

ASEM SMEs Eco-Innovation Consulting Project :

- *Eco-Innovation Guideline for PT. Ostec Indonesia* -

2011. 12



ASEM SMEs Eco-Innovation Center (ASEIC)

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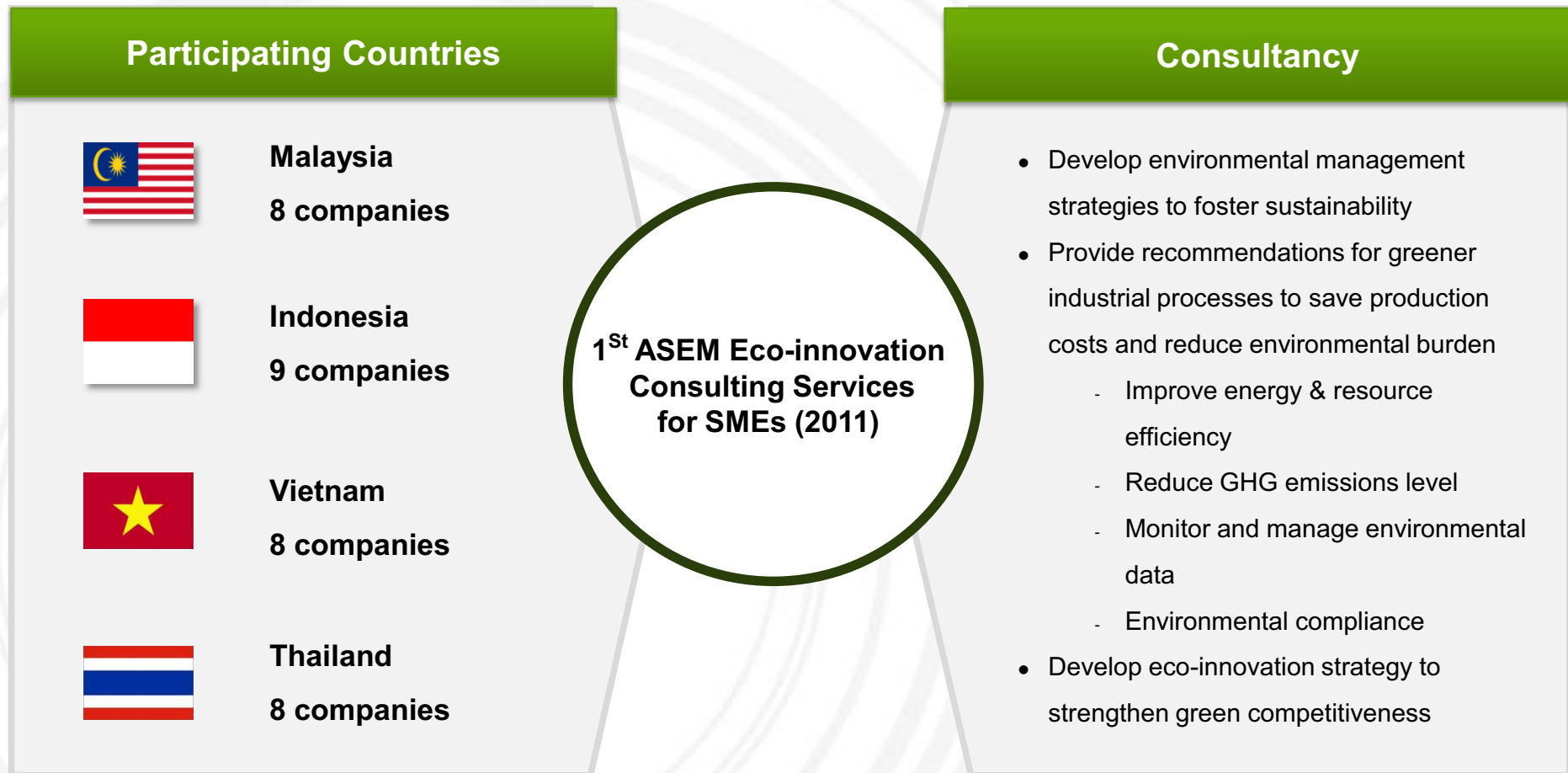
Introduction to ASEM Eco-innovation Project

- The green marketplace is worth trillions of dollars and against this backdrop, Asian and European countries under ASEM established ASEIC as a cooperative mechanism with the principal mandate of enhancing eco-innovation of SMEs in both regions.
- The Project aims to facilitate innovation in the corporate strategy of SMEs at any stage of the product or service lifecycle, while developing global green growth opportunities.
- The consulting services provide SMEs with the implementation of a holistic and multifaceted approach to strengthening eco-innovation, from sharing core environmental regulations, innovative techniques and practices, to providing related educational program.
- The main goal of Eco-innovation consulting is to strengthen the “green competitiveness” of SMEs by disseminating and utilizing green management and technology in their various businesses.



Introduction to ASEM Eco-innovation Project

1st ASEM Eco-innovation Project was launched September 2011 and finalized in December 2011. Four countries and a total of 33 companies participated in this Project.



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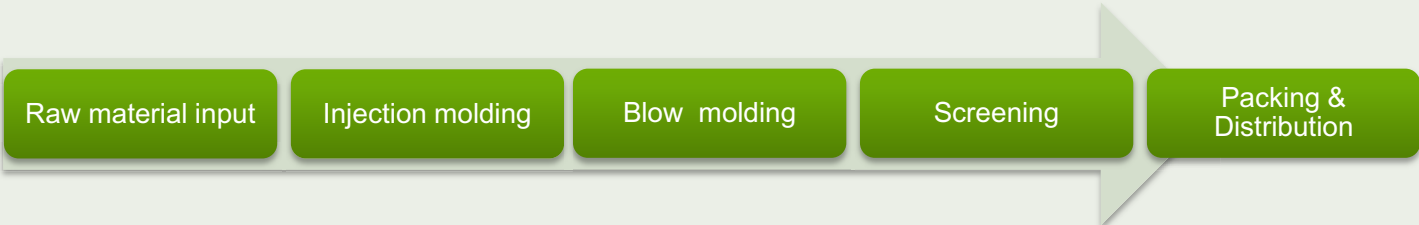


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Ostec Overview

Company Overview

Company Name	PT. Ostec Indonesia
Managing Director	Mr. Young. C. Park (CEO)
Address	Jl.Manis IV No.22 Zona Industri Manis Ds, Gandasari Kec
No of employees	260
Products & Services	Plastic Parts, automobile parts
Production Process	 <pre>graph LR; A[Raw material input] --> B[Injection molding]; B --> C[Blow molding]; C --> D[Screening]; D --> E[Packing & Distribution];</pre>

Ostec Overview

Initial visit

Date: 2011-09-26

Objective:

- Introduction to ASEM Eco-innovation Project
- Conduct an interview and a site tour to assess the company's environmental management and process activities
- Based on findings, provide short-term cleaner production recommendations

Participating Consultants:

- Eco-Frontier

Ostec representatives:

Mr. Young.C.Park(CEO)

Interim visit

Objective:

- Assist Ostec to implement the short-term cleaner production options recommended during the initial visit

Participating Consultants:

- Eco-Frontier, ASEIC

Ostec representatives

- Mr. Young.C.Park(CEO)

Final visit

Date: 2011-10-24

Objective:

- Review of preliminary findings
- Comprehensive education on environmental management
- Development of long-term eco-innovation strategy for Ostec

Participating Consultants:

- Eco-Frontier

Ostec representatives:

Mr. Young.C.Park(CEO)

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Environmental Management Assessment & Recommendations

Environmental Management Assessment Tool

➤ Environmental management is a way of managing an organization by using energy, and resources efficiently, reducing GHG emissions and reducing both health and environmental impact.

➤ Environmental Management Assessment Tool used in this Project was based on 5 criteria:

- ① Environmental Management Strategies
- ② Environmental Management System
- ③ Energy & Resources Management
- ④ GHG Emissions and Environmental Pollution Management
- ⑤ Environmental Responsibility



Environmental Management Assessment Report on SMFs

2. Environmental Management

Company :
Duration :
Consultant :

Environmental Management


Environmental Strategies and Policies

The company has established strategies and policies on environmental management.		YES	Proceed to Step 2 of the Analysis
		NO	0
Step 2	Identify the company's environmental management status. Are there environmental management objectives and targets? Is there an action plan for achieving these objectives and targets?		
	The company has environmental management objectives		
	The company has environmental management targets and strategies, but there is no action plan for implementation.		
	The company has environmental management targets and action plan, but they are irrelevant to the quantitative outcomes.		
	The company has environmental management targets and action plan, and they are managed using quantitative goals.		
	The company has environmental management targets based on medium and long-term goals, as well as a system for monitoring the performance results of the action plan.		
		2	4
		6	8
		10	

Preliminary Findings

1. Environmental Strategy & Policies
 - No environmental strategy; only informal form of communication
 - Conducts energy saving activities
 - No guidelines for green procurement
2. Environmental Management System
 - Environmental issues are verbally communicated
 - No environmental management representative or committee
 - Monitoring is not systematic
3. Energy & Resources
 - Environmental data is not managed using indicators
4. GHG Emissions and Environmental Pollution
 - Does not calculate GHG emissions and has not established GHG emissions reduction target
5. Environmental CSR
 - Does not disclose organization's environmental performance and activities
 - Complies to environmental regulations

***Refer to the initial report for detailed analysis.**



Preliminary Findings

- Environmental Management Assessment Tool used in this Project was based on 5 criteria:

- 
- 출판사: 서울경제신문출판부

21

Consultant :



	The company has established strategies and policies on environmental management.	YES	Proceed to Step 2 of the Analysis
		NO	0
Step 2	<p>Identify the company's environmental management status. Are there environmental management objectives and targets? Is there an action plan for achieving those objectives and targets?</p>	<p>The company has environmental management objectives</p> <p>The company has environmental management targets and strategies, but there is no action plan for implementation.</p> <p>The company has environmental management targets and action plan, but they are irrelevant to the quantitative outcomes.</p> <p>The company has environmental management targets and action plan, and they are managed using quantitative goals.</p>	<p>The company has environmental management targets based on medium and long-term goals, as well as a system for monitoring the performance results of the action plan.</p>
	2	4	6
			8
			10

SBC 중소기업진흥공단

***Refer to the initial report for detailed analysis.**



Cleaner Production Assessment & Recommendations

Case 1



- Catapult production is inefficient

➤ Cleaner Production Recommendations:

- Install an inverter to the catapult to control the electrical load capacity
- **Expected reduction in energy costs= 10,830\$/yr, if 175kW is used 11hours/day, 250days/year**

Case 2



- Preheating of catapults : twice a week
 - Preheating time: 30 minutes

➤ Cleaner Production Recommendations:

- Reduce warm-up time from 30 minutes to **25 minutes** to reduce electricity consumption.
- **Expected cost reduction = 160\$/yr, if 200kW is used twice a week. 52weeks/yr**

Cleaner Production Assessment & Recommendations

Case 3



- Cakes produced

➤ Cleaner Production Recommendations:

- Use a jig to flatten the cakes as thin as possible to reduce energy-use during grinding
- **Expected reduction in electricity costs = 12\$/yr per ton, if Ton per 2010wh**

Case 4



- High temperature and humidity in compressor room

➤ Cleaner Production Recommendations:

- Lower temperature and humidity of compressor room by installing a ventilation system.
- Install a ventilator to prevent water leakage during the monsoon season. Clear the surrounding area and install a door for the compressor room
- **Expect to improve efficiency of compressor by 5% annually**
- **Expected cost reduction = 130\$/yr; if 15hp motor is used 11hrs/day, 250days/yr**

Cleaner Production Assessment & Recommendations

Case 5



- No filtration system for circulated water

➤ Cleaner Production Recommendations:

- Install filtration system
- **Expected reduction in water use= if 50 tons of water is circulated 12 times a year = 60\$/yr**

Case 6



- Wastes not separated and recycled properly

➤ Cleaner Production Recommendations:

- Designate a specific storage area for each type of recyclable wastes.
- **Expect to improve the quality of recycled products and reduce material use.**

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Environmental Strategy Establishment

Establishment of Corporate Environmental Strategy (Policy, Objectives, Targets)

Environmental Policy

- Environmental policy is your declaration of commitment to the environment as well as to health & safety of your employees.
- To develop an environmental policy, make a list of general environmental concerns that could be addressed in your company.
- The environmental policy should serve as the framework for setting environmental objectives and targets.

Qualitative Objectives

- Environmental objectives are established based on the company's environmental vision and policy.
- Environmental targets are established for each environmental objective to measure change in improvement.
- Implementation plan should be developed for each environmental objective and relevant targets.
- Environmental objectives and targets should be included in the company's medium and long-term goals as well as a system for monitoring the performance results of the implementation plan.

Quantitative Targets

Environmental Strategy Establishment

SAMPLE Environmental Policy for Ostec

PT. Ostec Indonesia aims to promote and maintain environmentally responsible practices to benefit our customers, employees, clients and community as whole. To realize this vision, we will commit to the following:

- Establish and review our environmental objectives and targets.
- Comply with legal regulations and standards pertinent to our industry.
- Minimize emissions to contribute to climate change mitigation.
- Pursue efficient use of energy in our manufacturing process to reduce environmental burdens.
- Cooperate and communicate with all relevant stakeholders including employees, suppliers, government agencies and our client.

As a responsible manufacturer, **PT. Ostec Indonesia** is committed to manufacture, handle and distribute our products to ensure that this policy is met at all times.

[Name of Managing Director]

[Signature]

[Date]

SAMPLE

Environmental Strategy Establishment

SAMPLE Environmental Objective and Targets for Ostec

Environmental Management Objective	Targets (By Year 2015 with Baseline of Year 2010)
Transparency in environmental management	<ul style="list-style-type: none">• Post environmental management policy on the company's website• Set up an internal bulletin board that discloses the company's environmental management status
Develop eco-friendly processes	<ul style="list-style-type: none">• Increase the use of recyclable & recycled packaging materials by 5%• Increase resource efficiency by 5%
Increase green procurement (purchase of eco-friendly products)	<ul style="list-style-type: none">• Increase green procurement by 20%• Increase purchase of recycled materials• Develop green procurement guideline for office supplies
Reduce energy-use and GHG emission level	<ul style="list-style-type: none">• Reduce energy-use by 5%• Reduce GHG emissions (scope 1 & 2) by 5%• Conduct a detailed energy audit every 6 months

SAMPLE

Environmental Management Organization Establishment

- Appoint an environmental management representative to manage your company's environmental performance
- Establish an environmental management committee

Establishing an Environmental Management Committee

Who should be the environmental management representative?

- The Environmental Management Representative is the top plant manager responsible for the functioning of the organization's environmental management system (EMS).
- It is his or her job to ensure that all tasks relating to EMS are identified and completed in a timely manner.
- He or she is also responsible for reporting periodically to the President Director of the organization on the progress and results of the company's EMS.

Establishing an Environmental Management Organization

- Before establishing your environmental management organization, consider the following.
 - Who is/should be our EMS Management Representative?
 - Does this individual have the necessary authority to carry out the responsibilities of this job?
 - How will we divide EMS roles and responsibilities?
 - How do we ensure that adequate resources have been allocated for environmental management?
 - How will we keep this information up-to-date?

Responsibilities of Ostec's Environmental Management Representative

- Establish environmental strategy and objectives
- Manage environmental data (energy, resources, GHG emissions)
- Monitoring and set reduction targets (energy, resources, GHG emissions), and compare with actual performance
- Foster green production processes by practicing cleaner production
- Prepare a guideline for eco-friendly purchasing

Environmental Data Management

Environmental data should be managed in relative terms to compare your environmental targets (e.g.: reduction in energy use by 5% by year 2012) and your performance outcome (energy use in year 2012 compared to baseline year)

Why should you manage your environmental data?

- **Absolute indicators**

- Measure basic data in a given time frame, typically one year
- **e.g.)** tons of CO₂ emitted annually, tons of wastes generated annually

- **Relative indicators (normalized indicators)**

- Measurement of absolute consumption or emission figures relative to reference data
- Used to measure productivity and intensity ratios e.g.) waste generated per unit of production(kg)

***Relative indicators provide accurate information → better management**

Track, analyze and compare
monthly & annual environmental
performance

Environmental Data Management Tool

- The Project provided all participating SMEs with a tool that automatically calculates the organization's environmental data including:

- 1) Electricity consumption
- 2) Fuel consumption
- 3) Water use
- 4) Use of materials (resources)
- 5) Waste generation
- 6) Emissions of harmful substances

*** The environmental data management excel tool is available on ASEIC's portal site. <<http://www.aseic.org/main.do>>**

Environmental Data Management

Using the excel tool → Electricity Use (Example)

(Company A) Indicator					
Criteria for Comparison		Electricity Use Indicator			
Month(2010)	Sales/1,000RM	Electricity Use (kwh)	Total Price(RM)	Use/Sales (kwh/1,000RM)	Total Price/Sales(%)
1	464	32,642	2,307,390	70.35	0.5
2	291	32,254	2,527,930	110.84	0.9
3	462	29,102	2,203,710	62.99	0.5
4	526	33,902	1,851,810	64.45	0.4
5	447	26,894	1,670,230	60.17	0.4
6	654	23,832	1,806,190	36.44	0.3
7	514	26,076	2,212,550	50.73	0.4
8	348	24,163	2,181,980	69.43	0.6
9	354	24,509	2,047,000	69.23	0.6
10	417	17,549	2,054,190	42.08	0.5
11	426	22,649	2,233,310	53.17	0.5
12	401	25,675	2,468,170	64.03	0.6
yr2010	5,304.00	319,247	25,564,460.00	60.19	0.48

Step 1: Input the amount of your monthly sales volume.

Step 2: Input monthly electricity use in kWh indicated in your energy bill.

Step 3: Input the monthly electricity rate indicated in your energy bill.

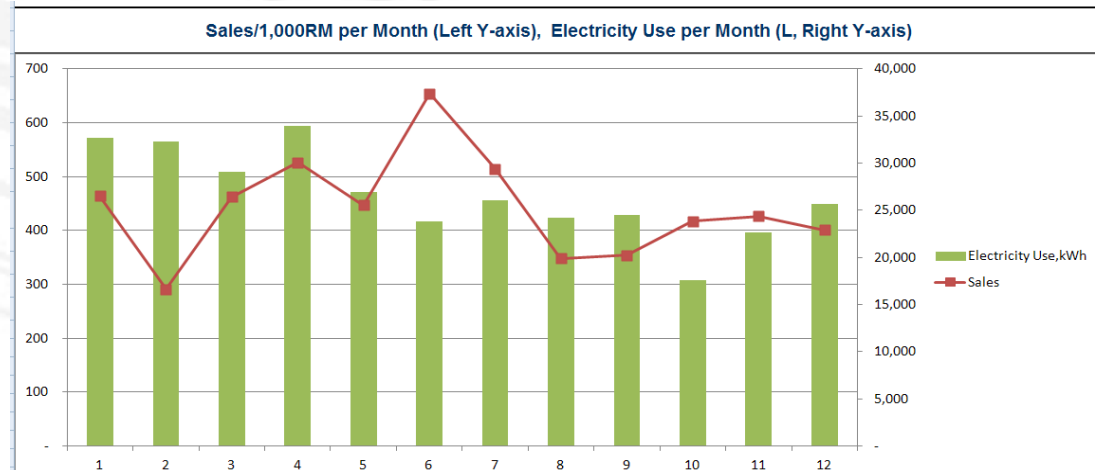
Environmental Data Management

Using the excel tool → Electricity Use (Example)

A graph & table automatically constructed based on the inputs from steps 1,2,3



Repeat steps 1, 2, 3 for other indicators (waste, materials, harmful substances , water, fuel)



Month (2010)	1	2	3	4	5	6
Use/Sales (kwh/1,000RM)	70.35	110.84	62.99	64.45	60.17	36.44
Unit Price(RM/kwh)	70.69	78.38	75.72	54.62	62.10	75.79
Month (2010)	7	8	9	10	11	12
Use/Sales (kwh/1,000RM)	50.73	69.43	69.23	42.08	53.17	64.03
Unit Price(RM/kwh)	84.85	90.30	83.52	117.05	98.61	96.13

2010 Use/ Sales (kwh/1,000RM)	60.19
2010 Unit Price (RM/kwh)	82.31

GHG Emissions Management

The Project also provided an excel tool for measuring GHG emissions level.

Types of GHGs	Global Warming Potential
CO ₂	1
CH ₄	21
N ₂ O	310
HFCs	140 ~ 11,700
PFCs	6,500 ~ 9,200
SF ₆	23,900

- GHG Emissions are gases in Earth's atmosphere that prevent heat from escaping into space. GHGs increase the Earth's surface temperature resulting in climate change and global warming.
- There are 6 types of GHGs.
- The 6 types of GHGs can come from 3 different scopes of emissions.

GHG calculation tool include

Scope 1

- **Definition:** GHG emissions from sources that are owned or controlled by a Federal agency
- **Examples:**
 - Vehicles and equipment
 - Stationary Sources
 - On-site landfills & wastewater treatment
 - Fugitive emissions

Scope 2

- **Definition:** GHG emissions resulting from the generation of electricity, heat, or steam purchased by the company.
- **Examples:**
 - Purchased electricity
 - Purchased Heating / Cooling
 - Purchased Steam

Scope 3

- **Definition:** GHG emissions from sources not owned or directly controlled by the company but related to the company's activities.
- **Examples:**
 - Business travel
 - Employee commuting
 - Contracted solid waste disposal
 - Contracted wastewater treatment
 - Others

GHG Emissions Management

1. Station Combustion (Scope 1 Emission)

Scope 1- Stationary combustion				Step 1		
				A	B	C
Calculation						
Factory Site	Period	Process	Equipments	Fuel Type	Collecting Methods	Fuel Consumption
	2011			LNG	measured	0
	2011			Gasoline	measured	0
	2011			Lamp oil	measured	0
	2011			Coal	measured	0
	2011			Diesel	measured	0
	2011			Others	measured	0
	2011			LPG	measured	0
Scope 1 Stationary Combustion Emission						

Step 1: Indicate year

Step 2: Select fuel type (LNG, Gasoline, Lamp oil, coal, diesel, LPG, Others)

Step 3: Input the total amount of fuel consumption

Step 4: Repeat steps 1, 2 & 3 if the facility uses more than one type of fuel

GHG Emissions Management

2. Mobile Combustion (Scope 1 Emission)

Scope 1- Mobile Combustion						Step 1				
						A	B	C	D	E
Calculation										
Factory Site	Period	Vehicle	Use	Registration number	Manufactured Year Production	Fuel Type	Collecting Methods	Fuel Consumption	Unit	Mile
	2011	Company Vehicle A	Transportation of Confectionery			Diesel	measured	34,796	l	-
	2011					Diesel	measured		l	-
	2011					LPG	measured		Nm3	-
Scope 1- Mobile Combustion Emission										

Step 1: Indicate year

Step 2: Select fuel type (gasoline, diesel, LPG)

Step 3: Input the total amount of fuel consumption

Step 4: Repeat steps 1, 2 & 3 if the facility uses more than 1 vehicle type

GHG Emissions Management

3. Electricity (Scope 2 Emission)

Scope 2 - Electricity			Step 1				
			A	B	C	D	E
			Emission Factor				
Period	Process or Place	Facility	Fuel Type	Collecting Methods	Electricity Consumption	Unit	CO ₂ Default emission Factor
2011				measured	10,950,000	kWh	0.6900
Scope 2 - Emission by Electricity							

Step 1: Indicate year

Step 2: Input annual electricity consumption in kWh.

Nations have different electricity emission factors; therefore, refer to national government website for accurate electricity emission factor or follow IPCC guideline.

GHG Emissions Management

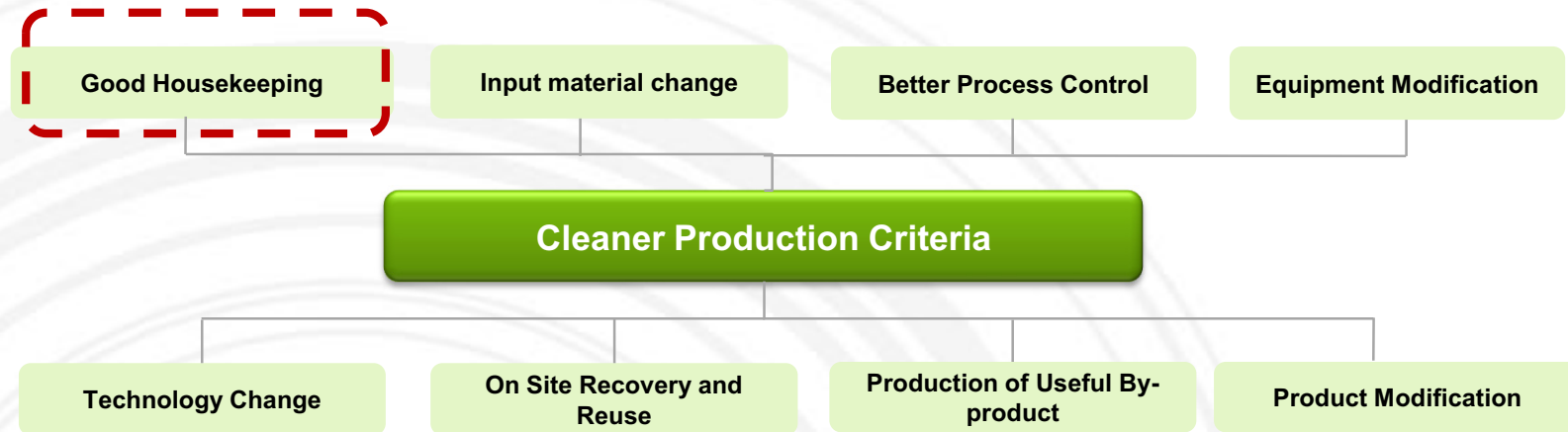
Total GHG Emissions for Scope 1&2

Total GHG emissions automatically calculated – A table is constructed showing accumulated GHG emissions for scopes 1 & 2

Emission Type			Emission total Amount	Emission Subtotal Amount	Types of GHGs					
					CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆
SCOPE 1	Stationary combustion	Fuel	0	0.0	0.0	0.0	0.0	-	-	-
	Mobile combustion	Vehicle	93	92.8	91.3	0.1	1.4	-	-	-
	Sub total		93	92.8	91.3	0.1	1.4	0.0	0.0	0.0
SCOPE 2	Electricity	Purchasing Electricity	7,566	7,566.2	7,555.5	1.5	9.1	-	-	-
	Sub total		7,566	7,566.2	7,555.5	1.5	9.1	0.0	0.0	0.0
GHG Total Emission (Scope 1 + 2)			7,659	7,659.0	7,646.8	1.7	10.6	0.0	0.0	0.0

Cleaner Production

“**Cleaner production** is the continuous application of an integrated preventative environmental strategy to processes, products and services to increase efficiency and reduce risks to humans and the environment” (United Nations Environment Programme, 1991)



- **Good housekeeping:** appropriate provisions to prevent leaks and spills and to achieve proper, standardized operation and maintenance procedures and practices. → **Lowest cost and most basic form of cleaner production**
- **Input material change:** replace hazardous or non-renewable inputs with less hazardous or renewable materials or by materials with a longer service life-time
- **Better process control:** modification of the working procedures, machine instructions and process record keeping for operating processes at higher efficiency and lower rates of waste and emission generation
- **Equipment modification:** modification of the production equipment so as to run the processes at higher efficiency and lower rates of waste and emissions generation
- **Technology change:** replacement of technology processing sequence and/or synthesis pathway in order to minimize the rates of waste and emissions generation during production
- **On-site recovery / reuse:** reuse of wasted materials in the same process or for another useful application within the company
- **Production of useful by-products:** transformation of previously discarded wastes into materials that can be reused or recycled for another application outside the company
- **Product modification:** modification of product characteristics in order to minimize the environmental impacts of the product during or after its use (disposal) or to minimize the environmental impacts of its production (e.g.: automatic control)

Cleaner Production

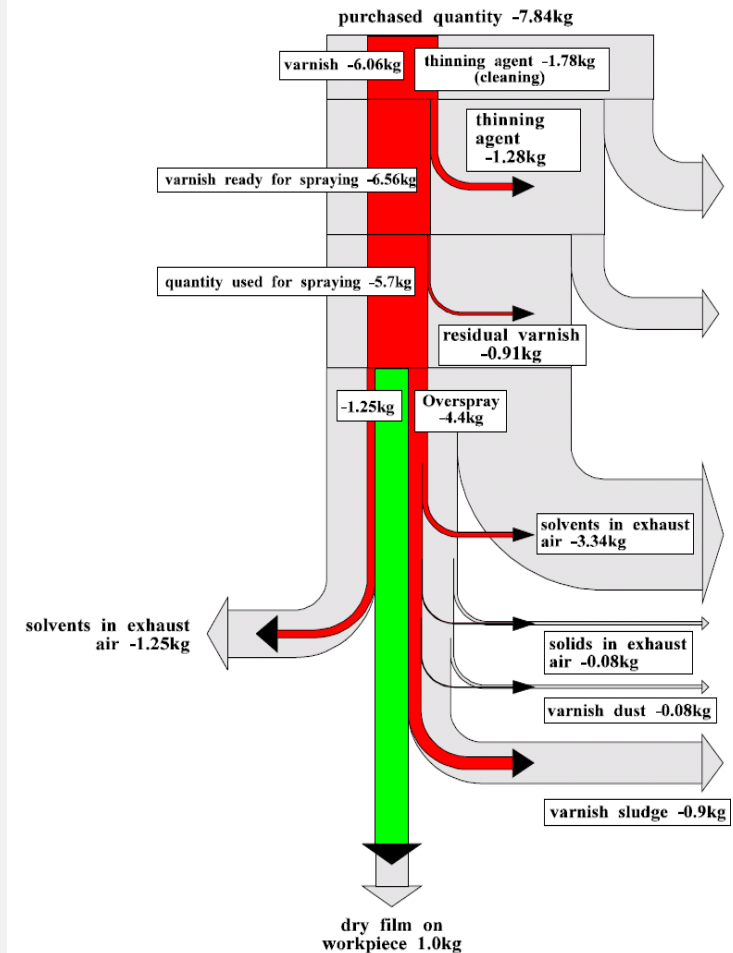
- To foster greener industrial processes, many nations have developed national programs to foster cleaner production.
- In Indonesia, the **Indonesian Cleaner Production Centre (ICPC)** is responsible for fostering cleaner production initiatives of companies.
- Enterprises that need assistance with cleaner production should contact ICPC for training and support.



- An initiative of the **Ministry of Environment (KLH)** supported by the **Indonesia-German Environmental Program (ProLH)**.
- Established May 2004
- Aims to **facilitate cleaner production in industries**
- Services include **1) support for pilot projects, 2) audit, 3) technical support, and 4) training**
- **Contact Info:**
 - Contact Person: Rismawarni Marshal, Executive Director
 - Address: Kantor Pusarpedal (Gedung 210), Gedung Sarpedal PUSPIPTEK, Jl. Raya PUSPIPTEK Serpong – Banten. 15314 Indonesia
 - Phone: 62-21-7564080
 - Fax: 62-21-7564088
 - Email: info@ppbn.or.id

Cleaner Production – Resource Efficiency

- **Material flow analysis** is a systematic approach aiming at:
 - Presenting an overview of materials used in a company
 - Identifying the point of origin, the volumes as well as the causes of waste and emissions
 - Creating a basis for an evaluation and forecast of future developments
 - Defining strategies to improve the overall situation
- There are 7 steps to completing the material flow analysis:
 - 1) Define the objective of the material flow analysis and parameters to be monitored
 - 2) Define the balance scope
 - 3) Define the balance period
 - 4) Identify and define process steps
 - 5) Draw a flowchart: qualitative approach
 - 6) Draw up balances: quantitative approach
 - 7) Interpretation of the results
 - 8) Conclusion



Resource Efficiency Example 1. Process Simulation Tool

- Improve metal mold design to save costs on materials and energy

BEFORE

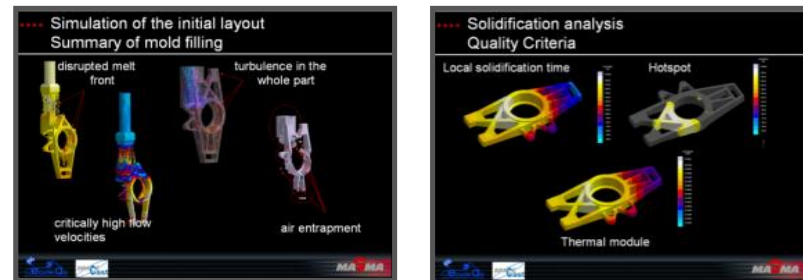
- CAD/CAM system used to design metal molds



- The design is too big, or too small for the product
- Unnecessary material input, high waste generation

AFTER

- Use metal mold design simulation tool



- The simulation program provides solutions for optimal metal mold designs
- Minimize waste and material input

➤ Improvement result: **Save 14,500 USD / yr**

- Reduce purchasing costs of raw materials from less input
- Reduce utility costs (electricity, gas, etc)
- Reduce working hours and equipment costs

Resource Efficiency Example 2. Jig Reuse

– Reuse Jig and Reduce Waste

BEFORE

■ Before Jig cleansing

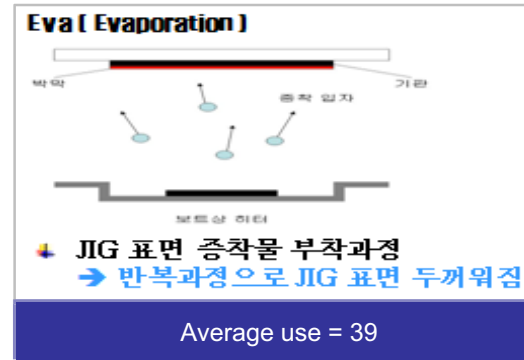


Average use = 35

- Continuous re-attaching of the jig to the product wears out the jig
- Disposed after an average use of 35 times

AFTER

■ Increase reuse by cleaning



- 4-fold increase in the reuse of the Jig

➤ Improvement result: **Save 29,430 USD/yr**

- Minimize use of resources
- Reduce waste, reduce environmental burden
- Raise environmental awareness among employees

Resource Efficiency Example 3. Efficient use of PVC using MFA

- Foster resource efficiency by conducting a material flow analysis (MFA)

BEFORE

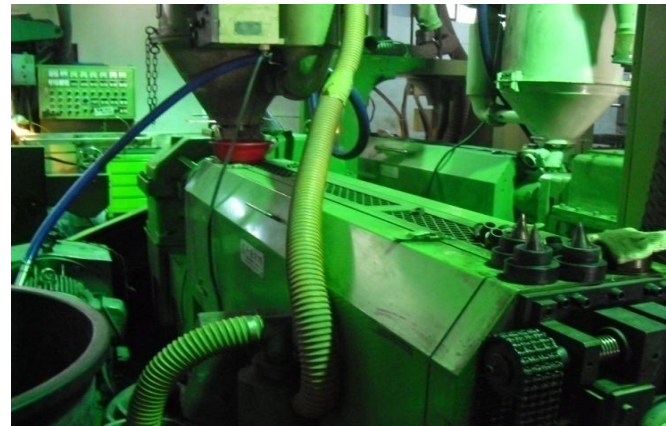
■ Before MFA



- 4kg of PVC residue is produced in after end of each extrusion process

AFTER

■ After MFA



- MFA allowed the company to accurately measure the amount of PVC needed for the extrusion process

- Improvement result: **Save 8,300 USD/yr**
 - Minimize the use of materials & reduce waste

Resource Efficiency Example 4. Minimize the use of packaging materials

- Reduce packaging materials to save time and costs

BEFORE



- Packaging materials used for concrete powder results in unnecessary waste disposal costs

AFTER

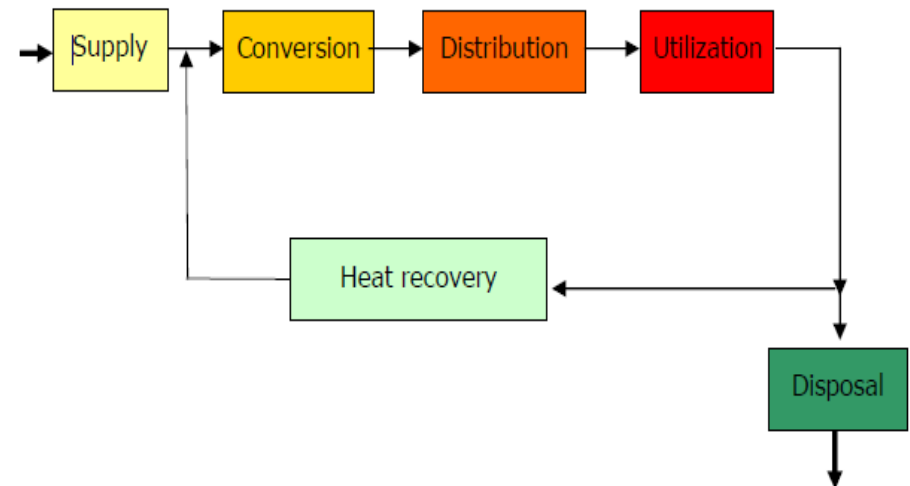


- The packaging material is the same as the input material

- Improvement result: **Save 4,300 USD/yr**
 - Able to input all materials into concrete mixer
 - Avoid unnecessary time consumption and costs from packaging

Cleaner Production - Energy Efficiency

- Energy efficiency aims to increase efficiency in terms of conversion, distribution and utilization of energy and heat recovery.
- The company's energy system covers six areas:
 - 1) Data collection
 - Collect data on type, number and characteristics of equipment/machines;
 - Types of energy consumed
 - 2) Energy purchase
 - Analyze energy consumption
 - 3) For all areas:
 - Interpret the data in comparison with benchmarks
 - Suggest possible solutions for efficient use of energy



Energy Efficiency Example 1. Energy audit

– Conduct energy audit and reduce energy costs

BEFORE

■ Before energy audit



- Pressure Level = 7~8 (kgf/cm²)
- Energy overuse from inaccurate pressure level

AFTER

■ After energy audit



- Pressure Level = 5~6 (kgf/cm²)
- Electricity consumption reduced due to accuracy in pressure level

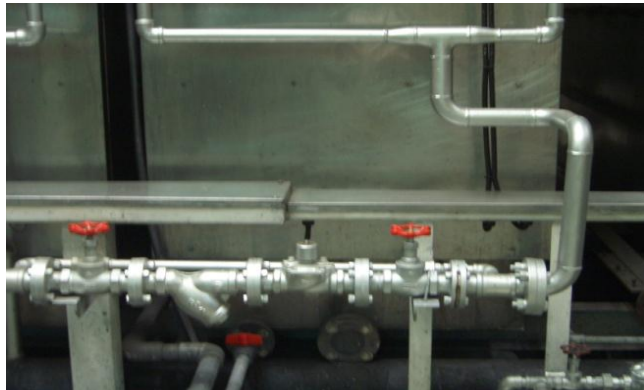
➤ Improvement result: **Save 3,460 USD/yr**

- Reduce energy use by maintaining appropriate pressure level of the air compressor

Energy Efficiency Example 2. Additional installation of pipe hangers

– Install additional hot water circulator pipe hangers to reduce energy costs

BEFORE



AFTER



Water is circulated to produce heat → Add protective materials over the pipes to prevent heat loss

➤ Improvement result: **Save $(20.46 \text{ USD/hr} \times 616 \text{ hr} - 10.68 \text{ USD/hr} \times 616 \text{ hr}) \times 0.47 = 2,831.51 \text{ USD/yr}$**

Energy Efficiency Example 3. Optimize drying process

– Optimize drying process to reduce energy consumption

BEFORE



Operation of drier, 10hrs/day

- Drier is operated 10 hrs/day

AFTER



Operation of drier reduced to 3hrs/day

- Optimize the drying process to increase efficiency

➤ Improvement result: **Save 7,290 USD/yr**

- Reduce operating costs
- Reduce electricity consumption
- Prevent heat loss

Cleaner Production - Waste Management

- Avoiding waste is more economical and environmentally friendly than collecting and recycling wastes.
- Waste consists of costly raw materials that have not been transformed into products and for which one pays additional disposal costs.
- Integrating waste management into the company's environmental management is crucial to saving resources and costs:
- Good waste management practice should include the following:
 - 1) Familiarize employees with relevant waste management regulations
 - 2) Ensure that the legal requirements for waste management are observed and initiated
 - 3) Designate a specific area for different types of wastes
 - 4) Collect data on waste volume and disposal costs
 - 5) Evaluate and identify areas of improvement for waste management
 - 6) Implement specific measures for proper waste management



Waste Management Example 1. Waste separation

– Waste separation and minimization of dead space waste storage

BEFORE



- Inadequate waste management results in high disposal costs
- No waste separation, no recycling

AFTER



- Establish waste logistics
- Reusable packaging
- Tie up waste with a rope to reduce dead space
- Notice sign in front of waste disposal site

Waste treatment cost/year	5,517 USD / last year → 3,767 USD / current year (under the same production amount)
Improvement result	32% reduction in disposal costs = Save 1,750 USD / yr

Environmental Transparency

Global companies are disclosing their environmental management practices.

⇒ **WHY:** Interested stakeholders (investors, consumers, buyers, suppliers) pressure companies to measure their sustainability.

⇒ **HOW:** **Transparency** is the first step to environmental responsibility of companies

What and how to disclose environmental information?

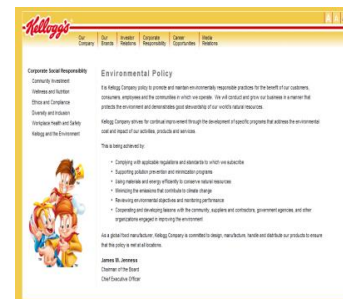
Information Content

- Use of Electricity, Fuel, Materials
- Waste and Toxic Substance Generation
- Carbon footprint
- Environmental Management Strategies & Targets

Methods

- Disclose environmental management information on company's **website**
- Publish a **sustainability report**
- Use **bulletin boards** to share information on the company's environmental management status and sustainability to employees & clients

Sample 1



Environmental policy on website

Sample 2



Environmental management bulletin board

Sample 3



Sustainability report

Contents

1. Introduction to ASEM Eco-innovation Project

2. Ostec Overview

3. Assessment & Recommendations

4. Strategies and Tools for Sustainability

4.1 Environmental Strategy Establishment

4.2 Environmental Management Organization Establishment

4.3 Environmental Data Management

4.4 GHG Emissions Management

4.5 Cleaner Production

4.6 Environmental Transparency

5. Eco-innovation Strategy

5.1 Sustainable Business Management

5.2 Green Factory



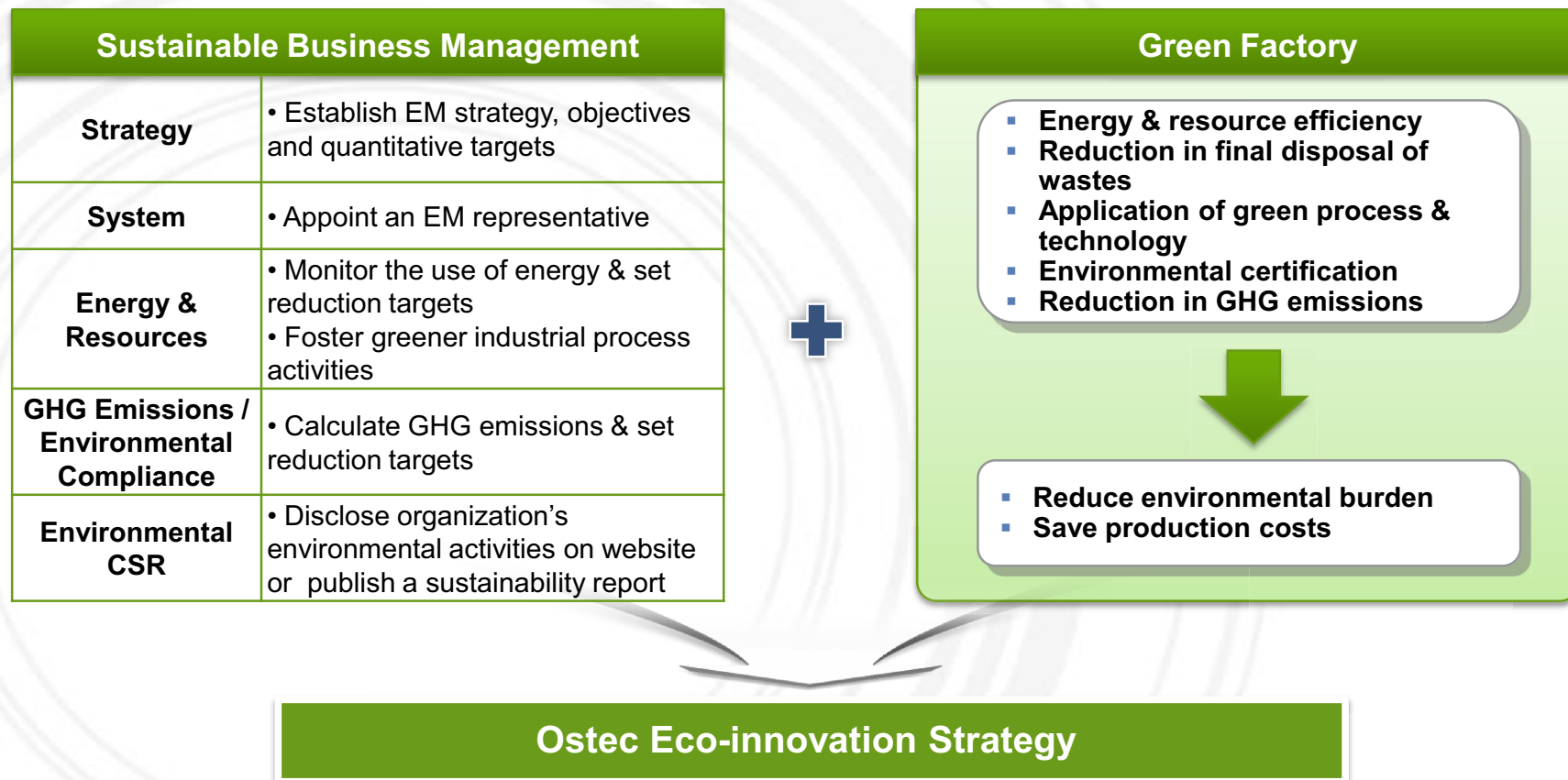
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Eco-innovation Strategy

- **Eco-innovation** is **innovation that results in a reduction of environmental impact**, no matter whether or not that effect is intended.
- Eco-innovation can be analyzed along three dimensions:
 - 1) **Targets**: the focus areas of eco-innovation such as products, processes, marketing methods, organizations and institutions
 - 2) **Mechanisms**: the ways in which changes are made in the targets (modification, redesign, alternatives and creation)
 - 3) **Impacts**: effects of eco-innovation on the environment

The following eco-innovation strategy was identified as most suitable for Ostec.



Sustainable Business Management

Sustainable Business Management Recommendations

1. Environmental Strategy & Policies

- Establish an environmental management strategy
- Set qualitative objectives and quantitative targets based on your EM strategy
- Increase green procurement such as purchase of eco-friendly office supplies and recycled materials
- Increase efficiency of equipments for energy efficiency

2. Environmental Management System

- Appoint an environmental management representative and establish an environmental management committee
- Establish an internal bulletin board to share EM information with employees & visitors
- Conduct an internal energy audit (twice a year)
- Attend EM & cleaner production training sessions provided by governmental organizations or global corporations

3. Energy & Resources

- Monitor energy consumption using relative indicators (use environmental data management tool provided by Eco-Frontier)
- Set quantitative reduction targets
- Annually compare environmental performance and targets

4. GHG Emissions and Environmental Pollution

- Calculate GHG emissions (Scope 1 & 2) from total energy use using GHG calculation excel tool provided by Eco- Frontier
- Set GHG emissions reduction target

5. Environmental CSR

- Disclose company's environmental management status on website (start with a simple environmental management policy)
- Publish a sustainability report

Green Factory

Green Factory aims to reduce environmental burden imposed by the use of raw materials and energy resources in factories and business activities.

Green Factory Criteria	
Energy Efficiency	<ul style="list-style-type: none">• Install high-efficiency production equipments• Energy-saving facilities• Application of green technology
Resource Efficiency	<ul style="list-style-type: none">• 100% waste separation & recycling• Reduce use of raw materials• Increase use of recycled materials
GHG Emissions Reduction	<ul style="list-style-type: none">• Manage & reduce GHG emissions
Renewable Energy Use	<ul style="list-style-type: none">• Use solar panels, etc.
Environmental Certificates	<ul style="list-style-type: none">• ISO 14001• Environmental labelling (carbon footprint labelling)• Green building certificate
Other	<ul style="list-style-type: none">• Comply with environmental regulations• Conduct in-house training• Participate in cleaner production & environmental management training courses

Reduce environmental burden



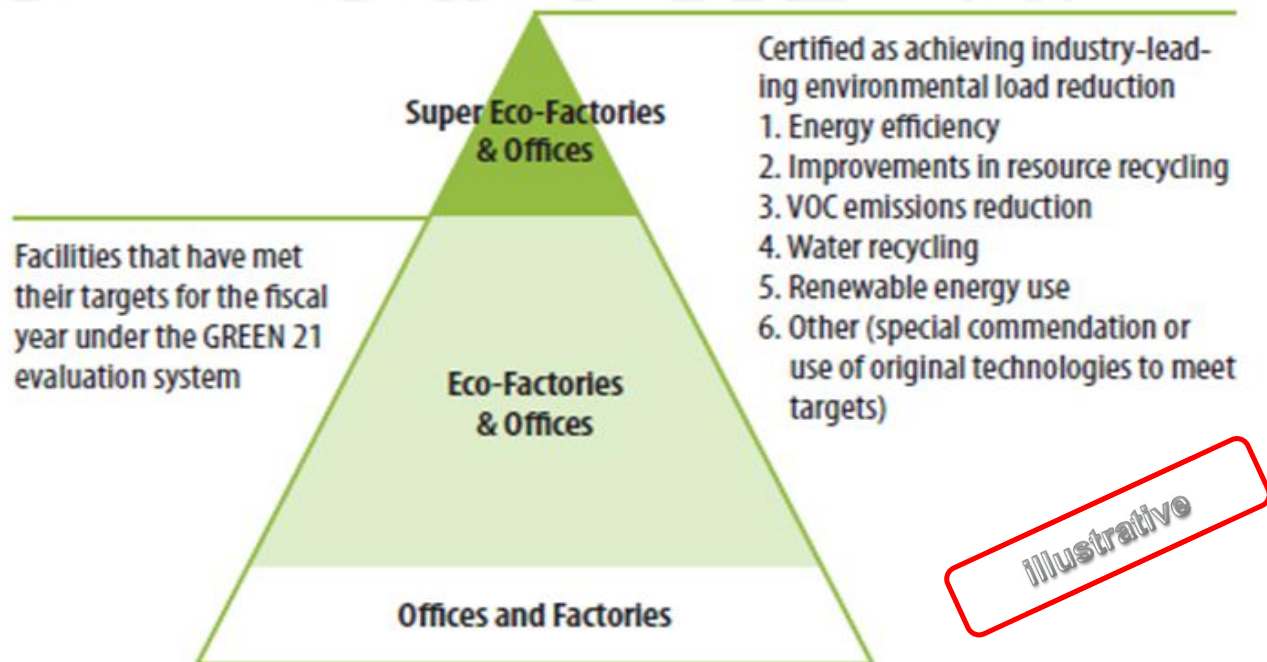
Reduce production costs

Green Factory

Green Factory Example 1 → Hitachi Super Eco-Factories & Offices

- Hitachi established “Super Eco-Factory and Office Certification” to foster development of green factories.
- Hitachi provides certificate to the facilities that meet the targets of Hitachi’s GREEN 21 System.
- By 2010, 35 (23 in Japan and 12 outside of Japan) were designated as “Super Eco-Factories & Offices.”
- Website: http://www.hitachi.com/environment/showcase/speco_factory/index.html

Hitachi’s Super Eco-Factory & Office Certification Criteria



Green Factory

Green Factory Example 1 → Hitachi Super Eco-Factories & Offices



Hitachi Elevator Motor in Guangzhou, China

- Eco-factory criteria:

- High-efficiency air conditioners
- LED lighting
- Optimal use of natural light
- Change in type of forklift used from diesel engines to electric (battery) motors

Hamura Works, Hitachi Kokusai Electric Inc.

- Eco-factory criteria:

- Improve the layout of assembly areas
- Adoption of energy-saving machinery and equipment such as high-efficiency Hf inverter fluorescent lights and air conditioners
- Reduce waste paper (accounts for 20% of company's waste) and aim to achieve zero final waste disposal rate through sorting and recycling including the use of wet shredders so that waste paper can be recycled into copy paper
- LED lamps on employees' desks
- Employee training on switching on and off the lights in work area
- Power use of entire facility monitored using a demand controller



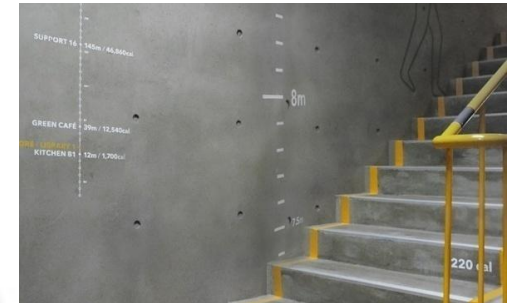
Green Factory

Green Factory Example 2 → NHN Corporation (Korea)

- **NHN (Next Human Network)** is an online gaming media and search-based Internet portal company in Korea.
- NHN adopted the Green Factory concept for their new headquarter.
- Green factory features include:
 - Transparent tower & vertical louvers (optimal use of natural light)
 - Individualized control over lighting levels for computer work
 - Green café: encourage use of mugs instead of disposal cups
 - Encourage use of stairs
 - Parking space for bicycles

- Website:

<http://www.nhncorp.com/nhnen/pr/officeTour.nhn>





ASEM SMEs Eco-Innovation Consulting Project :

- Eco-Innovation Guideline for PT. Ostec Indonesia -

ASEM SMEs Eco-Innovation Center (ASEIC)

9th fl, Business Office, 309 Mokdong-ro, Yangcheon-gu, Seoul, Korea
www.aseic.org / info@aseic.org