

Sustainable Solid Waste Management

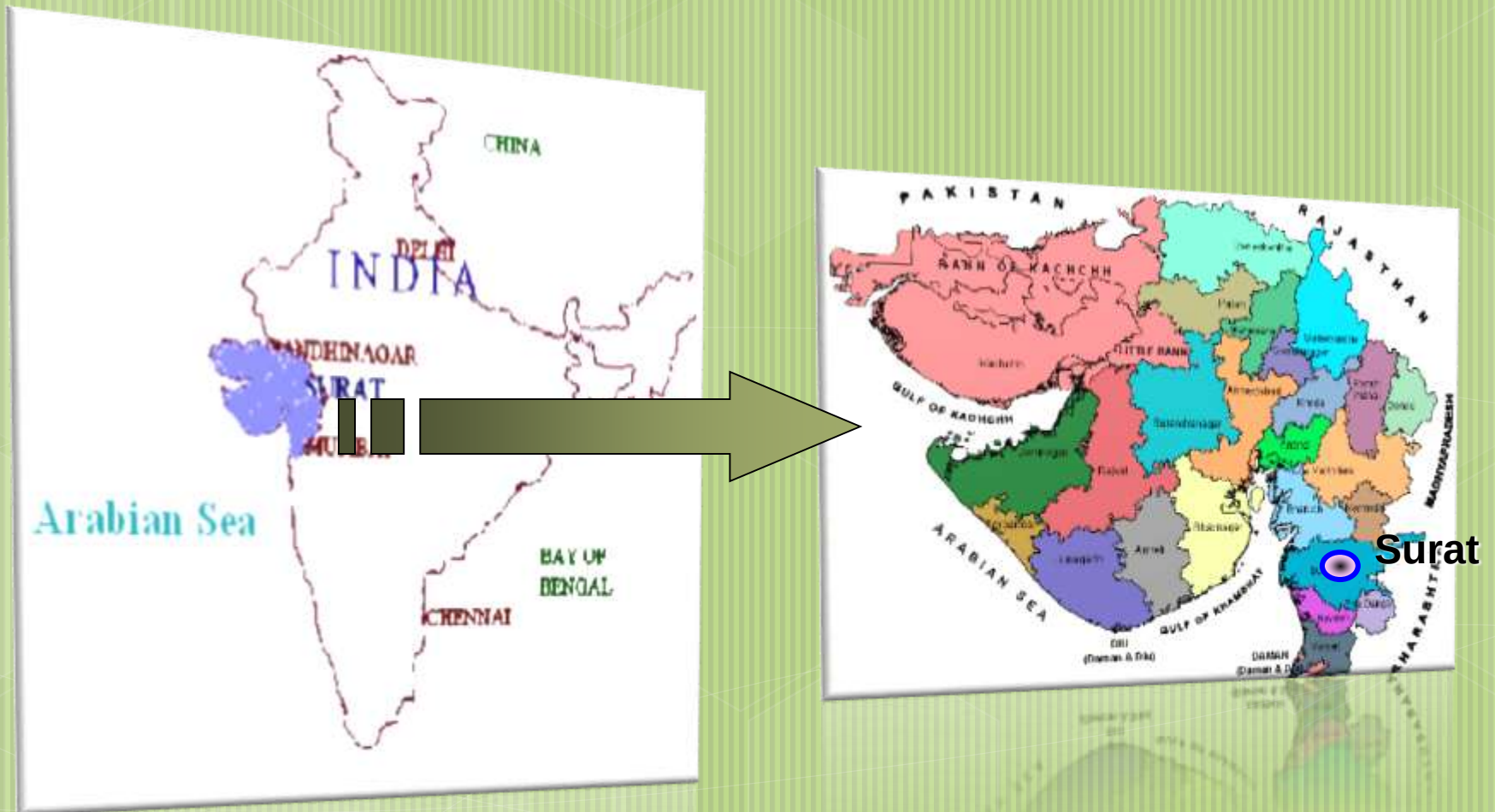


26th August, 2013

Thiruvananthapuram

E.H. Pathan,
Executive Engineer (Solid waste management)
Surat Municipal Corporation

Location of Surat



Glory of Surat

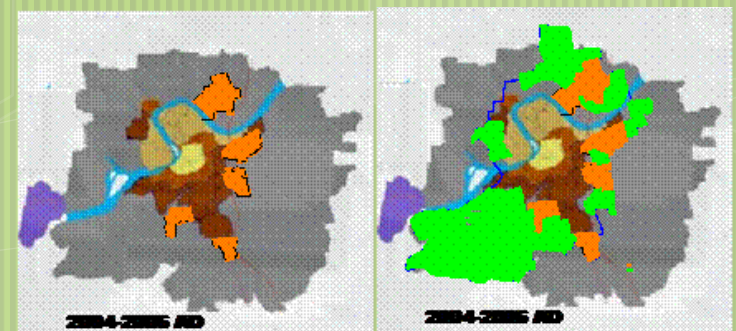
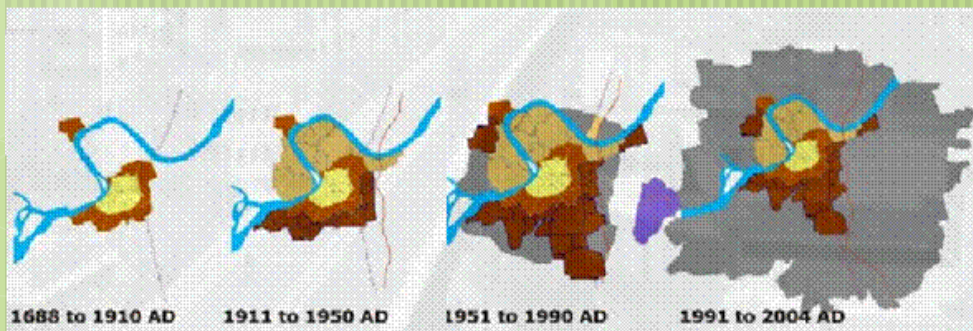
- Economic capital of Gujarat
- Home to Textile and Diamond industry
- 40% of the nation's total man made fabric production
- More than 500,000 power looms and 350 process houses
- Traditional zari and Zardosi work
- 70% of nations diamond cutting and polishing units
- More than 5 lakh workers employed in the industry
- Spin-offs from proximity to Hazira
- Peace-loving, resilient and harmonious environment



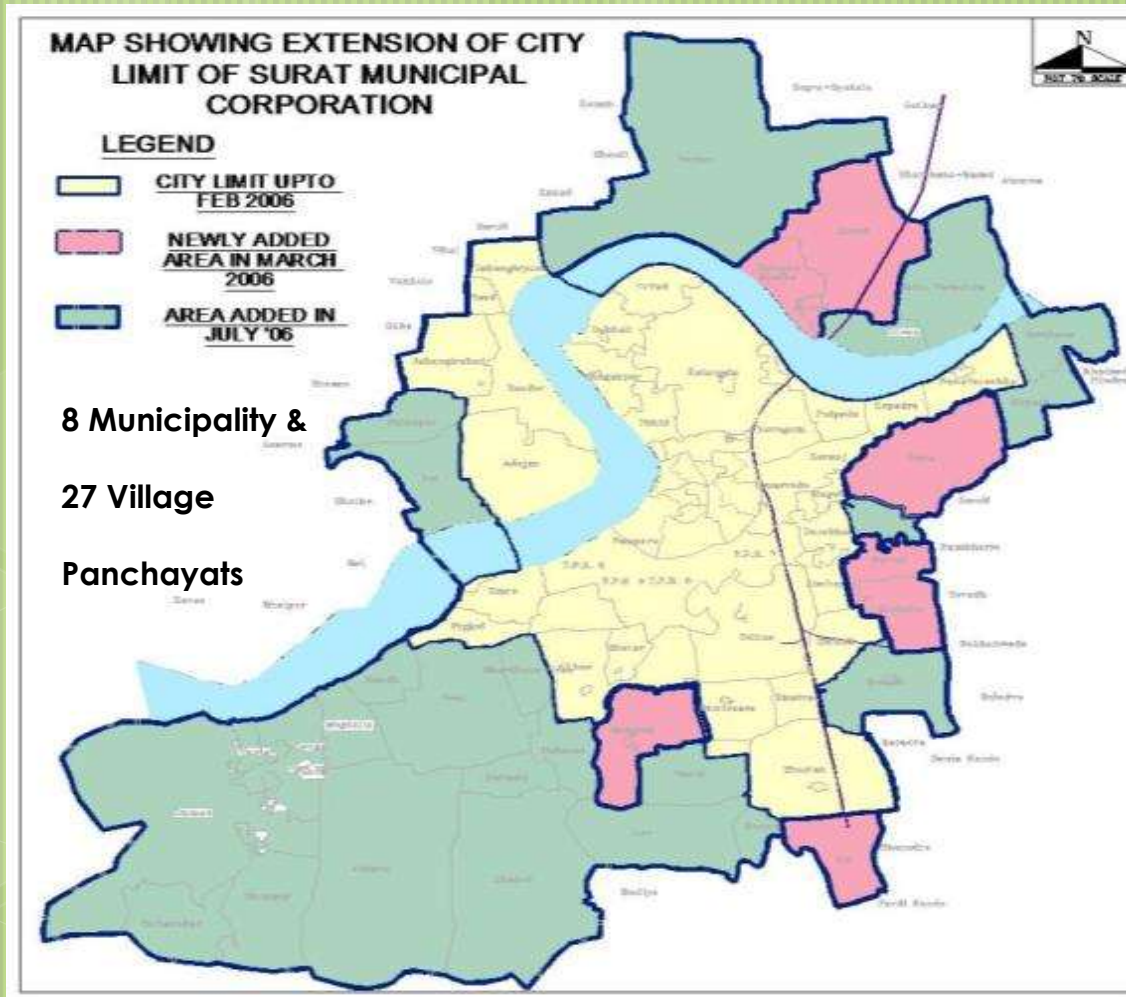
Growth of City

- Historical Development Of Surat Dates Back To 300 BC.
- Municipality Established In 1852 AD.
- Municipal Corporation Formed In 1966.

Year	Area in Sq. Km	Population
1951	8.18	2,23,182
1961	8.18	2,88,026
1971	33.85	4,71,656
1981	55.56	7,76,583
1991	111.16	14,98,817
2001	112.27	24,33,785
2001*	326.51	28,77,241
2011	326.51	~ 44.5 Lakhs



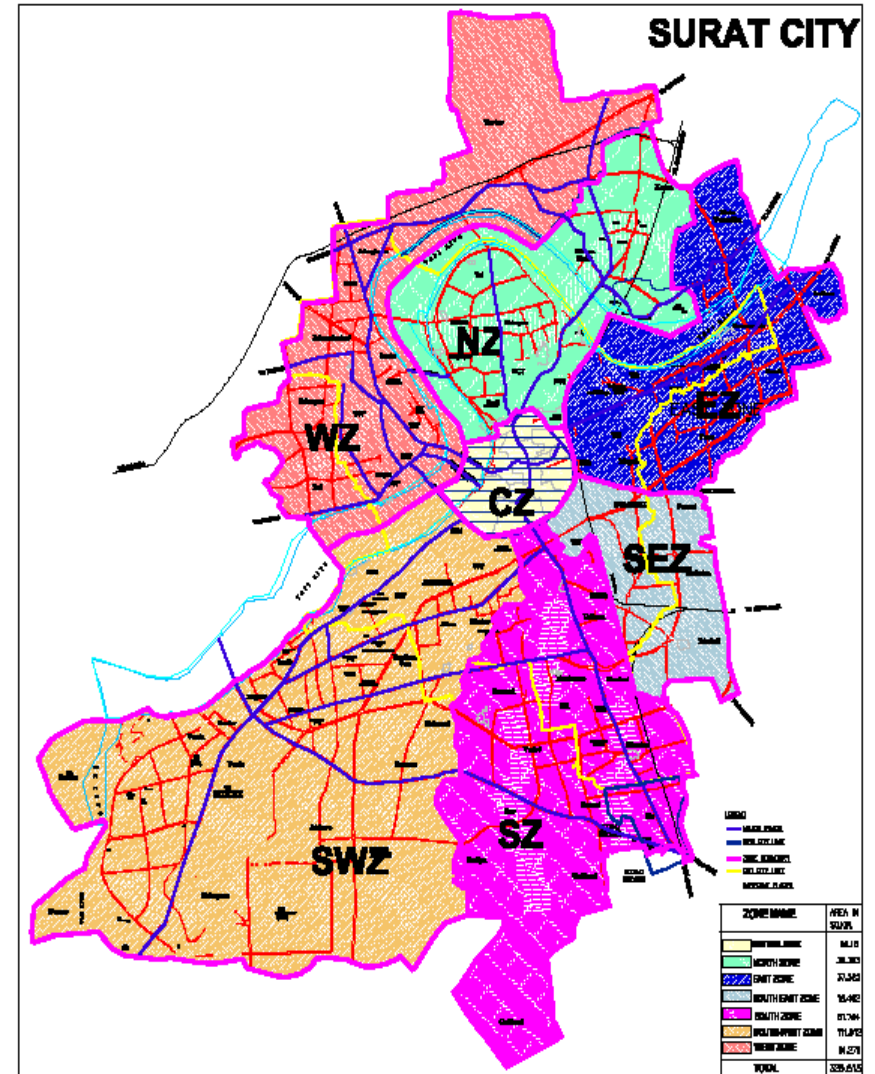
City Expansion



- Unprecedented growth in last four decades.
- 10-fold population rise.
- Now ranks the 8th largest city in the country.
- Jurisdictional limits extended to 3 fold.

Administrative Zones

Sr. No.	Zone	City
		Area (in Sqkm)
1	Central	8.18
2	South-West	111.91
3	South	61.76
4	South- East	19.49
5	East	37.52
6	North	36.36
7	West	51.27
TOTAL		326.51





Regulatory framework for treatment of Waste

Solid Waste Management [SWM]

Laid out in the 'Municipal Solid Waste(Management and Handling) Rules, 2000';

Responsibility :

Municipalities: Collection, Segregate, Transportation, Processing and Disposal of MSW in a scientific manner;

State Government: To enforce the provisions of these rules.

Electronic Waste Management [e-waste]

Come into effect from May 1, 2012;

Focus on concept of Extended Producer Responsibility (EPR), legislation would make producers responsible for the end-of-life management of e-Waste.

Bio-medical waste (Management & Handling) rules, 1998

Stipulates that occupier of every organization generating biomedical waste (as defined in the Rules) must manage his biomedical waste as prescribed in the Rules so as not to cause any harm to the environment.

Problems associated with MSW Management System

- Low Budgetary allocation by Municipalities for SWM
- Bulk of spending (80%) on Collection and Transportation, very little on processing or treatment
- Less than 5% of the MSW in our country is disposed in a proper scientific manner
- Municipalities under tremendous pressure to address the processing and disposal of MSW
- Lack of institutional and financial capability
- Lack of viable business models in the sector
- Municipalities dependent on budgetary sources of revenues from the State/Central Government
- Identifying suitable sites
- Willingness to Pay for Waste Management



Problems at Waste Community Bin Site

- Eye Sore
- Bacteria Breeding
- Foul Odour
- Attracts flies, mosquitoes
- Diseases & epidemic
- Blocks free flow of water



Problems of Waste Dumping Site

- Health & fire hazards
- Depleting space for landfill
- Long haulage of waste,

Problems merely shift from Community Bins to Landfill Site

Scenario of Solid Waste Management System-Surat

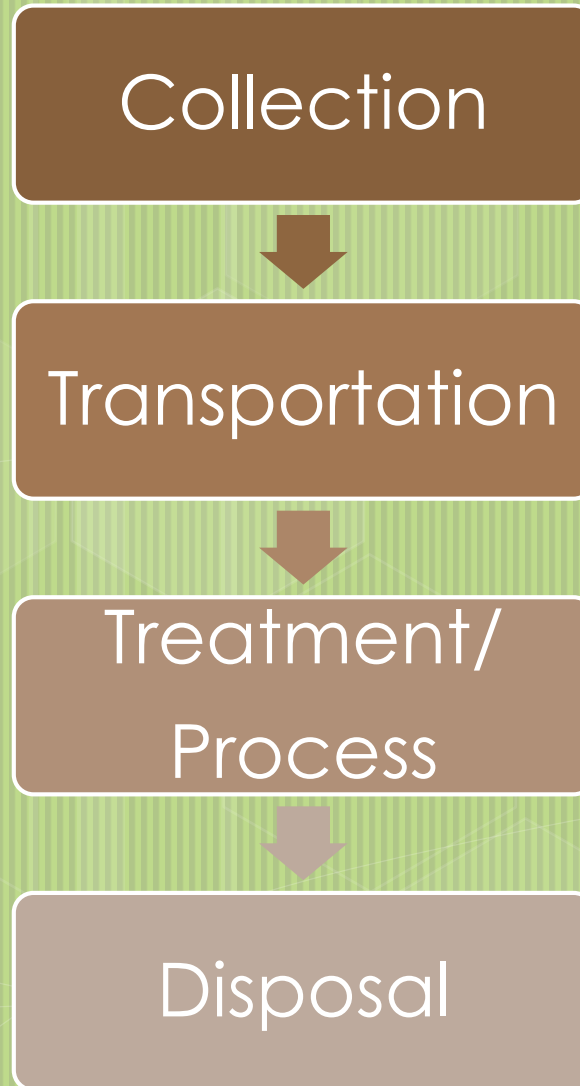
The situation of alleged plague after the flood compelled us to take many initiatives related to hygiene of Public at large. Major initiatives taken after the plague are listed as under

- Night Scraping Brushing activities on major and minor route with concept of zero garbage road.
- Privatization of MSW lifting activities along with augmentation of refuse transfer station.
- Paved platform at container spot.
- Cleaning of paved platform with spraying of insecticide.
- Infrastructure development of final disposal site.
- Capacity building of MSW management system.
- Campaign against use of plastic bags with thickness less than 40 microns.
- Complainants Redresel System

Success Stories of Surat Municipal Corporation in Solid Waste Management



Solid Waste Management System



Activities at a glance



- Daily collection of over 1400 MT
- Night brushing and scraping on around 200 routes
- Waste collection from more than 12 lakh households through Door to door collection, container lifting and other mode of collection



- 6 Modern transfer stations are operational in different zones
- Sanitary landfill site under utilization
- Waste to Energy project of capacity 1000 TPD under execution; beside 400 TPD compost plant under operation.



- Centralized Bio medical waste collection and disposal
- Acceptance of Solid waste from villages/ Town in vicinity of Surat city; on chargeable basis

Primary Collection System (Door to Door & Container lifting)

Door to Door Garbage Collection System

- It was introduced in the year 2004
- Closed body vehicles equipped with VTS procured by operator.
- Payment is made on per M.T. base of MSW brought to Transfer Station with provision of 5% escalation every year.
- Average daily D to D collection is around 55% of total collection.



Container Lifting System

- Quantity of MSW lifted through container : 450 MT/Day

	By SMC	By Agency
No. of trips	435	155
No. of dumper	52	18
% of Waste collected	75 %	25%

- Average waste collection through container is 40% of total collection.

Primary Collection System (Night Brushing - Scraping & Hotel Waste Management)

Night Scraping - Brushing

- Introduced in 1996 and carried out under departmental supervision.
- Major routes > 200
- Area Covered: 5,00,000 Sq.mt.
- Manpower engaged: around 2000 (on daily wages)



Hotel Kitchen Waste

- Introduced in 2000
- Hotel kitchen waste is collected and transported by the hotel association
- Total no. of hotels & restaurants- 300
- Vehicles deployed by the hotel association- 25

“Anudan Scheme” For Urban Dweller Units

- Minimum Rs. 1500/- per society, for Domestic 60 paisa per sq.mt and for Industrial 65 paisa per sq. mt. paid by SMC
- Total activity organized by president of housing colonies
- Area considered for grant in aid : 25% of lay out area.
- More than 600 societies

Concept of Morden Secondary Transportation:

Refuse Transfer Station- 6 Nos.



Facility at
Transfer
Station

All the primary collecting vehicles from Door to Door Garbage collection and sweeping activity reaches to transfer station from where secondary transportation vehicles are loaded for the purpose of transferring it to disposal site.

Concept of
Modern
transfer
station

- Primary collecting vehicles sent to the Elevated Platform through Ramp.
- Chutes are provided at Elevated Platform to receive the MSW from where it is unloaded by primary collection vehicles.
- Secondary transport vehicle is kept underneath the chutes.
- MSW unloaded from primary collection vehicles is transferred into the closed container provided with compactor system.
- The chute portion of transfer station is covered on the top with FRP sheet and whole structure is kept closed with concrete louvered blocks.
- Transportation of container is carried out on Hook lifting vehicles.
- Containers are fully closed with leak proof door opening system

Concept of Morden Secondary Transportation: Refuse Transfer Station



Operational Strategy

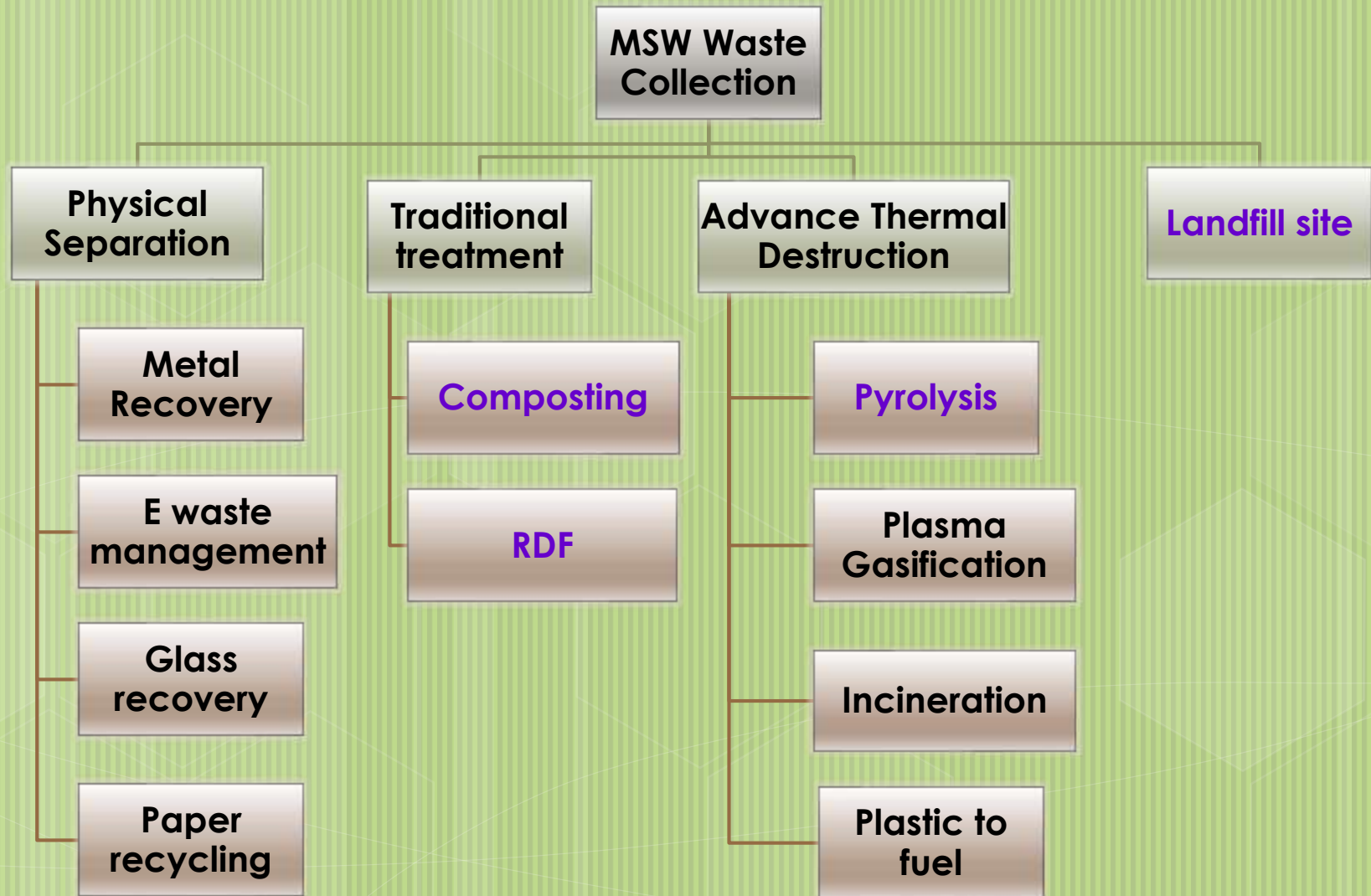
- Civil work of transfer station facilitated by municipal corporation
- Investment for machineries, equipment and vehicles to be born by operator
- Two separate agency have been entrusted work each for 3 transfer station
- Concession period for BOO contract is 10 year
- Provision for price escalation @ 5%
- To safeguard interest of operator clause of min guaranteed quantity.

Results Achieved

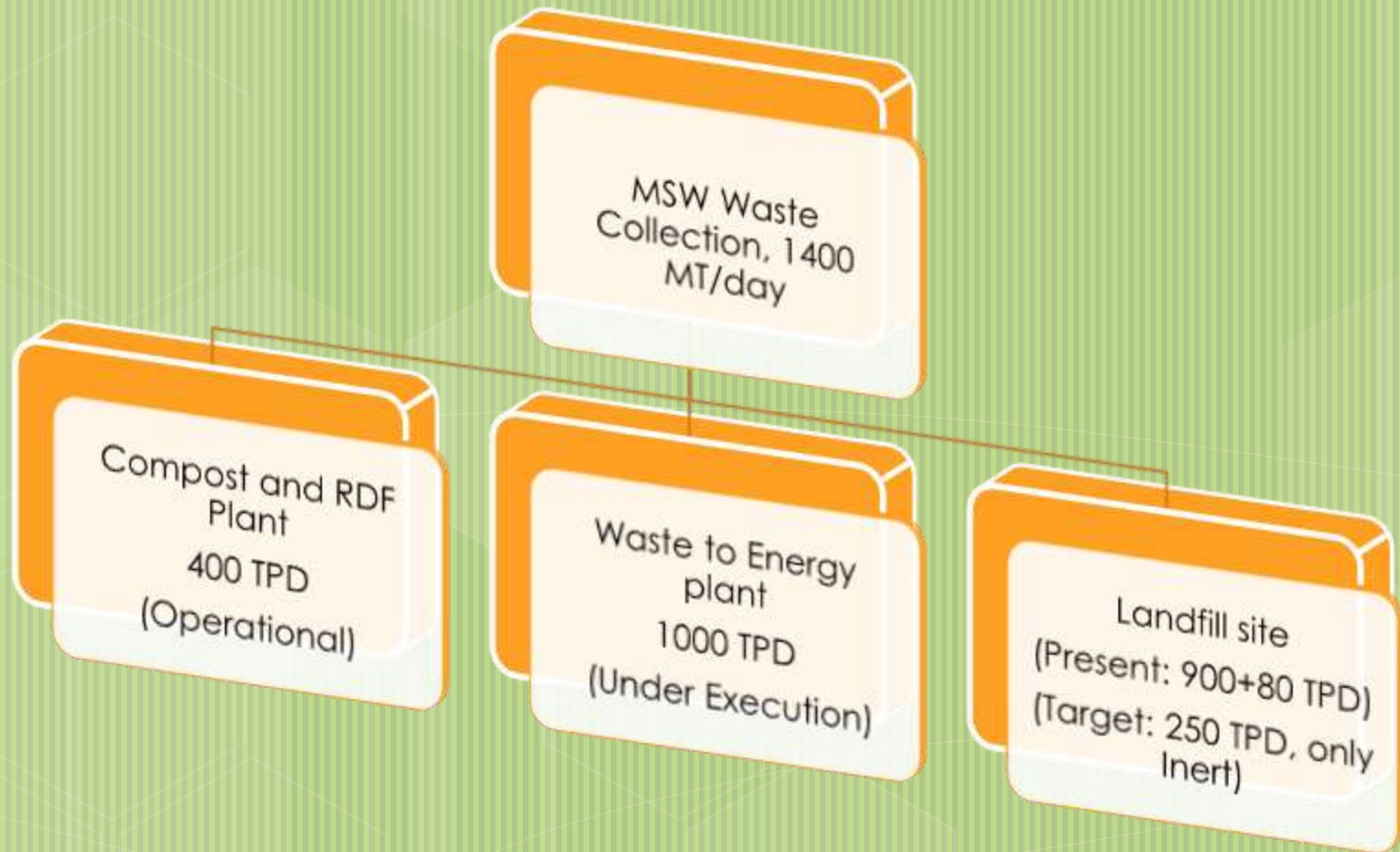
- MSW received through closed vehicles are dropped to closed containers without secondary handling.
- Covered leak proof container prevents spillage of garbage on the road.
- No foul Smell, as transfer station is semi-closed and transport containers are fully closed.
- No MSW storage, permanently or temporary, at transfer station as it is directly transferred to containers without secondary handling.
- Prevention of Animal entry, flies nuisance
- Creates hygienic conditions in surrounding area



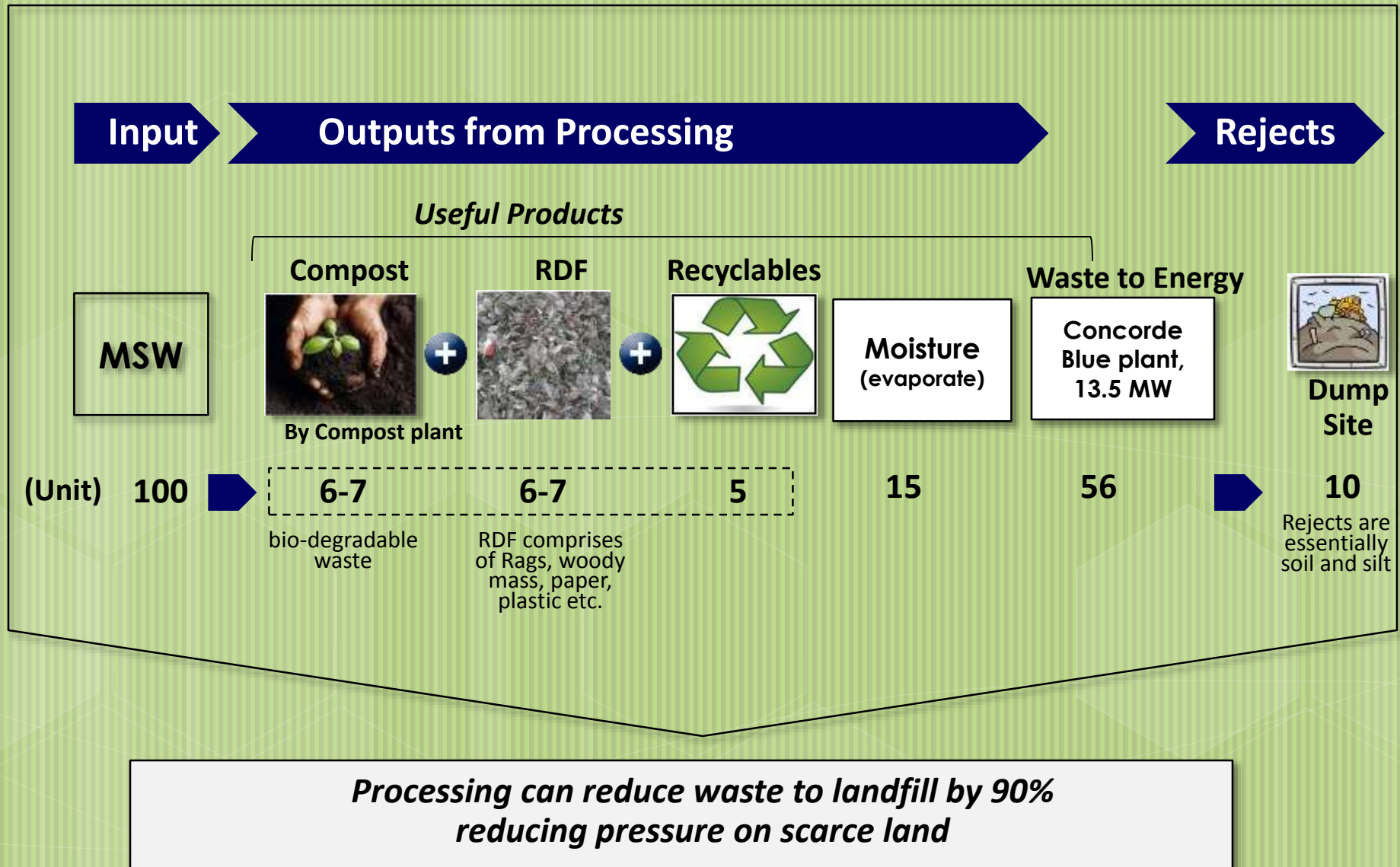
Treatment of MSW- Option available



Overview of MSW Treatment, Surat



Waste Processing technology adopted- SMC



MSW Treatment

Compost and RDF plant (Operational)-PPP

- Surat has opted for multiple waste processing technology for treatment of MSW.
- Segregation of incoming heterogeneous waste.
- Converting in to compost & RDF pallets.
- RDF on burning will emit less quantity of NOX, SOX, CO & CO₂ as compared to coal.
- Opted for BOOT base with concession period of 30 yrs.
- Return to SMC in form of lease rent.
- All the permissions, NOC, Consent to follow up the prevailing Rules and regulations is with the agency.



Waste to Energy: 1000 TPD (Proposed-PPP)

Salient Features:

Total Waste to be treated per day	:1000 TPD
Total Concession Period	: 25 years
Technology	: Pyrolysis (Concorde Blue reactor)
Net Electric Power generation(Mwe)	:13
Royalty to be paid to SMC	:Rs. 30/Tonne (for first year) (with 5.24 % increment every year)

Advantage:

- Completely sealed storage unit
- No smell
- **No Oxidation/ Burning of waste**
- Complete leachate control by RO system
- Safe Disposal of Plastic including PVC
- No Air Pollution only phase change from Solid to Gas
- Clean green hydrogen rich gas from waste for power production
- Least amount of space required for system
- Minimal rejects to landfill-Increases its life.



Centralized Biomedical Waste Collection, Treatment & Disposal Facility

- BOOT Contract
- Introduced in Jan 2003
- Land (4000 sq. mt.) provided by SMC at token rent
- Facility to be in strict adherence to BMW (M & H) Rules.
- Collection of waste – 4000 Kg./Day
- Capacity of plant 6500 kg / Day
- Population: 44 Lacs
- Hospitals – 723
- Beds – 5780
- General dispensaries 1954
- Pathological laboratories-220
- Others – 291
- Collection Centres – 31



Final Disposal of MSW

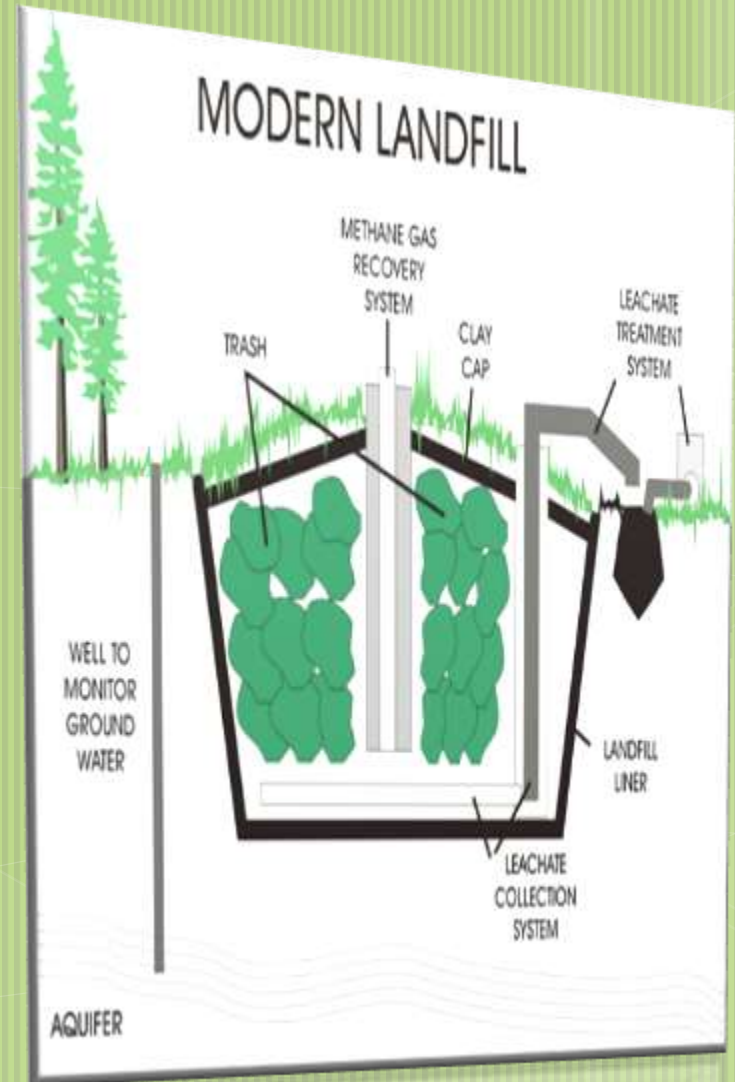
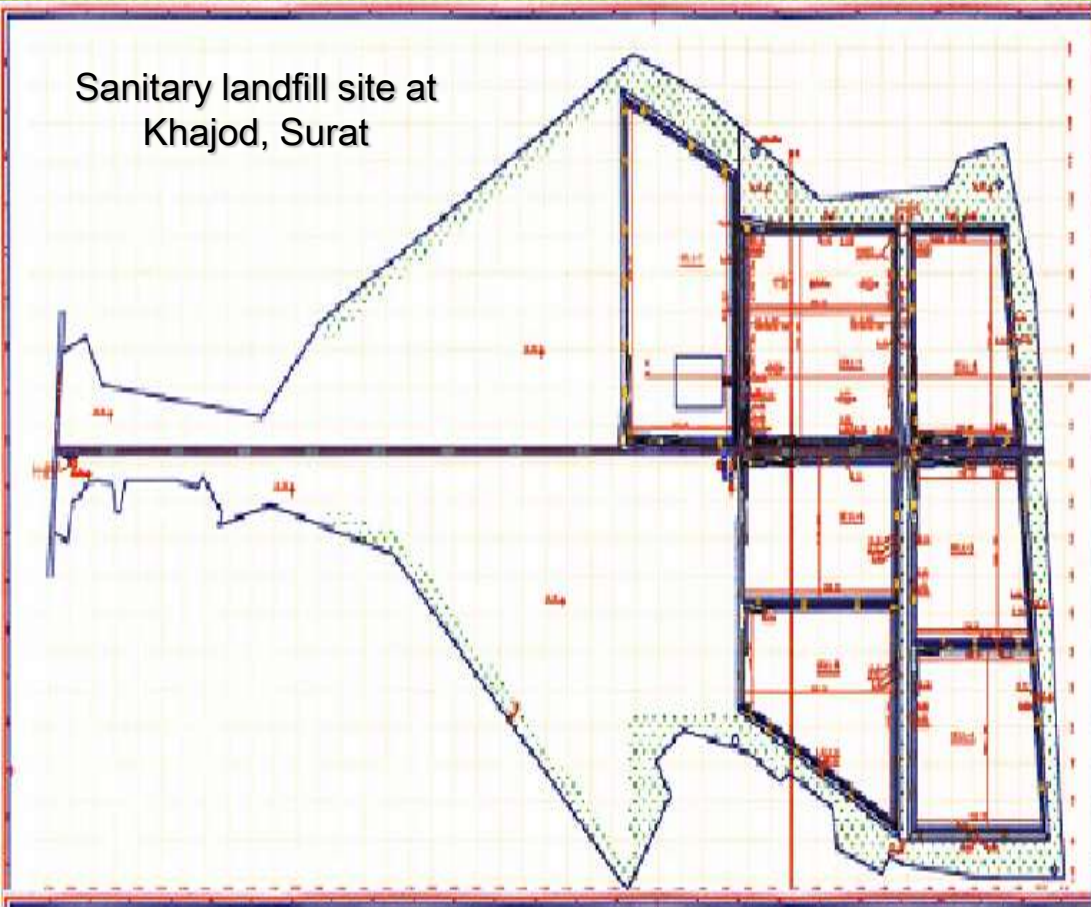
- Before MSW-2000 rules; MSW were dumped to open space in Bhatar.
- After MSW -2000 rules , Surat Municipal corporation has developed Sanitary Landfill site in the area about 200 hectares at Khajod.
- Sanitary landfill site of 1.25 lac cumts under operation for receiving inert residues.
- Sanitary landfill site with 6.25 lac cmt capacity is ready for utilization



Final Disposal of MSW

Sanitary landfill site at Khajod, Surat

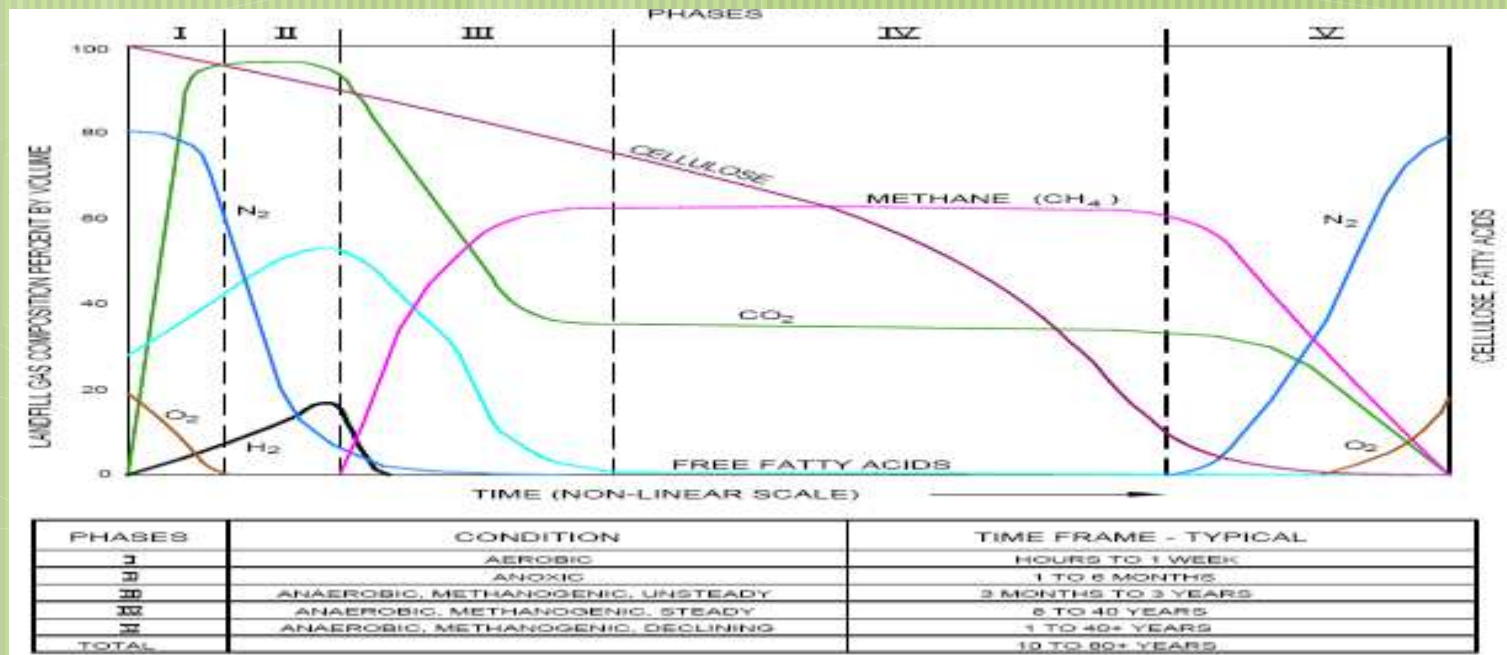
Sanitary landfill site at
Khajod, Surat



Need for land fill closure

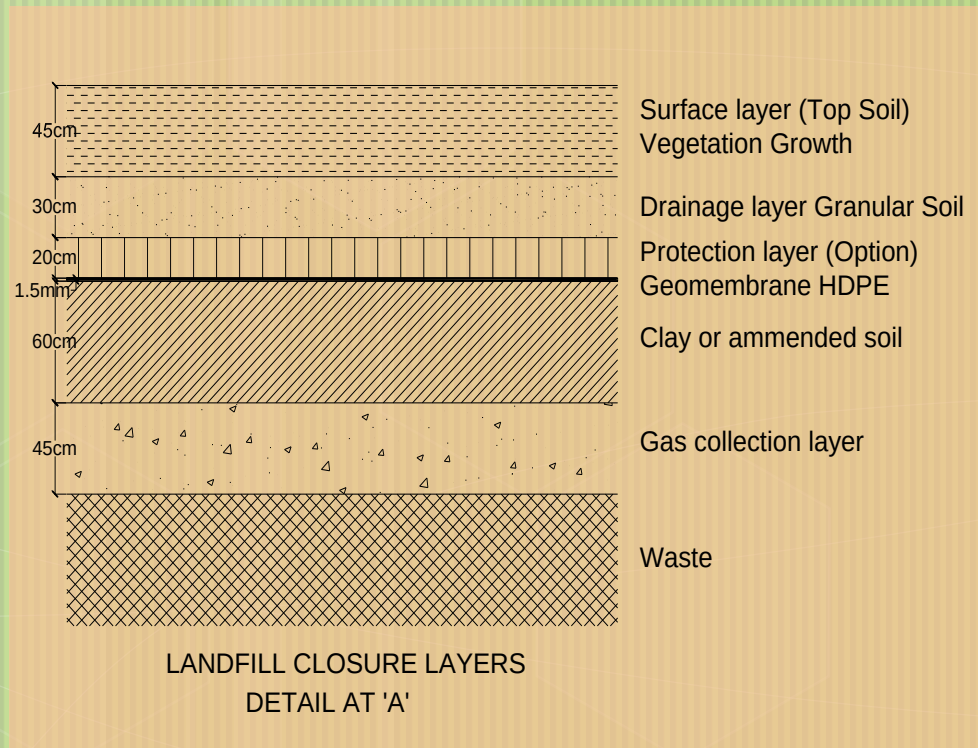
- Landfill closure is required to minimize land, water and air pollution
- Statutory requirement for Compliance to MSW rule 2000
- Enhance environmental values
- Reclaimed land can be used as open land for playground, gardens, parks
- Earn Carbon credits through CDM

Carbon credits are measured in units of certified emission reductions (CERs). Each CER is equivalent to one tonne of carbon dioxide reduction.)



The final cover system shall enhance

- Surface drainage
- Intercept percolating water
- Support surface vegetation
- Control the release the harmful landfill gases like CO₂, CH₄ etc.
- Better environmental quality (Less odour, leachate, disease vectors)
- Improvement in the quality of life in city.
- Considerable amount of power to the city. (LFG to power)
- Reduction of ground and surface water pollution and thus reducing health hazards.



Innovations / Improvisations

- Computer reports for effective monitoring & evaluation
- Wireless and mobile phone facility for communication
- Vehicle tracking system through GPS
- Delegation of Power to collect administrative charges
- Frequent public awareness program by Higher level administration
- Complaint Redresel System
- Automated complaint lodging and monitoring system
- Cradle type dust-bin for pedestrian
- Identification of Zero-garbage road
- Retired sweepers engaged for maintenance of public urinals and toilets.



Outcomes

Service Level Benchmarks

Indicator	Benchmark	Achievement FY 2012-13	Target FY 2013-14
Household level Coverage of SWM Service	100%	92.18 %	95 %
Efficiency of Collection of MSW	100%	86.53%	92%
Extent of Segregation of MSW	100%	11.57%	17%
Extent of MSW recovered	80%	22.16%	32%
Extent of Cost recovery in SWM Service	100%	100%	100%
Efficiency in Collection of SWM charges	90%	90%	90%

Financial Sustainability

- Infrastructure for solid waste management has been strengthened with financial grant under JnNURM scheme.
- Reforms have been implemented for cost recovery as per JnNURM guideline.
- User charges structure accepted by public as well as elected wings.
- Recovery of O&M cost is being met from user charges since year 2008-09.

Over all O & M Expenditure and User charges (FY 2012-13)			
Water supply, Sewerage and Solid waste management	User charges (Rs. in Crore)	O&M Exp (Rs. in Crore)	Cost Recovery (%)
	271.25	273.44	99.20%

Looking Ahead

- Segregation of waste at source
- Reuse and Recycle all possible waste streams
- Centralized monitoring system through SCADA
- Up gradation of MSW collection system
- Energy generation from MSW
- Waste to energy –as Solar Mission
- Carbon Revenue sharing –Major share to private sector
- E Waste Management -Participation with Producer and Generators
- Enhancing public participation
- Underground waste bin on PPP models



A close-up photograph of a person's hand holding a white rectangular card. The hand is positioned on the left side of the frame, with the thumb and index finger gripping the card. The card is held at an angle, showing its front face. The background is a solid light green color with a subtle geometric pattern of thin white lines. The text on the card is printed in a clean, sans-serif font.

Suggestions are welcome

E.H. Pathan

Executive Engineer

(Drainage and Solid Waste Management)

Surat Municipal Corporation

(m) 9724345411

Email: exen.swm@suratmunicipal.org



Thank you



ಕರ್ನಾಟಕ ಸರ್ಕಾರ