Techno-Commercial Proposal

Energy-Bin™ – 250

For

THYSSENKRUPP LTD.

Pimpri, Pune

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1. About Xeon Waste Managers

Xeon Waste Managers L.L.P (XWM) is started with a mission and vision to provide economically sustainable and state of art solutions in the field of Waste Management. XWM is of the view that waste management is a vast area and it need to be addressed in synergy with different technology available for disposal, based on different substrate.

XWM provides its services in the areas of project development and plant construction as well as service and operational oversight, and this makes it one of the few full-service providers in the industry. As well as providing technical assistance, the main focus is on delivering comprehensive service in the field of Waste Management.

The XWM is a team of leading expert's in field of organic waste treatment. The founders of XWM, are share holders and founder member of Green Elephant Engineering Pvt. Ltd. During their association with Green Elephant, they successfully build and commissioned south east Asia largest biogas cleaning system (water Scrubbing) at Kisaveer Sakhara Kharkhana, Bhuinj, Satara, Maharashtra, India. They were associated with many other small and medium size biogas projects execution.

XWM long term strategy is to focus on complete waste management solution for solid and liquid waste, particularly focusing on Muncipal Waste and Industrial Waste treatment solutions. The business model has been designed with the purpose of capturing significant, un-tapped, opportunities in waste handling and waste-to-energy sector particularly in Asia and Europe.

XWM´s business model takes advantage of the following key factors:

- The waste-to-energy / biogas industry is in its early stage of development in India.
- Our Country offers an abundant availability of feedstock (organicwaste).
- To offer compact, sustainable and economical waste handling system in market.
- Advanced biogas and gas up-gradation technologies offer opportunities in an untapped market segment: the generation and sale of up-graded biogas (fossil fuel replacement).

References

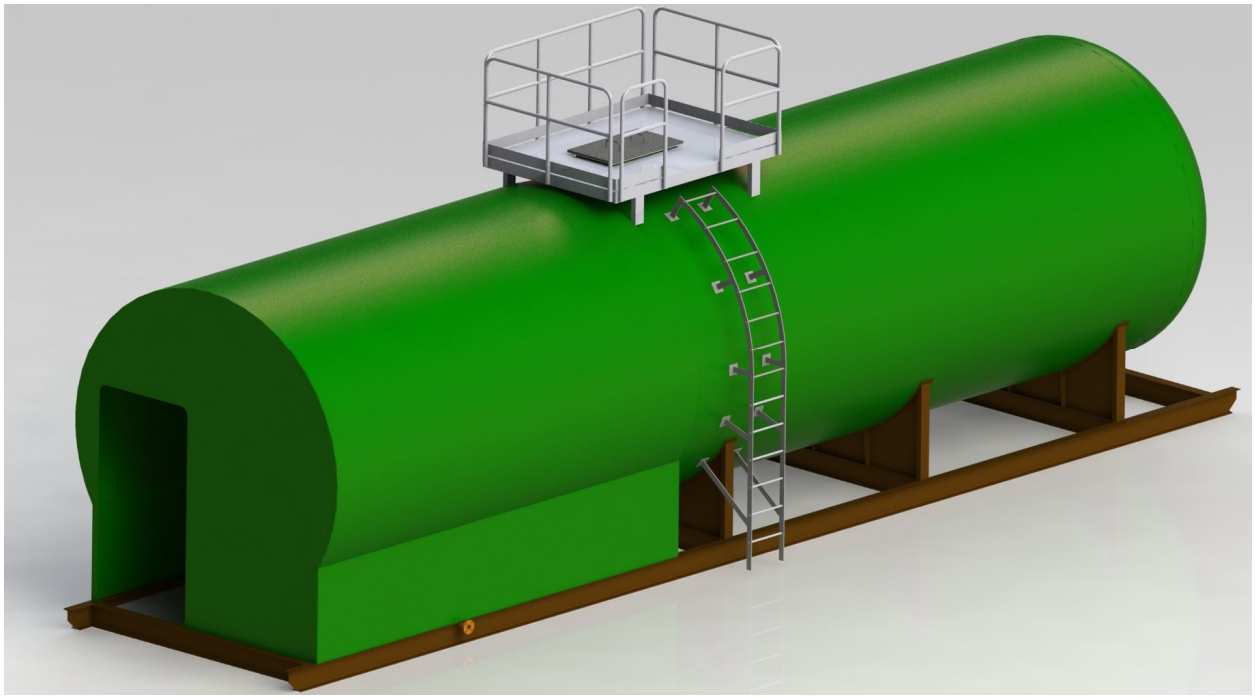
Following are the list of projects successfully installed by XMW Team members representing Green Elephant Group.

Project List		
Projects	Biogas production	Client
Bhuinj, Project	7,230,000 m^3/yr	Green Elephant Satara, representing Green Elephant Engineering Pvt. Ltd
Peswhe Park Project, Pune	126,000 m^3/yr	Pune Municipal Corporation, representing Green Elephant Engineering Pvt. Ltd
Peshwe Park II Project, Pune	292,000 m^3/yr	Pune Municipal Corporation, representing Green Elephant Engineering Pvt. Ltd
Katraj I Project, Pune	126,000 m^3/yr	Pune Municipal Corporation representing Green Elephant Engineering Pvt. Ltd
Katraj II Project, Pune	126,000 m^3/yr	Pune Municipal Corporation, representing Green Elephant Engineering Pvt. Ltd
Airport Road Project, Pune	146,000 m^3/yr	Pune Municipal Corporation, representing Green Elephant Engineering Pvt. Ltd
Township Project, Pune	263,000 m^3/yr	Magarpatta City, representing Green Elephant Engineering Pvt. Ltd
Township Project	263,000 m^3/yr	Nanded City, , representing Green Elephant Engineering Pvt. Ltd
Kerala, Kochi	Under development	TATA Power, representing Green Elephant Engineering Pvt. Ltd
Green Box 1000	25,000 m^3/yr	JSW Steel, representing Green Elephant Engineering Pvt. Ltd
Green Box 500	14,000 m^3/yr	Volkswagen, representing Green Elephant Engineering Pvt. Ltd

Green Box 100	2,500 m^3/yr	TATA Power representing Green Elephant Engineering Pvt. Ltd
Compact STP Plant, KLARO	2750 liters/day	Supplied to Green Elephant Engineering Pvt. Ltd.
Energy-Bin - 1000	1000 Kg/day	Supplied to Green Elephant Engineering Pvt. Ltd., Client - Tata Consultancy Services Nagpur
Operation and Maintenance contract – 3TPD	3000 kg/day	Jindal Steel and Power Ltd. Barbil, Orrisa.
Energy-Bin - 500	500 Kg/day	Pashim Banga Go-Sampad Bikash Santha, West Bengal

XWM´s vision is to build a standardized product for decentralized waste treatment, for all kind of organic waste. Energy-Bin will change the way in which organic waste is been treated. This is also our small initiative to achieve a Swachh Bharat Mission for 2020.

SCHEMATIC REPRESENTATION OF EnergyBin™ STANDARISED MODEL



2. EnergyBin™

The compact, modular small-scale system

- The **EnergyBin**™ is a state of the art, pre-fabricated, re-locatable, anaerobic digestion plant that provides customers with a zero discharge solution for organic waste, available in different capacities and in automatic/manual models. **EnergyBin**™ can now also be used by small operators for economical biogas production.
- For reliable operation of the plant, the **EnergyBin**™ is equipped with a Data Acquisition System providing daily information about important parameters of the plant like gas flow, ph-value, and temperature (EB ++ Model).
- For **EnergyBin**™ an operation and maintenance contract can be provided.
- The manufacturing, installation and commissioning of the **EnergyBin**™ will take 6 to 18 weeks only.
- **EnergyBin**™ has the potential to reduce considerably carbon dioxide emissions.
- Manufactured in IS 2062 grade steel with all flanges and connections as per ANSI standards and certified.
- Life of the **EnergyBin**™ is around 20 years.
- Epoxy coated from inside for 550 microns for durability and non corrosion.

Flexible use

EnergyBin™ processes a large number of digestate combinations. Depending on the feedstocks, you choose between different Model EB- 100 / EB-250 / EB -500 / EB-1000 / EB-2000.

The gererated biogas can be either used to generate electricity or can be used in Kitchen, as a replacement to LPG.

Flexible design

The biogas plant consists of one or two digester units and the all-in-one unit, which incorporates all the required technical modules for control and power generation. There are also many options for extending the plant. All interfaces are matched to each other exactly.

The beauty of the plant is that it can be relocated as and when required, with an ease.

Quick to install and ready for operation immediately

Due to its compact construction and intelligent design, **EnergyBin**™ only requires a small amount of space; 10 m² is sufficient for the smallest model. The size of the plant and its output capacity can be adapted precisely to your operation. Installation of **EnergyBin**™ requires neither a large amount of structural work on site nor a long

start-up phase. The plant is prefabricated as a standardized system and safety-tested at the factory and is delivered ready for operation.

The advantages of EnergyBin™ ***at a glance***

- Uncomplicated installation and quick start-up
- Modular system: very flexible in terms of set-up and digestate use
- Interfaces perfectly matched one to the other
- High-quality components and parts, low maintenance operation
- Stand-alone operation possible
- Can be integrated into existing infrastructure
- Can be expanded if necessary

3. ADDRESSED PROBLEMS

Waste generators, such as large industries, hotels, food malls are facing nipping problems in disposing off generated organic waste as the infrastructure for waste management is not developing in accordance with the waste generation. Smelling waste piles, unreliable waste collection along with internal storing and waste logistic issues are occurring out of this situation.

Beside this, the disposal problems of organic waste are twofold. Firstly, organic materials causing severe environmental problems through methane emission in landfill applications. Secondly, disposed organic waste is the prime source of diseases and contamination of air and water.

In general, it is a common practice that organic waste is dumped in large landfill pits which leads to significant uncontrolled methane emissions while degrading. As per the Inter Governmental Panel for Climate Change (IPCC) methane is considered 21 times more harmful than carbon dioxide.

	Model EB – 250	**Model EB - 500**	**Model EB – 1000**
Processed organic waste (kg)	250	500	1000
Number of operating days (d)	365	365	365
Total waste per annum (kg)	91,250	1,82,500	3,65,000
Carbon dioxide (avoided per annum) (kg)	47,906	95,812	1,91,624

** 1 ton of organic kitchen waste generate approx. 80-100 m^3 of biogas, with average methane content of 65%

4.1 Why EnergyBin™?

EnergyBin™ available in 100 / 250 / 500 / 750 /1000 / 1500 / 2000 Models

1. Modular, 'Plug N Play' - Skid-Mounted
2. Engineered & Integrated as a 'single unit' (twin digesters enclosed within the containerized canopy)
3. Portable - offering location flexibility
4. 15% higher Bio-Gas Output Efficiency compared to traditional Biogas plant
5. Manure bi-product is dewatered, nutrient-rich & ready to use (EB- ++ Model)
6. Fixed Structure, Closed Loop, Zero Leakage System
7. Plug Flow Reactor model equipped with submersible agitator for higher capacity, preventing any settlement of slurry or scum foaming formation - ensures output consistency over time
8. Insulated & Temperature Controlled Digester to ensure optimum & consistent bio-gas output across seasons (EB- ++ Model)
9. In-built PLC, HMI, Touch-Screen, Online Smart Systems for Automatic Operation & Control, Data Monitoring & Safety Management, SMS Tracking etc (EB- ++ Model)
10. Solenoid valves, auto gas flare with ionizers & spark ignition system to ensure safety & automatic operation. (EB- ++ Model)
11. Closed Loop Water Recycling process - water conservation. (EB- ++ Model)
12. Designed to meet aesthetic, safety, hygiene and odour standards of premier hospitality and commercial sectors , in line with international norms
13. More seamless installation and integration at site
14. Showcase environmental technology – 'Green Flag' Initiative

5 Scope of Supply – EnergyBin™

Sr.No.	EnergyBin™ BOQ	EB ++ Model	EB + Model
1	Bio digester made in MS, 6mm thk	with insulation	WO insulation
2	Submersible agitator (Model above 750 Kg)	1	1
3	Food crusher cum pump (Indigenously Developed)	1	1
4	Feeding tank in M.S.	1	1
5	Control panel	PLC	STD
6	Biogas Pressuring Unit	Y	Y
7	Internal Wiring	Y	Y
8	Gas piping* (100 mtrs if required) 25 NB	Y	Y
9	Knife gate valves	Y	N
10	Ball valves	Y	Y
11	Instrumentation	Y	Y
12	Biogas flaring unit	Y	Y
13	Thermowell with heaters 1.5 kW	Y	Y
14	Manure separator	1	Y
15	Gas Storage Balloon	Y	Y
16	Biogas industrial cooking range burner (SS316) along with SS casing	Y	Y
17	Moisture separator with desiccant filters	Y	Y
18	Skid mounted assembly with canopy	Y	Y
19	DAS Data Acquisition System for ph, temperature and gas production	Y	N
20	Pressure Regulator	Y	Y

21	Flame Arrester	Y	Y
22	Biogas meter	Y	N

6 TECHNICAL DATA

6.1 Input: Segregated Organic Waste

Biogas is produced by the bacterial decomposition of biodegradable matters. The proposed plant is designed for processing food and kitchen leftovers.

Composition of segregated organic food waste: The generated food waste for the biogas plant can be raw or cooked; it must be fresh and not degraded.

Particular	Specifications	Exp. Deviation
Segregated food waste	0.5 t/d	+/- 10%
Total solids (TS)	18.0 %	+/- 2.0 %
Volatile total solids (vTS)	90.0 %	+/- 10 %

Feed stocks like wood shavings, straw, grass, coconut shells, non degradable oils, contaminants, disinfectants, contaminated/adulterated food waste should be ideally avoided for feeding into the biogas plant as it will reduce efficiency of bio-gas output generation. Soft papers, paper tissues and other fibrous materials may be accepted to a certain extent, but takes longer time for getting digested. The overall mass of these slow degrading materials should not exceed 2% of the total incoming materials. Disturbing factors in the mechanical process of the biogas plants are bones above 100 mm length and should be avoided in order to reduce maintenance of the moving mechanical parts.

In-organic materials such as plastic, glass, and metal shall be segregated prior to the process as they do not contribute to the gas production and cause technical problems.

6.2 EnergyBin™ Primary Output: Biogas

Various factors such as feed stock and operation method of the plant may change the biogas composition and quantity. Based upon the assumed feed stock and proposed treatment technology the following parameters can be assumed.

Gas types	Specification	Exp. Deviation
Methane CH_4	65.00 %	+/- 7.00 %
Carbon dioxide CO_2	39.00 %	+/- 7.00 %
Oxygen O_2	0.10 %	+/- 0.10 %
Nitrogen N_2	0.40 %	+/- 0.40 %
Hydrogen sulphide H_2S	200.00 ppm	+/- 50.00 ppm
Temperature	35.00 ^{o}C	+/- 5.00 ^{o}C

- Taking into account feedstock quality & quantity variation, a 1 TPD model at full capacity generates minimum 80 -100 m^3 of biogas per day with an LPG replacement potential of approximately 2- 2.5 Commercial Cylinders (19.1 Kg each) per day
- On a monthly basis this equates to LPG saving of 60 commercial cylinders at a gross value of INR 1.08 Lac (considering price of commercial LPG cylinder at INR 1,700)
- On an annual basis approx. 720 commercial cylinders can be replaced @ a gross saving of approx. INR 12.96 Lac per year

6.3 EneryBin™ Bi-Product: Organic Manure or Fertilizer

An inbuilt solid screw manure separator (auto model) will separate the water from the solids and the digested slurry. It is a state of the art method to convert the wet digested slurry into nutrient rich, ready to use, organic fertilizer for landscaping and horticulture application - approximately 100-150 Kg per day.

7 Operating Parameters

- Plant is capable of running at 10% to 100% of its design capacity, depending upon the quality of the input (raw material) the output may vary.
- Plant is capable to run for 365 days but under normal conditions,
- Under Ideal conditions input of 250 Kg's/day of wet biodegradable canteen waste should give approx 20 – 25 m^3/day of biogas and 20 – 25 Kg's/day of manure. If the quality of the raw material is good then perhaps the quality of the output would be even better.

8 Value of Savings:

Depending upon the input of the designed capacity, the plant will show the following savings/benefit analysis, Value of savings (per day basis) for plant of 250 Kg's/day:

Size of the plant (input capacity)	250 Kg's/day
Generation of Biogas per day	20 - 25 m^3/day
Equivalent to LPG Kg's/day	9 – 10 Kg's/day
Cost of LPG per Kg (at current commercial rate excluding tax)	Rs. 90.00/Kg.
LPG replaced cost per day	Rs. 900.00 (approx.)/day
(+) Waste dumping (Dumper) expenses – approximate	-------
(+) Existing waste dumping manpower cost	-------
(+) Generation Of Manure per day {(20 – 25 Kg's (depending upon raw material) @Rs.3.00)}	Rs. 75.00/day
(-) Electricity Charges 3 kWh / day (EB-250 + Model)	Rs. 21.00 / Day
Total Savings Per day (approx.)	**Rs. 954.00 / Day**

Saving from EB-250 Model per annum = 3,43,440.00

9 CLIENT'S SCOPE OF WORK/ EXCLUSIONS

The client shall provide the following:

- Civil works for the installation of the EnergyBin™ if required (flat land space, tar or concrete support with water and electricity connection) – drawings will be submitted after receipt of LOI
- 3 phase electric connection (7.5 HP connected load) at the site. Electricity will be supplied free of cost during the installation and operation of the plant. Average power consumption will be less than 15% of self generation. (proportional to level of automation)
- One fresh water connection line near the plant. Water will be supplied free of cost during the installation and operation of the plant.
- Freshwater requirement will be approximately 10-20% of the waste to be treated. 80% of the water will be recycled & re-circulated within EnergyBin™ for (EB ++ Model)
- Permission for inward and outward movement of goods/machinery/material brought by XWM with relevant gate pass permissions.
- Flexible time limits for labour employed and labour inward outward movement should be allowed and overtime work if necessary should be allowed to XWM employees.
- Emergency first aid & medical facilities close to the site.
- Electricity, water pipeline to and from the EnergyBin™ is in the client's responsibility. Gas can be transported to the kitchen, located up to 300 m from the plant installation site.
- The biogas generated by the plant will be utilized by the client in kitchen burner
- To provide free food and accommodation to XWM staff during the installation. Commissioning and operation period of initial one months.

10 XWM Scope of Work:

- Detail Engineering of all civil, mechanical, electrical works & plumbing works.
- Supply and commissioning of all bought items. Erection and installation of all the items. Commissioning of the entire plant.
- Annual Operation and Maintenance for the efficient operation of the entire plant as per the contractual agreement.
- Provision of Stabilization Certificate after successful stabilization of the plant.
- Electricity and water required during the commissioning and execution period at free of cost.
- Training of local operator at ThyssenKurpp Ltd.

11 GUARANTEES FOR THE EnergyBin™:

Provided that the biogas plant is operatated and maintained as per our guidelines and commissioning takes place with undue delay, Xeon Waste managers L.L.P. warrents against manufacturing defects and performance failures (within its scope of supply) for 12 (twelve) months after complete installation of the plant or 16 (sixteen) months after the supply of the material, whichever is earlier.

11.1 Manufacturing Defects

Material and installations, which we supplied by Xeon Waste managers L.L.P., are warranted against defects within the warrenty period against any manufacturing defects. This does not include damages caused due to burnouts, accidents, neglect or mishandling of the units.

11.2 Performance Guarantee

Provided the incoming feed stock is as mentioned and the operation of the biogas plant is as per the instructions, the performance guarantee for the warranty period is given for:

a. Processing capacity
   The overall plant processing capacity is guaranteed to be 250 kg of segregated food waste per day

b. Gas quantity and quality

The methane content of the biogas will be minimum 60%, with an average production rate of 18 m^3/day*

*Gas Output guarantees can only be given relative to quality and quantity of input feedstock and operation as per our instruction. Therefore for this element of our Peformance Guarantee to be binding, waste input will need to be baslined and guaranteed within certain range by the client and XWM would be vested with resposibibility to operate and maintain the EnergyBin™.

If above guaranteed performance could not be achieved, Xeon Waste managers L.L.P. shall take prompt action for achievement of the desired performance or correction of the defect. If Xeon Waste managers L.L.P. is despite of all efforts not achieving the desired performance or correction of the defect, then deliberations with the buyer should be held to reach adequate economic compensation. The total cost for Xeon Waste managers L.L.P. to take corective measures and compensation to the buyer shall altogether amount to maximal 10 % (ten) of the order sum.

12 Commercials

12.1 Services and Cost of EnergyBin™

Sr. No.	Model	Price
1	EnergyBin™- 250 (+ Model)	13,50000.00
2	Electronic Flowmeter	51,000.00
3	Operation and training charges (7 days)	Free
4	One time Commissioning and Installation charges	50,000.00
5	Natural Bed Filter for 500L of biogas slurry and slurry transfer pump	50,000.00
6	G.I Enclosure for 10m3 ballon, dia-2m and Ht-3m	45,000.00
7	Dry Manure (30% T.S) buyback offer @ 3 Rs./kg, along with 100 kg manure collecting bag.	
	No regret, discounted price	**14,50,000.00**

NOTE: EneryBin™ is liable for 80 % deprecation in the first year of purchase, which will further reduce its cost by 25 %

12.2 Commercial Terms & Conditions

1. Price Basis:	F.O.R Pimpri.
2. Taxes:	VAT 5% and Octrio as applicable
3. Delivery Schedule:	8 weeks from the date of receipt of advance payment and PO.
4. Insurance:	By XWM
5. Road Permit:	By XWM
6. Inspection:	According to XWM Standard Quality Procedures
7. Payment Terms:	10% advance, against bank guarantee, 80 % 15 days after successful inspection, 10% after successful Mechanically installation, commissioning and successful running of biogas burner.
8. Quotation Validity:	30 days

Any terms and conditions not expressly stipulated and not commented against your enquiry shall be mutually discussed and agreed upon on cases to case basis

Pune, 05/12/2014

Kind regards for and on behalf of

Xeon Waste Managers L.L.P.

Vishal Y. Khalde