NEED FOR AND STANDARD OPERATING PROCEDURES THAT NEEDS TO BE IMPLEMENTED FOR EFFECTIVE

LANDFILL MINING/BIO-MINING PROJECTS

TO BE IMPLEMENTED ACROSS URBAN AND LOCAL BODIES

Background:

Indian solid waste management development story has been plagued by the lack of proper treatment and disposal of waste. Indian urban areas have a typical treatment capacity of 25%-30% of waste, while only 20%-25% of the waste generated is disposed in scientifically engineered landfill facilities in the country. This has resulted in large area of land under open dumps, equivalent to the size of Delhi, is used for waste disposal, and getting devoid of its potential better use. The open dumps are a potential hazard to;

A. Environment due to unattended leachate generation, methane generation, other fugitive dust into the environment, and threat to ground water pollution.
B. health and hygiene of people living in nearby areas
C. people depended on waste picking/ rag picking for their livelihoods
D. infrastructure due to loss of aesthetics, and issues related to vermin and birds

The government of India after careful consideration have prioritized the removal of these open dump sites through bioremediation and biomining. The GoI mandated in the SWM Rules 2016 about exploring remediation of existing operational dumpsites for their potential of biomining and bio-remediation options based on its feasibility. Further 'Guidelines for Disposal of Legacy Waste (Old Municipal Solid Waste)' was published in 2019 by the CPCB, and NGT recommendation on the three biomining models (in Indore, Ahmedabad and Gurgaon (Bandhwari) was published in July 2019. Based on the same, and advisory on Landfill Reclamation issued by the MoHUA is being evaluated which suggests the following three models.

A. 100% work to outsourced to be outsourced to private Private Operator
B. 100% by ULB with rental equipment and manpower
C. Part by private sector (processing only) and rest by ULB (Utilization, transportation, and disposal)

Solution:

- Biomining recovers the entire land area with no residues left behind for pollution, whereas in the case of capping the area becomes unusable for at least 15 years and involves huge maintenance cost.
- Once the dumpsite is Bio-mined, the land is put to best use of alternate applications like constructing a park / children's play area, parking lot, stadium, markets etc.
- After Biomining, the dumpsite can also take the incoming fresh waste or can be converted into a resource recovery park, sanitation park or a material recovery facility according to the need of the ULB.
- Huge land area is evacuated and reclaimed by way of bio-mining and bioremediation of legacy waste, which can compensate the cost of its treatment and improves the real estate value of the site and its adjoining areas.
- RDF which is a key constituent after the Biomining process, is supplied as an alternate fuel resource (AFR) to coal in major industries, as mandated by the Hon. National Green Tribunal and the CPCB and has a tangible impact on the environment in terms of significant savings in carbon emission translating to tree seedlings grown for many years and afforestation.
- Biomining process should be done in the most scientific way with a clear four-pronged approach of:
  - Pre assessment and analysis of the dumpsite
  - Pre stabilization of the legacy waste
  - Processing and segregation
  - Responsible disposal of the aggregates with clear traceability and testing reports.

Need for review:

In many places, legacy waste management in existing dumpsites is not scientifically dealt.

- There is generally a misconception that Bio-mining and Bioremediation merely requires trommels for separation of aggregates with literally no emphasis and effort to understand the aftermath.
- There is no mechanism for monitoring the methodologies adopted while carrying out bio-mining especially- pre-stabilization and responsible disposal of aggregates.
- Some of the tenders specifically opt the option of hiring trommels from private players who are simply required to carry out operation and maintenance with an assumption that the legacy waste dump is completely degraded and simply requires segregation.
- Carrying out just operation and maintenance of the machines does not make the Private Operator anyway responsible for responsible disposal of aggregates because of which the ULB's are stuck with the bad quality aggregate and its inability to find acceptability in the market.
- Simply segregation of the legacy waste using trommels poses a lot of challenges including
  - The quality of aggregates getting compromised.
  - Compromised quality of aggregates poses a challenge for disposal of aggregates thus ensuring that they pile up and not get disposed.
  - Sometimes the private operators resort to illegally dumping of this bad quality aggregates resulting in environmental pollution beyond the actual dumpsite.
  - Unless pre-stabilization is carried out on the waste by carrying out windrows, administering bio-culture and de-odouriser, there Is a possibility of high organic content in the inert leading to leachability when used for offsite earth filling.
- In the part model and rental trommel model, the testing of aggregates does not occur as the Private Operator often tends to shy away from the task mentioning that he is just an operator and has no other responsibility other than the same.
- Private Operators are resorting to malpractices during disposal of aggregates like resorting to burning of RDF in non-permitted industries like boilers etc.

- Private Operators tend to dispose RDF in the SLF instead of inert as this would result reduction of cost to the Private Operators and the same violating the SWM Rules 2016.
- By resorting to shortcuts, the Private Operators are reducing the price of Bio-mining thus impacting the serious players and causing serious environmental concerns. Illegal dumping of RDF etc. may lead to irreversible damage to the environment when carried out offsite.

CERTAIN KEY FACTORS THAT NEED TO BE ADOPTED DURING TENDERING OF BIO-MINING CONTRACTS:

- ULB'S must not opt for trommel (single/multiple) rental model without the responsibility of disposal being given to the Private Operator. This will ensure that the responsibility of segregation of material will be Private Operator's and he will ensure that all required machineries are required for ensuring good quality material is segregated.
- ULB's must not opt for only trommel (single/multiple) model as trommels only are not enough for effective segregation of all aggregates. They must insist on machines that are listed as per CPCB Guidelines for disposal of legacy waste 2019.
- ULB's in any model must ensure that the Private Operator's carry out pre-stabilisation of waste by converting the same into windrows/cones and administering of bio-culture/de-odouriser. ULB's must insist that germination test must be carried out and results must be recorded in the form of pictures before the same is taken for processing.
- The qualification mentioned in the RFP document must have the following parts:
  - **Processing Capacity**

    It must be noted that insistence must be given that the Bidder has previously worked and completed atleast two similar projects in the ULB of population which is equal to or more than the targeted ULB where the tender is called for. This will ensure that the Bidder has the capacity to execute similar projects at scale.
  - **Processing Capability**

    The ULB must follow the Central Vigilance Commission Guidelines for assessing the Processing capability of the bidder:

Experience of having successfully completed similar works during last 7 years ending last day of month before the one in which applications are invited should be either of the following: -

- Three similar completed works costing not less than the amount equal to 40% of the estimated cost.

  or

- Two similar completed works costing not less than the amount equal to 50% of the estimated cost.

  or

- One similar completed work costing not less than the amount equal to 80% of the estimated cost.

➢ **Disposal Capability**

ULB's must insist that the Bidder has responsibly disposed RDF and inert to the tune of atleast 8% and 10% respectively from the projects that the Bidder uses under qualification for which the proof in terms of Co -processing Certificates from clients with Unique Reference Number and letters from the Executive Engineers of the ULB's are attached.

➢ **Compliances**

It must also be insisted that the Bidder has obtained Authorization, CTO from the respective State Pollution Control Boards for any of the Bio-mining projects they have executed till date to ensure that the Bidder has followed all compliances in relation to the project.

In all the above cases, it must be noted that "similar projects" would mean Bio-mining/ Bio-remediation of legacy waste including disposal of aggregates.

- The ULB's must insist on following all the procedures for legacy waste management as outlined in the following:
  - SWM Rules 2016;
  - CPHEEO Guidelines for SWM 2016;
  - CPCB Guidelines for disposal of legacy waste 2019.
  - SBM Advisory on Landfill Remediation/Mining 2020.

- The ULB's must ensure that the following methodologies must be adopted in relation to monitoring of disposal of all fractions generated from the bio-mining process:

  - **GLASS:**

  There are two possible buyers of glass in the industry today namely

  (a) Recycling industries and (b) traders

  The underlying problem in supplying to the glass recycling industries is that they require accurate sorting of glass based on (1) colour (2) characteristics (3) dust free. Hence, performing these activities in the bio-mining sites becomes time consuming, requires large space for operation. However, if there are still industries that are happy to accept the same, then it may be supplied against which proper Certificates has to be obtained. The certificates must be on their letterhead, mentioning their GST Number, and full address with contact number. A copy of NOC obtained by the Industry from the State Pollution Control Board may also be obtained to ensure that they are genuine recyclers.

  In case of supplying to the traders, the following documents may be obtained:

  1. Any internal document from the company registering the sale like Invoice/ Delivery Challan which essentially mentions the name of the commodity, quantity, date etc.
  2. A photograph of the material loaded over the vehicle clearly showing the vehicle and it has to match the Vehicle number mentioned in the Invoice. The photograph taken must have the date embossed.

  In all the cases, weigh bridge slips may be kept in original for verification throughout the contract period.

  - **TYRES:**

  There are three possible buyers of glass in the industry today namely (a) tyre recycling plants (b) pyrolysis plants and (c) traders

  The tyre recycling industries hunt only for scooter and car tyres as those are the only ones which can be recycled. However, it is often observed that such tyres are already scavenged from the landfills and what remains are mostly the cycle tyres which have very less buyers. It is also true that the cycle tyres are not suitable in pyrolysis plants. However, if there are still recycling industries and pyrolysis plant buyers for the tyres the same may be supplied to them with proper traceability documents. Proper certificates must be obtained from them on their letterhead,

mentioning their GST Number, and full address with contact number. A copy of NOC obtained by the Industry from the State Pollution Control Board may also be obtained to ensure that they are genuine recyclers or pyrolysis plants.

In case of supplying to the traders, the following documents may be obtained:

1. Any internal document from the company registering the sale like Invoice/ Delivery Challan which essentially mentions the name of the commodity, quantity, date etc.
2. A photograph of the material loaded over the vehicle clearly showing the vehicle and it has to match the Vehicle number mentioned in the Invoice. The photograph taken must have the date embossed.

In all the cases, weigh bridge slips may be kept in original for verification throughout the contract period.

➢ SEGREGATED COMBUSTIBLE FRACTIONS:

The SCF has three possible buyers

1. Cement Industries
2. Thermal Power Plants
3. Waste to Energy Plants
4. Pyrolysis Plants

Although thermal power plants have not shown keen interest in buying the SCF till date due to technical issues in terms of feeding system and Sulphur sedimentation, the Cement companies has more of less accepted the SCF as an excellent alternate fuel. While supplying to the Cement Plants/Thermal Power Plants/Waste to Energy Plants it may be ensured that a co-processing certificate from the cement companies on their letterhead may be obtained for the quantity of the SCF they have used for co-processing. This may be obtained monthly or quarterly based on the cement company's willingness to provide them at intervals. The Certificates must have unique Reference Numbers and contact numbers of person/s to whom the client can talk for verification of its originality.

However, in case of Pyrolysis Plants, the same may be supplied to them with proper traceability documents. Proper certificates must be obtained from them on their letterhead, mentioning their GST Number, and full address with contact number. A copy of NOC obtained by the Industry from the State Pollution Control Board may also be obtained to ensure that they are genuine recyclers or pyrolysis plants.

In all the cases, weigh bridge slips may be kept in original for verification throughout the contract period.

In all the cases, it must be ensured that the Buyer has a CTE/CTO from the State Pollution Control Boards to accept RDF as their fuel.

➢ SOIL ENRICHER

The Soil Enricher may be used for the following applications (a) Agro-forestry (b) Afforestation in association with forest department (c) parks and (d) any other application barring food based crops.

It is important when supplied for such an application that the Private Operator understands whether the land belongs to a private party or the government. In case the land belongs to the government (like NHAI, Forest department, Public Works Department, Municipal Corporation) then,

1. An acceptance letter from the department may be obtained on the quantity in truck loads/ Metric tonnes clearly mentioning the application for which it is used.
2. A before and after picture of the site where the same has been used may be obtained by the Private Operator with the dates embossed on them.

In case the land belongs to a private person/company,

1. The Private Operator may sign a NOC with the landowner that he understands the soil has to be used for the specific purpose.
2. Contactor also has to obtain some proof showing that the land belongs to the said landlord or the person to whom the same is supplied has an understanding the original landlord for using the material for the specific purpose.
3. A before and after picture of the site where the same has been used may be obtained by the Private Operator with the dates embossed on them.

➢ INERT SOIL

The inert soil generated from the process can be used for possible applications like (a) Filling up low lying areas and (b) Supplying to C&D processing facilities for further applications.

In case the low-lying areas where the soil is being filled up belongs to the government departments then,

1. An acceptance letter from the department may be obtained on the quantity in truck loads/ Metric Tonnes clearly mentioning the application for which it is used.
2. A before and after picture of the site where the same has been used may be obtained by the Private Operator with the dates embossed on them.

In case the land belongs to a private person/company,

1. The Private Operator may sign a NOC with the landowner that he understands the soil has to be used for the specific purpose.
2. Contactor also has to obtain some proof showing that the land belongs to the said landlord or the person to whom the same is supplied has an understanding the original landlord for using the material for the specific purpose.
3. Private Operator also has to obtain a letter mentioning the number of truck loads/Metric Tonnes that has been dumped in the said site once the site is completely filled up.
4. A before and after picture of the site where the same has been used may be obtained by the Private Operator with the dates embossed on them.

- **INERT STONES**

The inert stones generated from the process can be used for possible applications namely (a) Filling up low lying areas and (b) Supplying to C&D processing facilities for further applications.

In case the low-lying areas where the stones is being filled up belongs to the government departments then,

i. An acceptance letter from the department may be obtained on the quantity in truck loads/ Metric Tonnes clearly mentioning the application for which it is used.
ii. A before and after picture of the site where the same has been used may be obtained by the Private Operator with the dates embossed on them.
iii. In case the land belongs to a private person/company,
iv. The Private Operator may sign a NOC with the landowner that he understands the stones has to be used for the specific purpose.
v. Contactor also has to obtain some proof showing that the land belongs to the said landlord or the person to whom the same is supplied has an understanding the original landlord for using the material for the specific purpose.
vi. Private Operator also has to obtain a letter mentioning the number of truck loads/Metric Tonnes that has been dumped in the said site once the site is completely filled up.

vii. A before and after picture of the site where the same has been used may be obtained by the Private Operator with the dates embossed on them.

➢ ANY OTHER RECYCLABLE/ RE-USABLE WASTE

This may contain metal scraps, recyclable plastics (like PET, PVC, HM, HDPE), Wooden logs, reusable garments etc.

For all the above materials being disposed, it must be ensured that

i. The buyer's certificate must be obtained mentioning for what purpose the same is being taken.
ii. A proper internal document of the Private Operator like Invoice/Delivery Challan.
iii. Weighment slip from the weigh bridge with photograph of the vehicle with material and clearly displaying the vehicle numbers.

- The ULB's must always insist on payment based on input weighment with a weighbridge facility with live monitoring. Payments must not be based on volume reduction basis as it is always prone to manipulation. The trucks used for weighment must be fixed with RFID ensuring that they are tracked online.
- The sites with less than 1 lakh MT versus more than 1 lakh MT must be treated differently.
- The machinery rental model must be preferably carried out only in cases of less than 1 lakh MT sites and for more than 1 lakh MT sites, complete outsourcing model must be carried out to ensure proper delivery of services.
- In the complete outsourcing model, it must be insisted that the Private Operator must follow near zero residue model with no provision for providing SLF for disposal of inert. This will ensure that the Private Operator would setup machinery which will ensure proper segregation and repurposing of inert. This will inturn help in complete reclamation of site rather than dumping the inert in SLF and thus developing a non-reclaimable area which cannot be used for any other purpose.
- It must be insisted that the Private Operators must apply and obtain Authorisation from the State Pollution Control Board under SWM Rules 2016 for operating the Bio-mining project in the name of the Urban and Local Bodies.
- It must also be insisted that the Private Operators must apply and obtain Consent to Operate from the State Pollution Control Board under SWM Rules 2016.

- The cost of the project must be visualized into two parts:
  - Stabilization, Processing and Segregation: The per MT cost for this service would range between Rs. 500 to Rs. 750 per MT depending on the capital expenditure investment, weather conditions, topography and dumping pattern.
  - Responsible disposal of aggregates: The per MT cost for this vary from place to place mostly depending on the distance of the dumpsite from the cement/ waste to energy plant where the RDF will be disposed. This cost may be arrived based on the Guidelines on Usage of Refuse Derived Fuel in Various Industries published by the Ministry of Housing and Urban Affairs, 2018: Page 74

Table 20. RDF transportation cost

Transportation distance (Km)	Transportation Cost (Rs./ Km/tonne)
0-30	10 to 12
30-120	7 to 10
120-250	4 to 7
250-600	3 to 4
600 -1300	2.8 to 3.2

  - It must also note that the cement plants that are considered must have the co-processing facility to offtake RDF and use it as alternate fuel.
- The project must ensure that the Health and Safety standards for all employees working at the site is taken care of with providing them with proper Personal Protective Equipment, frequent health checkups.
- It must also be ensured that Labour compliances must be strictly followed while operating such a plant.
- The Private Operators must also ensure that all monthly tests as mandated by SWM Rules 2016 must be carried out using NABL accredited laboratories.
- The Private Operators must also ensure that all daily parameters of testing like salinity, electrical conductivity, Ph and foreign matter must be checked and ensured that they are within permissible limits before offsite disposal of inert.