Compendium of Waste Management Solutions of Composting Technologies for Citizens

By Ekonnect Knowledge Foundation

A work in progress, this document will be continuously updated with information as and when site visits are made and / or requests are made to be included in the compendium. Please email prasad.modak@emcentre.com

Case 1

Vendor Name: Sampurna Earth **Contact**: http://www.sampurnearth.com/

Product: Designed Cement Pits

Location: Govandi, Mumbai

Process:

Objective to make society zero waste society.

Process wet and dry waste with different system.

Installed different system.

Housekeeping people segregate wet waste from dry.

Household waste and horticulture waste.

Horticulture waste is processed with vermin composting. It is processed in Major 3 stages.

> Stage 1: Put Dry leaves in a pit and water the pit every day for nearly an hour. Depending on season this watering frequency can be twice daily like in summer. Two pits are used for rotation purpose.
>
> One pit is completely filled and kept till the pit is ready. Meanwhile another pit can be used to fill horticulture waste.
>
> A pit is ready for stage 2 when the leaves biodegrade into coarse, raw, dark brown mixture. This batch is then transferred to Stage 2.
>
> Stage 2: The Stage 1 mixture is mixed with equal amount of cow dung and later is subjected to worms. Once the compost is ready, worms are moved to another pit.
>
> Stage 3: Curing Phase.
>
> Household waste is composted in pits of size 2 ft. x 3ft. Small holes are made for aeration.
>
> Cement pit structures are developed.
>
> Plastic and metal waste are sent to respective recycling industries.

Total Time: Horticulture compost: 3 months **Kitchen waste:** 2 months

Turning Mechanism: Manual

Number of people managing: 2

Number of years in operating condition: 2.5 years

Date of Site Visit: 15 April 2017

Case 2

Vendor Name: Sampurna Earth **Contact**: http://www.sampurnearth.com/

Product: SamEarth Modular Biogas plant

Location: Bandra, Mumbai

Structure : Grinder, compressor, Digester, Sludge Collector,Filter,Gas Meter, Gas Balloon, Pipeline structure, Motor to blow gas properly

Process: Kitchen Waste like cooked food and vegetable waste is shredded in shredder and mixed with hot water. This mixture is passed to digester where it resides till the floating dome of digester rises. This gas is later stored in balloon and eventually used at burner junction.

For 50kg of waste nearly 100 litres of water is used.

Within 48 hours waste is converted to gas.

For 50kg of waste nearly 4 hours of gas is obtained.

Waste Residing Time: 48 hours

Number of people managing: 1 person

Extra output: Good quality Manure used in garden.

Capacity:

Number of years of operation: 6 months

Date of Site Visit: 15 April 2017

Case 3

Vendor Name: Enviro Vigil **Contact**: http://www.envirovigil.org/Homepage.html

Location:

Number of people managing all the model given below: 2

Horticulture waste Composting:

Structure: A pit is dug of size of about 2 ft depth.

Process: Horticulture waste is dumped in pit.

Dried leaves are initially spread in pit and a layer of cow dung slurry is introduced.

Later only horticulture wastes are dumped in pit on daily basis. The pit is watered till the mixture is completely wet. This process is performed daily till the pit is full.

Composting Time: 3-4 months

Turning Mechanism: The raw compost is turned manually every week.

Vermicomposting

Structure: a rectangular layout bordered by a line of brick

Process: Dried leaves are spread over layout for a thickness of about an inch or two. Cow dung is laid over it in heaps and earthworms are introduced.

Wet Gunny bags are placed over the heaps to maintain moisture and low temperature.

The mixture is turned once in a week.

Earthworms thrive over these mixture and converts it compost over period of time.

Once the compost is ready, these earthworms are removed manually and the compost is then transferred to another place for Curing purpose.

Composting Time: 1 – 1.5 months

Turning mechanism: Manual Turning

Mixed Waste Composting:

Structure: Concrete rectangular structure of about 2 feet.

Process: mixed waste like horticulture, kitchen waste, etc. are used.

Waste is allowed to biodegrade and whenever required the water is sprayed to maintain moisture.

Composting Time: 3 months

Turning mechanism: manual

Vermi composting in Concrete structures

Structure: Concrete rectangular structure of about 2 feet

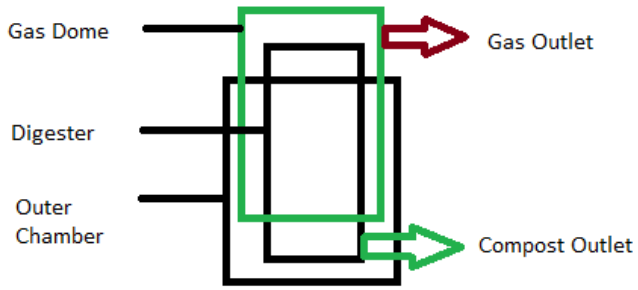
Process: Dried leaves are spread in the pit for about a inch or two. Cow dung is placed over it and earthworms are introduced.

Composting Time: 1- 1.5 months

Turning Mechanism: Manual

KanyaKumari Biomethanation

Structure: 3 Drum Structure. Outer drum acts as outer container. Middle as waste digester. Green upper as Dome.



Process:

The kitchen waste is put into the Digester along with a bucket of water. As biomethanation occurs, the dome gets raise which is an indicator that the gas is ready.

Gas is directly used in the kitchen. Since this is small household model, there is no need to have a separate gas balloon collector

Excess food waste flows from an outlet at the bottom which can be inserted back into the system.

The compost outlet can be used as a seed for next batch

This model handles 4-5 Kg of waste daily.

Kitchen Waste water to plants

The kitchen waste grey water is passed through pipes to plants.

These plants utilize this water for their bio mechanisms.

Above process is a phyto-remediation, where in plant species like Canna are used.

Date of Site Visit 29th April 2017

Case 4

Vendor name: **Fly catcher Technologies Contact:** http://www.flycatchertech.com/

Product: Bio digester unit

Location: BMC office, Bandra, Mumbai

Process: Segregated biodegradable waste is weighed each day (weigh machine attached) before being fed into the digester. Waste is fed via a sink with an inbuilt crusher which also has an attached tap for mixing waste with water during input.

Compressor is provided as an external attachment which stores the generated biogas.

Reading meter is also provided as an external attachment which displays the characteristics of the system like total gas generated in the digester, temperature of the system.

Single/ Multi digester unit: Single digester unit.

Capacity of the tumbler: 20 kg / day

No. of people managing: 1

Problem of odor: no

Date of Site Visit: 27 May 2017

Case 5

Vendor name: RUR **Contact:** http://rur.co.in/

Product: Green Gold Bio-Compost

Location: Fortune Heights, Mahim, Mumbai

Process: Wet waste and dry leaves put in the ratio of 2:1 ratio. Continue till the bin is full.

Aeration pf the pile is provided through smart vents (Patented).

Extra liquid flows via the drain control valve available at the bottom. Suggested to keep the valve open during the day and closed at night or vice-versa or at own times depending upon the pile quality.

Holding period: 1 month, once the bin is fill.

Turning mechanism: Manual – Suggested 10 cycles or rotations per day

Extra Comments:

1. Locking mechanism of the tumbler is provided so that tumbler remains in place.
2. No additional water requirement
3. Crushing of waste is not necessary

Capacity of the tumbler: 500 kg (M size) at current site

Other sizes available by the same vendor: XS (family of 4, 2kg per day), S (3-4kg per day), M (upto 10 kg per day), L, XL. Other products available by the same vendor include accelerators. However adding it in the tumblers is not necessary.

No. of people managing: 1

Portable: Yes. Need to be kept in shade. Away from direct sunlight rain.

What kind of food is not allowed?

A lot of spices or oil, or gravy. Fish is allowed. Bone is ok. Meat is not recommended.

Notes about the vendor:

1. Do audits before providing tumbler capacity, numbers and area.
2. Provide sensitization workshops for society and the housekeeping staff too

Date of Site Visit: 06 May 2017

Case 6

Community driven: Mahindra Eminente Society **Contact**:

Model 1

Product: Self designed

Location: Goregaon, Mumbai

Capacity: 150 kgs per day generated from 200 flats (Weighed every day)

Process: Cage to store the waste. Closed from 3 sides. Open at the top and V shaped from bottom. All kinds of home wet waste is crushed with cocoa pit and culture (for every 10 kg of waste, ½ kg cocoa pit and ½ kg culture is added.).

Compost and cocoa pit layer is the bottom layer to flatten out the V structure. Next, output of crusher is added and covered with cocoa pit and leaves. Add waste every day in a similar manner.

Aeration pipes available with holes (Not fixed, removable).

Tap at the bottom to drain excess fluid and an openable gate to remove the ready compost.

Holding period: 14-18 days.

Time since operational: Using for the past 5 days only.

Method to prepare cocoa pit powder: To 1 block of cocoa pit, add 9 liters water and subsequently dried. Cocoa pita re sourced from Bangalore.

Use of compost: Used in garden. Willing to sell excess

Material of the mechanism employed: Iron structure with a base of steel and mesh are made out of Aluminum/ Steel (not exactly known)

Portable: No

No. of people managing: 2 laborers

Model 2

Product: Composting in plastic Sintex drums

Process: Drums have holes all along the surface for aeration. Materials are added in a the same way as method 1. Only culture and leaves to crushed waste input. Cocoa pit was not used in this process.

Excess fluid seepage allowed from a bigger cut made near the bottom of the drum

Turning mechanism: No need to turn

Holding period: 18-20 days

Problems with the model: Difficult to draw out compost

Compost generated: Approximately 100 kg (Not weighed)

Testing of the compost done: Once.

Date of Site Visit: 06 May 2017

Case 7

Vendor name: Envirovigil Contact:

Model 1

Location: Shivaji Maharaj Hospital, Thane

Process: Open Pit method for (garden waste)

2 feet pit is dug up and waste is fed into the pit for the day. This is covered by a layer of leaves followed by a layer of cow dung. This is then watered until the whole thing is completely wet. This process is repeated each day

Holding period: 3-3 ½ months

Turning mechanism: Turned completely upside down with garden tool once in 8 days

No. of people managing: 2

Cost for the process: 0

Model 2

Location: Shivaji Maharaj Hospital, Thane

Process: Vermicomposting process (prepared on the ground)

Starts with a layer of dry leaves which is 1 inch in thickness. Cowdung is laid over it in heaps and earthworms are left over it. The heaps are the covered by Gunny bags (sacks). Over which water is sprayed regularly.

The prepared compost is separated from earthworms by hand.

Holding period: 1-1 ½ months

Turning mechanism: By hand. Once in 8 days

Extra comments:

1. Gunny bags hold moisture and prevent earthworms from being eaten away by birds
2. The reason heaps are prepared is because it enables quick turning of the pile and also prevents earthworms from crawling into the earth.
3. 5-6 kgs of earthworms used for the batch at the current site. Post which it is bred at the same site.
4. Procured cow dung is dried and preferably not used raw so as to cool it down.

Efficiency: 700-800 kgs of compost per cycle

Model 3

Process: Vermicomposting process (prepared in concrete pits)

Exactly same process as that in model 2 except that Brick pieces are the first layer followed by leaves and then cow dung. Concrete pits have an outlet for vermi wash to flow.

Holding period: 1-1 ½ months

Extra comments: Vermi wash is mixed with an equal quantity of water and used in the gardens.

Model 4

Product: Kaniyakumari Bio-Methanation plant

Process: Biomethanation

Consists of 3 drums of which 2 are facing down and the one in the middle is facing upwards.

Inlet pipe for food waste which is mixed with 5 liters of water. Middle drum gets food.

Methane gas generated lifts the upper drum

Excess food waste flows from an outlet at the bottom which can be inserted back into the system.

Capacity: 4-5 kg of kitchen waste per day

Site visit: 29th April 2017

Case 8

Vendor name: **Arregogreen** **Contact:** http://arregogreen.com/

Model 1

Location: Rayani House Housing Society, Bandra (Site 1), Mumbai

Process: Wet waste is put in along with dry garden waste. Continue filling the first compartment of the drum until it is nearly full. Then begin filling the second compartment of the drum, during the the first compartment is in the hold period.

Aeration of the pile is provided via turning (motor or manual)

Extra fluid flows via an outlet at the bottom.

Holding period: 20-28 days, once the bin is fill.

Turning mechanism (at current site): Automatic. Run for about a minute per day

Extra Comments:

1. No additional input requirement
2. Preferably Safe to keep motorized tumblers in a room that is locked and in shade
3. One time Activation kit provided in the beginning.

Capacity of the tumbler: 10 kg/day or 15kg/day of crushed input, (or 355 L by volume)

Other sizes available by the same vendor: 355L, 710L, 1420 L

No. of people managing: 1

Notes about the vendor:

1. Do site survey for a month before providing tumbler capacity and brief on waste segregation
2. After sales service provided. Warranty on the drum is 5 years.

Cost of the tumbler at the current site: nearly 1 lakh

Material: drum over stainless steel. Stands of mild steel. Newer models have Stainless steel

Model 2

Location: Le Pappilon housing society, Bandra (Site 2), Mumbai

Capacity: 710 L

Process: Same as previous.

Turning mechanism (at current site): Manual

Extra comments:

Dug a hole into the ground and placed a bucket inside so that fluid from the tumbler fills the bucket and mixes with the soil.

Turning mechanism: Minimum twice a day

Operational since: 2013

Notes about the vendor:

1. Regular visits and assistance when issues crop up

Testing of the compost: Not done from the actual sites

Model 3

Process: Waste and saw dust as input. Working process is same.

Turning mechanism: Rotate the entire tumbler by hand

Extra comments: Water flows out from the pipe attached at the bottom

Cost: 10,000 per set of tumblers

Capacity: 6 families per set of tumblers

Site visit: 22 April 217

Case 9

Vendor name: **D-Ert** **Contact:** https://www.facebook.com/DERTshop/

Model 1

Product: set of tumblers,

Location: St. Joseph Convent School, Bandra, Mumbai

Process: food waste and garden waste as input. A set of tumblers have 2 bins is provided.

Aerators which are cylindrical pipes having slits all along are fixed to the tumbler.

Fluid flows from holes provided at the bottom

Holding period: 25-30 days, once the bin is fill.

Turning mechanism: Manual turning

Capacity of the tumbler: 10 kg/day

Other sizes available by the same vendor: Yes

No. of people managing: 1

Notes about the vendor:

1. Provide assistance with regards to maintenance of the system and issues if any

Cost of the tumbler at the current site:

Efficiency: 30kg per month of compost

Cost: 12,000 for one set

Compost Testing: get compost tested every 3 months from client location

Model 2

Product: drum composting, 2nd type of model

Process: Aeration through the pipes that go long the length of the drum. Excess fluid may flow via the bottom hole provided for aeration. No separate outlets for water to flow.

Capacity: 40 kg/day

Turning mechanism: manual

Material: Polypropylene drum (To trap the heat inside). Stands and fittings made of steel

Site visit: 22 April 217

Case 10

Vendor name: **Skrap** **Contact:**

Service: provide waste management solutions to organizations, institutions and events

Location: ToyBank Office, Mahim, Mumbai

Process:

1. Skrap personnel audits the waste generated at the premises in terms of quality and quantity.
2. Skrap personnel prepare a waste audit report which enlists the above observation and the steps to be adopted
3. Train housekeeping staff at the premises and identify a volunteering staff as required
4. Steps adopted generally include replacing a one-bin system with a two-bin or a three-bin system as required. Toy Bank has adopted a two-bin approach.
    a. Wet and Dry garbage bins are placed wherever required with sign boards placed appropriately to instruct what goes in what bin.
    b. ToyBank generates more of dry waste which consists of papers and food take-away containers which is rinsed off with water, dried and collected until a generous amount has been collected. One of the office personnel drops off this recyclable waste at the Stree Mukti Sangathan Office.
    c. Food waste is used for composting.
5. For composting, the medium used is Daily Dump's 'Khamba'
    a. *Khamba* comprises of three terra cotta pots stacked on top of each other
    b. Place newspaper at the base of the pot before starting it.
    c. Pour some enzyme powder over it before starting the composting process
    d. Put food waste every day. At the end of the day cover with enzyme powder again.
    e. Cover with newspaper again to keep flies away
    f. Once the pot is full. Move it to the bottom layer and shift the empty pot up which can now be used to put in daily waste
    g. Composts used in the society premises.
6. Efficient waste management steps are thus adopted at the site

Extra Comments:

1. Even food from rinsed off containers are collected in the sink and used for composting
2. Office has stopped the use of tissue
3. Paper cups for tea has been stopped at the premises. Staff has been instructed to use their own reusable cups

No. of people managing: 1 (volunteer staff)

Site visit: 14 July 2017