بسم الله الرحمن الرحيم
SINDH SOLID WASTE MANAGEMENT BOARD

Hands together for clean & Healthy Sindh.
Solid waste are wastes that are not liquid or gaseous

The term solid waste means:
Material such as household garbage, food wastes, yard wastes, and demolition or construction debris

Solid wastes are all the discarded solid materials from municipal, industrial, and agricultural activities

What Is Solid Waste
GENERAL PRECEPTION

(RATHER MIS-PRECEPTION !):

✓ WE NEED TO COLLECT GARBAGE FROM OUR RESIDENTIAL / COMMERCIAL AREAS AND THROW IT AWAY FROM OUR SIGHT MAINLY BECAUSE IT GIVES UGLY LOOK AND BAD ODOUR !!
✓ GARBAGE IS A WASTE HENCE WE JUST NEED TO THROW IT AWAY FROM OUR WHERE WE LIVE !!!
REALITY AND FACTS:

✓ INDISCRIMINATE THROWING OF GARBAGE / DUMPING OF GARBAGE IS STARTING POINT OF PROBLEM AND NOT THE SOLUTION !!

✓ GARBAGE IS NOT WASTE – RATHER IT IS AN ASSET IF PROPERLY MANAGED !!!
WHY SOLID WASTE MANAGEMENT IS IMPORTANT?

- WHY TO WASTE RESOURCES TO MANAGE WASTE?
- HEALTH PROBLEMS?
- ENVIRONMENTAL POLLUTION?
- ECONOMIC PROBLEMS?
Infectious Disease Transmission: The “Epidemic-Triangle”

Agent

"Vectors"

Vertebrates – Humans, Buffalos, horses, rodents, birds, & reptiles

Hosts

Viruses
Bacteria
Protozoans
Nematodes

Environment

Air, Soil, Water
Solid Waste, Sewerage
Sindh Solid Waste Management Board
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Situation on Ground

- Municipal Agencies’ failure in Karachi and all other districts of Sindh
- Karachi is one of the dirtiest mega city in the world despite more than Rs.6.0 billion expenditure on SWM
- Situation in Interior Districts is worse in spite of spending around Rs. 3 billion per year
- Health & Environment hazards / adverse impact on investments
Situation on Ground (cont...)

- Multiplicity of SWM agencies — more than 19
- Coordination issues - No control of govt. & local agencies
- Heaps of garbage and burning waste everywhere
- Informal sector doing all recycling - Rs.150 million daily income going into private pockets
  - >600,000 families’ livelihood on recycling
  - Around 10,000 scavengers in Karachi only
  - Dangerous working conditions
  - Dumping of hazardous waste from all over the world
  - Exploitation and child labor issues - mostly Afghani labor
  - Moving live bombs carrying multiple infectious diseases
  - Linkage with crime / terrorism
Situation on Ground (cont…)

• Door to door collection of garbage and recovery of fees/tax being done by Mafias throughout the city
  – Potential of Rs. 2 to 3 Billions from SWM Cess/tax
  – Actual recovery of at least one billion being done by mafia
  – Funds being used to finance illegal & terrorist activities
  – Access and data of every household with criminals/mafia

• Rampant corruption & politicization in KMC & DMCs SWM departments

• Draining of city wealth

• Adverse effects on health, mega city planning, quality of life, foreign investments and environment of the city
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• The Board was created under Sindh Solid Waste Management Board Act, 2014.

• Paradigm shift in how the solid waste is managed through an integrated approach.

• Management of Solid Waste in an Integrated & Scientific basis.
# Composition Of Board

<table>
<thead>
<tr>
<th>Role</th>
<th>Position</th>
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<tbody>
<tr>
<td>Chief Minister Sindh or his nominee (Chief Secretary Sindh)</td>
<td>Chairman</td>
</tr>
<tr>
<td>Managing Director</td>
<td>Member</td>
</tr>
<tr>
<td>Four Executive Directors</td>
<td>Members</td>
</tr>
<tr>
<td>Additional Chief Secretary (Dev), P&amp;D Dept.</td>
<td>Ex-officio Member</td>
</tr>
<tr>
<td>Secretary Local Government, Housing and Town Planning Department</td>
<td>Ex-officio Member</td>
</tr>
<tr>
<td>Secretary Industries Department</td>
<td>Ex-officio Member</td>
</tr>
<tr>
<td>Secretary Health Department</td>
<td>Ex-officio Member</td>
</tr>
<tr>
<td>Secretary Finance Department</td>
<td>Ex-officio Member</td>
</tr>
<tr>
<td>Secretary Katchi Abadis Department</td>
<td>Ex-officio Member</td>
</tr>
<tr>
<td>Secretary Environment Department</td>
<td>Ex-officio Member</td>
</tr>
<tr>
<td>Mayor Karachi Metropolitan Corporation</td>
<td>Ex-officio Member</td>
</tr>
<tr>
<td>President, Karachi Chamber of Commerce and Industries</td>
<td>Ex-officio Member</td>
</tr>
<tr>
<td>Director Military Lands and Cantonment, Karachi.</td>
<td>Ex-Member</td>
</tr>
<tr>
<td>Administrator, Defence Housing Authority, Karachi.</td>
<td>Ex-officio Member</td>
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</table>
Sindh Solid Waste Management Board

- SSWMB IS RESPONSIBLE FOR:
  - MUNICIPAL SOLID WASTE
  - INDUSTRIAL WASTE
  - MEDICAL / HOSPITAL WASTE
  - AGRICULTURAL WASTE
Sindh Solid Waste Management Board

Objectives

• Establish an Integrated Solid Waste Collection and Disposal System in Sindh.

• Plan and execute Schemes for effective delivery of sanitation services.

• Control pollution of environment caused by Solid Waste.
Sindh Solid Waste Management Board

Objectives

• Providing Technical, Financial & Administrative support.

• One-window Facility.

• Legally made owner of garbage.

• Jurisdiction throughout the province.
Sindh Solid Waste Management Board

Objectives

- To ensure clean, healthy and pollution free environment in Sindh province.
- To ensure safe handling and disposal of solid waste and promotion of health and hygiene practices.
- To develop guidelines for evolution of an effective institutional and financial framework to implement the primary objectives.
Sindh Solid Waste Management Board - Strategy

• Action Plan to turn the situation around in 3 to 4 years.
• Phase-III: (2017-18 to 2019-20) shall cater remaining districts of Sindh Province.
Integrated Solid Waste Management:

• Integrated Municipal Solid Waste Management
• Integrated Medical / Hospital Waste Management:
  • Non-Hazardous Waste.
  • Hazardous Waste.
• Integrated Industrial Waste Management:
  • Non-Hazardous Waste.
  • Hazardous Waste.
Strategy -- Karachi

Soft Components

- Legal framework
- Environment Impact Assessments
- Community Awareness & Social Mobilization Plan
- Environmental Standards & Monitoring Mechanisms
- Complaint Management System
- Rehabilitation of waste pickers/ Scavengers & vulnerable communities on landfill sites
Sindh Solid Waste Management Board

**Front End**
- **Door to Door Collection**
- **Sweeping**
- **Washing**
- **Transportation**

**Back End**
- **Landfill Site**
- **Compost**
- **Waste to Energy**
- **MBF**
- **GTS**
Front End Collection & Transportation

1. Door to door collection
2. Manual & mechanical sweeping
3. Transportation from community dustbins to GTS
4. Washing of selected roads/places
5. Revamping of entire Bin system
6. Community Awareness/organization

- Karachi divided in 6 Zones (Existing DMCs)
- All works to be outsourced
- International Bidding carried out as per SPPRA Rules 2010 (Amended 2013)
- Contract for DMC East and DMC South awarded.
Garbage Transfer Stations

Components:
1. Garbage Transfer Station (GTS)
2. Material Recovery Facility / Recycling
3. RDF Plant
   - 06 GTSs PC-I approved
   - Land for 06 GTSs acquired
   - Work order for construction of Boundary Wall Awarded
   - Work for Construction of GTS shall start soon
### GTS Workflow

<table>
<thead>
<tr>
<th>Classification</th>
<th>Workflow</th>
</tr>
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<tbody>
<tr>
<td>① Waste carry in</td>
<td>Pickup trucks(2.5㎥), armroll trucks(5.5㎥) collect and transport wastes to the transfer depo</td>
</tr>
<tr>
<td>② Transfer waste to large armroll</td>
<td>Dump the waste in arm roll(25㎥) waiting in the waste transfer depot</td>
</tr>
<tr>
<td>③ Spread &amp; harden waste</td>
<td>Using a backhoe, spread and compact waste dump in the arm roll (25㎥)</td>
</tr>
<tr>
<td>④ Waste carry out</td>
<td>When the arm roll (25㎥) is filled up with wastes, a standby arm roll truck mounts the arm roll (25㎥) and carries to Cipeuca ng TPA</td>
</tr>
</tbody>
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GTS in Karachi

- Basic Design for Integrated Solid Waste Management System in Karachi

- GTS Layout (800ton/day)
  - Plan for the transshipment facility 380m² (20m×19m) considering traffic line of vehicles, backhoe.
  - Floor height plan (7.0m) considering backhoe’s reach.
Back End Disposal/Waste to Energy

1. Landfill sites (03 sites)
2. Waste to energy options
   a) Pyrolysis (anaerobic digestion)/ incinerator
   b) Plasma Gasification
   c) RDF
   d) Compost / Biogas
   e) Diesel from Plastics

   - 03 Cluster on 03 landfill sites
   - EOI issued – Under review
   - Dhabeji– a new landfill site & a unique project
   - Cattle Colony Landhi
IV. Technical F/S & Conceptual Design

- Facility layout plan

<table>
<thead>
<tr>
<th>Area</th>
<th>92,000m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>30m (6th stage)</td>
</tr>
<tr>
<td>Gas collection well</td>
<td>17ea</td>
</tr>
<tr>
<td>Leachate pond</td>
<td>5,000m³</td>
</tr>
</tbody>
</table>

Landfill capacity

<table>
<thead>
<tr>
<th>Stage</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st stage</td>
<td>351,700m³</td>
</tr>
<tr>
<td>2nd stage</td>
<td>429,500m³</td>
</tr>
<tr>
<td>3rd stage</td>
<td>414,900m³</td>
</tr>
<tr>
<td>4th stage</td>
<td>311,500m³</td>
</tr>
<tr>
<td>5th stage</td>
<td>220,900m³</td>
</tr>
<tr>
<td>6th stage</td>
<td>143,200m³</td>
</tr>
<tr>
<td>Total</td>
<td>1,871,700m³</td>
</tr>
</tbody>
</table>
IV. Technical F/S & Conceptual Design

- Sanitary landfill layout after final covering
IV. Technical F/S & Conceptual Design

- Liner system layout
IV. Technical F/S & Conceptual Design

- Leachate collection system layout
IV. Technical F/S & Conceptual Design

- LFG collection facility layout

Manifold station (4 point)
Landfill Gas (LFG) Collection & Electricity Generation System

- Air Pollution (Odor, Greenhouse effect) Prevention by Collecting LFG
- Energy recovery from Landfill Gas (LFG) & Creating benefit from CDM project

Diagram:
- LFG Collect System (Gas wells)
- Gas monitoring
- Pre-treatment
- Condensate removal
- Blower or compressor
- Flare
- Possible Pre-treatment
- Generation of Electricity
Case Study in Karachi

1. Assumptions

- Population: 15,000,000 person (Approx.)
- Waste generation: 0.6 kg/capita · day × 15,000,000 = 9,000 ton/day
- Landfill gas product: 1,200 Nm³/min
- Landfill gas collect: 600 Nm³/min (50~60%)
- Power generation: 50 MWh

2. Construction Cost

<table>
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<tr>
<th>Description</th>
<th>Amount</th>
<th>Remark</th>
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<tr>
<td>Civil, Building, Machinery, electric</td>
<td>125~150</td>
<td>2.5 ~ 3.0 million USD/MWh</td>
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3. Benefit

- Available generation: 43,200 household (1.2 kWh/household)
- Sale of electricity: 7,776,000 USD/year (12 cents/kWh) Say PKR 800 Million
Sindh Solid Waste Management Board

Thanks

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