



Introduction

What are gated communities?

In its modern form, a gated community (or walled community) is a form of residential community or housing estate containing strictly controlled entrances for pedestrians, bicycles, and automobiles, and often characterized by a closed perimeter of walls and fences. Gated communities usually consist of small residential streets and include various shared amenities. For smaller communities this may be only a park or other common area. For larger communities, it may be possible for residents to stay within the community for most daily activities. Gated communities are a type of common interest development, but are distinct from intentional communities. For the current study, BITS Pilani Goa campus has been considered which is a gated community.



Quick Facts about Solid Waste Management in India and why it is a topic of concern ?

- An estimated 115,000 MT of solid waste are generated every day in India, increasing every year by 5%. Almost three-fourths of the total waste (83,378 MT)
- City governments spend between Rs 500 and Rs 1,500 per tonne on solid waste collection, transportation, treatment and disposal. However, the expenditure is unevenly distributed, with waste collection accounting for about 60-70% of the expenditure being spent on collection, the rest being on transportation with hardly any expenditure on waste treatment and disposal
- Urban India is now the world's third-largest garbage generator
- It's not the amount of waste generated that's as much of an issue as the fact that more than 45 million tonnes, or 3 million trucks worth, of garbage is untreated and disposed of by municipal authorities everyday in an unhygienic manner
- As prosperity grows, 62 million tonnes of garbage is generated everyday by the
- Per capita waste generation rate in India has increased from 0.44kg/day in 2001 to 0.5kg/day in 2011
- Waste generation rate in Indian cities ranges between 200-870 grams per day per family depending upon regions lifestyle and size of the city.

Present problems faced during Waste Management

- Storage of waste at source is lacking
- No segregation of recyclable waste at source
- Primary collection of waste is not done at place of generation
- Unorganized sector has higher authority for recycling industry and has more wealth involved in terms of transaction

Reasons for improper waste management

- Lack of planning for waste management when planning new townships
- Lack of technically trained manpower
- Lack of community involvement
- Lack of expertise and exposure to modern techniques and best practices
- Lack of awareness creation mechanism
- Lack of management information systems
- Lack of funds with Urban Local Bodies (ULB)
- MSW Rules 2000 are antiquated and need revision and updating

Quantity of waste generation

Total quantity of solid waste generated in urban areas of the country: 0.18 million tonne / day (TPD) 65.7 million per year

		% of total garbage
Waste generated in 6 mega cities	45,875 TPD	18.35%
Waste generated in metro cities (1 million plus towns)	42,700 TPD	17.08%
Waste generated in other Class-I towns (0.1 million plus towns)	92,675 TPD	37.07%
	0.18 million tonne / day (TPD)	72.50%

If waste produced in all Class-I cities is tackled, percentage of waste scientifically managed would be 72.5% of the total waste

Component	Value in INR	
	If it can be re-used	If it cannot be re-used
PCB	100-500 per piece	12-20 per kg
IC	50-250 per piece	200 per kg
Colour CRTs	700-1200 per piece	100-200 per piece
Floppy Drives	100-150 per piece	12 per piece
Inkjet Printer	300-3000 per piece	100-300 per piece
Keyboards	100-200 per piece	15 per piece
Capacitors	2-10 per piece	90-20 per kg
CPU (Pentium IV)	2000-3500 per piece	150-175 per piece

Model Proposed For Effective Solid Waste Management In Gated Communities

The municipality waste generated in any gated community can be broadly divided into three main categories – biodegradable waste (which includes the organic waste generated from any household on a daily basis, non-biodegradable waste (which includes both recyclable materials like paper/ cardboard, glass rubber, plastics, textiles etc and non-recyclable items) and household biomedical waste (HBW). Examples of HBW include expired drugs, bandages, syringes, sanitary napkins, disposable diapers, expired cosmetics, blood stained cloths, used bottles of syrups/tablets/ear-drops/eye-drops, used ointment tubes. The objective of the model is to make the campus (BITS Pilani campus) zero waste and assurance of recycling and the same could be applied to any gated community. Considering from every household 500 grams of solid waste is generated everyday. The percentage composition of different categories include:

- Biodegradable organic waste – 35%
- Recyclable non-biodegradable waste - 45%
- Biomedical waste – 15%

Biodegradable Waste

- According to the proposed model, from 100 families at BITS campus approximately 175 grams of organic waste can be generated from all households
- From 17.5 kg of the waste collected everyday from all houses, it could be used for the biogas plant at the campus of capacity 500 Litres with retention capacity of 30 days that could generate 600 litres of biogas on a daily basis.
- According to research around 150-200 Litres of gas is required for preparing one meal, so this 600 Litres could be provided as source of energy to one particular family in the servant quarters
- Thus collective waste from all houses is a source of energy for a day for one servant house.

Non-Biodegradable Waste

For Non-biodegradable waste, the model proposes maximum recycling by taking following measures:

- ✓ Providing a 25 kg capacity container for specifically all types of plastics and paper waste where after dumping the waste lid could be tightened such that the plastics and cardboard sheets could be flattened by the weight of the lid and once the capacity is full, the waste could be sold to one person responsible for collecting waste from all households who will pay a minimum amount of Rs 100-150 for the exchange of plastic and paper waste. And for newspaper wastes etc to earn more profit, the house-owner can separately sell it to the same person.
- ✓ Similarly all gated communities have shopping complexes, so two large bins can be kept near them where all the residents are requested to dump their waste like glass and metals separately in the two bins and based on the weight of the waste dumped the resident could be provided any coupon to purchase things from the shopping complex. In this way waste like glass could be harmful during segregation for the workers could be separately collected.
- ✓ Similarly for E-waste, a single bin could be kept for the entire society where again on the basis of weight the person can get a minimum amount coupon, also again the option of selling the e-waste to the same person who is collecting recyclable waste from the society separately to get better price.
- ✓ The above model involves again the authority of the unorganized sector for waste recycling as in the above table the amount of money involved in recycling same products in unorganized sector is much more profitable than the organized sector.
- ✓ Also this one person collecting waste from one campus should register himself at the Pollution Control Board Portal (which should be designed for keeping check on the final destination of the waste and the eco-friendly treatment of the waste) and should be trained with the correct way of handling waste, also this would help ULBs or PCBs to keep a track of waste that is handled.

Household Biomedical Waste

- One separate small bin should be provided in all households to collect HBW (like diapers and sanitary napkins, currently this waste is in general directed towards landfills which is environmentally harmful or incinerated)
- Current country laws prohibit menstrual wastes to be incinerated in industries but amendments in laws could be proposed that could allow incineration of such wastes in industries like cements
- The current practice followed for Biomedical waste is incineration which is at very high temperatures of 1000°C which is really high for it so autoclaving at lower temperatures could be used at lower temperature of around 120°C

The type of litter we generate and the approximate time it takes to degenerate	
Type of litter	Approximate time it takes to degenerate the litter
Organic waste such as vegetable and fruit peels, leftover foodstuff, etc.	a week or two.
Paper	10-30 days
Cotton cloth	2-5 months
Wood	10-15 years
Woolen items	1 year
Tin, aluminium, and other metal items such as cans	100-500 years
Plastic bags	one million years?
Glass bottles	undetermined

