# Role of '*Swachh Bharat Abhiyan*' [Clean India Mission] in GHG Mitigation: A case of Indore, India

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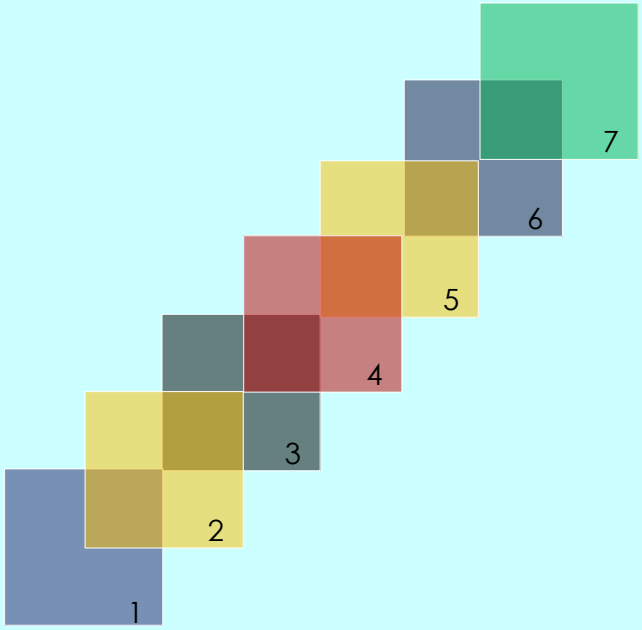
# Presentation Sequence

- Urban Transition in India
- What is *Swachch Bharat Abhiyan*?
- National Targets and Achievement
- Indore a case example of SBA
- AIM activities in 2018-19

# Urban Transition in India



# Million Plus UAs / Cities India

53 Million Plus UAs / Cities in India with population of one million or more. In Census 2001 the number was only 35. by 2021 it would reach 75.

## Mega UAs/Cities

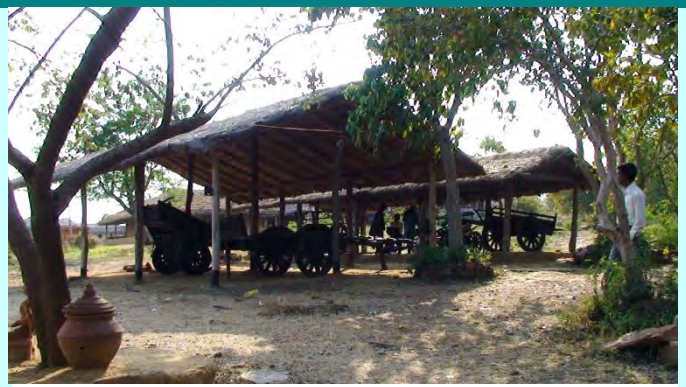
- Three megacities in India as per Census 2011 were having 10 million or more population
- These are:
  - Greater Mumbai UA 18.4 million
  - Delhi UA 16.3 million
  - Kolkata UA 14.1 million

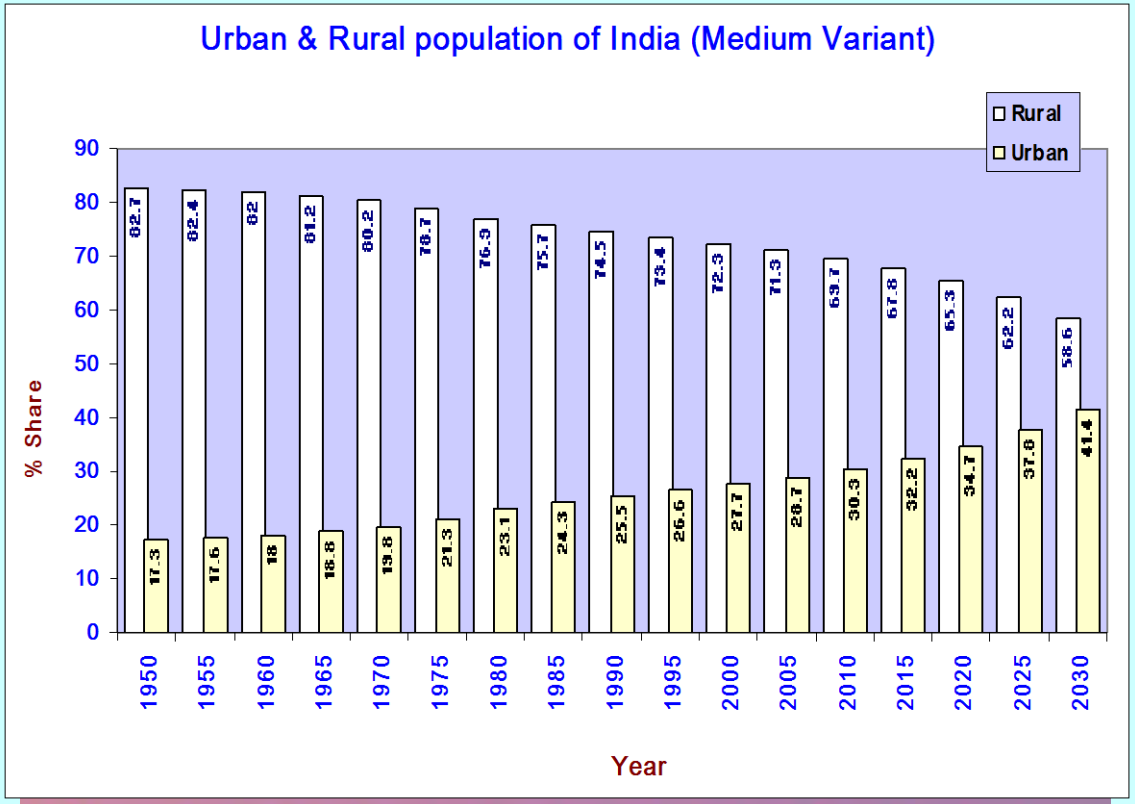
# Number of UAs/Towns and OGs in India

| Type of Urban Units | 2011 Census | 2001 Census |
|---|---|---|
| 1. Towns: | 7,935 | 5,161 |
| (a) Statutory Towns | 4,041 | 3,799 |
| (b) Census Towns | 3,894 | 1,362 |
| 2. Urban Agglomerations | 475 | 384 |
| 3. Out Growths (OGs) | 981 | 953 |

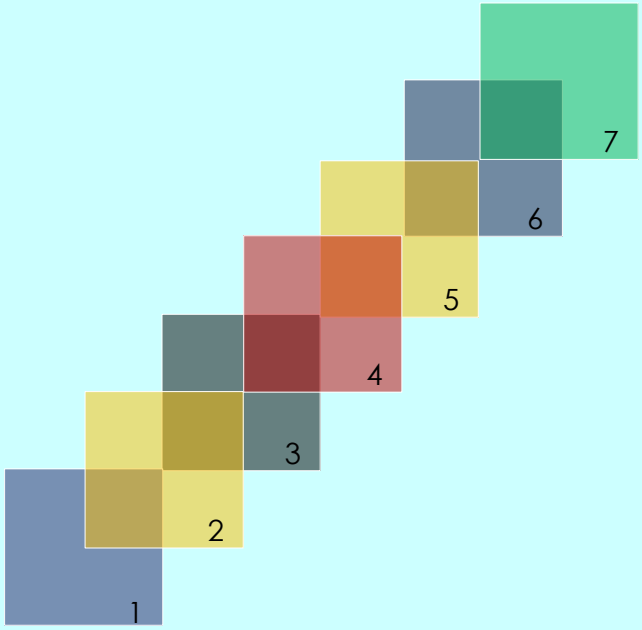
377 million persons were living in the urban areas of the country, constituting 31.16% of total population

# Rural to Urban Transition in India



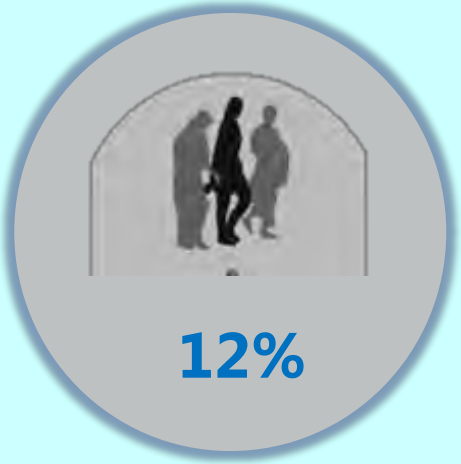



# *Swachh Bharat Abhiyan*



# Urban Sanitation & Waste Management Reality







India loses **USD 54 Billion** per year due to inadequate sanitation

**Poor sanitation and hygiene** cause **100,000 child** deaths per year in India

Over **12% Urban households** in India defecate in the open

Only **21.5% of Solid Waste generated** in of India is processed

**Sources: World Bank, JICA, 2011**

# What is *Swachch Bharat Abhiyan* (SBA)

- A nation-wide campaign in India launched for the period 2014 to 2019.
- The campaign was officially launched on 2 October 2014 at Rajghat, New Delhi by Prime Minister of India Mr. Narendra Modi on the 145th birth anniversary of Mahatma Gandhi.
- Its official name is in Hindi (स्वच्छ भारत) translates to 'Mission for Neat and Tidy India' or simply 'Clean India' in English
- It aims to clean up the streets, roads and infrastructure of India's cities, towns, urban and rural areas.
- The mission has two thrusts: SBA (Rural), which operates under the Ministry of Drinking Water and Sanitation; and SBA (urban), which operates under the Ministry of Housing and Urban Affairs.
- (SBM-U), aims at making urban India free from open defecation and achieving 100% scientific management of municipal solid waste in all the 4,041 statutory towns in the country.

# SBA Objectives

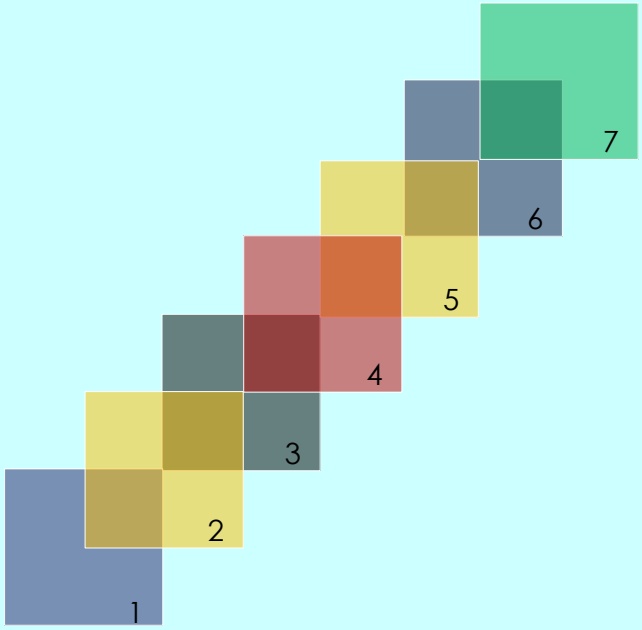
- Elimination of open defecation
- Eradication of Manual Scavenging
- Modern and Scientific Municipal Solid Waste Management
- To effect behavioural change regarding healthy sanitation practices
- Generate awareness about sanitation and its linkage with public health
- Capacity Augmentation for ULBs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

**It is worth noting that all the objectives of this mission are local in nature and it does not have any direct mention of global environmental concerns**

# Objectives and national targets

- Construction of 6.64 million individual household toilets (IHHL)
- Construction of 0.25 million community toilet (CT) seats
- Construction of 0.26 million public toilet (PT) seats
- Achieving 100% door-to-door collection and scientific management of municipal solid waste (MSW) in identified cities.
- Information, Education and Communication
- Capacity Building

# Integrated Waste Management at Indore



# Indore City Profile

- Indore city is a tier 2 city and commercial capital city of Madhya Pradesh with a population of around 2.75 million (2017 estimate).
- The city ranked 25 in the 2016 *Swachh Survekshan* conducted by the Ministry of Urban Development, Government of India.
- On 4$^{th}$ May 2017, the city was ranked 1$^{st}$ among 434 cities in the *Swachh Survekshan*, and awarded as the cleanest city in India..

# Indore - Salient Features

| | |
|---|---|
| Total Area: | 275 sq km |
| Population 2011: | 2.2 Million |
| Population 2017: | 2.75 Million |
| Floating Population: | 0.3 to 0.5 Million per day |
| Population density : | 8302 P/sqkm |
| No of Households: | 0.58 million |
| Slum population: | 27% |
| No of wards: | 85 |
| MSW quantity (2001): | 617MT/day |
| MSW quantity (2011): | 750MT/day |
| MSW quantity (2017): | 900MT/day |

# From 2017 Indore is 1st amongst Indian Cities

| Swachh Survekshan Award 2017 | Swachh Survekshan Award 2018 | Swachh Survekshan Award 2019 |
|---|---|---|

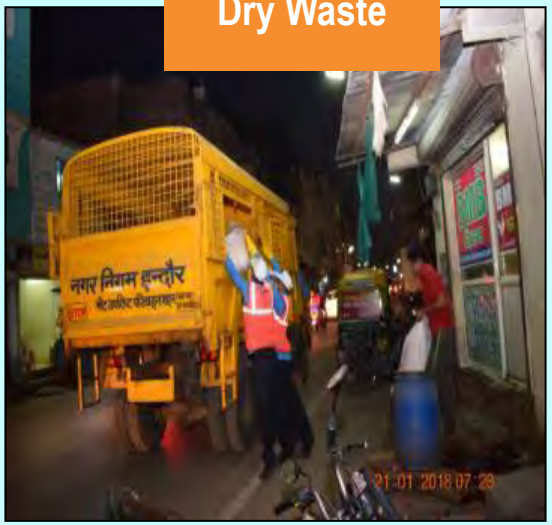

**Indore has been declared Cleanest city of India in last three Swachhata Survekshan (Cleanliness Surveys)**

# Key to Success – 100% Door to Door Collection with 100% Segregation


Wet Waste


Dry Waste


Sanitary & Domestic Hazardous Waste


# Fully Mechanized Transfer Stations

**10**
**Fully Mechanized Transfer Stations**



## Decentralized Waste Processing 150 TPD

**237 units**
Hotels, Hospitals, Marriage Gardens, Schools and Colleges etc.

**76 units**
Residential Welfare Associations (RWA's)

**368 units**
City Gardens covering all 586 developed gardens

**5 TPD**
Capacity mobile decentralized composting unit

**Approx. 30000 units**
Home Composting Bins

# 20 TPD Bio-CNG Plant at Choithram Mandi

**20 TPD**
**Bio CNG Plant at Choithram Mandi**

- 20 TPD Bio CNG plant at Choithram Mandi in the year 2017.
- Upgraded biogas is being used as fuel for automobiles.
- 800 kgs of gas is being generated on daily basis which is being used to run approx. 8 to 10 city buses per day for last 2 years
- Busses consume all 800 kg of bio CNG gas per day and run approx 2000 kms
- The cost of the project is INR 90 million

# 15 TPD Bio-CNG Plant at Kabitkhedi

- IMC decided to install another plant of 15 TPD at Kabitkhedi which is functional since October 2018.
- 600 kgs of gas is being generated on daily basis through this plant. Which is being used to run approx. 6 to 8 city buses per day.
- These busses consume all 600 kgs of Bio-CNG gas per day & runs more than 1500 kms per day.
- This innovation thus leads to reduce the Green House Gas Emissions of Indore City.
- The cost of the project is INR 90 million and is installed on EPC.
- Both projects put together are providing fuel for 3500 km of bus run per day

**15 TPD**

**Bio-CNG plant at Kabitkhedi**

# Feeding Mechanism

The wet waste generated from the vegetable wholesale markets (mandi's) is brought to the bio-methanation plant on daily basis and is dropped in the feeding area for processing.

# Digester

- Under anaerobic conditions, the temperature is maintained at around 35°C.
- Biogas is being produced by the conversion of the dissolved organic matters.
- Present daily feeding capacity – 15+20 Tons.


# Biogas Enrichment


Around 3 TPD of organic manure and 2000 $m^3$ / day of raw biogas is being produced from each plant. The obtained raw biogas is than further enriched to meet the gas quality which is equivalent to the standards specified by **BIS (IS: 16087 2016).**

# Bio-CNG Dispensing Unit

The installed gas dispenser meets statutory regulations on safety of vehicle being filled.

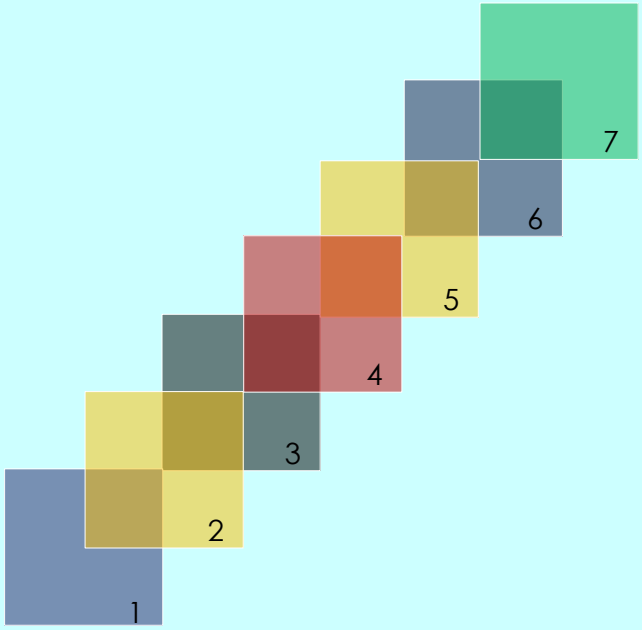

# Scaling up: Proposed 200 TPD Bio CNG plant

- After the successful implementation of the two models IMC has now decided to install a plant of 200 TPD. Work for the same is in progress.
- Initially the project was taken up for 50 TPD but after analyzing the future requirement of processing of organic waste and its cost benefits, then finally IMC proposed the project of 200 TPD capacity organic waste
- This biogas project will provide a greener fuel with zero discharge.
- The Bio CNG gas specifications are as per latest Indian Standard Norms and the gas is suitable to fill in the gas cylinders as per PESO Gas Cylinder Regulations.
- The estimated cost of the project is INR 800 million. IMC proposes to install this plant on PPP basis.

# Co-benefits of Bio CNG Plant

- Bio-Methanation process is successful only if segregated waste is provided to the plant. As Indore has 100% source segregation the committed gas generation through this plant is achievable thus making the project feasible.
- With installation of this plant IMC would be able to operate all the city busses running within the city.
- IMC/AICTSL could purchase the Bio CNG at cheaper rates than the market rates and since it is a green fuel it leads to reduce the green house gas emissions.
- In addition to that, IMC would also receive 40 TPD high quality compost from this plant.
- With success of this project many companies may be willing to bid for the projects in other cities.

# AIM and Associated Activities in India 2018-19



# AIM Training Workshop 3rd to 7th Dec. 2018

- Dr. Hanaoka conducted the AIM/enduse training workshop at MANIT, Bhopal, India
- 12 Participants from five different institutes in India attended the 5 days training programme

# Workshops on Climate Change Issues and Challenges

**Workshops conducted last year**

| | |
|---|---|
| Jan 21 - Feb 01, 2019 | Climate Change, Scenario Development for Policy Analysis |
| Oct 12 – 25, 2019 | Developing Transition Pathways for Climate Change Mitigation and Adaptation |

**Forthcoming Workshops**

| | |
|---|---|
| Dec 09 – 20, 2019 | Intelligent Infrastructure for Cities of the Future |
| Mar 09 – 12, 2020 | Green Technologies for Sustainable Development |

**Coordinator:**
Aashish Deshpande, Professor, Department of Management
NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, GOVERNMENT OF INDIA, MHRD, BHOPAL, INDIA

# Thank You….

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