

# **Suggested Approach for Application of Waste to Energy (Mass Burn) for Municipal Solid Waste Management at Pune**

Presentation by

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at

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Solid Waste Management in India**

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# SCENARIO AT PUNE (2000TPD)

- High Court, NGT Directions, Public Agitation
- Environ. Degradation and Public Health Issues
- Inefficient Performance of Existing Projects due to:
  - Low Tipping Fee
  - Impractical Commitments
  - Financial Unviability
  - Lack of Application of Knowledge in Planning & Project Management
  - Passive Approach in Implementation of Environmental Regulations
  - Inadequate Political Will and
  - Lack of Primary Importance to Environ. Protection.



# WHAT WE NEED

- 100% Compliance of Environmental Regulations
- 100% Protection of Public Health & Hygiene
- Minimum Land Requirement
- ZERO cost on Citizens
- Project Subsidy for Reduced Tariff
- Asset's Life 20 years with payback in 7 years
- Recovery of Subsidy & Reduced Tariff after 7 yrs.
- Corporate Guarantee from vendor



# WAY FORWARD

- Application of Waste to Energy based on Mass Burning (even without segregation) using reciprocating grate technology capable of operating low calorific value of MSW
- Technology is environmentally sound, time tested, & successfully operating about 1600 plants in cities across the world.



# MSW TO ENERGY PROCESS FLOW



Combustible Waste  
Receiving



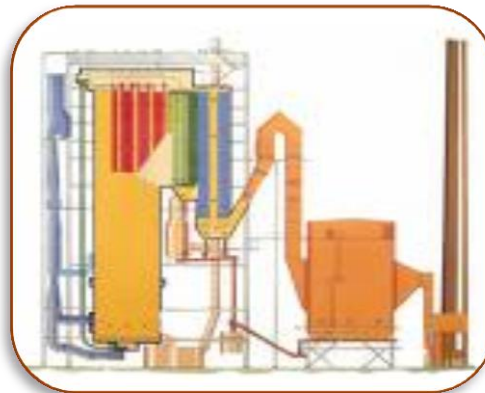
Lifting with Grab Crane



Combustible Waste  
Feeding into Hopper



Power Generation &  
Transmission

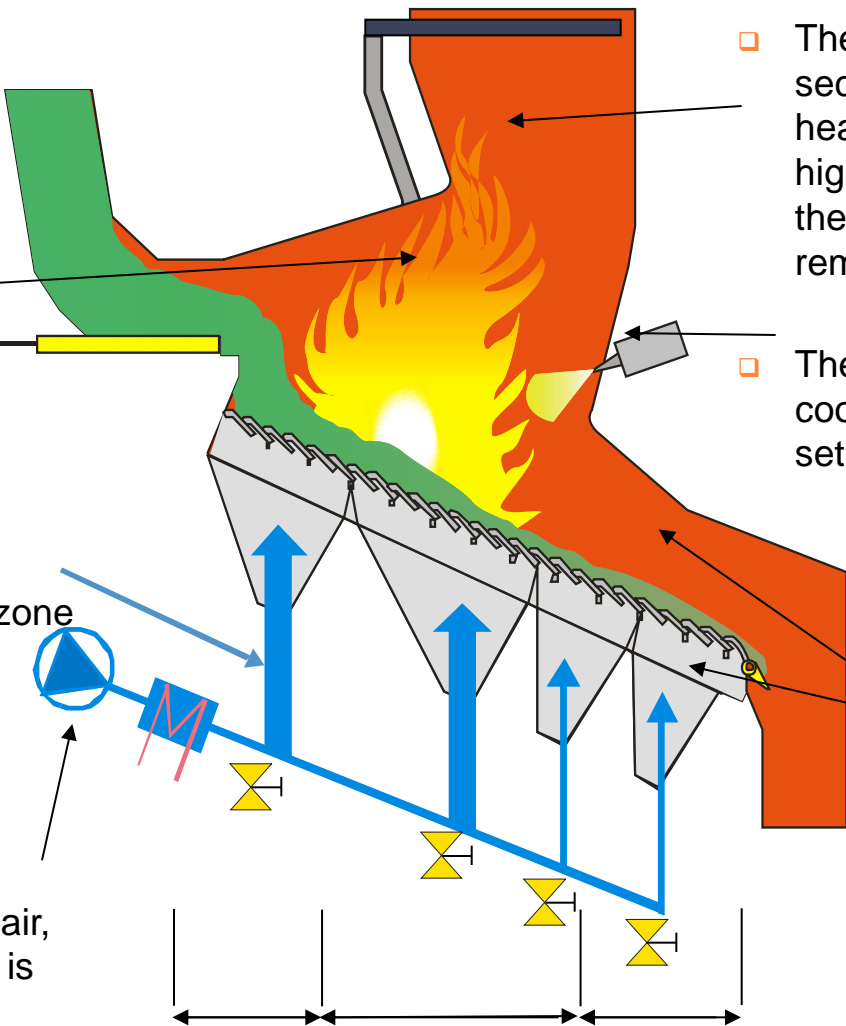


Steam Generation



Combustion

# DESIGN FOR LOW CAL WASTE BURN (ILLUSTRATED)

- 
- The combustion temperature is below  $1050^{\circ}\text{C}$  to maximally control the generation of  $\text{NO}_x$ .
  - The flue gas stays at least 2 seconds in the first flue and hearth while the temperature is higher than  $850^{\circ}\text{C}$ . Thus, the dioxins could be effectively removed in this way.
  - The form of hearth: no water cooling, the refractory brick is set in the combustion chamber
  - Four independent combustion air control zone in this direction.
  - Heat the primary combustion air and secondary combustion air, the lowest temperature is  $220^{\circ}\text{C}$ .
  - Increased length of fire grate and rear arch to make rubbish fully burnt and reduce mechanical load and heat load of furnace grate



# PROJECT PROPOSAL

- Capacity : 2x600 TPD
- Type of waste : Mixed waste
- Calorific Value : 1100 to 2200kcal/kg
- Technology: Mass Burning (Grate Technology)
- Furnace : Grate Furnace
- Flue gas treat. : Evaporation cooler /semidry,  
Bag Filter
- Electrical power : 2 x 11.5MW
- Land required : 5 Acres per unit + 5 Acres  
Landscape



# BUSINESS MODEL FOR PUNE

## Capital & Operational Cost:

- A. Capital cost for 2x600 TPD MSW mass burning with grate technology plant is estimated @ Rs.292 Cr + subsidy Rs.100 Cr = Rs.392 Cr.
- B. Rs. 2700/MT is the total cost of operations including interest, depreciation, manpower. This is equal to Rs.104 Cr. /year
- C. Rs. 2000/MT can be recovered from sale of power at Rs. 5.8/Unit. This is equal to Rs. 77 Cr/year
- D. Rs. 30/family/per month (12 lac families) levy will yield revenue of Rs. 44 Cr.
- E. Hence, Rs. 17 Cr will be surplus after (C+D)-B
- F. Therefore, subsidy will be recovered in first 6 years. PMC will save Rs.22Cr per year which is being spent today @ Rs.700/MT for 1000 MT/day of MSW.





# MODIFIED PPP MODEL

- “Modified PPP” model proposed with capital grant of Rs. 100Cr. from the client Local Body and/or Government
- Operator to arrange rest of the finance for capital investment and operation & Maintenance for 7 years
- Transfer of Assets to PMC after 7 years
- Expected life of 20 years for the assets created



# OPERATOR'S LIABILITY

- Processing and disposal of 1200 TPD MSW and generate minimum 20 MW (24-hr average) electricity.
- Operator to submit corporate bank guarantee as proof of feasibility of technology to generate committed quantity of power.
- Plant life shall be at least 20 years and operator shall operate and maintain plant for minimum period of 7 years. This can be extended thereafter based on mutual agreement.
- MSW processing and disposal cost of waste works out to be average Rs. 2700 per MT.



# SUPPORT REQUIRED FROM PMC/GOVT. (1)

- Provide 1200TPD mixed waste at site.
- Grant Rs.100Cr as subsidy for project
- Pay MSW processing and disposal cost @ Rs. 2700/MT
- Establish its own or hire power grid transmission system so as evacuate electricity generated at the facility by the Operator.
- Utilize power for own purpose or Sale to other users. This means PPA is not in the scope of the operator.
- In case the energy/power tariff is @ Rs.5.80 per unit as prevailing today, Rs. 2000 per MT can be recovered by the PMC/Govt. from the sale of energy.



## SUPPORT REQUIRED FROM PMC/GOVT.(2)

- Rs.700 per MT can be recovered from public by levying MSW P&D charges @ Rs. 30 per month per family from the 12 Lacs families in Pune city.
- Fast track system to be established for timely payment of P&D charges to the operator through an escrow account.
- Regular monitoring of plant operations in terms of power generation, efficient operation & maintenance and compliance of environmental and other regulations.



# BENEFITS OF WASTE TO ENERGY

- 90% DRE : *500 MT of MSW will become 50 MT inert ash in 24 hrs.*
- Bottom ash for RMC, Bricks etc.
- Fly ash disposal in SLF
- Best Available Technology (BAT): Maximum Resource Recovery
- Minimum waste re-handling for better ensuring health & safety
- Fully automatic process
- No odour, No smell, No fly/mosquito menace
- 100% Compliance of Environmental regulations.
- No ground water contamination.
- Not Land-intensive
- Customised for India due to its un-segregated low calorific value waste
- EST and ESM in place.



# ROAD MAP

- **Step 1:** Appoint High Powered Expert Committee for Transaction of Application of W2E (Mass Burn) for Management of MSW at Pune.  
(Action: Immediate)
- **Step 2:** Engage Expert Agency for Preparation of DPR and Draft RFQ and RFP ( Action: 3 months)
- **Step 3:** Engage Transaction Advisory for Procurement of Operator.  
(Action 4 months)
- **Step 4:** Agreement between PMC and Operator and Appointment of Independent Engineer for Project Implementation (Action: 1 month)
- **Step 5:** Project Implementation (18 months)
- *High Powered Committee to coordinate, supervise and recommend actions regarding project implementation.*



# *FOR SMARTER CITIES WE NEED:*

- ***SMARTER POLITICIANS***
- ***SMARTER BUREAUCRATS AND***
- ***SMARTER CITIZENS***

*-INDIA TODAY, DEC., 1, 2014*

## **THANKS**

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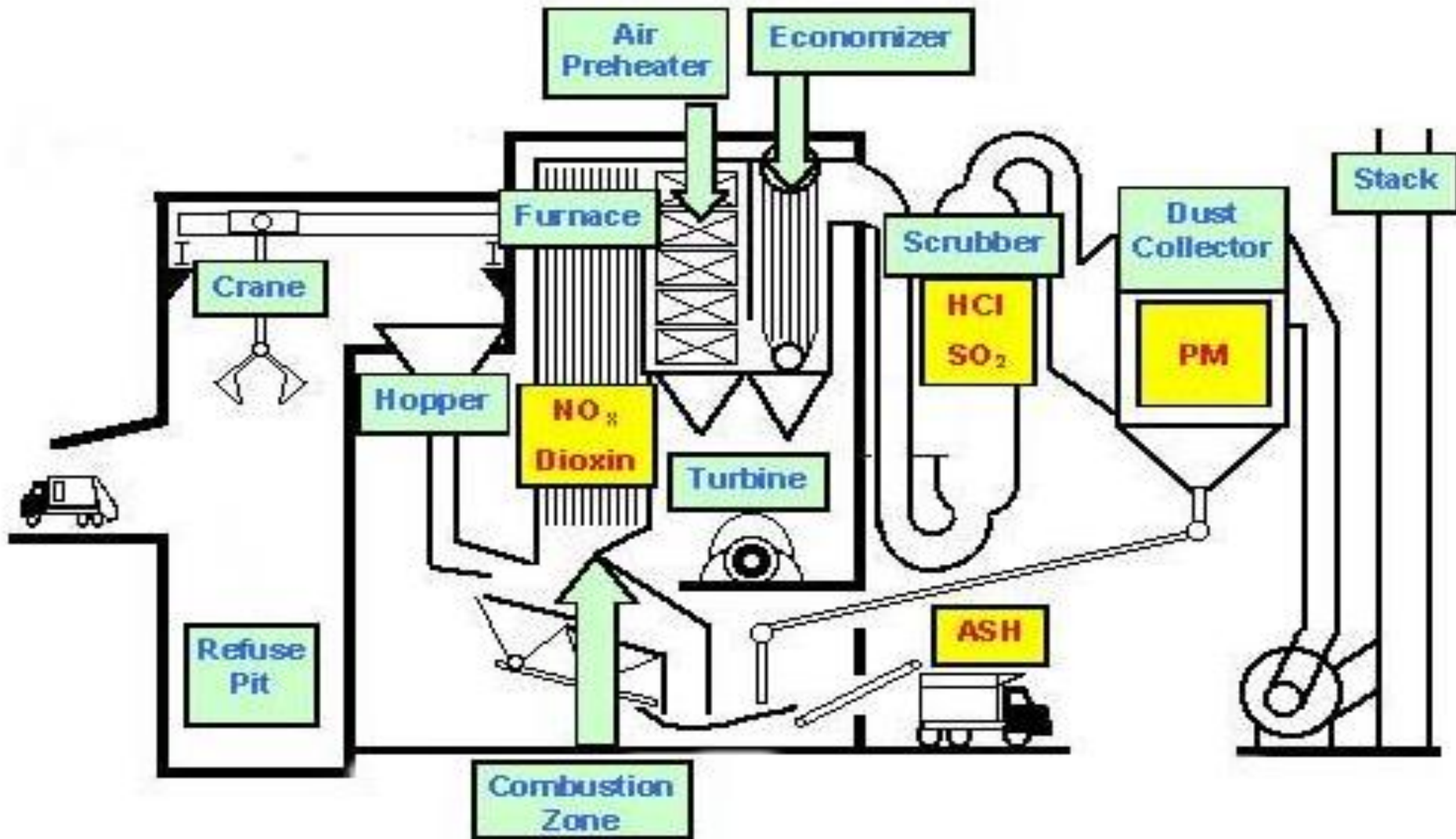
# POLLUTION MITIGATION

- Semi dry Flue gas system consists of
  - Reaction tower,
  - Lime slurry making system,
  - high speed atomizer,
  - Bag filter and stack .
- Removal of acidic components in the flue gas by injection of hydrated lime
- The flue gas is further treated by injecting Activated carbon for reducing Dioxins /Furans levels to  $< 0.1 \text{ mg/Nm}^3$ .
- Online environmental monitoring





# EMISSION CONTROL



# STACK EMISSION STANDARDS

Parameter	Environmental Regulations in India
Particulate matter	30 mg/Nm <sup>3</sup>
Sulphur Dioxide (SO <sub>2</sub> )	100 mg/Nm <sup>3</sup>
Oxides of Nitrogen (Nox)	350 mg/Nm <sup>3</sup>
Hydrochloric Acid (HCl)	50 mg/Nm <sup>3</sup>
Dioxins & Furans	0.1 ng/Nm <sup>3</sup> TEQ
Carbon Monoxide (CO)	100 mg/Nm <sup>3</sup>
Cadmium (Cd)	0.1 mg/Nm <sup>3</sup>
Lead (Pb)	0.1 mg/Nm <sup>3</sup>
Mercury (Hg)	0.02 mg/Nm <sup>3</sup>
Hydrofluoric Acid (HF)	0.5 mg/Nm <sup>3</sup>
Stack Height	Minimum 30m



## WASTE TO ENERGY (MASS BURN) PROJECTS: INDIA

- Timarpur, Delhi, 1300 TPD, 16 MW, PLF > 85. Chinese technology. *(Project operating since 2012).*
- Narela-Bawana, Delhi, 1600 TPD, 24 MW, Chinese technology. *(85% project complete)*
- Jabalpur, 600 TPD, 11.5 MW, Japanese technology. *(Project under implementation)*
- Taloja, MMRDA, 1900 TPD, 30 MW, Chinese technology. *(Project aborted due to administrative reason)*

