Successful Registration of CDM Project for Earning Carbon Credits

GORAI CLOSURE PROJECT

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Addl. Municipal Commissioner (City), Municipal Corporation of Greater Mumbai, INDIA

March 3, 2010
SWM in Mumbai

- Area (Greater Mumbai) - 437.71 sq. km
- Per capita generation rate - 450 gm/day
- Total MSW generated - 6,500 TPD (excluding C&D ~2,400 TPD)
- Decentralized treatment system is limited - 100-150 tons/day
- Waste collected is dumped at 2 Dumping Grounds:
  - Deonar – 5,300 TPD
  - Mulund – 1,200 TPD
- Severe environmental and social hazards to surrounding localities and nearby creeks observed at the dumping grounds

1. Construction and Demolition waste
## Overall Waste Management Strategy

<table>
<thead>
<tr>
<th>Site</th>
<th>Waste Allocation (TPD)</th>
<th>Available Area (ha)</th>
<th>Available for Processing (ha)</th>
<th>Partial Closure (ha)</th>
<th>Project Components*</th>
<th>Waste Processing Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mulund</td>
<td>500</td>
<td>25</td>
<td>4</td>
<td>21</td>
<td>5 units of 100 TPD capacity each</td>
<td>Biomethanation**</td>
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<tr>
<td>Kanjur</td>
<td>4,000</td>
<td>65</td>
<td>65</td>
<td>-</td>
<td>• 1,000 TPD Composting</td>
<td>Composting + Bioreactor Processing</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Bioreactor landfill</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>• Sanitary Landfill</td>
<td></td>
</tr>
<tr>
<td>Deonar</td>
<td>2,000</td>
<td>132</td>
<td>55</td>
<td>65</td>
<td>• 2,000 TPD Composting</td>
<td>Composting</td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>• Sanitary Landfill</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>• Emergency Sanitary Landfill</td>
<td></td>
</tr>
<tr>
<td>Gorai</td>
<td>-</td>
<td>20</td>
<td>-</td>
<td>19.6</td>
<td>• Impermeable liner (geomembrane and geosynthetics)</td>
<td>Scientific Closure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Leachate and LFG Collection and Conveyance system</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Flaring System</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Landscaping</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6,500</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Gorai Dumping Ground

- Gorai Site is spread over an area of 19.6 Ha and is located very close to Gorai creek and habitation
- Site was operational since 1972 and received up to 1,200 TPD of MSW until Dec. 31, 2007
- Continuous dumping of waste had exhausted the balance life of landfill
  - About 2.34 million of waste up to an average height of 26 m was lying at the site at the time of site hand over to the Contractor (May 2007)
Aerial View of Gorai Disposal Site
Open Dumping at Gorai Site
General Environmental Conditions
Site Conditions During Monsoon
GORAI CLOSURE PROJECT

Name of the Project : Scientific Closure of Gorai dumping Ground & its Subsequent Maintenance

Client : Municipal Corporation of Greater Mumbai

Project Advisors : M/s IL & FS / IL&FS Ecosmart Limited

Contract Awarded To : JV formed between M/s Vanderwiel Strotsgas BV (Netherlands) and M/s United Phosphorous Limited (Mumbai)

Project Duration : Two years for Execution of Civil Works followed by 15 years of O&M

Total Contract Value : Rs. 500 million; Rs. 120 million (O&M cost for a period of 12 years)
SALIENT FEATURES OF THE PROJECT

- Receiving, Relocating, Leveling, Reformation and dressing of existing MSW

- Laying of Cover Layer(s) which includes laying of
  - 300 mm thick C & D layer
  - 400/200 gsm Geotextile layer
  - 1.5mm thick textured/non textured HDPE Geomembrane
  - Geo composite layer
  - 300mm thick Top Soil layer
  - Vegetation Layer (green landscape)

- Construction of Sheet Pile, Boundary Wall, Storm Water Drain, Office Building, Internal Roads, and Walkways

- Construction of Gas and Leachate Collection Wells and sumps

- Installation of Gas Blower, Gas Burner and a Flaring system
Laying of Liner System: Top Flat Area

- SLOPE > 4%
- VEGETATION LAYER

Top Soil: 300 MM
GEO COMPOSITE (GEO-ET+BOTHSIDE GEOFABRIC)
1.5 MM HDPE GEOMEMBRANE SMOOTH

200 GSM GEOFABRIC (N.W.N.P.)

- ADDITIONAL SAND/SILT LAYER (75 MM THICK)
- ADDITIONAL LAYER OF AVAILABLE SOIL (100MM)

- 300 MM C & D MATERIALS

COMPACTED MSW
Laying of Liner System: Slopping Area

Layer Description:
- **Vegetation Layer**
- **300 mm Top Soil**
- **1.5 mm HDPE Geomembrane (Both Sides Textured)**
- **400 GSM Geo Textile (N.W.N.P)**
- **Additional Sand/Silt Layer (75 mm Thick)**
- **Addition Layer of Available Soil (1000 mm)**
- **300 mm C&D Materials**
- **Compacted M.S.W.**

Diagram elements include:
- Geo-Composite (GEO-NET+Both Sides Geotextiles)
- Geocomposite layers and their respective thicknesses.
LAYOUT OF THE LANDFILL GAS COLLECTION WELLS

40 Landfill Gas Collection Wells
CDM Project Features - Gorai

- The Project Captures and destroys methane emissions from anaerobic decomposition of Municipal Solid waste

- Estimated CERs over a period of 10 years: 1.2 million

- High standards of compaction, cover, gas collection and leachate control and treatment, air quality, water quality, noise and odor control

- Regular monitoring

- Isolation of the waste from coastal water bodies and provision of Green Belt
Past Initiatives of MCGM for CDM Project

• MCGM invited tenders three times to select the consultants for the project

• In response to the first invitation, the Bidder backed-out after submitting the proposal, quoting high up-front payment

• In response to the second invitation, the Bidder quoted low up-front payment. Hence MCGM rejected the offer

• MCGM therefore decided to appoint a consultant for completing the CDM formalities

• In response to the third invitation, IL&FS has been selected as a consultant for the CDM project
**Scope of Work of IL&FS Ecosmart as a CDM Consultant**

- Preparation of Project Idea Note (PIN), Project Concept Note (PCN), Project Design Document (PDD); baseline study
- Obtaining Host Country approval from Govt. of India
- Selection of Designated Operational Entities (DOE) for the project; coordination with DOE for validation, verification and registration of the project with UNFCCC: Det Norske Veritas, Oslo, Norway is doing the validation for Gorai.
- Training Operator to implement monitoring protocols and audits
- Submission of verification report to UNFCCC, facilitate issue of CER
- Negotiate with buyer to get optimal CER price
- Assisting MCGM in selection of Operator for Installation, Operation and Maintenance of Gas to Energy Project
**CDM Project Time Line**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Various Steps of the Project</th>
<th>Date of Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Work awarded for SWM Consultancy by MCGM to IL&amp;FS</td>
<td>May 2005</td>
</tr>
<tr>
<td>2.</td>
<td>First Local Stakeholders Consultation</td>
<td>November 2006</td>
</tr>
<tr>
<td>3.</td>
<td>Detailed Project Report Submitted to MCGM</td>
<td>October 2007</td>
</tr>
<tr>
<td>4.</td>
<td>Signing of Concession Agreement between MCGM &amp; UPL for the closure activity</td>
<td>October 2007</td>
</tr>
<tr>
<td>5.</td>
<td>Appointment of IL&amp;FS Ltd. as CDM Consultant by MCGM</td>
<td>April 2008</td>
</tr>
<tr>
<td>6.</td>
<td>Use of UNFCCC Approved Methodology to calculate CER</td>
<td>May 2008</td>
</tr>
<tr>
<td>7.</td>
<td>Submission of Project Idea Note</td>
<td>June 2008</td>
</tr>
<tr>
<td>8.</td>
<td>Submission of Project Concept Note</td>
<td>July 2008</td>
</tr>
<tr>
<td>10.</td>
<td>Application for Host Country Approval (HCA)</td>
<td>August 2008</td>
</tr>
<tr>
<td>11.</td>
<td>Appointment of Designated Operational Entity (DOE)</td>
<td>August 2008</td>
</tr>
<tr>
<td>13.</td>
<td>Press Conference for the Project</td>
<td>November 2008</td>
</tr>
<tr>
<td>15.</td>
<td>Commercial &amp; Legal Negotiation with the buyer, assuring off take of CERs generated from the project</td>
<td>June 2008-January 2009</td>
</tr>
<tr>
<td>16.</td>
<td>Identification of Buyer</td>
<td>January 2009</td>
</tr>
<tr>
<td>17.</td>
<td>Issuance of draft validation Report</td>
<td>January 2009</td>
</tr>
<tr>
<td>18.</td>
<td>Issuance of Host Country Approval (HCA) by National CDM Authority</td>
<td>February 2009</td>
</tr>
<tr>
<td>20.</td>
<td>Advance Received from Asian Development Bank</td>
<td>September 2009</td>
</tr>
<tr>
<td>21.</td>
<td>Registration with UNFCCC</td>
<td>February 2010</td>
</tr>
</tbody>
</table>
• Ecosmart was instrumental in getting an ERPA signed with Asian Development Bank
  – MCGM will get an advance of Rs. 267 million for the CER’s sold until 2012
  – The total expected revenue generation for the CER’s is Rs. 729 million

• The project demonstrates that the carbon credit finance mechanism can catalyse environmentally sustainable and financially viable closure of existing dumping sites
Main features of ERPA with ADB

- Advance given without any Bank/Corporate Guarantee

- ADB would off-take first 300 thousand CER generated from the project till 2012 and first 125 thousand ER generated (VERs) from the project in 2013-14 and provide a prepayment of 267 m INR in 2009.

- Willingness of the buyer to sign contract for post 2014 CERs after March, 2009 once payment of the first contract has been made.

- After repaying ADB’s Prepayment, remaining (approximately 50%) of CERs from the project will still be available to be sold in spot market to retain upside exposure for rise in CER prices

- ADB would provide technical support to the project for registration of project.
Total CER Generation from the project over 10 year period: 1.2 million

Total expected revenue generation from the CERs: Rs. 729 m (approx.)


: 125,789 VERs (2013-2014)

Revenue available through ERPA: Rs. 267 m
<table>
<thead>
<tr>
<th>Project Name</th>
<th>Expected CER from Closure</th>
<th>Expected CER from Processing</th>
<th>Expected Total CER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanjur</td>
<td>0</td>
<td>69,55,333</td>
<td>69,55,333</td>
</tr>
<tr>
<td>Mulund</td>
<td>1,55,634</td>
<td>17,58,810</td>
<td>19,14,444</td>
</tr>
<tr>
<td>Deonar</td>
<td>6,36,000</td>
<td>27,12,844</td>
<td>33,48,844</td>
</tr>
<tr>
<td>Total</td>
<td>7,91,634</td>
<td>1,14,26,987</td>
<td>122,18,621</td>
</tr>
</tbody>
</table>
Benefits to City

Project Benefits:

- Quality of life of people of Gorai improved.
- Quality of marine life improved.
- Market value of property in the area increased resulting in increases in property tax collection to MCGM.
- Fishermen’s income increased because of better marine environment.
- Mangroves got rejuvenated resulting in healthy biodiversity in this region.
- 19 ha. of green lung added to the City of Mumbai.
- GHG emission stopped resulting in reducing carbon foot prints in the city.
- Prevention in occurrence of problems like foul odour, fire, health hazards & breeding of flies & rodents.
- Power generation from methane of 1 MW for at least next ten years will be additional benefit.
Thank You...