

# **Solid Waste Management**

## **A Global perspective with timeline and SWOT**

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## **Concept Outline** *Waste to warming*

- Nature was taking care of its waste from stone age till agro based economy of human development
- destruction was inherent in the product produced by nature or by human activity
- Till a few centuries back, Till the industrial revolution.
- The fallout was of longer product cycle and end-residue was harmful to the nature

## Concept Commissioning

- *While the industrial revolution was consolidating, the territorial hegemony overtook all other collective human desires*
- *And so we were busy fighting for the full first half of the forgone century.*
- *While overcoming the hangover of the wars, and stabilizing the development process, giving momentum to it, we have stumbled with the issues of population explosion, rapid urbanization, and related consequences*
- *And then the Nature gave a hint of total life destruction, making us to sit up and be cautious of destruction processes of products after our consumption.*

## *Human Initiative*

- This was early seventies when, The concept of sustainable development at the UN Conference on Human Environment (Stockholm, 1972) took shape,
- Then the international community met for the first time to consider global environment and development needs.
- The 20th anniversary of Stockholm took place in 1992 in Rio de Janeiro. The UN Conference on Environment and Development, the "Earth Summit", agreed on Agenda 21 and the Rio Declaration.
- The Summit brought environment and development issues firmly into the public arena. Along with the Rio Declaration and Agenda 21 it led to agreement on two legally binding conventions: **Biological Diversity** and the **Framework Convention on Climate Change (FCCC)**.

# The KYOTO Protocol

- The Kyoto Protocol is a document signed by about 180 countries at Kyoto, Japan, in December 1997.
- The protocol commits 38 industrialized countries to cut their emissions of greenhouse gases between 2008 to 2012 to levels that are 5.2 per cent below 1990 levels.
- Now the question is -How are greenhouse gases produced and what impact do they have on the environment?
- Greenhouse gases is a term used for gases (like carbon dioxide) which are mainly generated as a result of burning fossil fuels like coal, petrol and diesel.
- While, the use of these fuels have helped industrialization enormously, it has caused a steady increase in levels of carbon rich gases and other pollutants. Scientists predict that higher levels of greenhouse gases will cause a significant warming of the earth by about one to five degrees Celsius.
- This could cause potentially disastrous changes in the environment like violent storms, expanding deserts and melting ice caps, causing sea levels to rise and engulf coastal regions.
- According to one estimate, global warming could cost the world about \$5 trillion. Developing countries are expected to be the hardest hit.

## ***SOLID WASTE MANAGEMENT***

- ***The post war human migration and urbanization gave rise to the issue of management of its various facets including municipal solid wastes.***
- ***The laws were enacted and implemented world over in various stages and various forms.***
- ***While you will learn the stages of municipal solid waste disposal in forthcoming presentations, I would like to mention that it all started in seventies in developed world.***

## ***SOLID WASTE MANAGEMENT*** ***as mostly executed***

- ✓ **Twin-bin collection Approach to bin-less operations**
- ✓ **Door-to-door Collection and segregation**
- ✓ **Mechanized Transportation**
- ✓ **Managing recycling sites**
- ✓ **Fee collection services**
- ✓ **Road sweeping and emptying bins**
- ✓ **Waste processing to minimize dumping**
- ✓ **Waste to bio-fuel (diesel) processing as alternative**
- ✓ **Composting and vermicomposting**
- ✓ **RDF plant with captive power generation**
- ✓ **Sanitary and engineered landfills**
- ✓ **Research & Development program**

## ***SOLID WASTE MANAGEMENT as being developed***

- ✓ **Zero waste concepts and waste free societies**
- ✓ **No more land fills or waste dumping sites**
- ✓ **Specialized waste treatment technologies due to funding availability in this sector**
- Optimization of the waste processing with IT integration**
- ✓ **Emphasis on house hold hazardous waste, segregation, collection and processing**

## Integration of the process is the need of the hour -

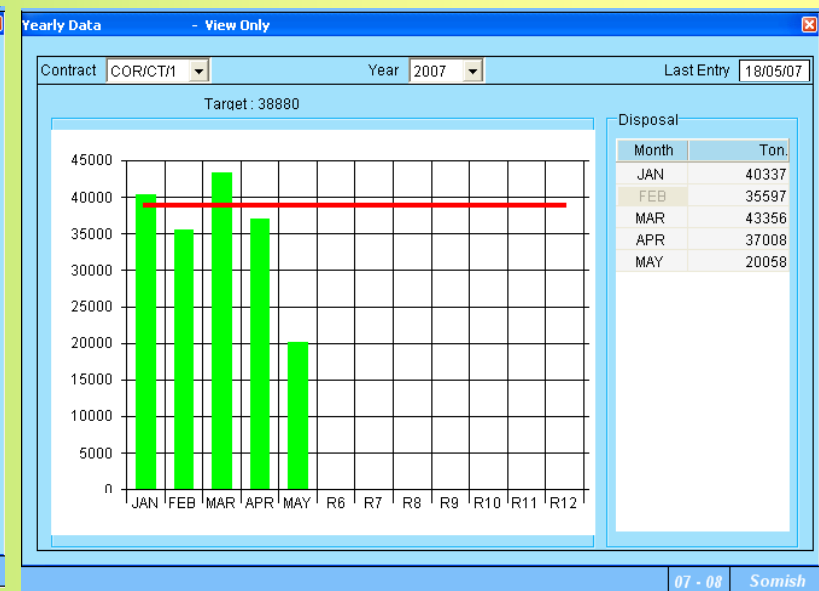
IWM systems combine all waste streams, waste collection, treatment and disposal methods, with the objective of achieving environmental benefits, economic optimization and societal acceptability by optimizing the total process with IT databases and processes automation including monitoring.



# Examples of ERP

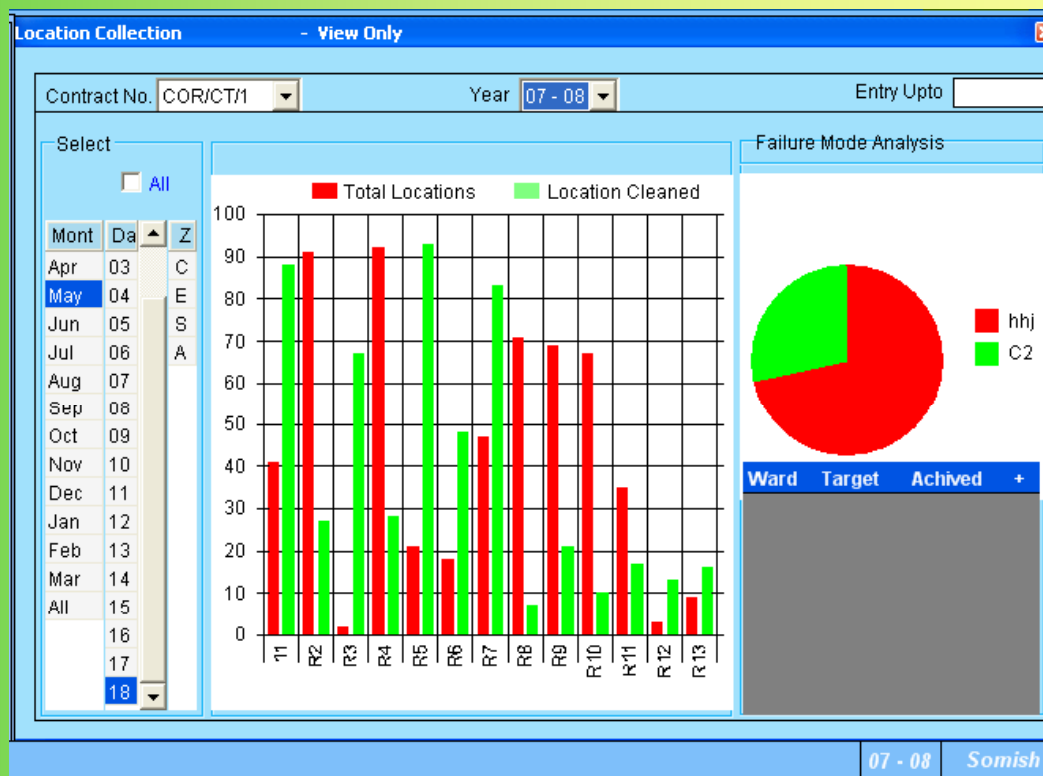
## Monthly Performance Review of Disposal

## Monthly Review of Disposal Progress



# Examples of ERP

## Collection Location



# Outline of the Integrated Waste Processing Facility

- Pre-Sorting stage
- Composting stage
- Recovering of compost
- Recovery of RDF
- Recovery of recyclables
- Disposal of inerts

## *Pre-sorting Stage*

- Waste is carried to the Processing facility.
- Material is fed to Trommel screen for mechanical segregation of inerts (Road sweepings), Compostable fraction & Oversized fraction.
- From oversized fraction separation of bulky matters like wood, metals, and concrete blocks is done. Plastics is sent to recycling or RDF facility.
- All compostable material is be sent to composting area after removal of plastic or inerts if any.

## *Composting Stage*

- The Compostable material is sent to compost pad.
- The material is stacked in form of windrows.
- Special cultures are used to accelerate composting and suppress odour.
- Periodic turning converts all organic fraction in compost.



**Formation of Windrows**



[www.esrfindia.com](http://www.esrfindia.com) **Turning of Windrows**

## *Composting*

- The digested material is dried in shed
- The dry material is fed in machines to separate various fractions.
- At intermediate stage material is again stored for another 15 days to stabilize the compost.
- Final screening and destoning is done to recover good quality of compost.

## *Composting contd.*

- The compost can be enriched to specified quality as per market & seasonal demands.
- All intermediate fractions can be sent for further processing / storage.
- The complete process is mechanized and involves no human interaction.
- Equipments used can be indigenously developed to give low maintenance & trouble free working.

## ***RDF***

- All Non-composted portion can be separated out from the compost bulk.
- This material can be further sorted to separate recyclables and RDF material
- Manual sorting at this stage is very hygienic as during composting this material is subjected to temperatures as high as 70 degrees which sanitizes the whole mass.
- After the sorting process, it can be sold to industry like cement factories as an alternative.

## *Recycling*

- All recyclables as tires, wooden boxes, rags, paper, glass, special plastics etc. can be sorted and sent to respective storage yard.
- In storage yard this material can be further cleaned & processed as per market requirements .
- Finally material can be sold in open market.

## *Inerts*

- All inerts recovered at various stages will be sent to fill low lying area.
- The bulky inert material is used for construction purposes, covering of landfills, and river bands.

## *Separation of Plastics*

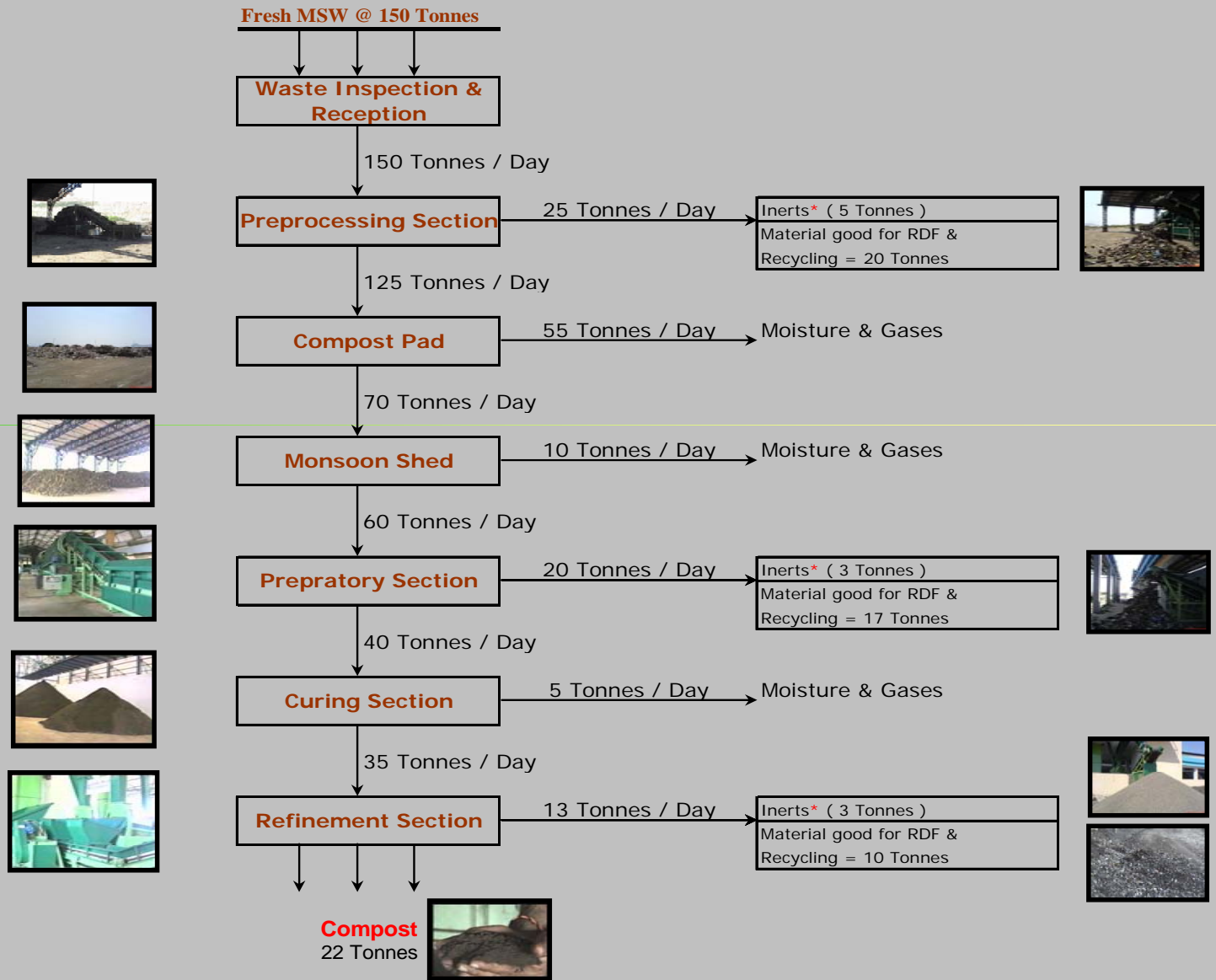


## *Separation of Inert/girt*



# MUNICIPAL SOLID WASTE PROCESSING PLANT

## MATERIAL FLOW CHART



\* Inerts will be reduced with minimization of C&D in Municipal Solid Waste coming to facility

All Values are approximate & will vary as per site , material & seasonal variations.

## System Benefits

- Most Economical and scientific method to dispose waste.
- The technology is proven, so no experiments on public money.
- Acceptable as most appropriate technology for south Asian countries.
- The compost is very high grade organic manure which is highly needed to replenish the soil fertility.
- No other source can give this huge amount of compost as required in India.

## System Benefits Contd.

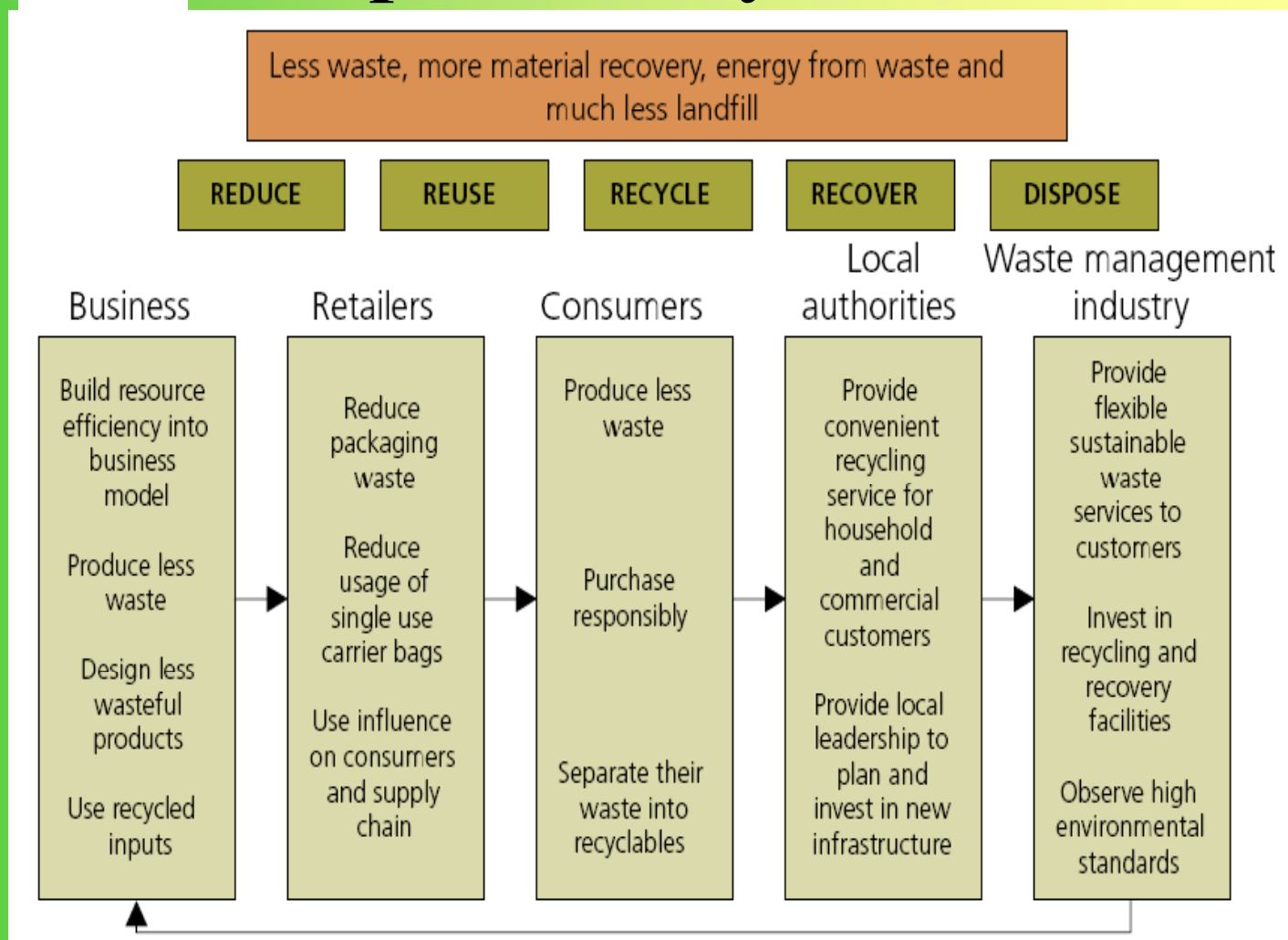
- The material sent for sanitary landfill is very low which will save valuable land and money involved in development of SLF.
- All recyclables will be utilized this will enable many people to get employment related to recycling industry.
- RDF recovered will be utilized in industries which reduces dependency on coal

**The only Integrated Waste  
Management Strategy  
ensures**

**ZERO waste concept  
implementation.**

**WASTE FREE SOCIETY**  
**Be the aim**

# Moving to a no waste system needs shared responsibility



## **This Vision at a glance**

- **Aim to promote efficient use of natural resources and reduce the impact of waste on climate change.**
- **Rapidly changing face to a waste processing industry similar in philosophy and management to a manufacturing industry.**
- **Moving away from landfill to reduction, recycling and use of new technologies.**
- **Industry made up of national and local government, the regulator, industry, support services and business supply chain.**
- **To promote resource efficiency and break the link between economic growth and waste growth.**
- **Generation of more employment from lower level to technocrats & management and social welfare program**

# Waste Management

- At the time of our existence together ,the present shared life and breath,
- The harmony with nature is essential and this to be in a progressive sustainable mode
- SO LETS WORK FOR “ ***TO GIVE BACK TO THE NATURE IN NATURALLY HARM LESS FORM***”
- And ***lets do this good work together***

***SWOT***  
***On***  
***Environmental***  
***Entrepreneurship***

## ***Strengths***

- 1. Innovation driven***
- 2. Sustainability movement***
- 3. Climate change Crisis***
- 4. Rapid urbanisation***
- 5. Technological acceleration***

## ***Weaknesses***

- 1. Innovation deficiency***
- 2. Economic system profit oriented***
- 3. Lack of Environmental responsibility***
- 4. Missing Development goals***
- 5. Resources crunchs***
- 6. Sectoral Approach***

## ***Opportunities***

- 1. Waste management***
- 2. Recycling***
- 3. Social sector***
- 4. IT***
- 5. Knowledge management***
- 6. R & D***

## ***Threats***

- 1. Cost of experimentation***
- 2. Unscientific recycling***
- 3. Collection system & its cost***
- 4. Irresponsible manufacturing***
- 5. Technological integration***

*Join the mission-----*

*“Zero Waste –  
Total Recycling”*

**THANK YOU !!**

**Team ESRF**  
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