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CERTIFICATION COURSES


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## INTEGRATED WASTE MANAGEMENT FOR A SMART CITY FOCUSED ON MSW, C&D AND E-WASTE MANAGEMENT

BRAJESH KUMAR DUBEY  
DEPARTMENT OF CIVIL ENGINEERING

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### Duties of Ministry of Urban Development



- Formulation of **National policy and strategy** on SWM including policy on Waste to Energy
- Undertake **training and capacity building** of local bodies and other stakeholders
- Provide **technical guidelines** and **project finance** to states, Union territories and ULB's in meeting timelines and standards.
- Conduct **periodic review** on he measures taken by the states and local bodies at least **once in a year**


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### During this week (Week-4)

- Solid Waste Management Rules -2016 – contd..from previous week
- Government Missions: SBM, Smart Cities overview
- Waste Collection, Transport, Segregation and Processing


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### Duties of Ministry of Chemicals and Fertilizers



- Provide **market development assistance** on city compost
- Ensure **promotion of co-marketing** of compost with chemical fertilizers in the ratio of 3 to 4 bags: 6 to 7 bags.
- Ensure that the fertilizer companies make compost available for marketing to the companies.

### Duties of Ministry of Power



- Decide **tariff or charges** for the power generated from the **waste to energy plants based on solid waste**.
- Ensure **purchase power generated** from such waste to energy plants by distribution company

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### Duties of MoEF & CC




- The Ministry shall be responsible for over all **monitoring the implementation** of these rules in the country.
- It shall constitute a **Central Monitoring Committee** under the **Chairmanship of Secretary**, MoEF &CC, comprising officer not below the rank of Joint Secretary or Advisor
- This Committee shall meet at least **once in a year** to monitor and review the progress. The Committee shall be **renewed every three years**.

Central Monitoring Committee members	
Ministry of Urban Development	Urban Development Departments of three State Governments by rotation
Ministry of Rural Development	Three Urban Local bodies by rotation
Ministry of Chemicals and Fertilizers	Two census towns by rotation by rotation
Ministry of Agriculture	Two subject experts, FICCI and CII
Central Pollution Control Board	Rural Development Departments from two State Governments by rotation
Three State Pollution Control Boards or Pollution Control Committees by rotation	


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### Duties of Ministry of Agriculture



- Provide flexibility in **Fertilizer Control Order** for manufacturing and sale of compost
- Propagate utilization** of compost on farm land
- Set up laboratories** to test quality of compost produced
- Issue suitable **guidelines for maintaining the quality of compost** and ratio of use of compost to chemical fertilizers on farmland.

### Duties of Ministry of New and Renewable Energy Sources



- Facilitate **infrastructure creation** for waste to energy plants
- Provide appropriate **subsidy or incentives** for such waste to energy plants.

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### Duties of the Secretary-in-charge (Urban/Rural Development)

They shall ensure the following activities within a year after release of SWM rules:

- Preparation of state policy on solid waste management
- Identification and allocation of land for setting up of waste processing facilities
- Development of master plan with all the policies and action plans
- Allocation of exclusive space for segregation, storage and decentralized processing of solid waste for Resident welfare and market associations, gated communities and institutions with more than 5,000 sqm area, hotels and restaurants
- At least 5% of the total area is allocated for recovery and recycling facility by developers of SEZ's and Industrial parks.



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### Duties of Central Pollution Control Board

- Co-ordinate with the SPCB for implementation of these rules.
- Formulate /review the standards for different units from time to time.
- Review the proposals of SPCB on use of any new technologies and prescribe performance standards, emission norms for the same within 6 months.
- Preparation of Annual Report on implementation of these rules on the basis of reports received from SPCB and submit to MOEF & CC.
- Publication of the standards and reports in website from time to time.
- Development of guidelines for maintaining buffer zone.
- Provide guidance to States or Union Territories on inter-state movement of waste.



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### Duties of the Secretary-in-charge (Urban/Rural Development)

- Development of buffer zones for SW processing and disposal facilities receiving waste more than 5 tons per day in consultation with SPCB.
- Initiate schemes for integration of informal sector into the solid waste management system
- Arrange for capacity building of local bodies in managing solid waste, segregation and transportation or processing of such waste at source
- Facilitate establishment of common regional sanitary land fill for a group of cities falling within a distance of 50 km (or more) from the regional facility on a cost sharing basis and ensure professional management of such sanitary landfills



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### Duties of State Pollution Control Board

- They shall enforce SWM rules in their State through local bodies and review on implementation of standards and new technologies at least twice a year.
- Examine the proposals received in consent with the concerned departments in the prescribed format on receiving applications from the local body or any other agency authorized by the local body.
- They should provide a documentary evidence for grant, renew or refusal of proposal after a detailed review on the application.
- For new technologies with no standards, they shall approach CPCB for getting standards specified.
- Provide directions for safe handling and disposal of domestic hazardous waste
- Regulate Inter-State movement of waste.



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### Duties of District Magistrate/Collector or Deputy Commissioner

- Facilitate identification and allocation of suitable land for setting up solid waste processing and disposal facilities to local authorities in his district.
- The process shall be done within one year from the date of notification of these rules
- Review the performance of local bodies, at least once in a quarter on waste segregation, processing, treatment and disposal.
- They shall provide the corrective measure on the same in consultation with concerned authorities



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### Responsibilities of local authorities/village Panchayat

- Prepare a SWM plan as per state policy within six months from the date of notification.
- Formulation of bye-laws incorporating the provisions of these rules within one year
- Formulate bye-laws for levying of spot fine for persons who litters or fails to comply with the provisions
- Prescribe from time to time user fee as deemed appropriate and collect the fee from the waste generators on its own or through authorized agency
- Submission of annual report in the prescribed format on or before 30<sup>th</sup> April every year.
- Make adequate provision of funds for capital investments as well as operation and maintenance of solid waste



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### Responsibilities of local authorities/village Panchayat

- Collection of bio degradable waste on day to day basis and promote decentralized composting or bio-methanation
- Monitor the environment, health and safety conditions in the facilities developed
- Establish and facilitate in integrating the authorized waste pickers, self help groups and informal sectors in collection of waste. Incentives may be provided to recycling initiatives by informal waste recycling sector.
- Involvement of communities to develop decentralized processing of waste at community level
- Establishment of waste deposition centers for domestic hazardous waste



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### Duties of the industrial units

- All industrial units using fuel and located within one hundred km from a solid waste based refused derived fuel plant
- At least five percent of the fuel requirement shall be replaced by RDF.
- The arrangements shall be made within six months from the date of notification of these rules

### Duties of manufacturers or brand owners

- Financial assistance shall be provided to ULB's for setting of SWM system.
- Mechanisms should be developed to collect non biodegradable and packaging waste generated due to their production.
- Utilization of recyclable materials shall be explored for sanitary products
- Proper disposal pouches shall be provided with packets for sanitary products
- Awareness to the masses on wrapping and disposal of their products.



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### Responsibilities of local authorities/village Panchayat

- Ensure safe storage and transportation of the domestic hazardous waste to the hazardous waste disposal facility
- Facilitate setting up of material recovery facilities or secondary storage facilities with sufficient space for sorting of recyclable materials
- Facilitate transport of non-bio-degradable waste to the respective processing facility or material recovery facilities or secondary storage facility
- Transport of construction and demolition waste as per the provisions of the Construction and Demolition Waste management Rules, 2016
- Investigate and analyze all old open dumpsites and existing operational dumpsites for their potential of biomining and bio-remediation.



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### Criteria for setting-up SW processing and treatment facility

- Suitable land should be allocated for setting up of the solid waste processing and treatment facilities by the department in-charge of allocation of Land assignment.
- The operator of the facility shall do the following
  - Design and set up the facility as per the provided by CPCB and MoUD
  - For setting up the facility necessary approvals shall be obtained from SPCB
  - Safe and environmentally sound operations should be followed as per the guidelines
  - Annual report should be submitted to SPCB or local authority as per the format on or before 30th April every year.
- SPCB shall monitor the implementation of standards periodically.



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### Responsibilities of local authorities/village Panchayat

- Create public awareness through information, education and campaign and educate the waste generators on
  - Littering and minimization of waste
  - reuse the waste to the extent possible
  - Segregation of waste, sanitary waste and domestic hazardous wastes at source
  - Home composting, bio-gas generation or community level composting
  - storage of segregated waste at source in different bins
  - Deposition of segregated waste to concerned authorities
  - pay monthly user fee or charges to concerned authorities
- Provide training on solid waste management to waste-pickers and waste collectors



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### Criteria and actions to be taken for SWM in hilly areas

- Suitable space should be allocated for setting up of decentralized waste processing facility.
- Transfers stations should be constructed at suitable enclosed locations for collection of residual and inert waste.
- Construction of landfill on the hill shall be avoided, It should be disposed in a landfill located in a plain area down the hill within 25 kilometers.
- In case of non-availability of such land, efforts shall be made to set up regional sanitary landfill for the inert and residual waste.
- Step garden system may be adopted for optimum utilization of hill space.



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### Criteria and actions to be taken for SWM in hilly areas

- Bye-laws shall be framed by local authorities to prohibit citizens and tourists from littering wastes on the streets
- Awareness should be created to deposit such waste in the litter bins at the specified locations.
- Provisions shall be conveyed to the tourists at the entry point, hotels, guest houses and tourist destinations by distribution of pamphlets and by putting suitable hoardings.
- Local body may levy solid waste management charge from the tourist at the entry point to make the solid waste management services sustainable.



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### Review of implementation of rules at Various levels

Activity	Time period
Ministry of Environment, Forest and Climate Change, Central Monitoring Committee	Every year
District Collector review on performance of Local authorities	Quarterly
SPCBs/PCCs review on implementation of Rules	half yearly
Secretary Incharge, Urban Development- State level Advisory Committee	half yearly



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### Criteria for waste to energy process

- Non recyclable waste having calorific value of 1500 K/cal/kg or more shall not be disposed of on landfills
- Utilization for generating energy by converting it into Refuse Derived fuel.
- Co-processing of high calorific wastes in cement or thermal power plants.
- The Proponent who is proposing to set up waste to energy plant of more than five tones per day processing capacity shall submit an application as per format to the SPCB
- The SPCB on receiving such application, shall examine the same and grant permission within sixty days.



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### State Level Advisory Body



- The committee shall be constituted within six months from the date of notification of these rules.
- They shall meet at least one in every six months to review the progress.
- On review, they advice to state government for taking measures in implementation of rules and policies.
- The copies of the review report shall be forwarded to the SPCB for necessary action.



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### Time frame for implementation

Activity	Time period
Identification of suitable sites for setting up Solid Waste (SW) processing facilities	1 year
procurement of suitable sites for setting up SW processing and sanitary landfill facility	2 Years
Ensure segregation of waste by the generators at source	2 Years
Ensure door to door collection of segregated waste and its transportation in covered vehicles to processing or disposal facilities.	2 Years
setting up SW processing facilities by all local bodies having 100000 or more population	2 Years
Setting up SW processing facilities by local bodies towns below 100000 population.	3 Years
bio-remediation or capping of old and abandoned dump sites	5 Years



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Annual Report		Submitted by	Submitted to	Format	Due date every year
	Step 1	Operator of facility	Local body	Form III	Before the 30 <sup>th</sup> April
	Step 2	Local body	SPCB	Form IV	Before the 30 <sup>th</sup> June
	Step 3	SPCB	CPCB and MoUD	Form V	Before the 31 <sup>st</sup> July
	Step 4	CPCB	MoEF & CC and MoUD	Review report	Before the 31 <sup>st</sup> August
	Step 5	The annual report shall be reviewed by the MoEF & CC during the meeting of Central Monitoring Committee			



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### Accident Reporting

- The Officer- in- charge of the facility shall report to the local body as per the format **Form-VI** of SWM rules Which include
  - Date and time** of accident; Sequence of events and **waste involved** in accident
  - Assessment of the **effects of the accidents** on human health and the environment
  - Emergency measures** taken; Steps taken to **alleviate the effects** of accidents
  - Steps taken to **prevent the recurrence** of such an accident
- The local body shall review and issue instructions if any, to the in- charge of the facility.

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List of Forms	Form 1	Application for obtaining authorization under SWM rules for processing/recycling/treatment and disposal of solid waste
	Form 2	Format for issue of authorization
	Form 3	Format of annual report to be submitted by the operator of facility to the local body
	Form 4	Format for annual report on SWMt to be submitted by the ULB's to SPCB
	Form 5	Format of annual report to be submitted by SPCB to CPCB
	Form 6	Accident Reporting

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### Specifications for Sanitary Landfills (SCHEDULE I)

- The specification include the criteria for
  - Site selection
  - Development of facilities at the sanitary landfills
  - Specifications for land filling operations and closure on completion of land filling
  - Pollution prevention and water quality monitoring
  - Ambient air quality monitoring
  - Plantation at landfill Site
  - Post-care of landfill site
  - Special provisions for hilly areas
  - Closure and Rehabilitation of Old Dumps

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### INTEGRATED WASTE MANAGEMENT FOR A SMART CITY

FOCUSED ON MSW, C&D AND E-WASTE MANAGEMENT

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DEPARTMENT OF CIVIL ENGINEERING

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### Standards of processing and treatment of SW (SCHEDULE II)

- The schedule includes
  - Standards for composting
  - Standards for treated leachate
  - Standards for incineration

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### SWACHH BHARAT ABHIYAN

Ministry of Urban Development, Govt. of India

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### Introduction

- According to Census 2011, India's urban population is 377 million or 31% of the total population.
- These numbers are expected to increase to 600 million by 2031.
- The Census 2011 also showed that in 4,041 statutory towns, close to eight million households do not have access to toilets and defecate in the open (7.90 million).
- Weak sanitation has significant health costs and untreated sewage from cities is the single biggest source of water resource pollution in India.
- This indicates both the scale of the challenge ahead of the Indian cities and the huge costs incurred from not addressing them.



### Mission Objectives

- Elimination of open defecation
- Eradication of Manual Scavenging
- Modern and Scientific Municipal Solid Waste Management
- To effect behavioral change regarding healthy sanitation practices
- Generate awareness about sanitation and its linkage with public health
- Capacity Augmentation for ULB's
- To create an enabling environment for private sector participation in Capex



### Introduction

- The Swachh Bharat Mission (SBM) emanates from the vision of the Government articulated in the address of The President of India in his address to the Joint Session of Parliament on 9th June 2014:  
**“We must not tolerate the indignity of homes without toilets and public spaces littered with garbage. For ensuring hygiene, waste management and sanitation across the nation, a “Swachh Bharat Mission” will be launched. This will be our tribute to Mahatma Gandhi on his 150th birth anniversary to be celebrated in the year 2019”**
- SBM is being implemented by the Ministry of Urban Development and by the Ministry of Drinking Water and Sanitation (M/o DWS) for urban and rural areas respectively.



### Mission Components

- Household toilets, including conversion of insanitary latrines into pour-flush latrines;
- Community toilets
- Public toilets
- Solid waste management
- IEC & Public Awareness
- Capacity building and Administrative & Office Expenses (A&OE)



### Swachh Bharat Urban Portal



### Mission Strategy

- Comprehensive Sanitation Planning, which includes
  - (a) City Level Sanitation Plans
  - (b) State Sanitation Concept As per Annexure IV
  - (c) State Sanitation Strategy
- Behavioral Change Strategy and IEC
- Enabling Environment for Private sector participation
- Capacity Building



### Special focus groups

- Manual scavengers in urban areas (Employment in Sanitary toilets).
- Integration of Informal sector workers in waste management (rag pickers)
- Temporary accommodation for migrants and the homeless in urban areas
- Adequate provision for toilets either on the premises or linked to a public / community toilet.
- Mandating that construction labour in urban areas have access to toilets at all sites.
- Priority shall be accorded pro-actively to cover households with vulnerable sections such as pensioners, girl children, pregnant and lactating mothers.



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### Mission Outlay

- The estimated cost of implementation of SBM (Urban) based on unit and per capita costs for its various components is Rs. 62,009 Crore.
- The Govt. of India share as per approved funding pattern amounts to Rs. 14,623 Crore.
- In addition, a minimum additional amount equivalent to 25% of GoI funding, amounting to Rs. 4,874 Crore shall be contributed by the States as State/ULB share.
- The balance funds is proposed to be generated through various other sources of fund which are, but not limited to:
 

a. Private Sector Participation	f. Innovative revenue streams
b. Additional Resources from State Govt./ULB	g. Swachh Bharat Kosh
c. Beneficiary Share	h. Corporate Social Responsibility
d. User Charges	i. Market Borrowing
e. Land Leveraging	j. External Assistance

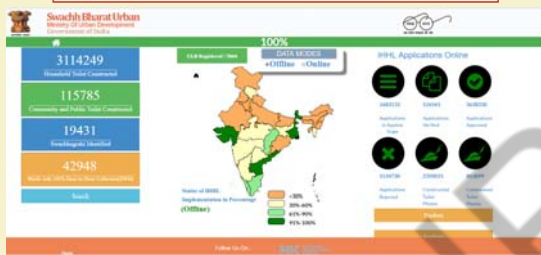


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### SBM Data Dash Board



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### Swachhata Augmentation through Corporate Helping hands



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### Open Defecation status portal



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### Mission Management Structure

- National Advisory and Review Committee (National Level, Headed by Secretary, MoUD)
- SBM National Mission Directorate (Headed by National Mission Director)
- High Powered Committee (State level, Headed by State's Chief Secretary)
- SBM State Mission Directorate
- District Level Review and Monitoring Committee (DLRMC)
- Urban Local Body level



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### SWACHH Survekshan 2017 Portal

### Smart City Mission

- Smart Cities Mission is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions.
- The Union Ministry of Urban Development is responsible for implementing the mission in collaboration with the state governments.
- The government of India has a vision of developing 100 smart cities by modernizing the existing mid-sized cities.

Source: [http://www.ncpedp.org/Smart\\_Cities\\_Mission](http://www.ncpedp.org/Smart_Cities_Mission)

### E-Learning Portal

### Self Assessment Portal

### What is a Smart City

- The conceptualization of Smart City, varies from city to city and country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the city residents.
- In the imagination of any city dweller in India, the picture of a smart city contains a wish list of infrastructure and services that describes his or her level of aspiration.
- To provide for the aspirations and needs of the citizens, urban planners ideally aim at developing the entire urban eco-system, which is represented by the four pillars of comprehensive development-institutional, physical, social and economic infrastructure.

### SMART CITIES MISSION

Ministry of Urban Development, Govt. of India

### Core Infrastructure elements

- Adequate water supply.
- Assured electricity supply.
- Sanitation, including solid waste management.
- Efficient urban mobility and public transport.
- Affordable housing, especially for the poor.
- Robust IT connectivity and digitalization.
- Good governance, especially e-Governance and citizen participation.
- Sustainable Environment.
- Safety and security of citizens, particularly women, children and the elderly.
- Health and Education.



### Smart Solutions

<b>E Governance and Citizen services</b> <ol style="list-style-type: none"> <li>1. Public Information, Grievance Redressal</li> <li>2. Electronic service Delivery</li> <li>3. Citizen Engagement</li> <li>4. Citizens-City's Eyes and Ears</li> <li>5. Video Crime Monitoring</li> </ol>	<b>Waste management</b> <ol style="list-style-type: none"> <li>1. Waste to Energy &amp; Fuel</li> <li>2. Waste to Compost</li> <li>3. Wastewater to be treated</li> <li>4. Recycling and reduction of C&amp;D waste</li> </ol>
<b>Energy management</b> <ol style="list-style-type: none"> <li>1. Smart meters &amp; management</li> <li>2. Renewable Sources of Energy</li> <li>3. Energy efficient &amp; Green Buildings</li> </ol>	<b>Waste management</b> <ol style="list-style-type: none"> <li>1. Smart meters &amp; management</li> <li>2. Leakage Identification, Preventive Maint.</li> <li>3. Water Quality Monitoring</li> </ol>
<b>Urban Mobility</b> <ol style="list-style-type: none"> <li>1. Smart parking</li> <li>2. Intelligent Traffic Management</li> <li>3. Integrated Multi-Modal transport</li> </ol>	<b>Others</b> <ol style="list-style-type: none"> <li>1. Tele-Medicine &amp; Tele Education</li> <li>2. Incubation/Trade Facilitation Centers</li> <li>3. Skill Development Centers</li> </ol>

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### How Many Smart Cities in Each State/UT

- The total number of 100 Smart Cities have been distributed among the States and UTs on the basis of an equitable criteria.
- The formula gives equal weightage to urban population and number of statutory towns
- Based on this formula, each State/UT will have at least one smart city.
- The number of Smart Cities from each State/UT will be capped at the indicated number.
- The distribution of Smart Cities will be reviewed after two years of the implementation of the Mission.
- Based on an assessment of the performance in the Challenge, some re-allocation of the remaining potential Smart Cities among States may be required to be done by MoUD.

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### Smart City Features

- Promoting mixed land use in area based developments.
- Housing and inclusiveness -expand housing opportunities for all.
- Creating walkable localities.
- Preserving and developing open spaces.
- Promoting a variety of transport options.
- Making governance citizen-friendly and cost effective.
- Giving an identity to the city.
- Applying Smart Solutions to infrastructure and services in area-based development.

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### Steps for City Selection

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    A[Letter to all state Govt. to shortlist potential Smart Cities based on criteria as per the guidelines of MoUD (Intra state competition)] --> B[On the basis of the response from states/UTs, the list of potential 100 Smart Cities is announced. (All India competition)]
    B --> C[Each potential Smart City prepares its proposal assisted by a consultant and a hand-holding External Agency]
    C --> D[Submission of Stage 2 proposals. Evaluation by experts]
    D --> E[Declaration of Round 1 selected Smart Cities]
    E --> F[Initiation of SCP, Preparation of DPR's and tenders by selected cities]
    E --> G[Improvement of proposal by other cities for the next round]
    G --> F
  
```

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### Smart City Features

<b>Retrofitting</b>	It will introduce planning in an existing built-up area, to make the existing area more efficient and liveable
<b>Redevelopment</b>	It will effect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure.
<b>Greenfield development</b>	It will introduce the Smart Solutions in a previously vacant area (more than 250 acres) using innovative planning, financing and implementation tools
<b>Pan-city development</b>	envisages application of selected Smart Solutions to the existing city-wide infrastructure.

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### Financing for Smart Cities

- The Smart City Mission will be operated as a Centrally Sponsored Scheme (CSS)
- The Central Government proposes to give financial support to the Mission to the extent of Rs. 48,000 crores over five years i.e. on an average Rs. 100 crore per city per year.
- An equal amount, on a matching basis, will have to be contributed by the State/ULB; therefore, nearly Rupees one lakh crore of Government/ULB funds will be available for Smart Cities development.
- The project cost of each Smart City proposal will vary depending upon the level of ambition, model and capacity to execute and repay.

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### Financing modes for Smart Cities

- States/ ULBs own resources from collection of user fees, beneficiary charges and impact fees, land monetization, debt, loans, etc.
- Additional resources transferred due to acceptance of the recommendations of the Fourteenth Finance Commission (FFC).
- Innovative finance mechanisms such as municipal bonds with credit rating of ULBs, Pooled Finance Mechanism, Tax Increment Financing (TIF).
- Other Central Government schemes like Swachh Bharat Mission, AMRUT, National Heritage City Development and Augmentation Yojana (HRIDAY).
- Leverage borrowings from financial institutions, including bilateral and multilateral institutions, both domestic and external sources.
- States/UTs may also access the National Investment and Infrastructure Fund (NIIF), which was announced by the Finance Minister in his 2015 Budget Speech.
- Private sector through PPPs.



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### key responsibilities of National Level Committee

- Review the list of the names of Cities sent by the State Governments after Stage 1.
- Review the proposals evaluated by panel of experts after Stage 2.
- Approve the release of funds based on progress in implementation. Z
- Recommend mid-course correction in the implementation tools as and when required.
- Undertake quarterly review of activities of the scheme including budget, implementation and co-ordination with other missions/ schemes and activities of various ministries.



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### Distribution of funds under the Scheme

- 93% project funds.
- 5% Administrative and Office Expenses (A&OE) funds for state/ULB (towards preparation of SCPs and for PMCs, Pilot studies connected to area-based developments and deployment and generation of Smart Solutions, capacity building as approved in the Challenge and online services).
- 2% A&OE funds for MoUD (Mission Directorate and connected activities/structures, Research, Pilot studies, Capacity Building, and concurrent evaluation).



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### State Level

#### Mission Monitoring

- State Level There shall be a State level High Powered Steering Committee (HPSC) chaired by the Chief Secretary.
- There would also be a State Mission Director not below the rank of
- The State Mission Director will function as the Member-Secretary of the State HPS
- The indicative composition of HPSC is given below
 

1. Principal Secretary, Finance	6. Selected Mayors and Municipal Commissioners State
2. Principal Secretary, Planning	
3. Principal Secretary, Town Planning Department	7. vii. Secretary/Engineer-in-Chief , Public Health Engineering Department
4. Representative of MoUD	8. Principal Secretary, Urban Development – Member Secretary
5. Selected CEO of SPV in the State	



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### National Level

#### Mission Monitoring

- An Apex Committee (AC), headed by the Secretary, MoUD and comprising
- The committee will approve the Proposals , monitor their progress and release funds.
- The AC will consist of the following indicative members:
  - Secretary, Housing and Poverty Alleviation
  - Secretary (Expenditure) Member
  - Joint Secretary, Finance, MoUD Member
  - Director, NIUA Member
  - Chief Planner, Town and Country Planning Member
  - Select Principal Secretaries of States Member
  - Select CEOs of SPVs Member
  - Mission Director Member Secretary



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### key responsibilities of State Level Committee

- Provide guidance to the Mission and provide State level platform for exchange of ideas pertaining to development of Smart Cities.
- Oversee the process of first stage intra-State competition on the basis of Stage 1 criteria.
- Review the SCPs and send to the MoUD for participation in the Challenge.



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**Mission Monitoring**

### City Level

A Smart City Advisory Forum will be established at the city level to advise and enable collaboration among various stakeholders.

This will include the District Collector, MP, MLA, Mayor, CEO of SPV, local youths, technical experts, and at least one member from the area who is a,

- President / secretary representing registered Residents Welfare Association,
- Member of registered Tax Payers Association / Rate Payers Association,
- President / Secretary of slum level federation, and
- Members of a Non-Governmental Organization (NGO) or Mahila Mandali / Chamber of Commerce / Youth Associations.

The CEO of the SPV will be the convener of the Smart City Advisory Forum.

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### Resource mobilization

Resource mobilization (share)	Baseline	Mission target	Target till Date	Progress
Gol				
State				
ULB				
Others				

### Implementation Status

Outcomes	Unit (%)	Baseline	Mission target	Target till Date	Progress
Physical Progress	%	NA			
Financial Progress	%	NA			
	Rs Crores	NA			

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### Score Card for Smart Cities

*The score for smart city constitutes of four sections*

- Progress on Mission Objectives
- Mission Outcomes
- Resource mobilization
- Implementation Status

#### Progress on Mission Objectives

Objectives & Activities	Unit (%)	Baseline	Mission target	Target till Date	Progress

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### Score Card for Smart Cities

#### Implementation Status

Outcomes	Unit (%)	Baseline	Mission target	Target till Date	Progress
Physical Progress	%	NA			
Financial Progress	%	NA			
	Rs Crores	NA			


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### Score Card for Smart Cities

#### Mission Outcomes

Outcomes	Unit (%)	Baseline	Mission target	Target till Date	Progress
Scheduled Electricity outages in a month					
Unscheduled Electricity outages in a month					
Non-revenue water (%)					
AT&C Losses (%)					
Collection of property tax as % of demand					

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BRAJESH KUMAR DUBEY

### INTEGRATED WASTE MANAGEMENT FOR A SMART CITY

FOCUSED ON MSW, C&D AND E-WASTE MANAGEMENT

BRAJESH KUMAR DUBEY  
DEPARTMENT OF CIVIL ENGINEERING

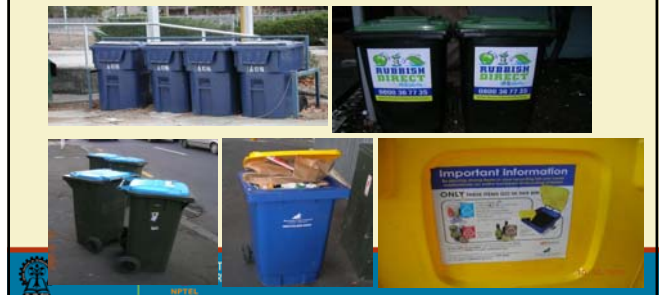
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## Storage of Solid Waste

- Solid waste is stored in a variety of containers
- The type of container used is a function of:
  - The type of waste stored
  - Time limits for storage
  - The amount and density of the waste
  - Method of collection and transport
  - The frequency of collection
  - Local regulations or ordinances



## Wheeled Carts



## Storage of Waste at Small Generators

- Trash cans
- Bags
- Carts
- Bins



## Garbage Can and Recycling Bin





Yard Trash



Piled at the curb



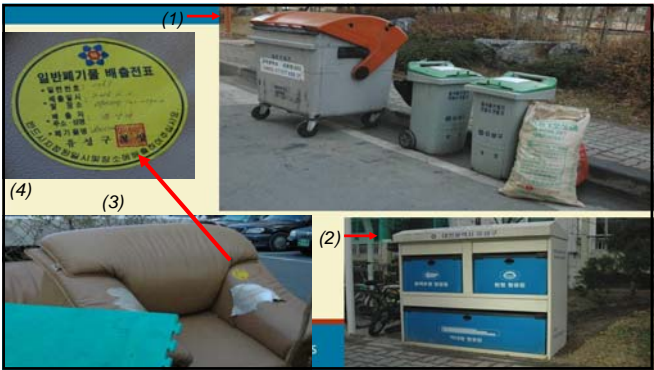
Compostable bag



Trash Day in Alachua County



Trash Day in Auckland



## Storage of Waste at Large Generators

- Carts
- Dumpsters
- Hauled Containers



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Dumpster for Mixed Waste



Containers for Recyclables



Dumpster for Recycled Cardboard



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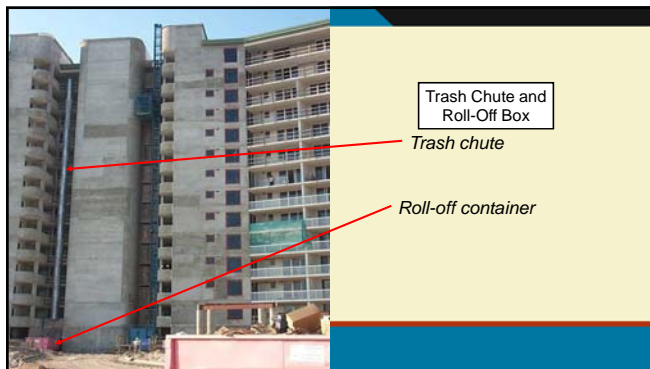
Wire Bin for Recycled Cardboard












### Residential Collection Systems

- Storage container specifications
- Solid waste separation requirements
- Frequency of collection
- Pickup points
  - Curbside/Alley
  - Backyard collection
  - Drop off



**INTEGRATED WASTE MANAGEMENT FOR A SMART CITY**  
FOCUSSED ON MSW, C&D AND E-WASTE MANAGEMENT

BRAJESH KUMAR DUBEY  
DEPARTMENT OF CIVIL ENGINEERING

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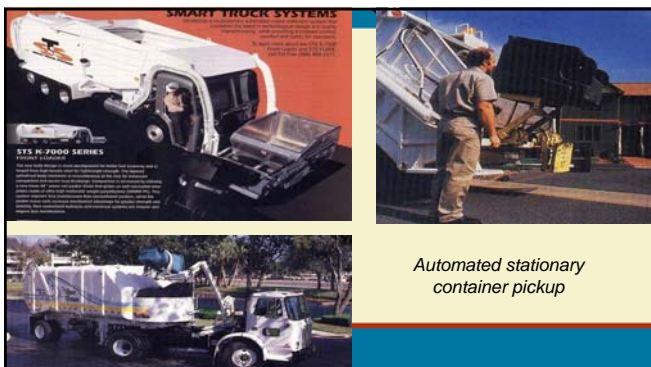
### Stationary Container Systems

- Manually Loaded
  - Side Loaders
  - Rear Loaders
- Mechanically Loaded
  - Front Loaders
  - Side Loaders
  - Grapple Loaded

### Collection Equipment

- Hauled Container Systems
  - Commercial
  - C&D Debris
- Stationary Container Systems
  - Residential
  - Commercial







## Waste Collection

- Picked Up At the source
  - Curbside
  - Place of business
  - C&D site
- Delivered by the Generator
  - Drop-off Centers
  - Collection Events



Special Collection Event - EWaste



Citizen Drop Off



Special Collection Event - EWaste



Citizen Drop Off



## Waste Unloading

- Gravity
  - Roll-off boxes
  - Dump trucks
- Mechanical removal
  - Compactor trucks or boxes
  - Transfer Trailers



Unloading of Roll-Off Box using Tilt Frame Truck



Unloading of Roll-Off Box using Tilt Frame Truck



Unloading of Roll-Off Box using Tilt Frame Truck



Unloading of Roll-Off Box using Tilt Frame Truck



## INTEGRATED WASTE MANAGEMENT FOR A SMART CITY FOCUSED ON MSW, C&D AND E-WASTE MANAGEMENT

BRAJESH KUMAR DUBEY  
DEPARTMENT OF CIVIL ENGINEERING



11.6



Unloading of Rear Loading Compactor Truck



Unloading of Tractor Trailers Walking or Live Floors



Unloading of Rear Loading Compactor Truck



Unloading of Tractor Trailers



Unloading of Rear Loading Compactor Truck





Unloading of Tractor Trailers





### Residential Collection Systems

- Funding Collection Services
  - Property Taxes vs Utility Bills
  - Flat Fees vs Variable-rate Fees

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## Pay-As-You-Throw

- In communities with pay-as-you-throw (PAYT) programs, residents are charged for the collection of MSW based on the amount they throw away.
- Communities considering pay-as-you-throw must determine whether they will charge residents for waste management services based on the **volume** or **weight** of their trash.



## Volume-based PAYT

- Options
  - Variable Cans
  - Prepaid Bags
  - Stickers

An example system. Residents decide on what size of cart that they want to use; the larger the cart, the more that they pay. If they have more waste than the cart will hold, they must purchase prepaid bags.



## Volume based service

- Advantages
  - Easy to administer
  - Less expensive to operate
- Disadvantages
  - Over filled cans (compaction)
  - Less incentive to reduce waste
  - Must use specific cans, tags



## Weight based service

- Advantages
  - Large incentive to reduce waste
  - Seems fair to public
  - Can use own cans
- Disadvantages
  - Expensive to set up (capital investment)
  - More administration (billing)

## Solid Waste Generation Rates

- knowledge of the quantities of solid waste generated, separated and collected for further processing is fundamental to the design of a solid waste management system
- we estimate the quantity of waste generated using available data:
  - load-count analysis
  - weight-volume analysis } weighing scales are critical
  - material balances
- these are based on amount collected, which is different from the amount generated
- people divert waste before it gets collected
  - backyard composting
  - re-use programs (outside of public collection and disposal)
  - transport between municipalities
  - taking stuff on trips to the cottage, disposal in other jurisdictions, ...



## Load Count Analysis

- in this method, the number of individual loads are counted, and the waste characteristics are estimated (type of waste, estimated volume)
- weight is estimated, or, if scales are available, weight data are also recorded
- unit generation rates are determined using the field data:
  - residential area = 1500 homes, average of 3 people per home
  - observations at the scales (transfer station) per week:

<ul style="list-style-type: none"> <li>11 truck loads, each 20 m<sup>3</sup>, total = 40,500 kg/wk</li> </ul>	$S.W. = \left( \frac{40,500}{20(11)} \right) = 184 \text{ kg/m}^3$	
<ul style="list-style-type: none"> <li>40 private loads, each 300 cm<sup>3</sup>, total = 900 kg/wk</li> </ul>	$S.W. = \left( \frac{900}{40(0.3)} \right) = 75 \text{ kg/m}^3$	

unit rate =  $\frac{(40,500 + 900) \text{ kg/wk}}{(1,500 \times 3) \text{ person}} = 9.2 \text{ kg/capita/ wk} = 1.31 \text{ kg/capita/ day}$



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## INTEGRATED WASTE MANAGEMENT FOR A SMART CITY FOCUSSED ON MSW, C&D AND E-WASTE MANAGEMENT

BRAJESH KUMAR DUBEY  
DEPARTMENT OF CIVIL ENGINEERING  
End of Week-4



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