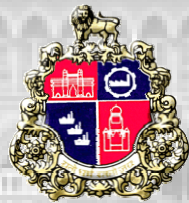


# Lessons Learnt from Experiences in Solid Waste Management Project of Mumbai

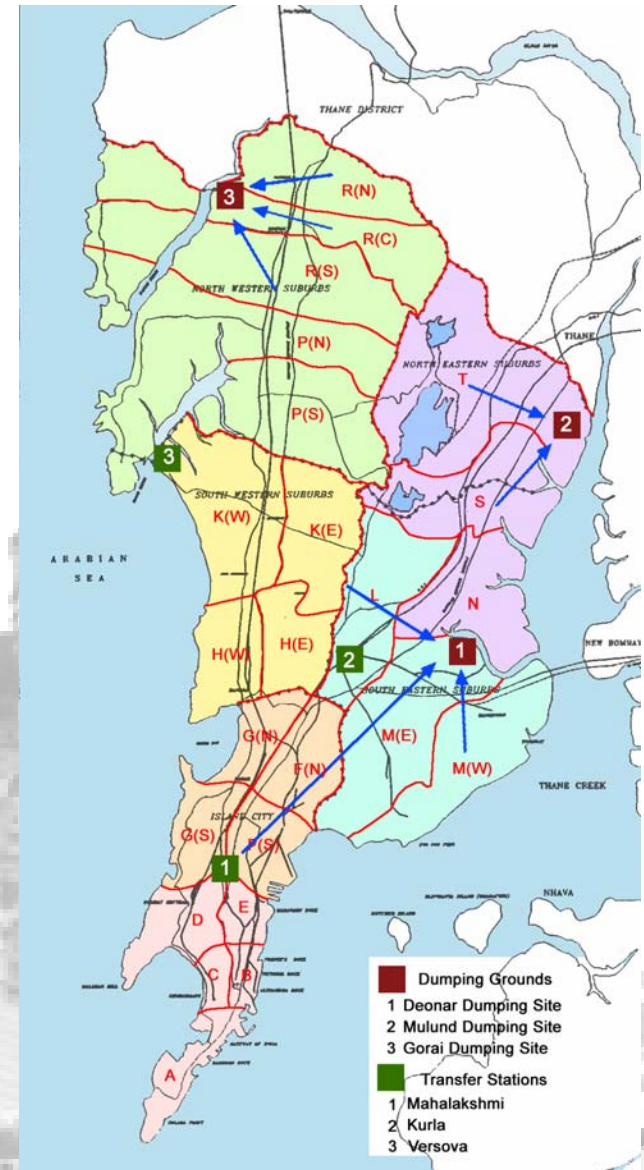


**R.A. Rajeev, IAS**  
**Additional Municipal Commissioner (City), MCGM**

# Mumbai's Statistics



- Area (Greater Mumbai) - 437.71 km
- Population (in 2005) - 16 million [including 3 million floating]
- Population Density
  - City 46000/sq. km.
  - Suburbs 20000/sq. km.
- Zones – 6
- Administrative wards - 24



# Disposal of MSW

- ◆ MSW is disposed at three disposal sites by open dumping

Name of Site	Operational Since	Total Area (ha)	Height of Waste (m)	Future life (years)
Goari	1972	20	18	2
Mulund	1968	21	16	2
Deonar	1927	132	120	8

- ◆ A green field site of 141ha area at Kanjurmarg has been recently allotted by State Govt.

# Technologies Considered for Waste Management at Landfill



- Aerobic composting
- Refuse derived fuel
- Biomethanation
- Incineration
- Gasification/Pyrolysis
- Plasma Pyrolysis Vitrification (PPV)



**Sanitary Landfill is an integral component of overall MSW strategy for Mumbai**

# Technology Evaluation Criteria



## Reliability Filter

Category I

Proven Technology for Large Scale Application

Category II

Proven Internationally

Category III

No Proven Track Record

## Waste Suitability Filter

Category I

Suitability for Mumbai Waste

Category II

Can be made suitable by using auxiliary fuel

Category III

Unsuitable for Mumbai waste

## Environmental and Social Acceptance Filter

Category I

Environmentally and socially accepted

Category II

Environmental Suspect/Does not meet MSW Rules

# Technology Evaluation Results



## Reliability Filter

Category I

Composting, RDF, Biomethanation

Category II

Mass Burn, Plasma Pyrolysis

Category III

Pyrolysis

## Waste Suitability Filter

Category I

Composting, RDF, Biomethanation

Category II

Plasma Produced Vitrification

Category III

Mass Burn

## Environmental and Social Acceptance Filter

Category I

Composting, Biomethanation, RDF

Category II

Mass Burn

# Technology Evaluation Results



## Reliability Filter

Category I

Composting, RDF, Biomethanation

## Waste Suitability Filter

Category I

Composting, RDF, Biomethanation

## Env./Social Acceptance Filter

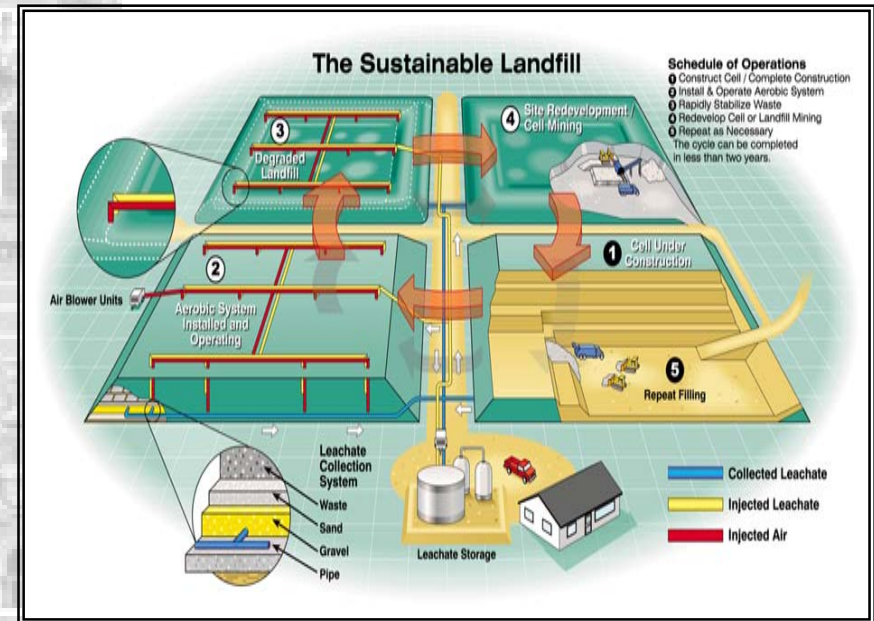
Category I

Composting, RDF, Biomethanation

# Proposed Scientific Management of Dumpsites



- Reclamation of Accumulated Waste
  - Shifting of Existing waste
  - Capping
  - Landscaping



Before Shifting



After Shifting and Capping



After landfill closure



# Implementation Strategy



- Public Private Partnership framework to leverage private funds
- Appointment of World Class operator through International Bidding
- Creation of Special Purpose Vehicle for project implementation and operation
- Off-take agreements for processing outputs (compost, gas and power)
- Adequate supervision and monitoring mechanism

# Competitive International Bidding Process



- Transparent and competitive bidding process
- Two stage bidding evaluation
- **Stage I - Technical Evaluation**
  - Technical expertise and past experience
  - Methodology and plan
  - Fund mobilization capabilities
- **Stage II - Financial Evaluation**
  - Lowest funding support/tipping fees from MCGM

# Key Success Factors



- Fully integrated facilities with complete residue management and zero waste discharge
- At par with International Best Practices
- Participation of well establish international companies as technical partners
- Claim Potential CDM benefits for closure of dump sites, capture of landfill gas and composting
  - Advanced discussions with the World Bank for VER/CERs

# Key Success Factors... (Contd.)



- Off-take agreements for processing outputs
  - Advanced discussions with Gas and Fertilizer Companies
- Financing Support
  - From International Finance Corporation (IFC)
  - Infrastructure Leasing & Financial Services

# Pre-Qualified Bidders



- SembCorp Env. Mgt. Pvt. Ltd., **Singapore** with SITA Env. Solns. **Australia**  
Agni-Inc., **Porugal**
- IVRCL Infrastructure and Project Ltd, Hyderabad with Enkem **Australia**
- Veolia Environmental Services Asia Pvt Ltd, Chennai with Onyx  
**Alexandria** and Onyx **Hong Kong**
- United Phosphorus Limited, Mumbai with End-I Ag **Germany**
- Antony Waste Handling Cell Pvt. Ltd, Mumbai with Modern Asia  
Environmental Holdings, **Thailand** and BTA, **Germany**
- Unity Infraprojects Ltd, Mumbai with Han-je Bio-Tech Energies Pvt Ltd.
- SPML, Delhi with SMEC Intl. Pvt Ltd., **Australia**
- ILISO/DSW, **Durban** with Garware Wallropes Ltd. Pune
- EA Infrastructure Operations Pvt. Ltd., Mumbai with AMA **Italy**, UDC  
**Kuwait**
- Ramky Enviro Engineers, Hyderabad with **City of San Diego**
- STRABAG-AG, **Austria** with Helit Woerner Bau GmbH, **Germany**



**Thank You**