

**Then in whose
backyard?**

**Setting the
agenda for
garbage-free
India**

How much waste is generated?

- No clear idea on how we generate daily
- Data on generation of solid waste is not based on measurement but it is calculated using: **per capita** (number of people in urban areas) x **amount of waste generated every day**
- But what is clear is that is huge, it is growing as we become more affluent
- **Waste generation is linked to wealth**

Solid waste generation in India

(Million tonnes/Year)

1991



2000



2011



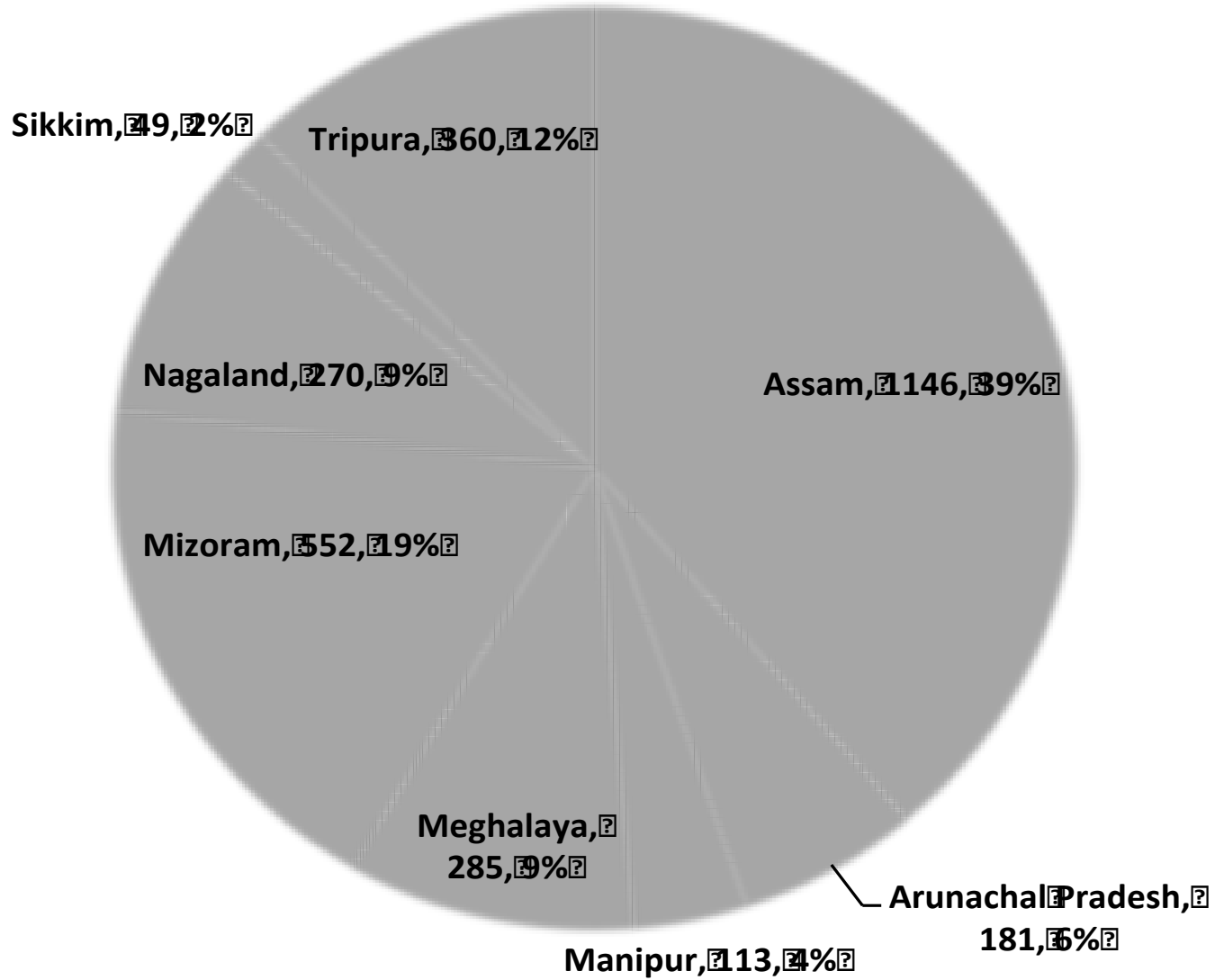
2014



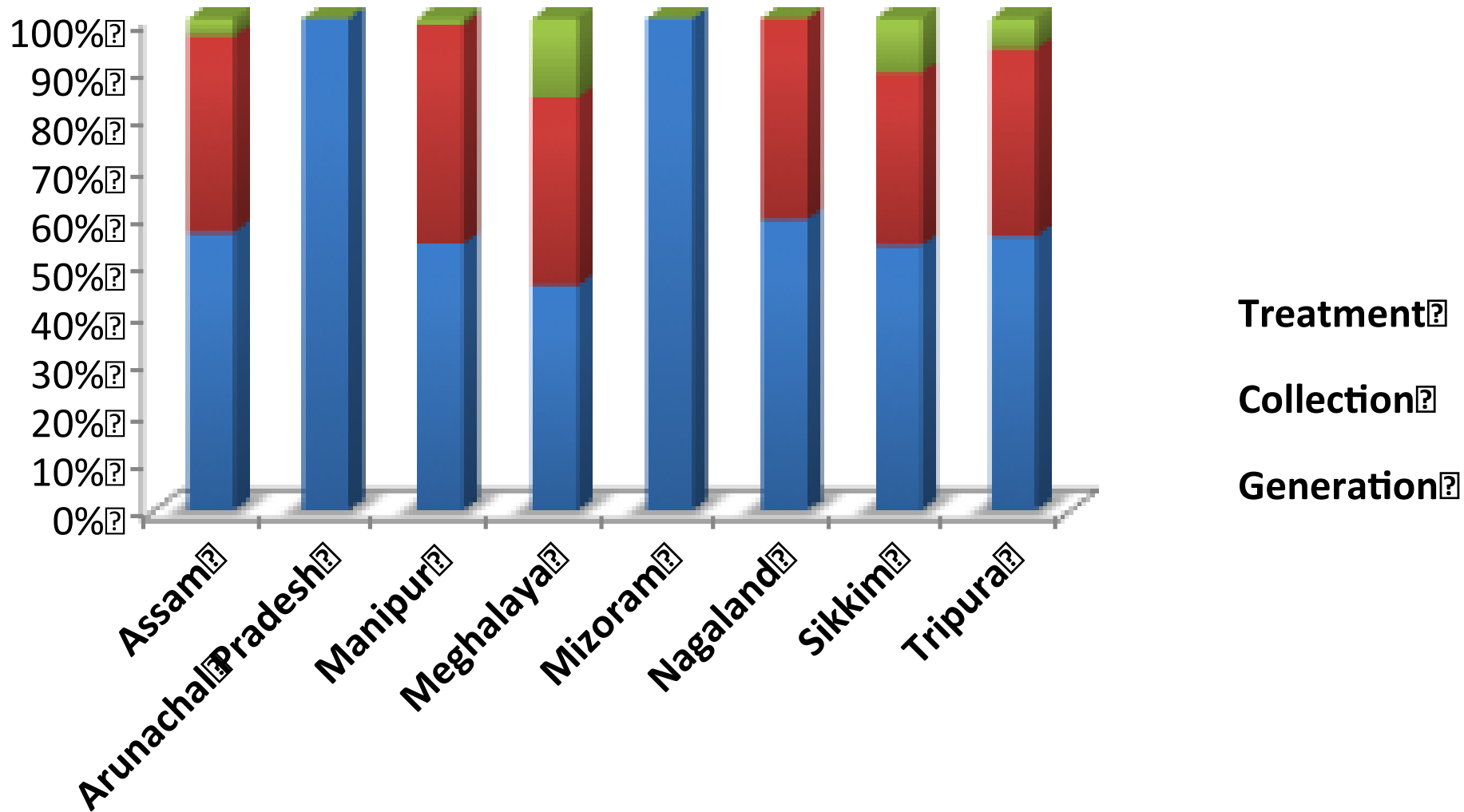
Source: Compiled from research papers and available documents
(DEA and CPCB)

Solid waste generation in Northeast region (MTD)

Total: 2596 MTD



Less emphasis on treatment

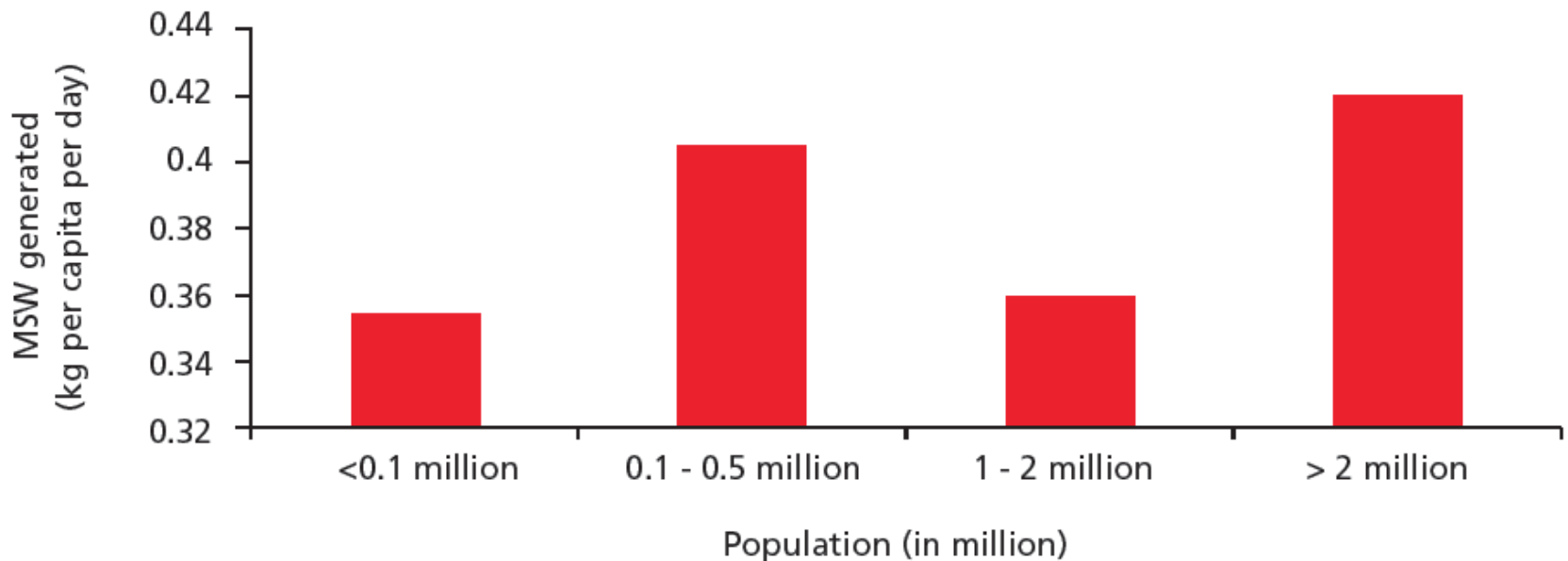


Per capita

- How much do each of us produce?
- Again data is weak
- But clear our waste is growing
- Small cities/poor people: 0.3 tonnes/day
- Big cities/richer people: 0.6 tonnes/day
- **Will increase as we get more affluent** (unless we change policies today)

PER CAPITA WASTE GENERATION—NEERI-CPCB (2008)

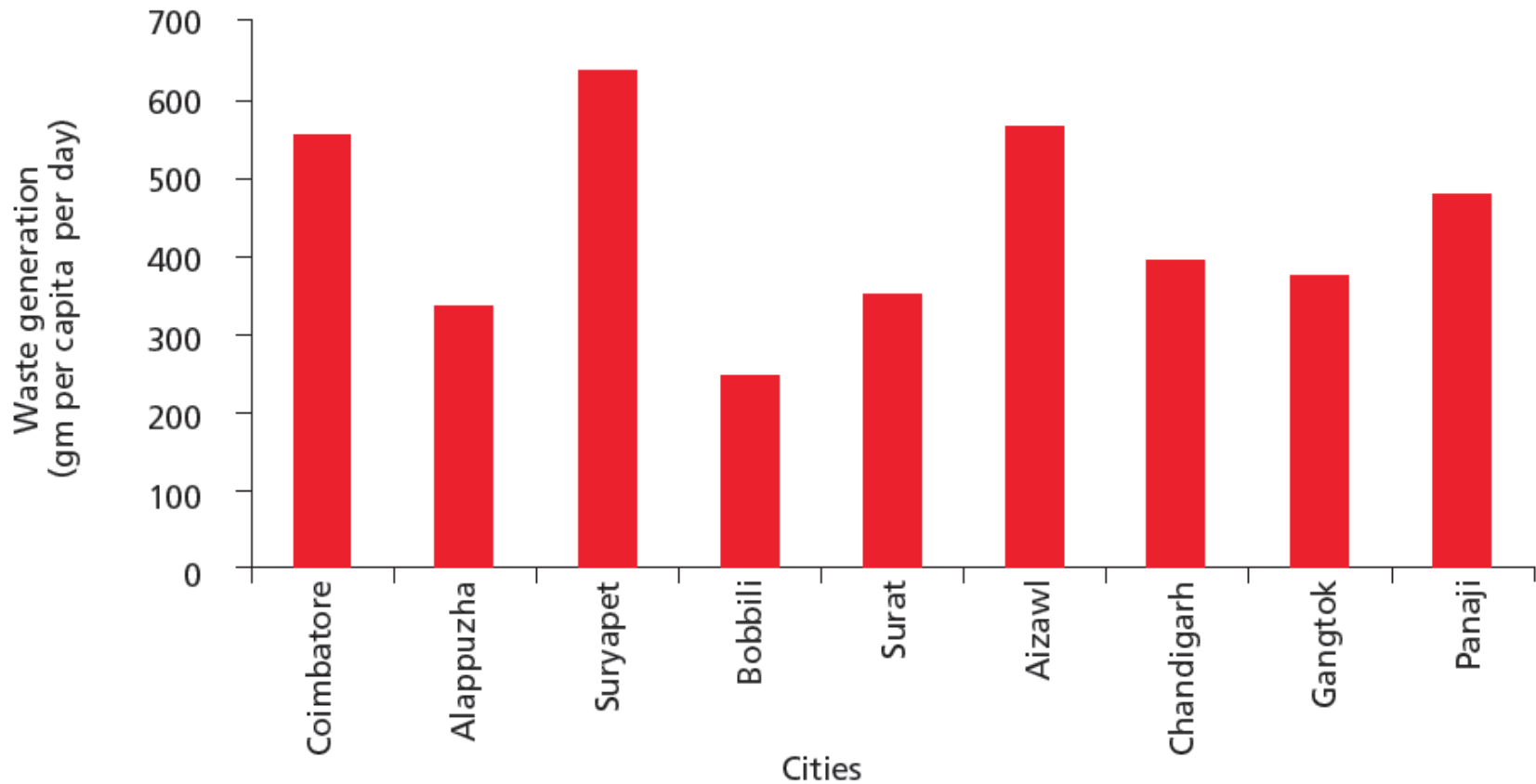
The assessment paper presented a more staggered relationship between per capita waste generation and the population of an urban centre



Source: Sunil Kumar *et al.* 2008, 'Assessment of the status of municipal solid waste management in metro cities, state capitals, class I cities, and class II towns in India: An insight', *Elsevier, Waste Management* 29 (2009) pp 883–895

PER CAPITA WASTE IN CITIES SURVEYED BY CSE

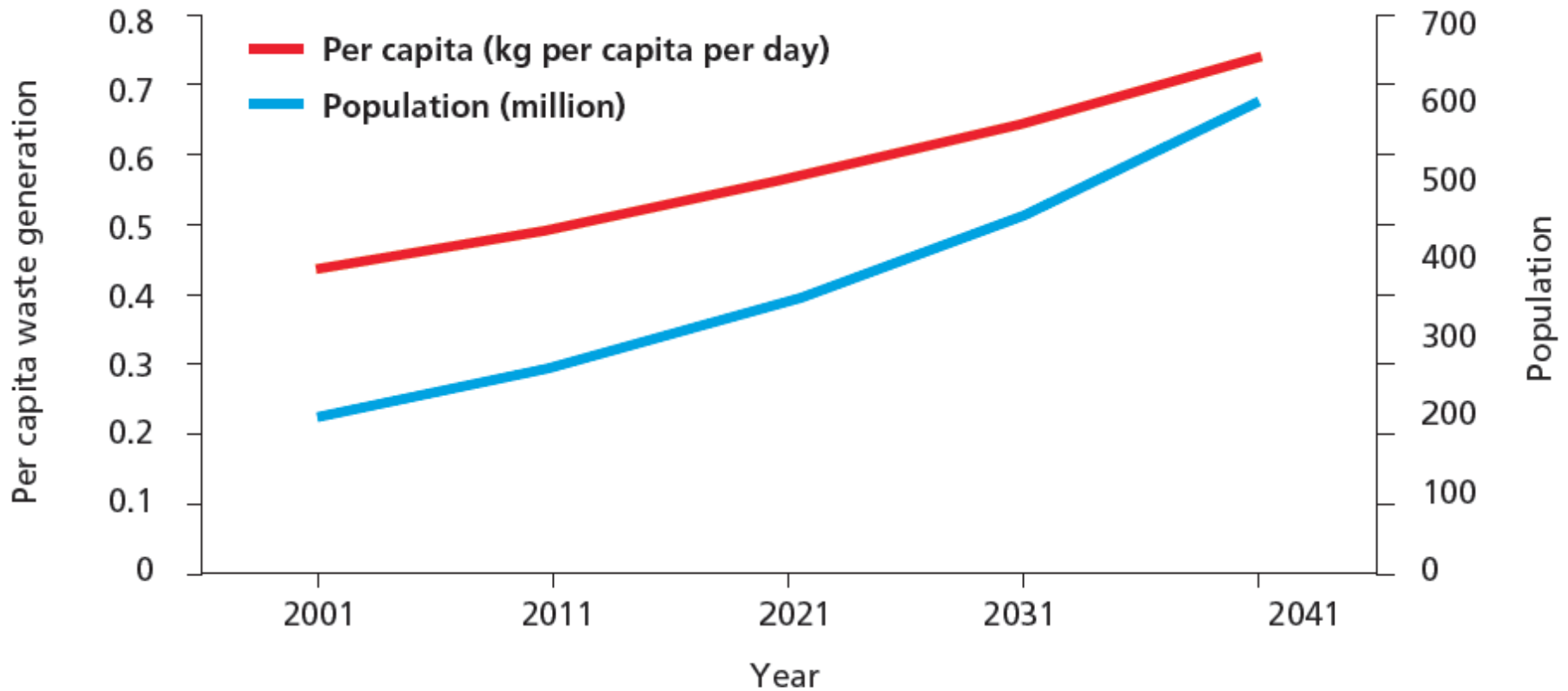
Per capita waste generation was generally found proportional to the population of a city



Source: CSE survey, 2014-15

PER CAPITA WASTE GENERATION AND PREDICTIONS

Waste generation and urban population are both expected to grow at a steady rate



Source: Report on Sustainable Solid Waste Management in India, 2012, Columbia University, USA

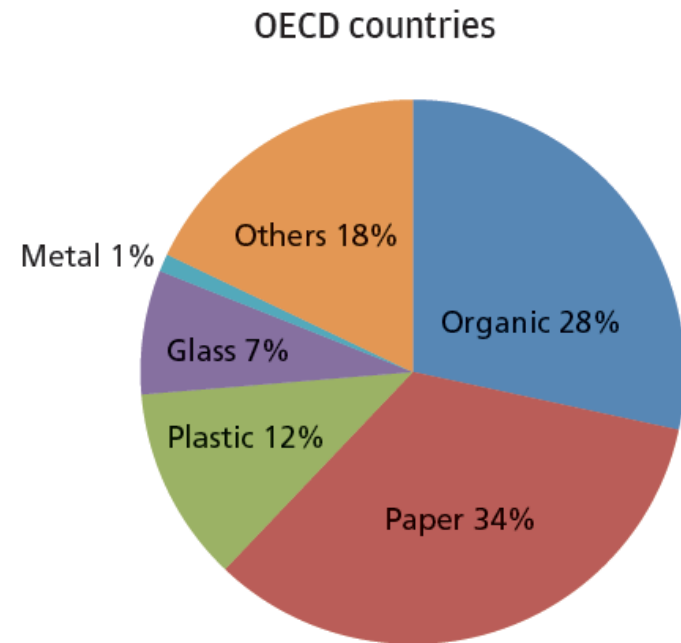
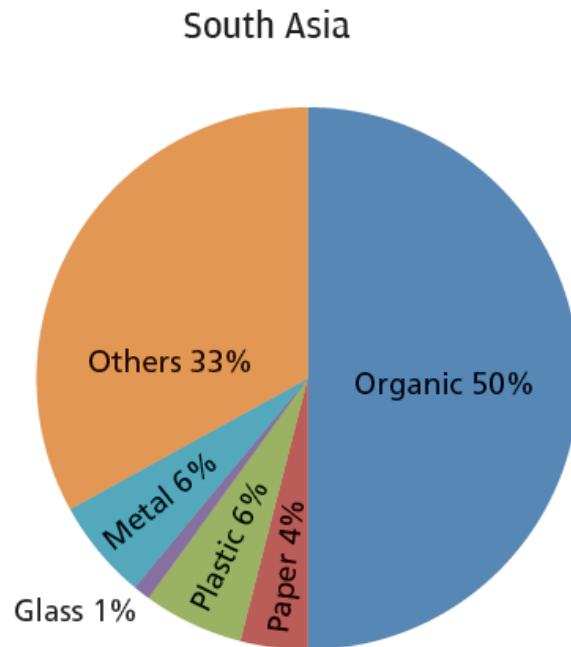
Composition

- Critical question
- Determines what will be the 'method' of waste management
- **Again**
- We have broad idea that our waste is mainly organic and so biodegradable and so high in energy
- But will also change (**is changing**)

Composition changes with wealth

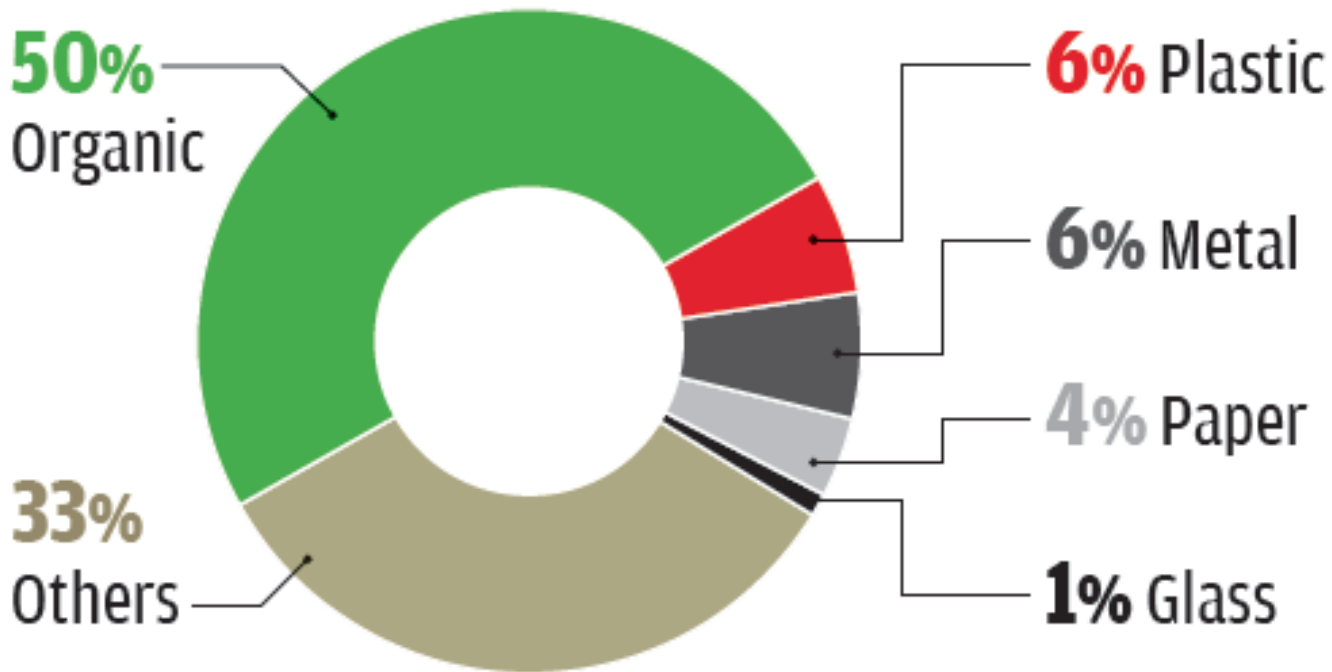
COMPOSITION OF WASTE

Half of the waste in South Asia is organic, while the organic fraction is less than one-third in OECD countries



Source: *What a Waste*, 2012, World Bank paper

Composition of waste in India



Source: What a Waste, 2012, World Bank

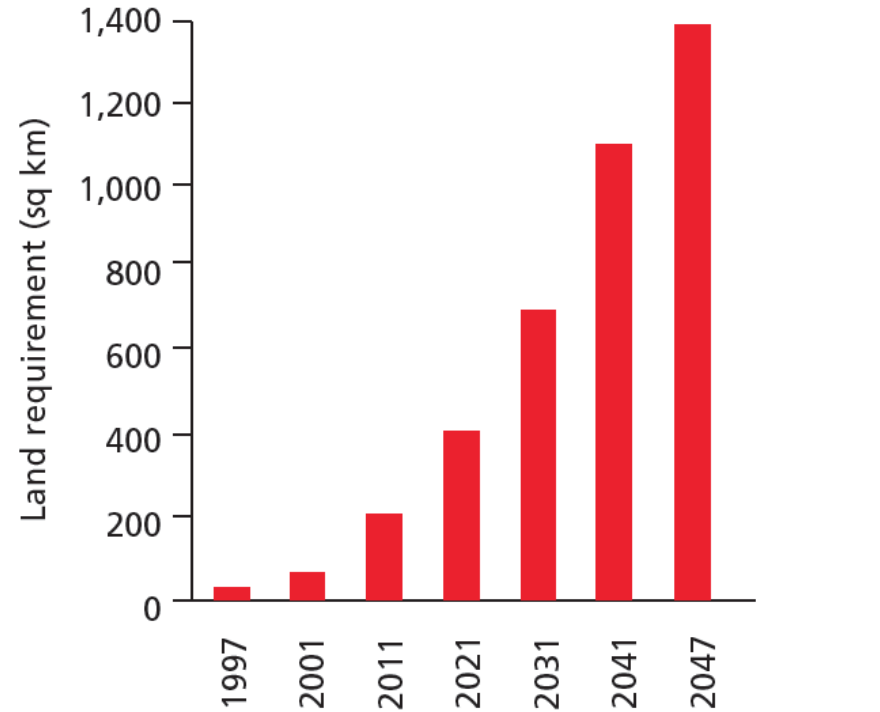
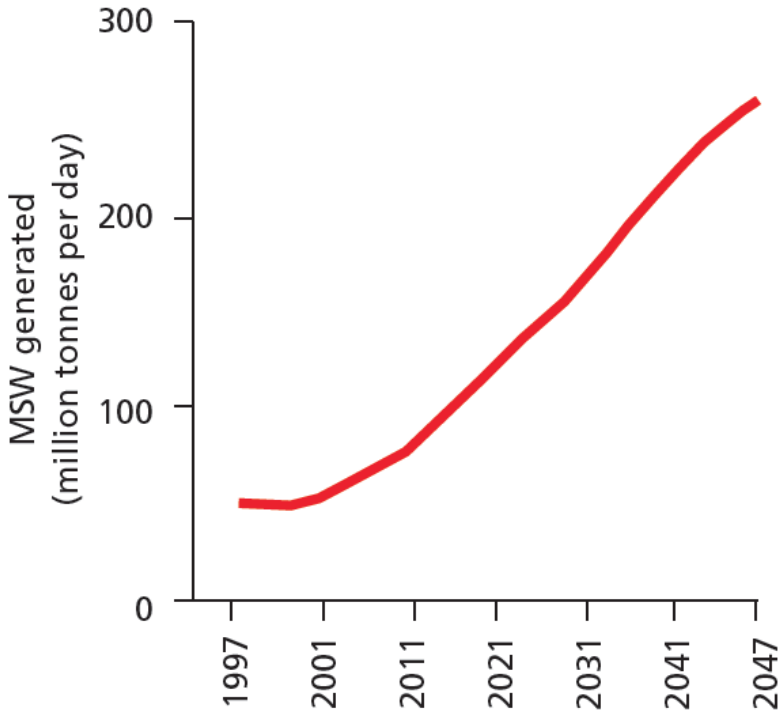
Yet CPCB in 2015 found 10% plastic in landfills. This is when we know much of the plastic generated is already collected by recyclers or thrown in drains and does not make it to landfills

Why our mountains of waste

- **Big issues**
- Running out of land to dump waste
- Not-in-my-backyard means that waste disposal schemes are contested
- Silver-bullet of burning waste to make energy not working
- Municipal capacity weak; funds limited and dream of 'outsourcing' not so simple

SOLID WASTE GENERATION AND LANDFILL REQUIREMENTS

There has been an exponential increase in the volume of MSW and, therefore, the area of land needed to dispose it



Source: DEA 2009, *Position paper on solid waste management sector in India*, Department of Economic Affairs, Ministry of Finance, New Delhi

Too poor to waste

- Agenda for solid waste management
- **Agenda for Swachh Bharat**
- Waste is resource
- India too poor to use land to 'dump' waste
- Not an option

Agenda: segregate.. segregate

- Do not focus on technology
- **Focus on segregation**
- Lost last 15 years in bad experiments; sold white elephants by technology companies
- Waste-to-Energy projects will work only if the quality of waste that is provided to make fuel is high in calorific value

'Sold' quick fix

- W-T-E plants closing; asking for higher rates for tipping fee or energy; unviable; or people are protesting against pollution by plants
- Reason is quality of waste received by plants
- Reason is contracts for waste are based on how much waste is 'tipped' at plant
- No incentive to segregate
- '**Sorting**' at plant does not work if waste is mixed – everything from plastic to construction waste

Global experience

- **W-T-E works** if waste is segregated so that fuel generated is of high quality and plants can get paid for energy
- **W-T-E works** if emission standards are stringent; monitoring systems are credible so that plants do not pollute (***more the unmixed waste, more stringent the standards need to be and higher the cost of plant***)

COMPARISON OF INDIAN AND GERMAN/EUROPEAN STANDARDS

European standards for waste-to-energy plants are more stringent and exhaustive

Contaminant	EU standards (mg/m ³)	MSW Rules 2000 (mg/Nm ³)	SWM Rules 2016 (mg/Nm ³)
Organic substances (C-total)	10		20
CO	50		100
HCl	10	50	50
HF	1		4
SO ₂	50	100	200
NO _x	200	450	400
SPM	10	150	50
Hg	0.03		0.05
Cd, Tl	0.05		0.05
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Sn	0.5		0.5
Dioxins and furans	0.1 ng TEQ		0.1 ng TEQ
Minimum temperature	850 centigrade		
Retention time	More than 2 seconds		
Reference value for flue gas oxygen content	11 per cent by volume		
Reference value for flue gas oxygen content for waste pyrolysis/gasification/waste oil	3 per cent by volume		

Source: Seventeenth Ordinance of the German Federal Immission Control Act (BMU, 2009); MSW (M&H) Rules, 2000 and SWM Rules 2016

Operationalize segregation

- Two ways:
- **Alleppey-way**: municipality does not collect waste because of NIMBY and so households have to segregate and compost/biogas
- **Panjim-way**: municipality collects biodegradable waste everyday; non-biodegradable twice a week; promotes community compost
- **Any other way**: But segregate at source essential. Then transport and process segregated streams of waste (**do not first sort and then mix**)

Agenda: Re-design MSW contracts

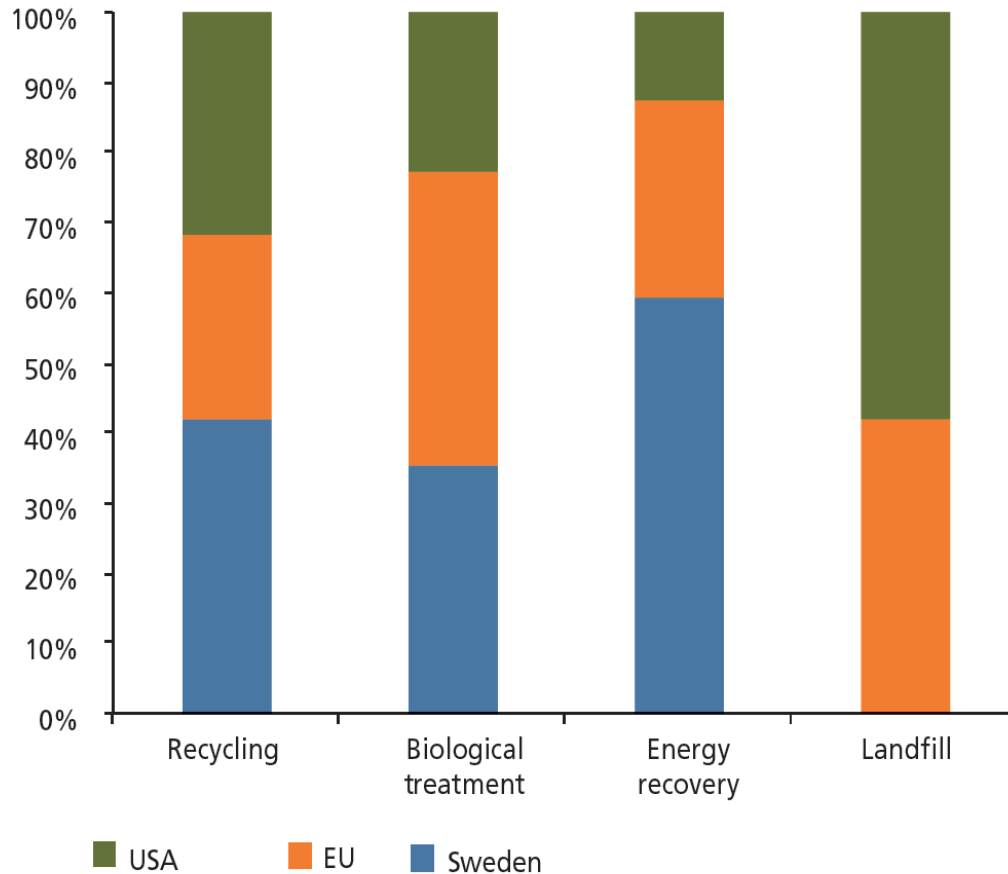
- All contracts for municipal waste management provide perverse incentive to transport more waste, not less
- Agencies are paid 'tipping' fee based on how much MSW is brought to landfill site
- Pay instead based on how much waste is **segregated; recycled and processed** – not how much is collected or transported

Agenda: Landfill tax

- Zero landfill has to be objective of waste management
- Impose landfill tax – waste that is brought to landfill pays cost of land and its ‘misuse’
- High charge – has to be disincentive
- Countries use provision this to move towards waste-recycling and reuse

TREATMENT TECHNOLOGIES UTILISED IN SWEDEN, EU AND USA (2010)

While EU and USA still rely on landfills, Sweden has moved on



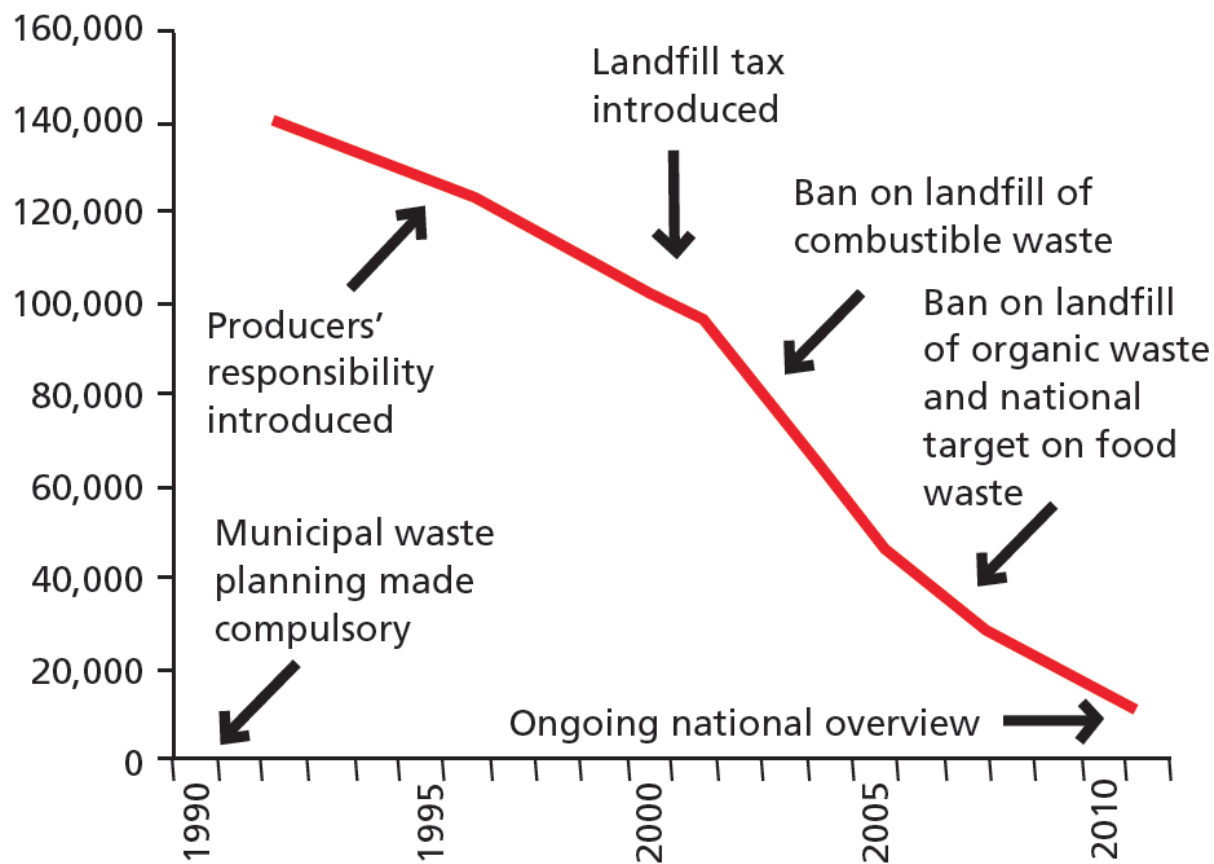
Source: Personal Communication with Ylva Reinhard, Swedish Environmental Protection Agency on 9 March, 2016

Global
learning is
that landfills
not solution

But then
need laws to
change this

PATHWAY TO RESOURCE RECOVERY?

A slew of measures helped Sweden bring down mountains of waste



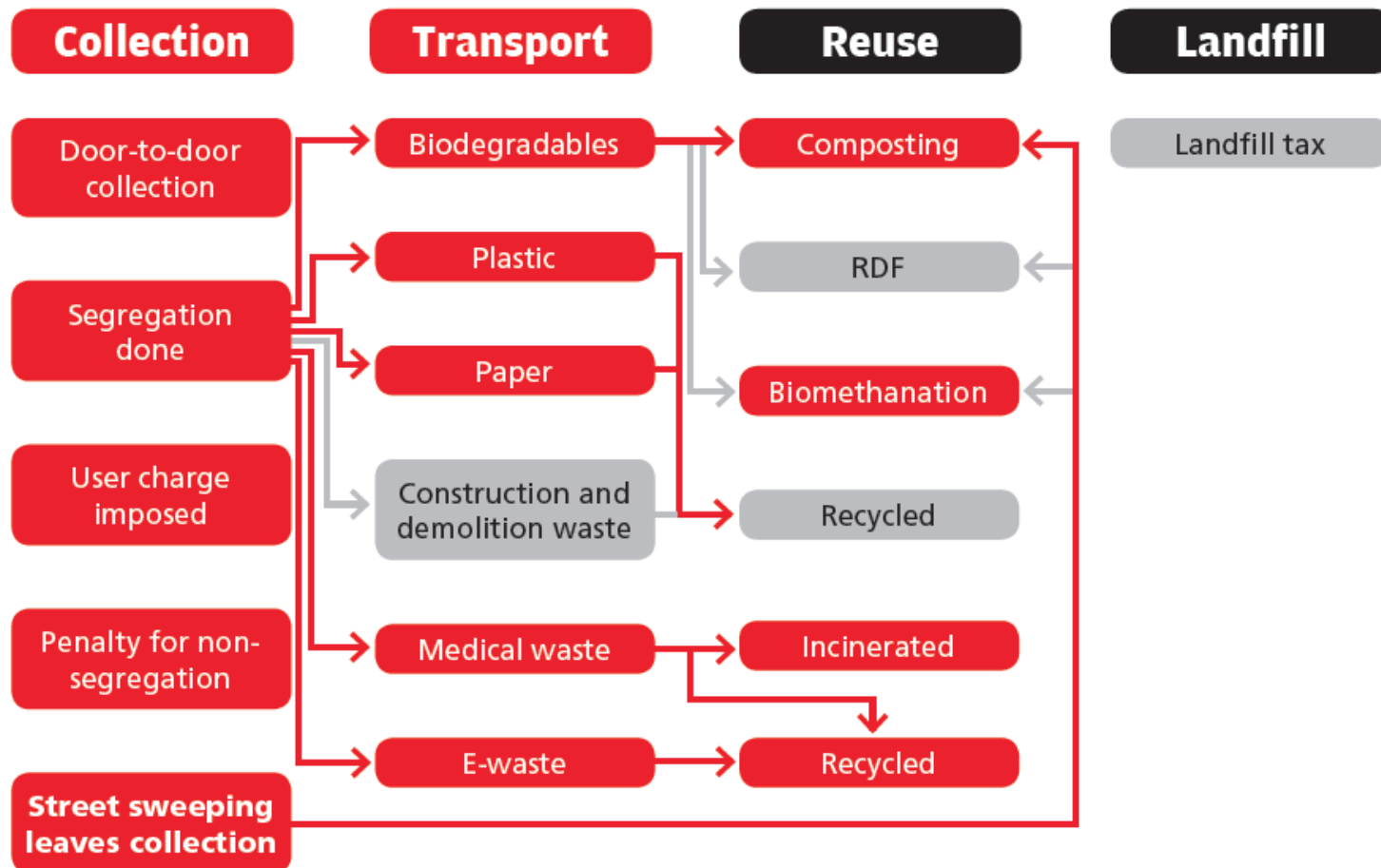
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Agenda: Recognize informal sector

- The reason we have not completely drowned in our waste is because **the poor** collect it and then process it
- We do not **recognize** this contribution
- We do not even **measure** this contribution
- We certainly do not **promote** it or **reward it** in municipal bylaws etc
- The issue is how to work with massive and well-organized informal waste collection and processing sector without 'formalizing' and destroying it

What the city must do..our rating

WHAT THE CITY DOES...



THE GOOD, BAD AND SMELLY

CSE rankings of cities based on their solid waste management system

Group	City
Group 1 Best: Segregation, processing and recycling of waste. Zero-landfill cities	Alleppey, Kerala
	Bobilli, Andhra Pradesh
	Panaji, Goa
	Mysuru, Karnataka
Group 2 Second-best: Clean cities; some segregation and some processing	Aizawl, Mizoram
	Pune, Maharashtra
	Surat, Gujarat
	Suryapet, Telangana
Group 3 Third-best: Have worked on cleaning the city but not on how to process and recycle the waste	Agartala
	Bengaluru
	Chandigarh
	Delhi
	Gangtok
	Shimla



Source: CSE survey, 2014-15

Agenda: Celebrate NIMBY

- When the poor say **not-in-my-backyard** nobody listens
- When the middle-class says **not-in-my-backyard** then somebody listens
- But poor are getting more politically aware (as they must). They will insist also **not-in-my-backyard**
- **Celebrate this**

Every backyard is a frontyard

- because....if it is not in my backyard. **Then it is in my front-yard**
- This is how we must manage our waste – turn it into a resource.
- **Not use and throw, but use and use and use**

Thank you