG. 2. Necessity for GHG management system as the process needs much energy.	<u>After</u> 1. Constructing the GHG inventory by using the GHG management program, WISEGEM was invested by Ecowise. 2. Calculating the GHG emission and constructing the GHG inventory.
<u>Problem</u> 1. No GHG inventory system. 2. Necessity to calculate the GHG emission as the working place needs a lot of energy.	<u>Improvement scheme</u> 1. Constructing a GHG web solution system that can input and calculate the data of GHG. 2. Possible to have sustainable management through GHG web solution.
<u>Expectation effectiveness</u> 1. Constructing the GHG emission calculation system through GHG management web solution. 2. Using the GHG emission calculation system for social responsibility report.	

10. Name of the company: Saffron Philippines, Inc.

① General information of company

Name of company	Saffron Philippines, Inc.		
Category	Small and medium size enterprise		
Address	Governor's Drive, Brgy. Paliparan I , Dasmariñas Cavite		
Type of business	Dye Factory	Products	Dyed Clothing
Employees	260	Certification	
Eco-innovation leader			
	Dante Dacanay		Eleonor Arcilla
Company introducing	Dyeing the clothes is the main process of Saffron. Local Filipino companies or international companies order to Saffron. Saffron is a global garment manufacturer, and regularly receives an environmental audit(supplier of Wranger, Disney, Untailer).		

② Products and Process

Main process is the dyeing which consumes a lot of energy and water. It is hard to treat the waste water. Saffron plans to have high a efficiency dyeing machine, and interested in technology and facility expansion.



[Image 27] Saffron Philippines, Inc. manufacturing process

③ Explaining main process

No	Main process	Explaining of process
1	Storing the raw materials	Inspecting the fabric and chemicals (dye and other chemicals).
2	Dyeing and removing moisture	Dyeing the fabric. Removing the moisture after dyeing.
3	Adding the chemical and drying	Drying after softening the fabric with chemical.
4	Ironing and packaging	Ironing the fabric with strong heat and packaging individually.

④ Summary of precision diagnosis

- Saffron is interested in treating the waste from the process. Daily waste water disposal is almost closed to the tolerance of waste treatment system.
- Increasing the water consumption is burden to Saffron, so they are interested in a way to reduce water consumption.
- Big pressure of regular environmental audit of global clients so Saffron implements the internal audit of environmental management and energy for reporting to the clients.



Project	Main issues	Seriousness		
		low	mid	high
Not following the waste water treatment standard	-Chromaticity of waste water from the process is too high. -Experienced to paying the penalty of environmental regulations. -The technology will be applied can reduce the chromaticity of waste water.			■
Much of water consumption	-Necessity to reduce water consumption as much of the water has been used for dyeing process. -Suggesting a way to reduce the water consumption by securing the annual water consumption and the water pipe line.		■	
HIGG Index	- Regular environmental audit by global clients. - The result of environmental audit effects to the sales (large burden for the company).		■	

⑤ The purpose of consulting

Main area	Purpose	Accomplishment		Etc.
		Before	After	
Non-compliance of waste water standard	Applying the technology for chromaticity of waste water	Chromaticity (400PCU)	Chromaticity (150PCU)	
Conforming to the environmental regulation(HIGG) of global buyers	Preparing the environmental regulations	40 points from self-examination (control target of global buyer)	60points from self-examination	
Environmental education	Implementing environmental education for Eco-innovation leader and staff	No specific environmental education	Implementing the environmental education(more than one time)	Implementing policy and environmental regulations education for the staff

⑥ Consulting benefits and improvement

(1) Applying bleaching technology for treatment of the dyeing waste water

Comparing to before and after	
Subject	Applying bleaching technology for treatment of the dyeing waste water
<p>Before</p> <ol style="list-style-type: none"> 1. Aluminum Sulfate is used for treatment the chromaticity in waste water. 2. Aluminum Sulfate is not enough for following the regulations(64kg of Aluminum Sulfate is used for one day). 3. No facility separates the acidic and alkaline waste water, and it leads to difficulties in managing the chromaticity of waste water. 4. Experienced paying a penalty because of chromaticity of waste water(50,000 peso/day, 190,000 peso in 2008). 	<p>After</p> <ol style="list-style-type: none"> 1. Suggesting to separate the waste water into acidic and alkaline. 2. Possible to treat the chromaticity through decolorant(test the Korean brand colorant). 3. With colorant the level of chromaticity will be less than 150PCU. 

<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. High level of chromaticity is violating the environmental regulation for waste water (received a penalty by DENR). 2. Necessity of managing the waste to obey the standard. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Managing the chromaticity with a high efficiency colorant. 2. Importing the Korean colorant to use in the working place. Understanding the effect of the colorant through testing in the working place. 3. Planning to import Korean technology.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Treat the chromaticity of waste water. 2. No worries about paying the penalty, because of treatment implemented with high efficiency colorant. 3. Possible to treat the waste water with a small amount of colorant. 	

(2) Conforming to the environmental audit of global buyers

Comparing to before and after	
Subject	Corresponding the environmental audit (HIGG Index)
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. Receiving a regular audit (HIGG Index) from global buyers. 2. HIGG Index is a program to audit the environmental system, air-environment management, waste management, and management of GHG and energy. 3. Received 41/100 points from self-examination in 2014. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Received higher points (62points) than the first half of the year(41points), because of the efforts such as selecting the PCO, education about the Eco-innovation leader, improvement of waste water, constructing the strategy of environmental management. 2. Received higher points through the improvement of environmental management and consulting.

<p><u>Problem</u></p> <ol style="list-style-type: none"> 1. Received a regular audit (HIGG Index) global buyers. 2. No good result of environmental audit could lead the cancellation of order. 3. Received the basic marks of environmental audit. 	<p><u>Improvement scheme</u></p> <ol style="list-style-type: none"> 1. Corresponding the requirement of HIGG Index(Possible to have higher points through having PCO, Eco-innovation leader, construction the monitoring system, and strategy for environmental management). 2. Constructing the basic environmental management system for waste water treatment, chemical and energy management.
<p><u>Expectation effectiveness</u></p> <ol style="list-style-type: none"> 1. Releasing the pressure as the company is able to conform to the HIGG Index. 2. Avoiding penalties from bad results of environmental audits. 3. Promoting the eco-friendly image. 4. Ability to construct the environmental management system and strategy. 	

(3) Identifying and education of the environmental regulations

Comparing before and after	
Subject	Identifying and education of the environmental regulations
<p><u>Before</u></p> <ol style="list-style-type: none"> 1. Waste treatment and air-environment regulation is applied to the company, but staffs or employees aren't aware of them. 2. Receiving pressure about unexpected audits of DENR for environmental regulations. 3. Received a penalty because the company has not conformed to the regulations. 	<p><u>After</u></p> <ol style="list-style-type: none"> 1. Understanding the environmental regulations by environmental consultants and the staff from PCAPI. 2. Constructing an environmental regulation monitoring system. Selecting the person for environmental monitoring. 3. Understanding the trend of environmental regulations through regular education and training.

Problem

1. No environmental regulation specialist.
2. Lack of efforts to understand and prepare for the environmental regulations.
3. No education and training for environmental regulation and PCO.



Improvement scheme

1. Understanding the environmental regulations by environmental experts and the staffs from PCAPI.
2. Training the staff as a environmental specialist for preparing the environmental regulation.



Expectation effectiveness

1. Decreasing the burden of environmental auditing (expanding the activity range of the company as the environmental risk is decreasing).
2. Strengthening the eco-friendly image of company.
3. Training the staff as an environmental experts and preparing to respond to regulations.

2. Holding the overseas workshop

a. Holding a business conference and first workshop

(1) First business conference

- Event name: The first Philippines Eco-innovation consulting business conference
- Date: 6th, June, 2014(Fri)
- Contents: Introducing the Eco-innovation business, Promoting the result of 2013
- Venue: Conference room of DTI Laguna
- Time: 14:00 ~ 16:30
- Attendants: DTI Laguna, Ecowise, 10 companies
- References: The companies recommended by DTI Laguna joined(8 companies)



Introducing the Eco-innovation consulting 1



Introducing the Eco-innovation consulting 2



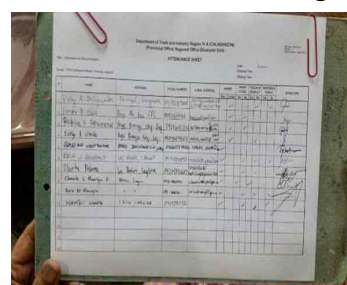
Introducing the Eco-innovation consulting 3



Q&A 2



Q&A 1



Participants list

[Image 28] First business conference

[Table 6] First business conference participating company list

No	Name of company	Person in charge	Product	Employees	Region
1	ESCABA Food Product, Inc	Perla D. Escaba	MACAPUNO	61	Laguna
2	MAKILING Organic Product	Clarke Nebrao	TURMERIC	32	Laguna
3	Jhaz Footwear	NEPHTAU	SHOES	30	Laguna
4	CSM Philippines Inc	Enrico Manrique	Bone China	100	Laguna

5	LA CARLOTA Food Enterprise	Manny Cauntay	Pork skin food	13	Laguna
6	Sustalicious Food and Beverage Product	Violy A.Saliqumka	Water and Juice	4	Laguna
7	Oryspa Spa Solutions	Edwin Frawas J.Quimana	Personal care	20	Laguna
8	CHOCOVRON Global Corporation	MARISSA G.YALA	POLVORON Product	42	Laguna
9	MACO'S Meat Products, Inc	Evelyn H. Viterbo	Meat Product	154	Laguna
10	Bugong Foods Corp	Armando Ergviza	Marinated Chicken	25	Laguna

(2) Second business conference

- Name of the event: The second Philippines Eco-innovation business conference
- Date: 18th, June, 2014(Wed).
- Contents: Introducing Eco-innovation consulting, request for participation in Eco-innovation.
- Venue: Conference room of DTI Cavite.
- Time: 14:00 ~ 16:30
- Participants: DTI Cavite, Ecowise, 10 companies.
- References: The companies recommended by DTI Cavite joined. Introducing the results of 2013 Eco-innovation. Six companies applied.

[Table 7] Second business conference participating company list

No	Name of company	Person in charge	Product	Employees	Region
1	Balayong Summit Inc	Joshua Marasigan	Bread	120	Cavite
2	Cafe Amadeo Development Cooperation	Ma. Agnes M. Madlansacay Gerry Bunyi	Coffee	11	Cavite
3	Myrna's Miraculous Mushroom	Myrna T. Alonsagay	Mushroom	12	Cavite
4	Delfa's Food Products	Isabel N. Punzalan	Food	16	Cavite
5	Vamana Enterprise	Marissa Caanqued	Bag	24	Cavite

6	A.M. Rieta Chemicals Trading Manufacturing	Francis Rieta	Cosmetic product	160	Cavite
7	Covenant Community Service Cooperative	Elmer Valencia	Clothing	1200	Cavite
8	Hocheng Philippines Corporation	Phillip Rocales	Ceramic product	620	Cavite
9	Royal Tern Ceramics Philippines INC	Romy Calub /Rey Plamiano	Ceramic product	350	Cavite
10	Pasadako Multi Purpose Cooperation	Roberto Cnyana	Clothing	8	Cavite



Introducing the Eco-innovation consulting 1



Introducing the Eco-innovation consulting 2



Introducing the Eco-innovation consulting 3



Introducing examples of Eco-innovation consulting



Explaining the results of 2013



Q&A 1

[Image 29] Second business conference

(3) First workshop

(a) Introducing first workshop

- Name of the event: The first Philippine Eco-innovation business workshop.
- Date: 27th, June, 2014 (Thur).
- Contents: Introducing Eco-innovation consulting, sharing the consulting program and the results, applying to the business.
- Venue: Cavite Provincial Capitol.
- Time: 10:00 ~ 12:30
- Participants: DTI, PCCI, PCAPI, governors of Cavite, and 18 companies.
- References: Governor of Cavite is interested in the business and promised support for Eco-innovation.



Introducing Philippine Eco-innovation

Group picture with companies and government agency

[Image 30] First workshop

(b) First workshop companies

[Table 8] participating company list for first workshop

No	Name of company	Person in charge	Product	Employees	Region
1	ESCABA Food Product, Inc	Perla D. Escaba	MACAPUNO	61	Laguna
2	MAKILING Organic Product	Clarke Nebrao	TURMERIC	32	Laguna
3	Jhaz Footwear	NEPHTAU	SHOES	30	Laguna
4	CSM Philippines Inc	Enrico Manrique	Bone China	100	Laguna

5	LA CARLOTA FOOD Enterprise	Manny Cauntay	Pork skin food	13	Laguna
6	Sustalicious Food and Beverage Product	Violy A.Saliqumka	Water and Juice	4	Laguna
7	Oryspa Spa Solutions	Edwin Frawas J.Quimana	Personal care	20	Laguna
8	CHOCOVRON Global Corporation	MARISSA G.YALA	POLVORON Product	42	Laguna
9	MACO'S Meat Products, Inc	Evelyn H. Viterbo	Meat Product	154	Laguna
10	Bugong Foods Corp	Armando Ergviza	Marinated Chicken	25	Laguna
11	Balayong Summit Inc	Joshua Marasigan	Bread	120	Cavite
12	Cafe Amadeo Development Cooperation	Ma. Agnes M. Madlansacay Gerry Bunyi	Coffee	11	Cavite
13	Myrna's Miraculous Mushroom	Myrna T. Alonsagay	Mushroom	12	Cavite
14	Delfa's Food Products	Isabel N. Punzalan	Food	16	Cavite
15	Vamana Enterprise	Marissa Caanqued	Bag	24	Cavite
16	A.M. Rieta Chemicals Trading Manufacturing	Francis Rieta	Cosmetic product	160	Cavite
17	Covenant Community Service Cooperative	Elmer Valencia	Clothing	1200	Cavite
18	Hocheng Philippines Corporation	Phillip Rocales	Ceramic product	620	Cavite
19	Royal Tern Ceramics Philippines INC	Romy Calub / Rey Plamiano	Ceramic product	350	Cavite
20	Pasadako Multi Purpose Cooperation	Robento Cnyana	Clothing	8	Cavite

b. Holding final workshop

(1) Introducing the final workshop

- Date: 21st, October, 2014(Tue).
- Venue: Convention center of Laguna DOST.
- Target: The corporate participations, government agencies, and consultants.
- Organizer: ASEIC, Ecowise Inc.
- Purpose:(a) Inspection of the results of ASEIC Eco-innovation consulting.
 - (b) Sharing the best practices and building a network between the companies.
 - (c) Strengthening the cooperation with local government agencies.

[Table 9] Eco-innovation final workshop program

Time	Program	Etc
09:30-10:00	Register and greeting	
10:00-10:05	Congratulatory message	ASEIC
10:05-10:25	Welcome Speech 1	Susan R. Palo
	Welcome Speech 2	Noly Guevara
	Welcome Speech 3	Lydia S. Manguiat
	Welcome Speech 4	Marilou Quinco-Toledo
10:25-10:30	Film of ASEIC	
10:30-10:45	Reporting the result of Philippines Eco-innovation business	Ecowise
10:45-10:55	Eco-innovation certification	
10:55~11:05	Photography	
11:05~11:20	Coffee Break	
11:25-11:40	Sharing the best practice	Ecowise/Oryspa
11:40-12:00	Q&A	
12:00~13:00	Luncheon	



Group picture with Philippine government agencies and the companies



Reporting the Eco-innovation results



ASEIC welcome speech



Explanation the business results



Implementation the event



Reporting the business results

[Image 31] Final workshop

(2) Summary of final workshop

(a) Welcome speech by important people

- ASEIC (Younji Kang PM): Introducing the Eco-innovation business of ASEIC, gratitude greeting to the companies joined.
- DTI Laguna (Susan R. Palo): Gratitude greeting to the six companies from Laguna, especially the Jhaz Footwear, and hoping more companies join the business in the future.
- DTI Cavite (Noly Guevara): Gratitude greeting the support in 2013 and 2014 for the companies in Cavite. Saying that developed technology of Korea helps a lot.
- DOST (Lydia S. Manguiat): Gratitude greeting that developed technology of Korean solves the environmental problems. Evaluating the business as helpful for the companies.
- DTI Caravazon (Marilou Quinco-Toledo): Gratitude greeting to Korean government, ASEIC, and Ecowise. So impressed by the waste treatment for Jhaz Footwear and Liliw municipal, and promised funding by SSF(Share Service Facility).



ASEIC(Younji Kang PM)



DTI Laguna (Susan R. Palo)



DTI Cavite (Noly D.Guevara)



DOST(Lydia S. Manguiat)



DTI CARAVAZON (Marilou Quinco-Toledo)



Oryspa

[Image 32] Final workshop welcome speech

(b) Certification of Eco-innovation leader

- Eco-innovation business certification for the Eco-innovation leaders of the 10 companies.



[Image 33] Eco-Innovation Leader



CSM Philippines



Jhaz Footwear



Group picture of
Eco-innovation leaders

[Image 34] Award an Eco-Innovation Leader certification

3. Making a report and promotion

a. Submission of consulting report

Reporting the Eco-innovation consulting business as launched report, monthly report, first assessment report, precise diagnosis report, and interim report.

[Table 10] Making the report in phase and submission

No	Date	Name of report	Main contents	Etc.
1	12th May	Launched report	<ol style="list-style-type: none"> 1. Selecting the companies 2. Selecting the consulting theme 3. Information of local government 4. Preparing the workshop 	
2	9th June	First assessment report	<ol style="list-style-type: none"> 1. Selecting the companies for first diagnosis 2. Contents of first workshop 3. Implementing the first diagnosis 4. Visiting the local government * Attachment: Information of first diagnosis 	
3	11th July	Re-reporting the first assessment	<ol style="list-style-type: none"> 1. Re-holding the first diagnosis reporting conference 2. Providing the detailed results of first diagnosis 3. Selecting the consulting subjects 4. Result of diagnosis 5. Future plans 	Re-reporting the first assessment
4	8th Aug	Precision diagnosis report	<ol style="list-style-type: none"> 1. Introducing the precise diagnosis 2. Results of the precise diagnosis 3. Selecting the consulting theme for each company 	
5	6th Oct	Interim report	<ol style="list-style-type: none"> 1. General information and management status 2. Selecting the improvement subject 3. Results of consulting 	



b. Discovering the best practice

Selecting the two companies, CSM Philippines and Jhaz footwear as best practice companies, and evaluating the consulting results.

(1) Discovering the best practice

(a) Jhaz Footwear

① General information of the company

Name of company	Jhaz Foot Wear		
Category	Small and medium size enterprise		
Address	BRGY. Kanluzoung Bukal, Liliw, Laguna		
Type of business	Footwear	Main Product	Women Shoes
Employees	30	Certification	
Eco-innovation leader			
	Nephtali Moneda		Elvira Moneda
Company introducing	Producing women's shoes and providing the products to local market, Asia, and Europe. Located in Liliw municipal, and produce the products at shoes factory. Selling at the Liliw local market. Small company as cottage industry produces waste rubber and toxic chemical substances.		

② Motivation and consulting overall rating

Jhaz Footwear joined the business through Philippines DTI, and was interested in waste treatment and environmental improvement. Much of waste rubber is accumulated, and incinerated and dumped, so it leads to environmental problems. Waste treatment is not only the problem of the company, but also for the society (200 shoes companies). Discovering new waste treatment method and finding a new profit mode.

③ Summary of precise diagnosis

- Interested in treatment of waste rubber. Most of waste rubber is now incinerated, need to improve the way to treat waste rubber.




Project	Main issues	Seriousness		
		low	mid	high
Much of waste rubber occurred and incinerated	<ul style="list-style-type: none"> -About 10% of raw material is occurred as waste. -Waste rubber is incinerated in open space so it leads to more pollution. -Making such a council with local government, shoes association, and company for finding the way to recycle the waste together with a profit model. -Review the way to reuse the recycled rubber as flooring of sports facility. 			■
Improvement of working environment	<ul style="list-style-type: none"> -Employee, who is in attaching process, uses their hands to brush the bond or organic solvent for attaching. -Protecting the skin of employees by providing the tool(brush). 			■
Toxic substances management system	<ul style="list-style-type: none"> - No toxic substances management system. - No MSDS and education for the employees. 		■	

④ The purpose of consulting

Main area	Purpose	Accomplishment		Etc.
		Before	After	
Recycle much of waste rubber	1. Seeking way to recycle the waste together 2. Local government and other association treat the waste together	Dumping and incinerating the waste (600kg/month)	Industrializing the profit business of recycling the waste rubber (100% Recycling)	Need effort from company, local government, and association for improving
Improving of working environment	Installing the ventilation facility at the working place	Being exposed to organic solvent	One ventilation system installed to air out	Improvement of environmental health of employees
Improving the operating method	Constructing and improving the operating method of the toxic chemical substances management system	No toxic chemical substances management system, directly use the substances by hands	Providing education and manual for toxic chemical management system, Providing the equipment for toxic chemical substances	Improvement of operation method and system of toxic chemical substances management

⑤ Consulting accomplishment

Three subjects which are the recycling the waste rubber, ventilating the working place, and improvement of toxic chemical substance system, are applied. Especially the recycling of waste rubber is chosen as the best practice.

Subject	Solution	Consulting issues	Etc
Recycling the waste rubber		1. Discovering a new profit model through recycling of waste rubber with recycling facility. 2. 20 kg of waste rubber is occurred per day, and it is big environmental problem.	Analyzing the economics and technology
Ventilating the working place		1. Employee is exposed in organic solvent from bond in working place. 2. Ventilating of working place for health of employee.	Completed
Improvement of toxic chemical substance system		1. No management system, even though they use the toxic chemical substances. 2. Identification of toxic chemical, separated storage, MSDS, safety training.	Completed

(b) CSM Philippines Inc.

① General information of company

Name of company	CSM Philippines Inc.		
Category	Small and medium size enterprise		
Address	Alpha wood compound, Brgy. Sto. Tomas, Binan, Laguna		
Type of business	Bone China Manufacturing Industry	Main product	Ceramics
Employees	100	Certification	
Eco-innovation leader			
	Enrico		Erika
Company introducing	Philippines manufacturing company who produces ceramics in Laguna Philippines. Produces the ceramics made of bone of animal, now exports the products to Europe and America. Interested in reducing energy consumption.		

② Motivation and consulting overall rating

CSM Philippines is producing the ceramics to import to the U.S, Australia, and Europe. CSM Philippines is a pretty big sized company in Laguna, and interested in environmental problem. CSM Philippines joins the Eco-innovation consulting through DTI Laguna.

CSM Philippines is interested in energy saving and management, improvement of waste water treatment, process improvement for decreasing the loss. The CEO of the company has big interest of this consulting, and has the will to improve, so produces good results. Satisfaction is occurred, because they solve the problem of the penalty of violating the waste water.



[Image 35] Final inspection of CSM Philippines

③ Summary of precision diagnosis

- High energy consumption in the process, and much waste occurs. Plan to reuse the energy from the process for casting(recycling the waste heat for casting part).

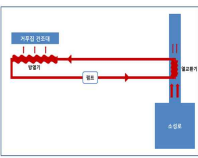



Project	Main issues	Seriousness		
		low	mid	high
Recycle the waste heat	-Plan to collect the waste heat from kiln to recycle for cast. Kiln and cast uses LPG as heat resource, and distance between kiln and cast is 22m. Recycle the waste heat after analyzing economics.			■
Waste water violation of environmental regulations	-Receive a penalty as waste water treatment is not obeying the criterion, and representative is also summoned by government. -Plan to apply the technology can replace cloudiness.			■
Other violation of environmental regulations	-Violation of air pollution and waste has been discovered by diagnosis. -Consultant of PCAPI provides the information of environmental regulations and suggests solution.		■	
Treating the micro dust from working place	- Micro dust from the process that mixes the bones and clay. - Health problem is occurred when the micro dust enters into contact with person.		■	

④ The purpose of consulting

Main area	Purpose	Accomplishment		Etc.
		Before	After	
Recycle the waste heat to cast	<ol style="list-style-type: none"> Analyzing economics and technology of recycling the waste heat for cast Apply the technology 	<ol style="list-style-type: none"> Release heat to atmosphere LPG used for casting 	<ol style="list-style-type: none"> Reducing LPG consumption for cast by recycling the waste heat (Aim to use 50% of LPG) 	<ol style="list-style-type: none"> Preceded by analyzing economics and technology
Waste water regulatory non-compliance	<ol style="list-style-type: none"> Improvement of TSS(total suspended solid) Improvement of cloudiness 	TSS (1256mg/l) Color (2500PCU)	TSS (70mg/l) Color (150 PCU)	Urgent task
Analyzing the air and waste regulations	<ol style="list-style-type: none"> Reviewing the environmental regulations 	<ol style="list-style-type: none"> Non-identified air regulation Non-identified waste regulation 	<ol style="list-style-type: none"> Environmental regulation training(one time) Waste regulation training(one time) Diagnostic report 	Necessity of reviewing the environmental regulations
Protecting the employee from micro dust	<ol style="list-style-type: none"> Providing the effective personal with protective equipment 	<ol style="list-style-type: none"> No mask in the working place 	<ol style="list-style-type: none"> Personal equipment (Nosk) 	Pilot training of Nosk

⑤ Consulting outcomes

Four improvement schemes are suggested. Collecting the heat from the kiln process to recycle for the casting, and it leads to energy saving. Penalty for violating the waste water of cloudiness and total suspended solid(TSS) is given to the company, but the problem is solved with the technology for cloudiness of waste water. Preparing the environmental regulations through understanding the information of the regulations. Improvement of working environment by providing personal protective equipment.

Consulting subject	Solution	Consulting issues	Etc
Recycling the waste heat		<ol style="list-style-type: none"> 1. Recycling the heat from the kiln for casting part. 2. Decreasing the LPG consumption for casting. 	Analyzing the technology and economics
Cloudiness and TSS of waste water		<ol style="list-style-type: none"> 1. Receiving the penalty of waste water for cloudiness and TSS. 2. Treatment for waste water with Bubble generator facility. 	Analyzing the technology and economics
Understanding and education about environmental regulations		<ol style="list-style-type: none"> 1. No understanding of the regulation for waste and air environment. 2. Education about the environmental regulation from an environmental expert. 	Completed education
Personal equipment for protecting from micro dust		<ol style="list-style-type: none"> 1. Health problem is occurred when the micro dust is going into the person. 2. Providing the Nosk which is protecting from micro dust. 	Providing personal protective equipment

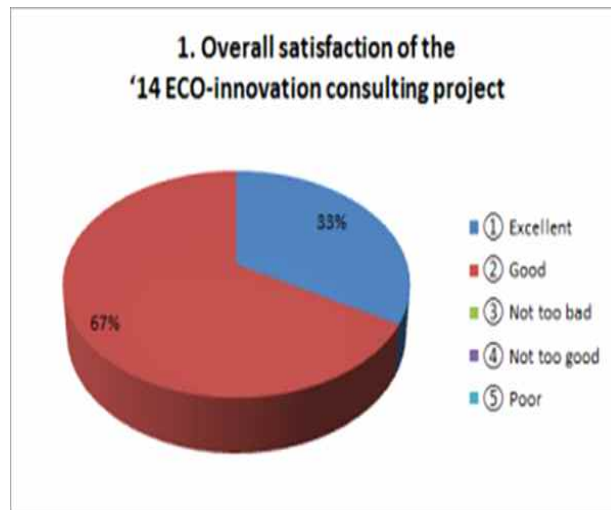
c. Satisfaction survey and result analysis

(1) Introducing the satisfaction survey

- o Period : 20th, October, 2014 ~ 31st, October, 2014.
- o Target : People of the 10 companies (Eco-innovation leaders).
- o Method : Complete enumeration survey.
- o Survey : Distributing the survey paper.
- o Collection : 15 survey (collection rate-100%)
- o Contents : 10 questions
 - Satisfaction of this business, outcomes, interested in consulting program, effective consulting program, recommendation, improvement, etc.

(a) Satisfaction for the consulting business

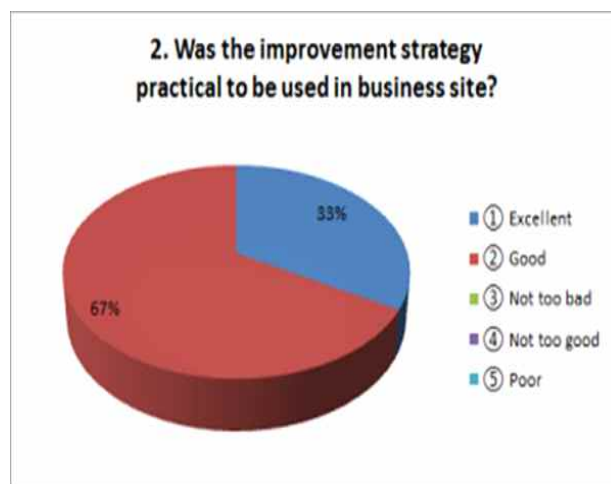
67% of companies said it is excellent, and 33% of companies said it is good. According to the survey, satisfaction is high. Some companies said that the period of the business is not enough, and they want to expand the period of the business.



[Image 36] Satisfaction survey for Eco-innovation

(b) Realistic assessment of improvement scheme

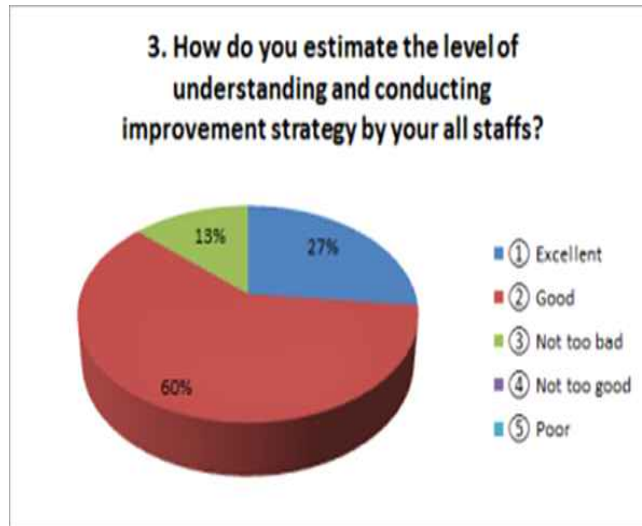
67% of companies said it is excellent, and 33% of companies said it is good in the survey. The companies said that the practical improvement scheme is applied to the each company.



[Image 37] Assessing the improvement

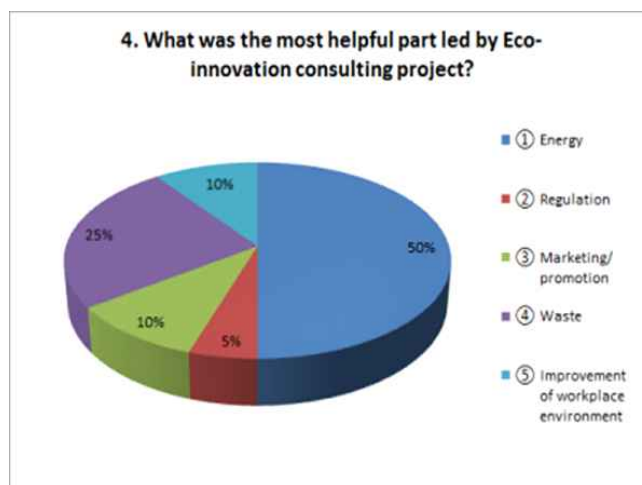
(c) Evaluating the participants' understanding of the business

27% of companies said it is excellent, 60% of companies said it is good, and 13% of companies said it is not too bad. According to the survey, understanding of the business is generally high enough.



[Image 38] Assessing the improvement and understanding the participants

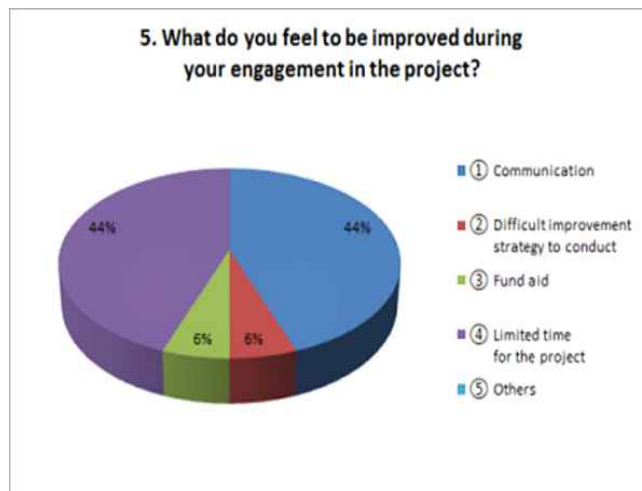
(d) Helpful part of Eco-innovation consulting business: 50% of companies said it is energy management, 25% said waste management, 10% said marketing and promoting, another 10% said improvement of working environment, and 5% said environmental regulations.



[Image 39] Helped area by Eco-innovation consulting business

(e) The part needed to be improved

44% companies said communication, another 44% said limited period of the project, 6% said difficulty in implementing the improvement way, and another 6% said the funding needs to be improved. Communication and the limited time are the most things to be improved.



[Image 40] Improvement for project processing

(f) Considerations for the next year business

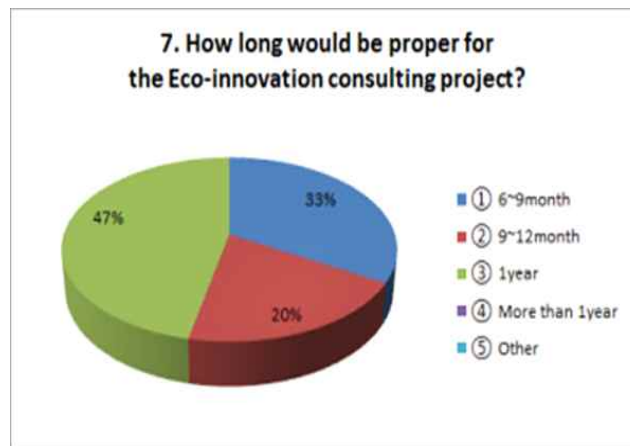
35% companies said scheduling, 24% said incentives for the companies, 23% said support by local government, 18% said the period of project is the thing to be concerned for next year.



[Image 41] Considerations for project

(g) Reasonable period of Eco-innovation consulting

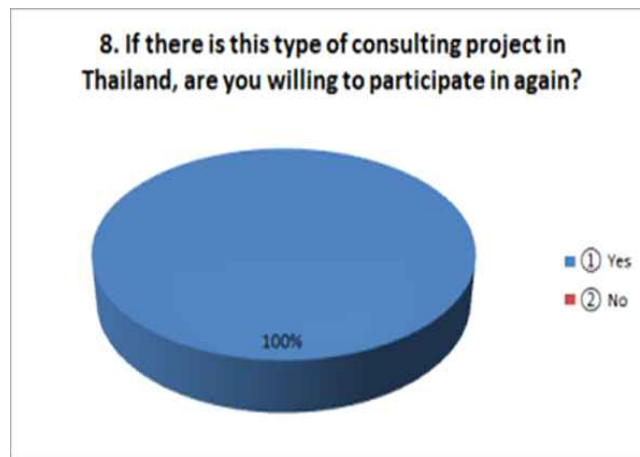
33% companies said between 6 and 9 months, 20% companies said between 9 and 12 months, and 47% companies said one year is the reasonable period for Eco-innovation consulting. According to the result, companies want the project to be expanded in the period.



[Image 42] Appropriate project period

(h) Decision to participate in the Philippine Eco-innovation consulting

100% companies said they are willing to participate in the Philippine Eco-innovation consulting for the future.



[Image 43] Re-attendance intention for Eco-innovation

(i) Decision to recommend to another company for Eco-innovation consulting
 100% companies said willing to recommend Eco-innovation consulting to other companies.



[Image 44] Recommendation intention for Eco-innovation

(j) Other opinion or requirement

The Philippines companies want more Korean companies to join so that more Philippines companies can join Eco-innovation business, and want to have a chance to visit the Korean companies. The Philippines companies want to have the opportunity to share the information and technology through Eco-innovation network. Some of them including DTI said that some companies received help, and want more countries to join this project.

ECOWISE	Satisfaction review
1. Overall satisfaction of the "14 ECO-innovation consulting project" <input type="radio"/> 1: Excellent <input checked="" type="radio"/> 2: Good <input type="radio"/> 3: Not too bad <input type="radio"/> 4: Not too good <input type="radio"/> 5: Poor If your satisfaction is low, what are the reasons? (if double answer possible) <input type="checkbox"/> 1: Limited time for improvement performance <input type="checkbox"/> 2: CSO's neglecting <input type="checkbox"/> 3: Unwillingness of change by Staffs <input type="checkbox"/> 4: Not enough education for consulting issues <input type="checkbox"/> 5: Lack of staff who can deal with consulted <input type="checkbox"/> 6: No support from local government	
2. Was the improvement strategy practical to be used in business site? <input checked="" type="radio"/> 1: Excellent <input type="radio"/> 2: Good <input type="radio"/> 3: Not too bad <input type="radio"/> 4: Not too good <input type="radio"/> 5: Poor	
3. How do you estimate the level of understanding and conducting improvement strategy by your all staffs? <input checked="" type="radio"/> 1: Excellent <input type="radio"/> 2: Good <input type="radio"/> 3: Not too bad <input type="radio"/> 4: Not too good <input type="radio"/> 5: Poor	
4. What was the most helpful part led by Eco-innovation consulting project? <input type="checkbox"/> 1: Energy <input type="checkbox"/> 2: Regulation <input type="checkbox"/> 3: Marketing/promotion <input checked="" type="checkbox"/> 4: Waste <input type="checkbox"/> 5: Improvement of workplace environment	
5. What do you feel to be improved during your engagement in the project? <input type="checkbox"/> 1: Communication <input type="checkbox"/> 2: Difficult improvement strategy to conduct <input checked="" type="checkbox"/> 3: Fund <input checked="" type="checkbox"/> 4: Limited time for the project <input type="checkbox"/> 5: Others	
6. What should be considered for the project management plan for the next time? <input type="checkbox"/> 1: Local government support <input type="checkbox"/> 2: Project period <input checked="" type="checkbox"/> 3: Project schedule management <input type="checkbox"/> 4: Incentives for participating companies <input type="checkbox"/> 5: Others	
7. How long would be proper for the Eco-innovation consulting project? <input type="checkbox"/> 1: 6-month <input type="checkbox"/> 2: 9-12month <input checked="" type="checkbox"/> 3: 1 year <input type="checkbox"/> 4: More than 1 year <input type="checkbox"/> 5: Other	
8. If there is this type of consulting project in the Philippines, are you willing to participate in again? <input checked="" type="radio"/> 1: Yes <input type="radio"/> 2: No	
9. Are you willing to recommend Eco-innovation consulting project to other companies? <input checked="" type="radio"/> 1: Yes <input type="radio"/> 2: No	
10. Any other opinion you would like to add? <i>I suggest that consultant have more visits to the company at various stages of project. From project conception, project implementation to project evaluation.</i>	

[Image 45] Survey paper

d. Promotion effort for result diffusion

DTI and the companies promotes the Eco-innovation on the central and local level

(1) Promoting on the central and local press

Philippine DTI introduces SMEs that can receive the Eco-innovation consulting support. It is talking about Eco-innovation consulting being implemented for the SMEs in the region of Cavite and Laguna of Calabarzon, and also talking about the way to apply practices and benefits for the SMEs. It is also introducing ASEIC and Eco-innovation business of ASEM.



[Image 46] Advertisement article of Eco-Innovation

Perlas ng SILANGAN BALITA



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Korean consultants assist Calabarzon SMEs to upskill in eco-innovation, address environmental issues

ASEIC is assisting Calabarzon SMEs to improve capability on green management and eco-innovation to promote sustainability and induce economic impact. The ASEIC, or the 'ASEM SMEs Eco-Innovation Center' based in Seoul, South Korea, promotes green growth business opportunities for SMEs in Asia and Europe through providing advisory services and sharing best-practice expertise in eco-innovation. Its primary goal is to encourage SMEs to integrate eco-innovation into their schemes. Eco-innovation is the development of products and procedures that lead to sustainable development, or any innovation that precedes any decrease in environmental impact.

DTI Calabarzon Regional Director Marilou Quinco-Toledo said that the Korean assistance is timely since the DTI is gearing to incorporate greening philosophies such as the Green Economic Development in its development program



and to be adopted by the SMEs. "We are also motivated about eco-innovation since we could dovetail it with our SSF project for our SMEs to be provided with machinery, equipment or facilities to address environmental issues as well", Toledo said.

ASEIC said that they provided information on green business opportunities, including advisory and consulting services and disseminating best practices in eco-innovation, apart from conducting training on environmental regulation for the selected SMEs. In 2013, the project had been pilot-

ed in Cavite where there were 10 SMEs assisted. On October 21, DTI Cavite Provincial Director Noly Guevara met with ASEIC's Younji Kang, program director, and Jang Yujeong, to explore other consultation needs of SMEs and for the project to extend coverage for the entire Calabarzon Region.

This year, 10 more were selected out of the 30 SMEs evaluated, this time, the project coverage extended to the province of Laguna of which consultation processes started in June and will end on November this year. Guevara stated that the SMEs are selected according to

ASEIC with DTI Officials. L-R: Marissa Argente, head of business development, (DTI-Batangas); Marcelina Alcantara, Provincial Director, DTI Quezon; Marilou Quinco-Toledo, Regional Director, DTI Calabarzon Region; Susan Palo, Provincial Director, DTI Laguna; and Noly Guevara, Provincial Director, DTI Cavite. (Charlie S. Dajao | DTI Calabarzon)

their capacity to contaminate the environment, and the quantity of water and energy use.

The selected firms from Cavite are Saffron Philippines, Inc., A.M Rieta Chemicals, Balayong Summit Inc., and Hoeheng Philippines Corporation while CSM Philippines, Jhaz Footwear, Oryspa, Escaba Food Products, Bugong Roast Chicken, and Chocovron are from Laguna.

ASEIC conducted process diagnoses and consultations and came up with advisories in forms of corrective or improvement measures which would result to the preven-

tion of materials wastages, heat/energy recovery, improvement of waste water quality, and the decrease in energy demand and usage of energy, fuel and water.

The best practices include the recycling of materials through the use of appropriate recycling equipment; proper maintenance and improvement of facilities; implementing heat recovery systems; improvement of waste water quality; conservation of water, and conservation of energy (decreased use of fuel through heat recovery of heating systems).

Also, ASEIC trained the SMEs to comply with environmental regulations using the ISO 14000 environmental management standard as the framework.

On the consultation stages, ASEIC provided technology and materials, i.e., chemicals, microorganisms and enzymes for the treatment of nonconforming waste water of SMEs.

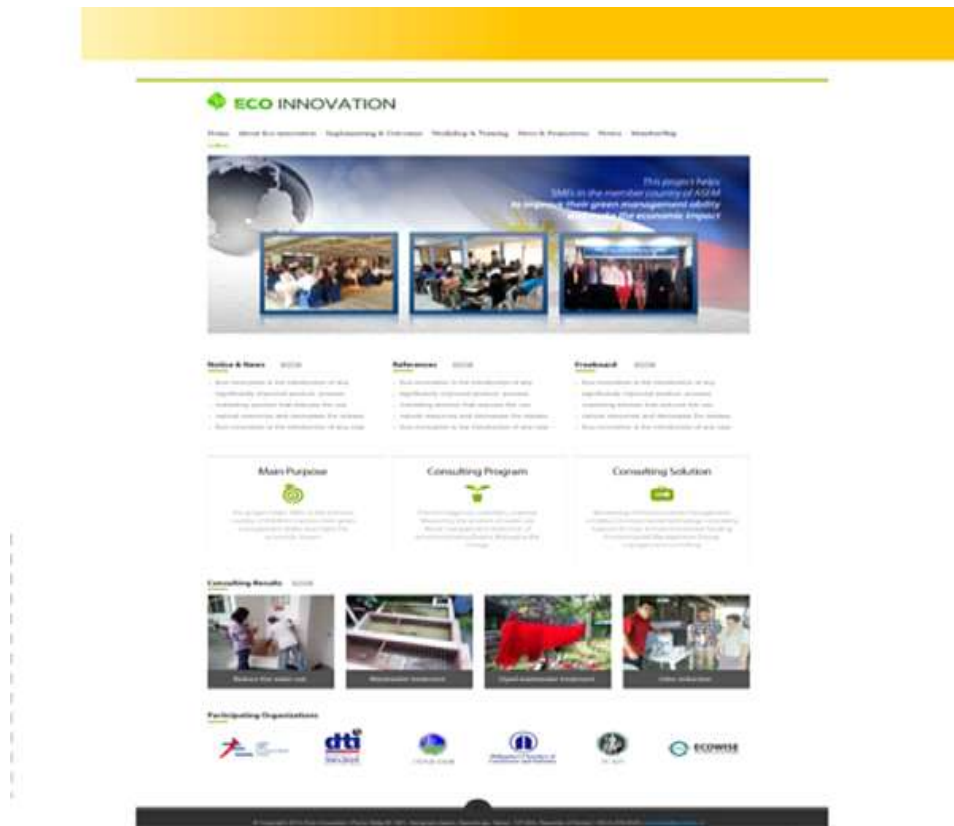
(Charlie S. Dajao | DTI Calabarzon)

[Image 47] Advertisement article of Eco-Innovation

(2) Opening the Philippines Eco-innovation homepage

(a) Purpose of the homepage

The purpose of Philippines Eco-innovation homepage (www.ecoinnovation.com.ph) is to promote and share the outcomes of the business. It is also for after-service for the companies, and building the network with Philippine government.



[Image 48] Philippines Eco-innovation homepage

(b) Homepage contents

The homepage shows the concept of Eco-innovation business, consulting contents, introducing the companies and government agencies, network between companies, outcomes of 2013 and 2014 business, and promotion article.

(c) Utilization plan of homepage

This homepage will be used mainly to introduce and promote the business, and recruit companies for the next year. Continuously promote the business to central and local Filipino government, press, and SMEs.

Chapter 3. Business Result and Expectation Effectiveness

Section 1. Business Result

Establishing the improvement goal of the companies through first and precise diagnosis, and producing consulting results.

- CSM Philippines is saving energy through recycling waste heat, and solving the waste water problem with a Micro Bubble Generator.
- Jhaz Footwear creates new profit model by recycling the waste rubber, and improved the working environment through treatment of organic solvent.
- Oryspa Spa Solution is reducing the electricity consumption by installing the solar power facility, and also reducing the water consumption through rainwater recycling.
- A.M.Rieta is saving the energy by separating the steam pipe, increasing the energy efficiency by providing the steam faster.
- Bugong Food increases the waste water treatment efficiency through improvement of waste water treatment by microorganism and by redesigning the septic tank.
- Chocovron is saving energy consumption through installation of the high efficiency air conditioner, and construction the environmental management system.
- Balayong Summit is saving the waste treatment cost through recycling, and construction of the environmental management system.
- Escaba is saving the cost of 5,760m³ of ground water annually, so Escaba released the pressure of the penalty. Escaba creates a new waste water treatment model.
- Hocheng is saving the waste treatment cost through recycling the ceramic waste, and constructing a GHG web-solution to calculate the GHG emission.
- Saffron is improving the chromaticity of waste water through high efficiency colorant, so Saffron releases the pressure of the penalty. Saffron is preparing for the global market through HIGG Index program consulting.

[Table 11] Summarizing the Philippines Eco-innovation consulting result

No	Name of company	Improved items	Numbers
1	CSM Philippines	Recycling the waste heat	4
2		Treatment of cloudiness and TSS of waste water	
3		Environmental regulation education	
4		Protecting the dust through personal protection equipment	

5	Jhaz Footwear	Recycling the waste rubber	3
6		Ventilation for working place	
7		Improvement of toxic chemical treatment	
8	Oryspa Spa Solutions	Constructing the solar power facility	4
9		Environmental management system	
10		Recycling the rainwater through the facility	
11		Environmental marketing	
12	A.M.Rieta	Energy saving by insulation of steam pipe	3
13		Energy saving by separating the steam pipe	
14		Water and energy saving movement	
15	Bugong Food	Waste water treatment by microorganism	4
16		Redesigning the waste water septic tank	
17		Replacement of the disinfectant of process	
18		Water saving through water saving facility	
19	Chocovron	Introducing high efficiency air-conditioner	3
20		Introducing environmental management system	
21		Energy saving movement	
22	Balayong Summit	Constructing environmental management system	2
23		Constructing waste management system	
24	Escaba	Recycling the ground water	2
25		Improvement of waste water through microorganism	
26	Hocheng	Recycling the waste ceramics	2
27		Constructing the GHG inventory	
28	Saffron	Improvement of dyed waste water treatment	3
29		HIGG Index consulting	
30		Environmental regulation education	
Total		-	68

◦ CSM Philippines

Main outcomes	Purpose	Accomplishment		Etc
		Before	After	
Productivity improvement (resource and energy)	Process improvement	Releasing the waste heat	Recycling the waste heat of kiln(1 issue)	
	Efficiency of material utilization			
	Energy efficiency	Releasing the waste heat	Reducing the 3,000kg of LPG annually	
	CO2 emission reduction	Releasing the waste heat	8,961kg CO2e	
Waste treatment	Before and after waste treatment	No treatment plan for designated waste	Consignment processing for designated waste(1 issue)	
Strengthening of technology	Documentation system			
	Automated system			
	Applying technology	Waste heat recovery, waste water treatment technology (2 issues)		
Strengthening of non-technology	Recognition of improvement	Eco-friendly mind through education (Education 3 times)		
	Sustainable management system	Education for Eco-innovation leader and PCO(education 3 times)		
	Raising morale, Constructing the culture	Increasing eco-friendly mind		
Understanding the policy and utilization	Sharing new information	Environmental technology, energy saving know-how(2 times)		
	Applying the environmental standard	Economic effects(2million pesos) by improvement of waste water		
Support	Funding/ technology/ program	Waste water treatment and energy management technology		
Entering new market		U.S.A, Japan, and Korean market		

◦ Jhaz Foot Wear

Main outcomes	Purpose	Accomplishment		Etc
		Before	After	
Productivity improvement (resource and energy)	Process improvement		Installing ventilation, improvement of organic solvent direction for use	
	Efficiency of material use	Incineration and dumping of rubber	Applying the rubber recycling technology (1 issue)	
	Energy efficiency CO2 emission reduction			
Waste treatment	Before and after waste treatment	Waste rubber dumping	Recycling the waste rubber, 4,000kg/day	
Strengthening of technology	Documentation system	Constructing the toxic substance management system		
	Automated system Applying technology	Densifier(recycling facility)		
Strengthening of non-technology	Recognition improvement	Establish the necessity of toxic substance management		
	Sustainable management system	Selecting and educating Eco-innovation leader and PCO (education 3 times)		
	Raising morale, Constructing new culture			
Understanding the policy and utilization	Sharing new information	Applying environmental technology and know-how (1 issue)		
	Applying environmental standards	Understanding the environmental regulation for waste treatment (education 3 times)		
Support	Funding/technology/program	Introducing the program, SSF by DTI		
Entering new market		Planning for new market, U.S, and the Middle East		

◦ Oryspa Spa Solutions

Main outcomes	Purpose	Accomplishment		Etc
		Before	After	
Productivity improvement (resource and energy)	Process improvement			
	Efficiency of material utilization			
	Energy efficiency		Introducing renewable energy	Solar power facility
	CO2 emission reduction		Reducing 7,907kgCO2e of GHG annually	
Waste treatment	Before and after waste treatment			
Strengthening of technology	Documentation system	Documentation for environmental management system		Complete
	Automated system			
	Applying technology	Solar power equipment and rainwater facility(2 issues)		Complete
Strengthening of non-technology	Recognition improvement	Increasing the eco-friendly mind (Education 3 times)		Complete
	Sustainable management system	Selecting and educating Eco-innovation leader and PCO (1 issue)		Complete
	Raising morale, Constructing the culture	Improvement of working environment through eco-friendly building		
Understanding the policy and utilization	Sharing new information	Introducing the developed technology and management of environment (education 2 times)		
	Applying the environmental standard	One time education of Philippines environmental regulations		
Support	Funding/technology/program	Receiving the fund from DTI		
Entering new market		Planning to import Korean product		Planning to visit Korea in 2014

◦ A.M. Rieta Chemicals Trading Manufacturing

Main outcomes	Purpose	Accomplishment		Etc
		Before	After	
Productivity improvement (resource and energy)	Process improvement			
	Efficiency of material utilization			
	Energy efficiency	Diesel	Saving 683L of diesel annually	Analyzing the technology, economics
	CO2 emission reduction		Reducing 1,794kgCO ₂ e annually	Analyzing the technology, economics
Waste treatment	Before and after waste treatment	Incineration and unauthorized disposal of waste	Recycling the waste	
Strengthening of technology	Documentation system			
	Automated system			
	Applying technology	Saving the 27,337 peso through applying the coating type insulator		
Strengthening of non-technology	Recognition improvement			
	Sustainable management system	Selecting and educating Eco-innovation leaders and PCO (education 3 times)		
	Raising morale, Constructing the culture			
Understanding the policy and utilization	Sharing new information	Having the energy management information and know-how (2 issues)		
	Applying the environmental standard	One time education on Philippines environmental regulations		
Support	Funding/technology/program			
Entering new market				

◦ Bugong Food Corp

Main outcomes	Purpose	Accomplishment		Etc
		Before	After	
Productivity improvement (resource and energy)	Process improvement		Water saving by water saving device	Complete
	Efficiency of material utilization			
	Energy efficiency			
	CO2 emission reduction			
Waste treatment	Before and after waste treatment			
Strengthening of technology	Documentation system			
	Automated system			
	Applying technology	Applying the waste water treatment technology (2 issues)		Complete
Strengthening of non-technology	Recognition improvement	Improvement of environmental management mind(education 1time)		Complete
	Sustainable management system	Selecting and educating Eco-innovation leader and PCO (education 3 times)		Complete
	Raising morale, Constructing the culture			
Understanding the policy and utilization	Sharing new information	Understanding the technology of waste water treatment (2 issues)		Complete
	Applying the environmental standard	One time education of Filipino environmental regulations		Complete
Support	Funding/ technology/ program			
Entering new market				

◦ Chocovron Global Corporation

Main outcomes	Purpose	Accomplishment		Etc
		Before	After	
Productivity improvement (resource and energy)	Process improvement		Improvement of process for air conditioner	
	Efficiency of material use			
	Energy efficiency		-Inverter air conditioner : 5% reduction -Hybrid solar air conditioner : 22% reduction	
	CO2 emission reduction		-Inverter air conditioner : 1,772kgCO2e/year -Hybrid solar air conditioner : 7,799kgCO2e/year	
Waste treatment	Before and after waste treatment			
Strengthening of technology	Documentation system	Documentation the manual and the procedure of environmental management system		
	Automated system			
	Applying technology			
Strengthening of non-technology	Recognition improvement			
	Sustainable management system	Selecting and educating Eco-innovation leader and PCO (education 3 times)		
	Raising morale, changing the culture	Expanding eco-friendly management		
Understanding the policy and utilization	Sharing new information	One time education of Philippines environmental regulations		
	Applying the environmental standard			
Support	Funding/technology/program			
Entering new market				

◦ Balayong Summit

Main outcomes	Purpose	Accomplishment		Etc
		Before	After	
Productivity improvement (resource and energy)	Process improvement			
	Efficiency of material utilization			
	Energy efficiency			
	CO2 emission reduction			
Waste treatment	Before and after waste treatment		Establishment of waste recycling system	Complete
Strengthening of technology	Documentation system	Documentation of waste management		
	Automated system			
	Applying technology			
Strengthening of non-technology	Recognition improvement	Implementing the environmental management education		Complete
	Sustainable management system	Selecting and educating Eco-innovation leader and PCO		Complete
	Raising morale, Changing the culture			
Understanding the policy and utilization	Sharing new information	Securing the technology and policy of waste treatment		Complete
	Applying the environmental standard	One time education of Philippines environmental regulations		Complete
Support	Funding/technology/program			
Entering new market				

◦ Escaba Food Product Inc

Main outcomes	Purpose	Accomplishment		Etc
		Before	After	
Productivity improvement (resource and energy)	Process improvement		Process improvement for water saving	Complete
	Efficiency of material utilization			
	Energy efficiency			
	CO2 emission reduction			
Waste treatment	Before and after waste treatment			
Strengthening of technology	Documentation system			
	Automated system			
	Applying technology	Applying the waste water technology		Complete
Strengthening of non-technology	Recognition improvement	Education for an eco-friendly mind (education 1 time)		Complete
	Sustainable management system	Selecting and educating Eco-innovation leader and PCO (education 3 times)		Complete
	Raising morale, Constructing a new culture			
Understanding the policy and utilization	Sharing new information	Having the waste water treatment technology and know-how (2 issues)		Complete
	Applying the environmental standard	One time education of Philippines environmental regulations		Complete
Support	Funding/technology/program			
Entering new market				

◦ Hocheng Philippines Corporation

Main outcomes	Purpose	Accomplishment		Etc
		Before	After	
Productivity improvement (resource and energy)	Process improvement			
	Efficiency of material utilization			
	Energy efficiency			
	CO2 emission reduction		Applying the GHG web solution	Complete
Waste treatment	Before and after waste treatment	Dumping the ceramic waste	Applying the technology of ceramic waste treatment	Complete
Strengthening of technology	Documentation system			
	Automated system			
	Applying technology	Applying the technology of ceramic waste treatment		Complete
Strengthening of non-technology	Recognition improvement			
	Sustainable management system	Selecting and educating an Eco-innovation leader and PCO		Complete
	Raising morale, Constructing the culture			
Understanding the policy and utilization	Sharing new information	Getting the waste treatment technology and know-how		Complete
	Applying the environmental standard	One time education of Philippines environmental regulations		Complete
Support	Funding/technology/program			
Entering new market		Expanding the market to Southeast Asia		

◦ Saffron Philippines

Main outcomes	Purpose	Accomplishment		Etc
		Before	After	
Productivity improvement (resource and energy)	Process improvement		Reviewing to separate the waste into acidic and alkaline groups	No reflecting of economic analyzing
	Efficiency of material utilization			
	Energy efficiency			
	CO2 emission reduction			
Waste treatment	Before and after waste treatment			
Strengthening of technology	Documentation system	Documentation for HIGG Index		
	Automated system			
	Applying technology	Applying the high efficiency dyed water treatment		Applying the Korean colorant
Strengthening of non-technology	Recognition improvement	Increasing the environmental management interest by preparing HIGG Index program		
	Sustainable management system	Selecting and educating an Eco-innovation leaders and PCO (education 3 times)		
	Raising morale, Changing the culture			
Understanding the policy and utilization	Sharing new information	Consulting for HIGG Index, and waste water treatment		
	Applying the environmental standard	Consulting for HIGG Index, waste water treatment		
Support	Funding/technology/program			
Entering new market		Another U.S market with HIGG Index		

Section 2. Expectation Effectiveness and Henceforth Task

1. Expectation effectiveness

22,900,000 won, which is 16% of total budget, is invested for leasing the venue for first and final workshop for Eco-innovation consulting. We select the improvement goal of each company through the diagnosis. Environmental management, eco-innovated technology is considered for each company, as well as applying the appropriate solution for the improvement scheme. We expect to see many effects for the same industry field, if we apply the solution founded by the Eco-innovation project. This Eco-innovation consulting creates and applies the new consulting model for Filipino SMEs. We expect more support of businesses by the Filipino governments because the local government is now interested in environmental technology, management, and consulting.

2. Task henceforth

Support is needed for the companies who joined Eco-innovation so that they can maintain concern about their improvement. The government and consulting company maintain concern about the companies, so they can improve themselves.

After-program of Eco-innovation consulting is also needed. It is better than one-sided support, so Filipino SMEs can stand by themselves to improve themselves. Ecowise opens the Filipino Eco-innovation homepage (www.ecoinnovation.com.ph), so Ecowise can support Philippine SMEs

We have planned to have a seminar with DOST (Department of Science and Technology, DTI(Department of Trade and Industry), and PCAPI (Pollution Control Association of the Philippines). Ecowise will promote Eco-innovation business to Filipino SMEs with DTI(Department of Trade and Industry).

ASEIC

ASEM SMEs Eco-innovation Center

Achieving eco-innovation of SMEs through
Asia-Europe cooperation



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