



ZERO WASTE PHILIPPINES' PROJECT

**An Integrated Approach
To Sustainable Waste
Management In The Philippines**

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The Zero Waste Philippines Project envisions that the entire concept of waste is totally reused and revalued.

- That waste is a 'resource' to counter the impression of waste as rubbish in the normal course of life.
- The potential of reduced costs, increased profits, and reduced environmental impacts are found when returning these "residual products" or "resources" as food to either natural and industrial systems.



The World About The Dumps...



**LOSS OF
VALUE**



**LOSS OF
RESOURCES**



**LOSS OF
MONEY**

THE BATTLE AGAINST THE DUMPS...EVERYBODY'S CONCERN

The Waste Problem

Estimates that the amount of MSW generated worldwide in 2006 was 2.02 billion tons; 14.00 M tons in 2010 in the Philippines; 30,000 tons being collected everyday nationwide at 50% rate.

Link between growth in wealth and increase in waste -- the more affluent a society becomes, the more waste it generates.

As the less cities/towns develop, they too are creating more wealth, thus adding to the waste output.

Waste is produced by all activities of industry and commerce, with important waste streams including construction/demolition, mining, quarrying, manufacturing and municipal waste.

Forecasts state that total global MSW will increase by 37.3% between 2007 and 2011



**Philippine Laws
Governing Waste
Management**

**Republic Act No.9003
(Solid Waste Management Act)**

**Republic Act No.8749
(Clean Air Act)**

**Republic Act No.9513
(Renewable Energy Law)**

**Republic Act No.7160
(Local Government Act)**

**Republic Act No. 9729
(Climate Change Act)**

Environmental Principles of Zero Waste Philippines' Project

Realizing that the country's natural resources are limited and fragile, Zero Waste Philippines' Project considers environmental protection to be consistent with its overall goals and values and an important consideration in its total activities.

This commitment to environmental protection is reflected in the government's policies, programs and practices for conducting operations in an environmentally as well as economically sustainable manner.

Environmental Principles of Zero Waste Philippines' Project

Zero Waste Philippines' Project recognizes that effective environmental management can positively impact corporate profitability in several important ways.

First, programs designed to make efficient use of natural resources often minimize operating costs.

Second, environmental quality programs help sustain and enhance Zero Waste Philippines' Project presence and reputation in domestic and international markets;

Third, compliance programs minimize risk and potential legal liability. In these ways and more, environmental protection is viewed by Zero Waste Philippines' Project as important to the economic well-being of the country.

The Zero Waste Economy

DESIGN FOR THE ENVIRONMENT:

ALL PRODUCTS MUST BE RECOVERABLE THRU REUSE, RECYCLING, OR COMPOSTING

SHIFTING SUBSIDIES:

STIMULATING GREEN PRACTICES RATHER THAN FAVORING WASTE AND POLLUTION.

CLEAN TECHNOLOGIES:

MORE RESOURCE RECOVERABLE, ZERO TOXIC TO ENVIRONMENT, COMPLIES GOVERNMENT REGULATIONS



RESOURCE RECOVERY PARKS:

COMMUNITY CENTER FOR TOTAL RECOVERY, REUSE, RECYCLING AND COMPOSTING-MATERIAL EXCHANGE AND EDUCATION.



JOBS CREATION:

REDESIGN AND RECOVERY CREATE MORE JOBS THAN RESOURCE DESTRUCTION



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CHANGING THE RULES

REMOVING MARKET BARRIERS AND INEQUITIES TO SUPPORT SUSTAINABLE INDUSTRY.



Zero Waste Philosophy

This requires that the concept of waste as a “rubbish” be replaced by the concept of waste as “resource”.

Envisages to implement the Zero Waste Sustainable Development Philosophy.

- **Sustainable Zero Waste Philosophy is....**

- The recycling of all materials back into nature or the marketplace in a manner that protects human health and the environment.
- The conversion of any carbon-based materials converted into a vitrified glass. Molten metals are separated from the glass and recovered.
- Non-carbon feedstock are converted into saleable products with nothing leftover. There is virtually no need for the use of a landfill with the process.

The Zero Waste Approach

A goal that is both pragmatic and visionary, to guide people to emulate sustainable natural cycle, where all discarded materials are resources for others:

- Encourage the redesign and manufacturing of products to reduce their volume and toxicity of waste and materials;
- Recognize that one person's trash is another treasure and materials are resources and commodities.
- Nothing to dump, nothing to throw away.

The Zero Waste Approach

Zero Waste means designing and managing products and processes to eliminate the volume of waste and materials as close as possible, conserve and recover all resources and not burn or bury them.

The Zero Waste Approach

- **Successful implementation of zero waste will eliminate all discharges to land, water, or air that may be a threat to planetary, human, animal or plant health.**

AIMING FOR ZERO WASTE

Zero waste is a whole system approach that aims to eliminate rather than 'manage' waste.

Zero waste is a unifying concept for a range of measures aimed at eliminating waste and allowing us to challenge old ways of thinking.

- **It shifts from the current one-way linear resource use and disposal culture to a 'closed-loop' circular system modeled on Nature's successful strategies.**

Aiming for zero waste will mean viewing waste as a potential resource with value to be realized, rather than as a problem to be dealt with. But zero waste will not happen overnight.

- **It is a guiding design philosophy for eliminating waste at source and at all points down the supply chain.**



**INNOVATIVE CLEAN
TECHNOLOGIES**

**WASTE
PREVENTION
METHODS AND
STRATEGIES**

**SYSTEM TOOLS:
ANALYSIS AND
IMPROVEMENT**

**Zero Waste Philippines'
Project**



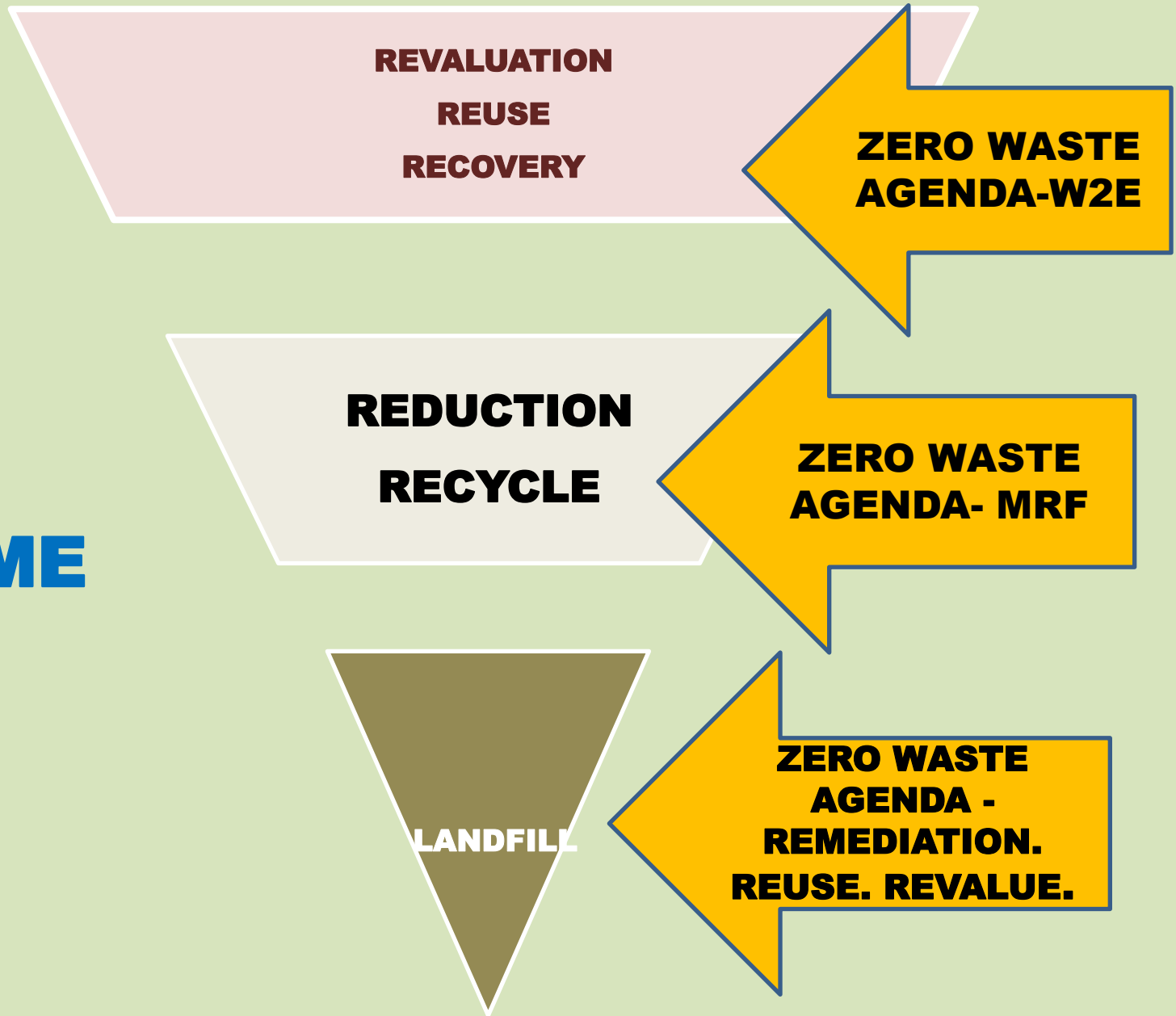
TARGETS

**35% REDUCTION OF
GREENHOUSE GAS
EMISSIONS**

**100% OVERALL RE-
USE AND RECYCLING
OF WASTE**

**75% REDUCTION
OF FRESH WATER
USE**

SCHEME





**Zero Waste
Philippines'
Project**

**FOCUS IS TO
REVALUATE,
REDUCE,
RECYCLE AND
REUSE THE
VOLUMES OF
VARIED WASTE
NATIONWIDE**

**WE INTEND TO
PROVIDE
SERVICES AND
WORKING
TECHNOLOGY
WITH RELIABLE
SYSTEMS AT THE
LOWEST CAPITAL
AND OPERATING
COST**

**WE INTEND TO
PROVIDE
SERVICES THAT
WILL LEAD THE
PATH TO A ZERO
WASTE
PHILIPPINES**



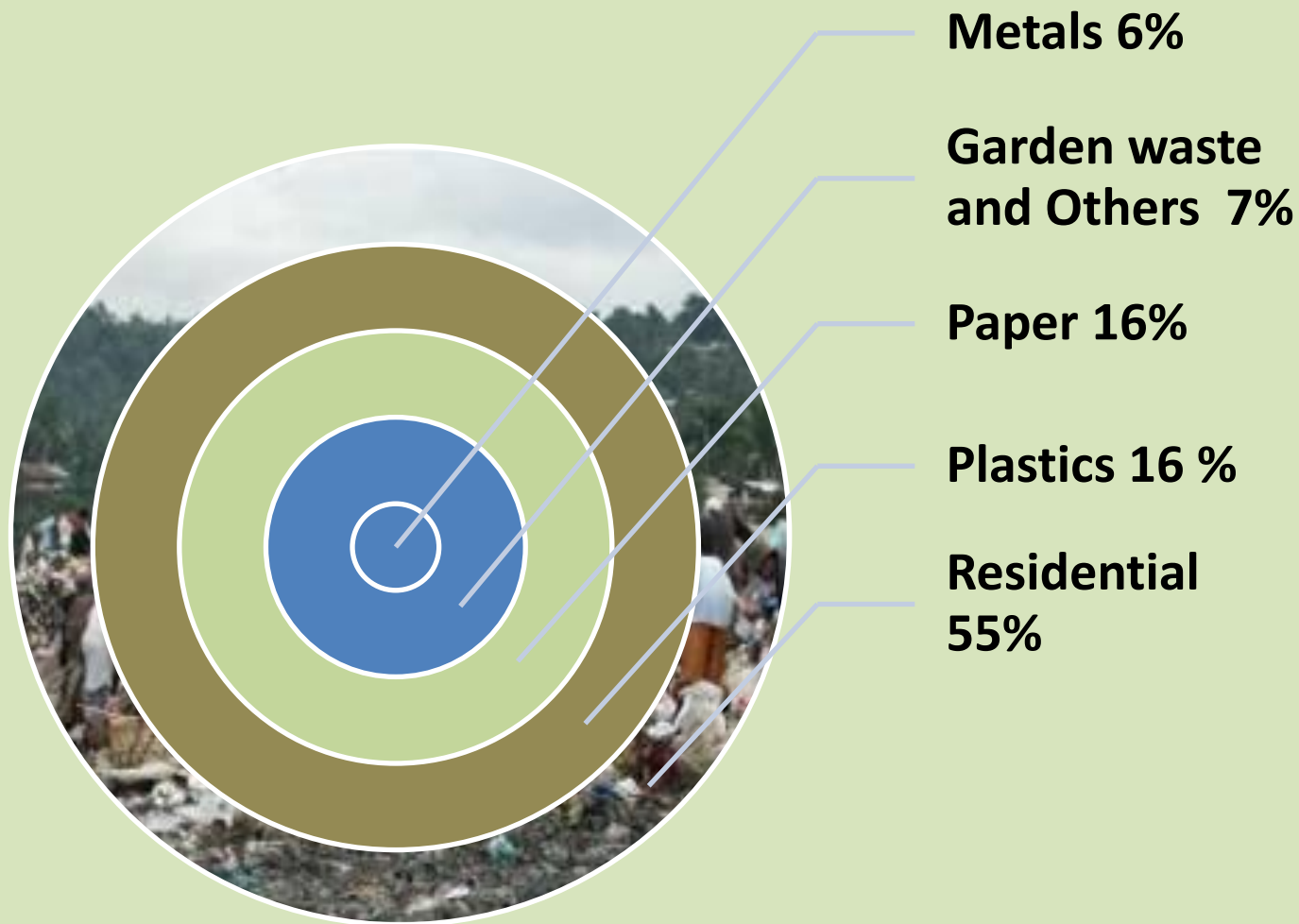
Zero Waste Philippines' Project

Zero-waste plans have an encompassing view of trash reduction, focusing less on recycling and more on prevention on waste production .

The plan emphasizes the need to “Reduce and Reuse first, and then Recycle”.

Three main waste streams are targeted: construction and demolition (which contributes to 1/3 of all landfill waste), organics and traditional recyclables. The plan emphasize the economic and job growth opportunities of a zero waste plan.

Data Waste Stream Characteristics in the Philippines





**Project
Development
Stages**

**Signing of Appropriate
Instruments**

**Preliminary Engineering
Design Study by GSI and
National Permitting;**

Fund Sourcing Options;

**Civil Works and Facility
Construction**

**Fabrication, EPC
Contracting, Commissioning,
and Operation.**

STRATEGIES

**Existing
Facilities
Evaluation and
Baseline Data**

**Evaluate LGUs
waste streams**

**Document LGUs
Waste
Management
Success
Strategies**

STRATEGIES

Evaluate proposed Private-Public Partnership Arrangements;

Increase Waste Diversion Capacity

Improve zero waste markets

Invest in Zero Waste Infrastructure

Establishment of Material Recovery Facilities

Establishment and Development of Waste Conversion Facilities

Development and Investment in Zero Waste Technologies

Zero Waste Philippines' Management Master Plan

Identification of long-term infrastructure needs to Provide economically and environmentally efficient waste management services

Landfill Remediation Technologies and Facilities;

Waste-to-Energy Technologies and Facilities;

Material Recovery and Energy Facilities

Industrial Waste Treatment Technologies

Recycling and composting programs.

Comprehensive Communication Plan

TERM: TEN (10) YEARS

The proposed Zero Waste Project strategies cover turnkey environmental management solutions with multiple waste streams at multiple levels in order to reduce costs, increase recycled waste, and bring operations to “zero waste” status.

The solutions are unique in that they address waste reduction goals in a turnkey manner.

Starting with a baseline analysis all the way through to the day to day management of waste, the Project experts offer the custom approach .

Zero Waste Communication Plan

Creation of a nationwide online Zero Waste Survey;

Based on nationwide input, develop Zero Waste messaging, branding, and logo;

“ How Can I Go Zero?” public education campaign nationwide which will start in schools;

Creation of community based Climate Change Teams and develop Green Teams in all Barangays to improve, develop and build green efforts.



**Technology
Evaluation for a
Proposed Waste-to-
Energy Project**

Waste Stream Characteristics

Waste Volume Characteristics

**Steam and Electric Generation
Capacity**

Utility configuration

Air Pollution Control Systems

Ash Management

Environmental Risks

Primary Considerations in the selection of a Waste-to-Energy Technology

Capability and reliability and cost effective that will convert or process the total waste of varied feedstock that this brought to the Proposed Facility.

Proven to operate successfully for a minimum of five to ten years and has commercial operation track record that has resulted in the positive balance sheet from utilization of the technology.

The process is capable of converting at least 90% by weight of the waste received at the proposed facility into electricity or steam and producing environmentally benign wastes

The process maybe adapted to capturing/sequestering CO₂ from the conversion process to reduce carbon emissions that will conform to local and international standards.

The process has been satisfactory demonstrated at a minimum of one facility of similar size that has been commercially operating in five years.

TECHNOLOGIES

Waste-to-energy (WtE) is the process of creating energy in the form of electricity or heat from the conversion of waste source.

WtE is a form of energy recovery

Thermal technologies

Plasma arc gasification, uses vitrified silicate and metal ingots and salts and sulfur.

Gasification (produces syngas)

Pyrolysis (produces tar and chars)

Thermal depolymerization (produced

synthetic crude oil

Waste-to-Energy
Technologies

**NON-THERMAL
TECHNOLOGIES**

**Anaerobic digestion
(Biogas rich in methane)**

**Fermentation
Productions**

**Mechanical Biological
Treatment**

Refused Derived Fuel

Technologies

**LANDFILL
TECHNOLOGIES**

- **Landfill Gas to Energy**

Through a piping system and gas blowers, landfill gas is extracted and fed into gas engines for power generation.

Landfill gas management is key for prevention of fires, odour management and reduction of green house gases.

Technologies



Gasification of Waste

- **Gasification** is a process that converts carbonaceous materials, such as coal, petroleum, solid waste, biofuel, or biomass, into carbon monoxide and hydrogen by reacting the raw material, such as house waste, or compost at high temperatures with a controlled amount of oxygen and/or steam.
- The resulting gas mixture is called synthesis gas or syngas and is itself a fuel. Gasification is a method for extracting energy from many different types of organic materials.
- The advantage of gasification is that using the syngas is potentially more efficient than direct combustion of the original fuel because it can be combusted at higher temperatures or even in fuel cells, so that the thermodynamic upper limit to the efficiency defined by Carrot's rule is higher or not applicable. Syngas may be burned directly in internal combustion engines, used to produce methanol and hydrogen, or converted via the Fischer-Tropsch process into synthetic fuel.

TECHNOLOGIES

Gasification of Waste

Solid waste gasification technology can use municipal waste to generate a renewable fuel source that has beneficial environmental effects

With gasification technology, cleaning up the earth and eliminating municipal waste can also generate fuel and energy, so waste to energy plants create a win - win situation.

Process converts any carbon-containing material into a synthesis gas composed primarily of carbon monoxide and hydrogen, which can be used as a fuel to generate number of uses in the petrochemical and refining industries

Adds value to low-or negative-value feed stocks by converting them to marketable fuels and products

Process that chemically and physically changes biomass through the addition of heat in an oxygen-starved environment 20-70 bars of pressure (290.075-1015.26 psi)

Technologies



Biomass Gasification

- **Biomass Gasification** is the process in which **BioMethane** is produced in the **BioMass** Gasification process. The BioMethane is then used like any other fuel, such as natural gas, which is not a renewable fuel.
- **Biomass gasifiers** are reactors that heat biomass in a low-oxygen environment to produce a fuel gas that contains from one fifth to one half (depending on the process conditions) the heat content of natural gas. The gas produced from a gasifier can drive highly efficient devices such as turbines and fuel cells to generate electricity.
- **Biomethane** is a renewable energy/fuel, with properties similar to natural gas, produced from "biomass." Unlike natural gas, BioMethane is a renewable energy.
- The cost of producing BioMethane, after installation of the BioMass Gasification equipment used to produce BioMethane (the process of making BioMethane is called "BioMethanation") is called is essentially free.

Technologies



BIOGAS

- **Biomethanation** is the process of conversion of organic matter in the waste (liquid or solid) to BioMethane (sometimes referred to as "Biogas) and manure by microbial action in the absence of air, known as "anaerobic digestion."

- **BioMethane** is generated from organic materials as they decay. Sources of BioMethane include; landfills, POTW's/Waste water Treatment Systems, and from animal operations where manure can be collected and the BioMethane is generated from anaerobic digesters where the manure decomposes.

- **Methanogenesis** is the production of CH₄ and CO₂ by biological processes that are carried out by methanogens.

Technologies



Anaerobic Digestion

- **Anaerobic digestion** is a biological process that produces a gas principally composed of methane (CH₄) and carbon dioxide (CO₂) otherwise known as biogas.
- These gases are produced from organic wastes such as livestock manure, food processing waste, etc.

Anaerobic processes could either occur naturally or in a controlled environment such as a biogas plant. Organic waste such as livestock manure and various types of bacteria are put in an airtight container called digester so the process could occur. Depending on the waste feedstock and the system design, biogas is typically 55 to 75 percent pure methane. State-of-the-art systems report producing biogas that is more than 95 percent pure methane

Technologies



**Industrial Waste
Treatment**

VacuDry Indirect Thermal Absorption

Steel Plant Residues Recovery

Solidification/Immobilisation

Sterilisation

Secondary Fuel Production

**STAGES OF PROJECT
DEVELOPMENT OF A
MATERIAL RESOURCE
AND ENERGY FACILITY**



Preparation of the long term project management plan ;



Conduct of Front End Engineering Design::;



Detailed investigation and analysis of the technical, economic, institutional, legal, regulatory elements of the proposed project to substantiate the project's economics;



Preliminary capital cost estimate;



Site layout drawing;



Process flow diagram;

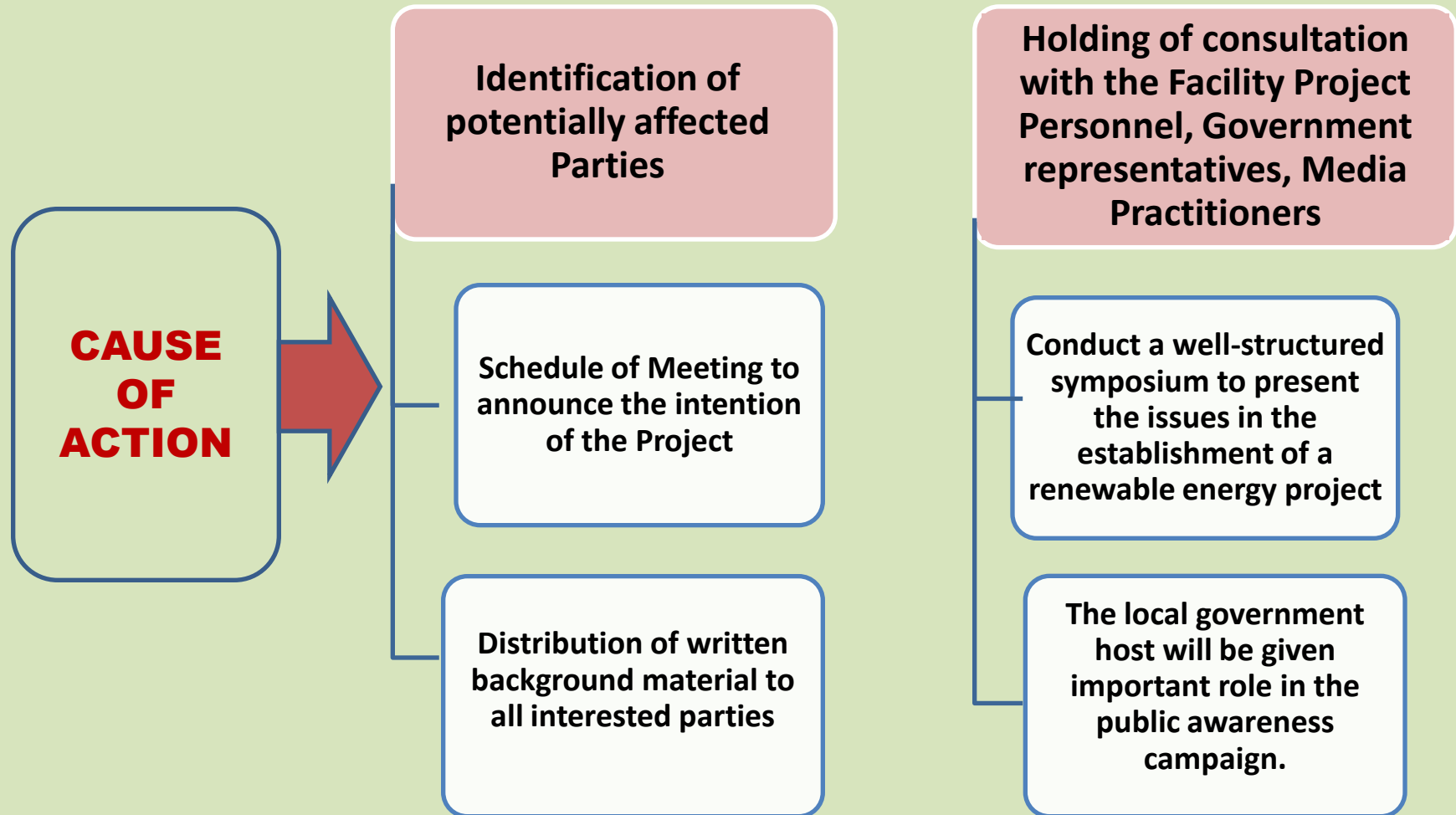


Preliminary heat and mass balance;



Determination of the firm price quote and the delivery schedule for the project equipments.

One of the critical elements of renewable energy projects is the social acceptance of the host community– there is a need to initiate open and direct communication with all affected parties.

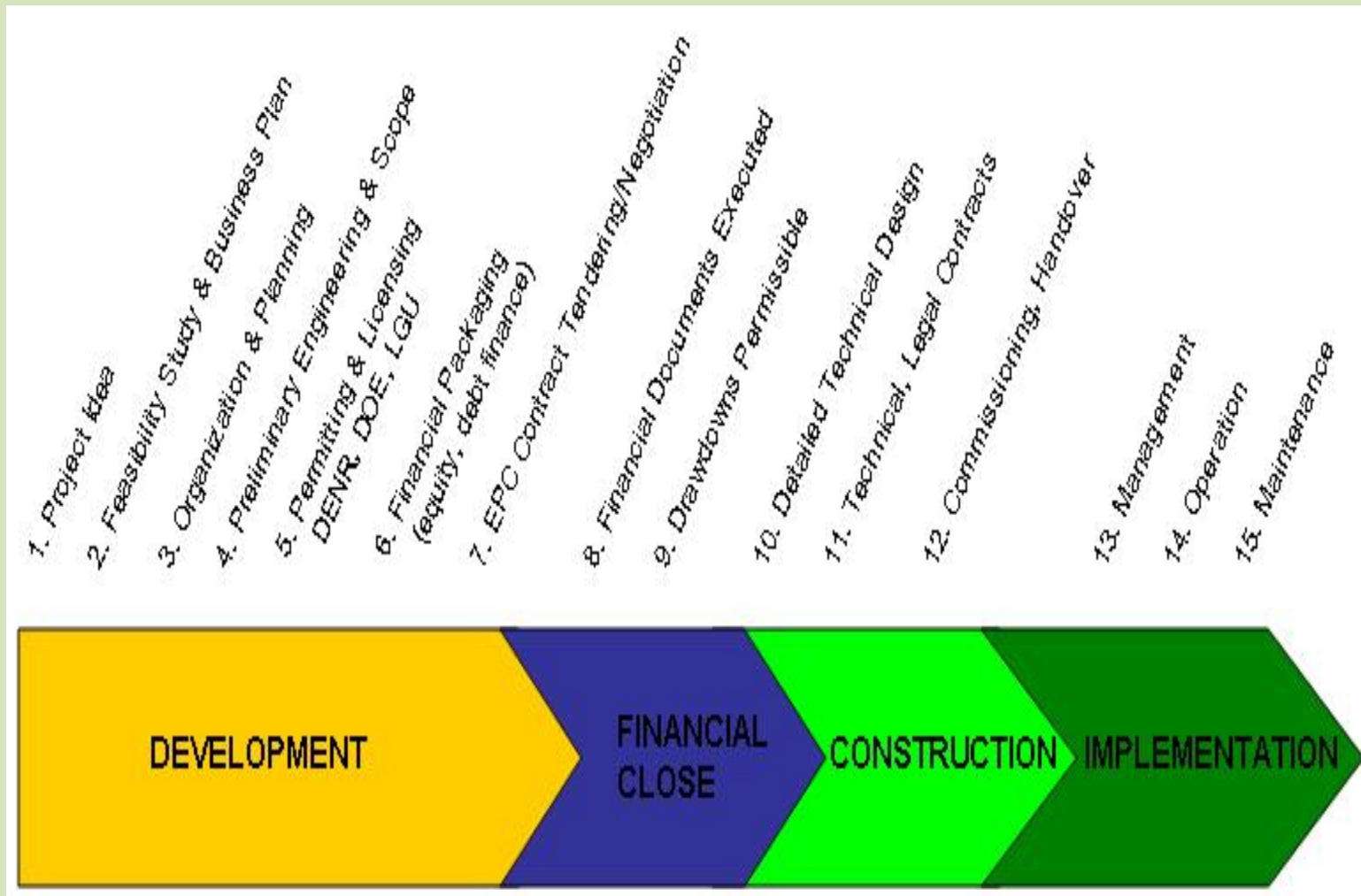


SITES OF THE FIRST TWENTY PROPOSED MATERIAL RESOURCE AND ENERGY FACILITIES TO BE INSTALLED AND ESTABLISHED IN THE PHILIPPINES BY THE ZERO WASTE PHILIPPINES PROJECT.

GREENERGY SOLUTIONS SEEKS INVESTORS, EQUITY PARTNERS AND CO-DEVELOPERS FOR THE PROPOSED PROJECTS NATIONWIDE

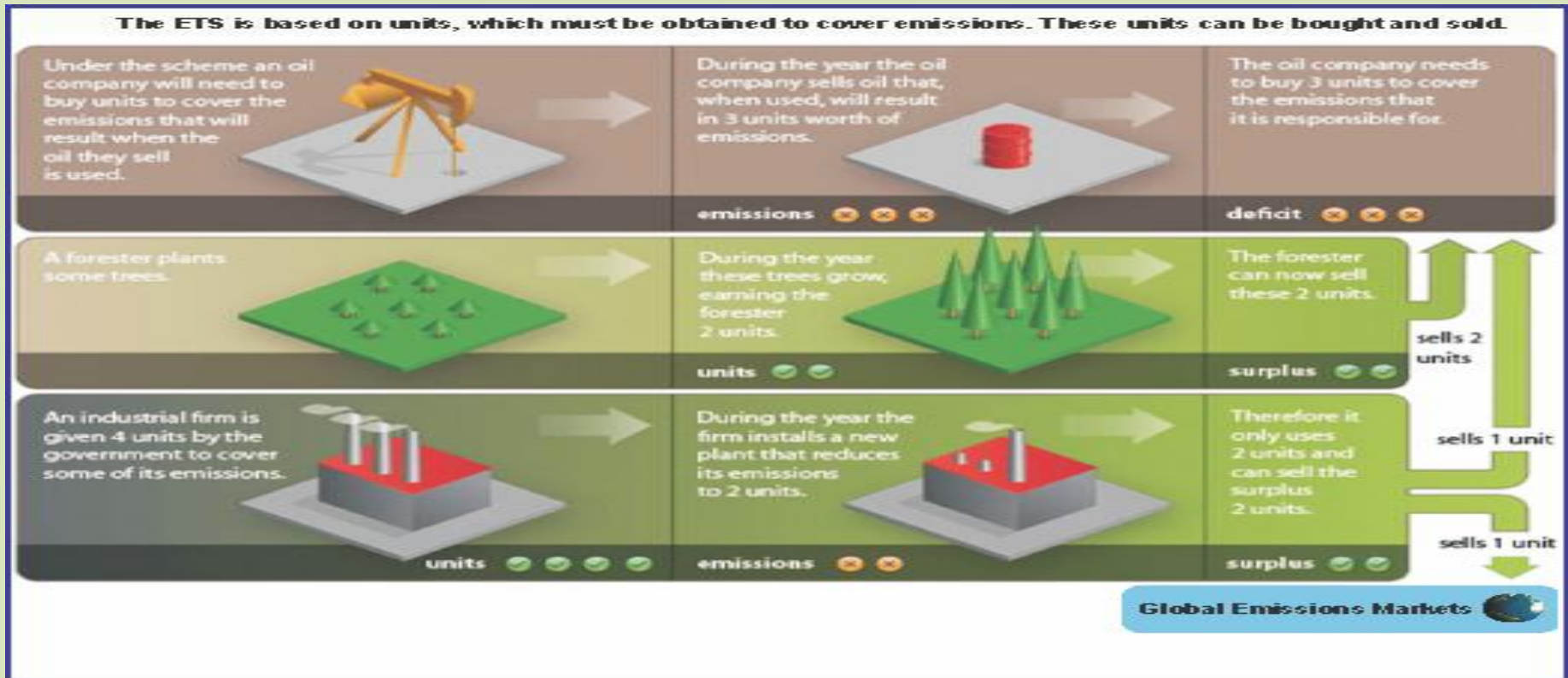


FOUR STAGES OF PROJECT MANAGEMENT FOR MATERIAL RESOURCE AND ENERGY PROJECTS

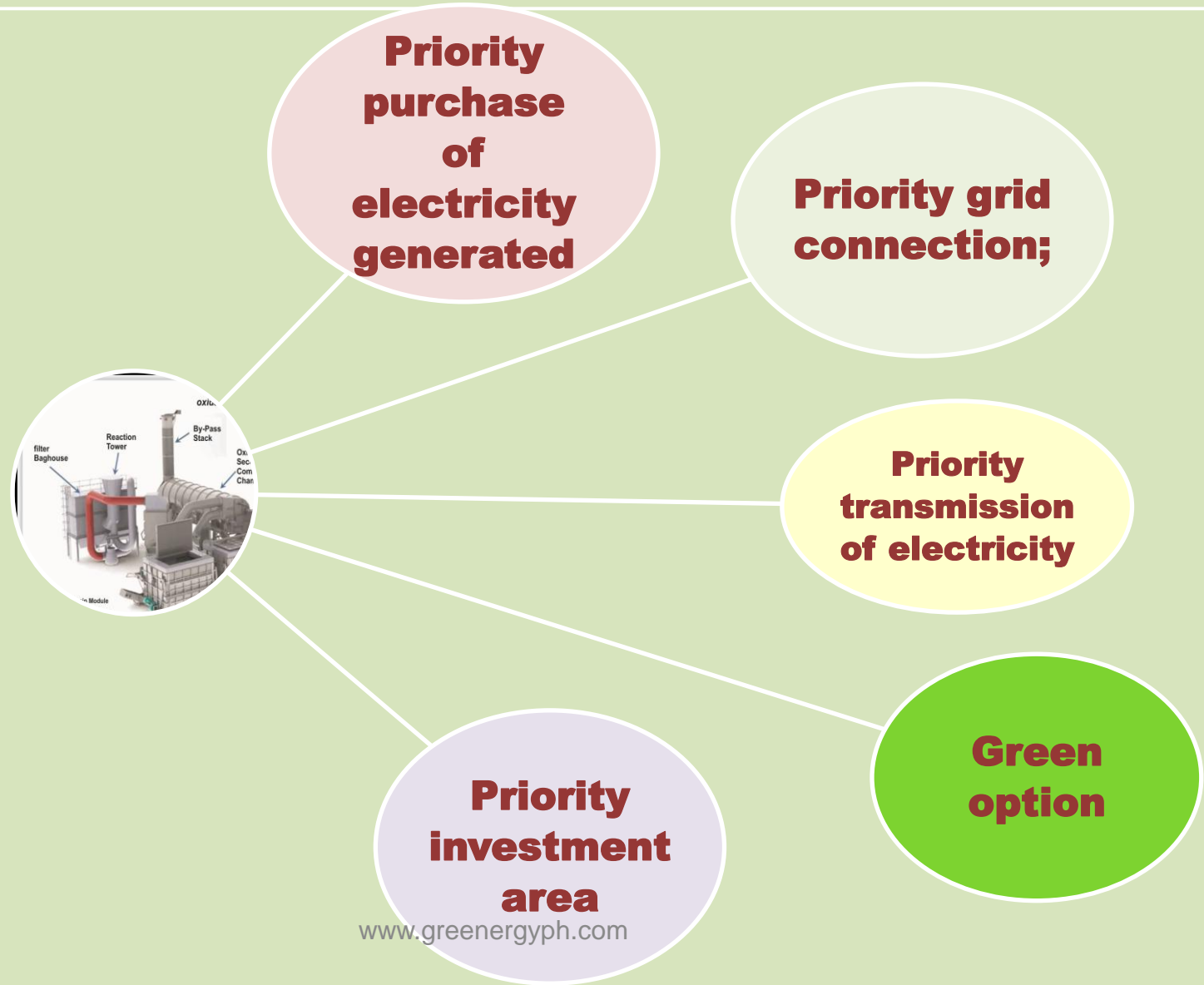


CARBON CREDIT TRADING

This is the new trading phenomenon that is starting to take off. As more and more companies are forced to compensate for their carbon footprints. It will encourage companies to cut their greenhouse gas emissions and make more expensive for companies who don't.



Incentives of Waste-to-Energy Facilities Under the Renewable Energy Law (R.A. 9513)



Incentives of Waste-to-Energy Facilities Under the Renewable Energy Law (R.A. 9513)

Income Tax Holiday for the first seven years; 10% corporate tax on the 8th year

Duty Free importation of W2E machineries, equipment and materials

Zero rated value added tax on the sale of power generated

Cash incentives to W2E developers for Missionary electrification.



There is an alternative to speculation about the meaning of a new world. It is all about how we rebuild our future. Inventions may not be sufficient to comply to these requirements but, joining hands together will make a lot of difference.

**FOR MORE
INFORMATION**

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