Approaches and practices for energy and resource efficiency in water management

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REGIONAL WORKSHOP
Energy and Resource Efficiency in Urban Water Management

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Present Water Paradigm - Inefficient

Water Supply

Surface water

Ground Water

Wastewater (Blackwater + Greywater)

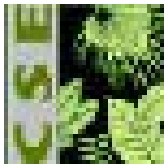
How much is the treatment ?

30-50% loss in leakage

POLLUTION

Wastewater Treatment Plant

Recycle ?
Reuse ?



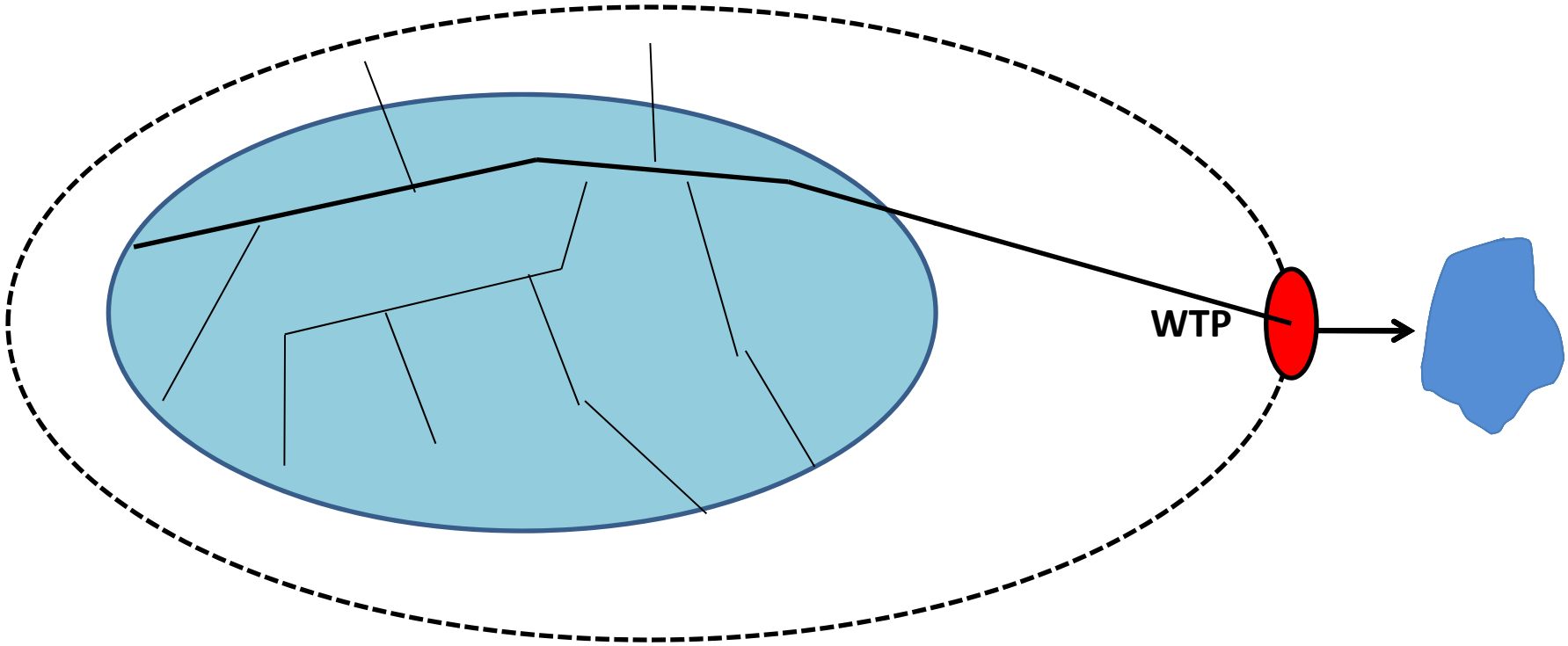
Water Supply is Energy-Intensive

Source: Alliance to Save Energy

Between 2 and 3 percent of the world's energy consumption is used to pump and treat water for urban residents and industry. Energy consumption in most water systems worldwide could be reduced by at least 25 percent through cost-effective efficiency actions.

Source: Alliance to Save Energy

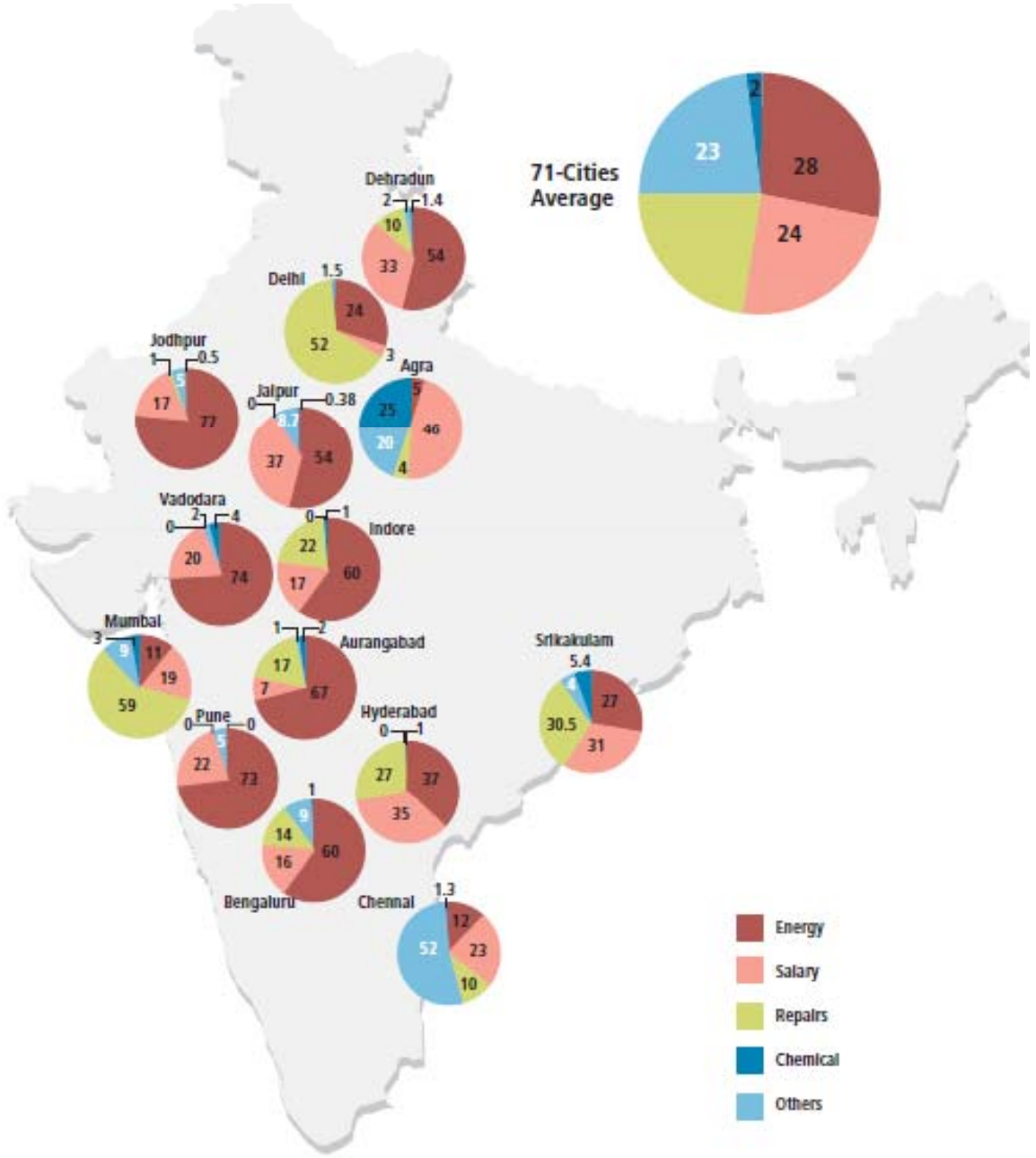
Current sewage paradigm – Inefficient



Centralized system serving the city centre and outskirts

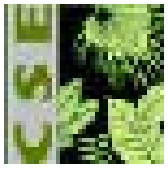
Treating just 1 MLD of sewage costs around Rs. 1 crore, excluding land costs

Cost Components of Water Supply



71-CITY SURVEY: WATER SUPPLY REQUIRES EXHAUSTIVE SPENDING ON ENERGY (TOP 22 CITIES)

City	Energy expense[1]		
	Rs crore	%[2]	Rs lakh/MLD
Jodhpur	54	77	24.40
Vadodara	41	74	15.30
Pune	22.5	73	2.8
Aurangabad	20	67	9.8
Nagpur	20	63	4.3
Bhopal	21	60	7.9
Indore	49	60	24
Mussoorie	3	60	37
Bengaluru	251	60	28
Baramati	0.22	57	1.8
Ranchi	12	57	10.3
Bhubaneswar	14	56	6.9
Dehradun	6	54	5.2
Jaipur	42	54	12
Alwar	5	47	15.8
Bhilwara	0.91	45	4.8
Faridabad	8.55	44	3.7
Aizawl	9	44	86
Jammu	13.79	40	6.3
Jabalpur	5.5	38	3.5
Hyderabad	80	37	8.6



Water / Sewage Management - Costs

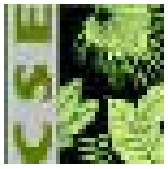
25 %

IT TAKES A LOT OF MONEY TO SUPPLY WATER AND TAKE CARE OF SEWAGE

Sector	Per capita cost (Rs)	Per capita O&M (Rs)	Total capital expenditure needed (Rs crore)[1]	Relative share of sector (%)
Water supply	5,099	501	3,20,908	10.4
Sewage	4,704	286	2,42,688	7.8
Solid waste management	391	155	48,582	1.6
Urban roads	22,974	397	17,28,941	55.8
Stormwater drains	3,526	53	1,91,031	6.2
Transport	5,380	371	4,49,426	14.5
Traffic support infrastructure	945	34	97,985	3.2
Street lighting	366	8	18,580	0.6
Total	**43,386**	**1,806**	**30,98,141**	

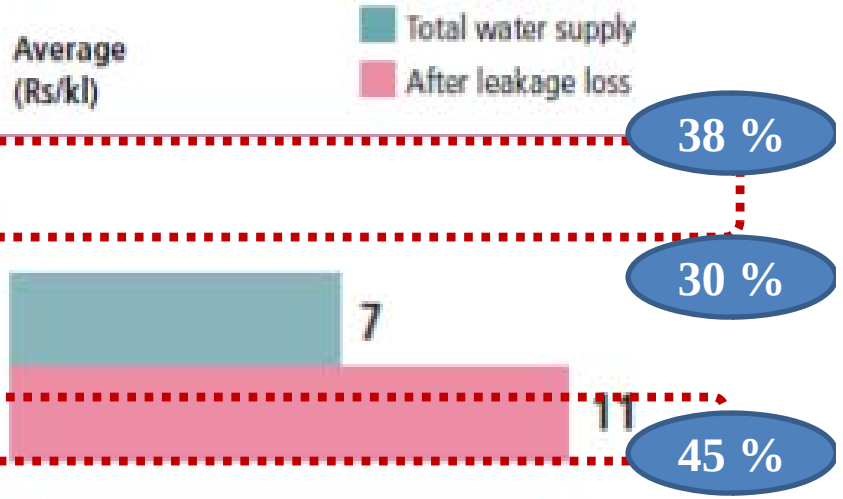
[1]At 2009-2010 prices; O&M: Operation and maintenance

Source: Anon 2011, *Report on Indian Urban Infrastructure and Services, the high powered expert committee for estimating the investment requirements for urban infrastructure services, JNNURM*, Ministry of Urban Development, GOI, Delhi

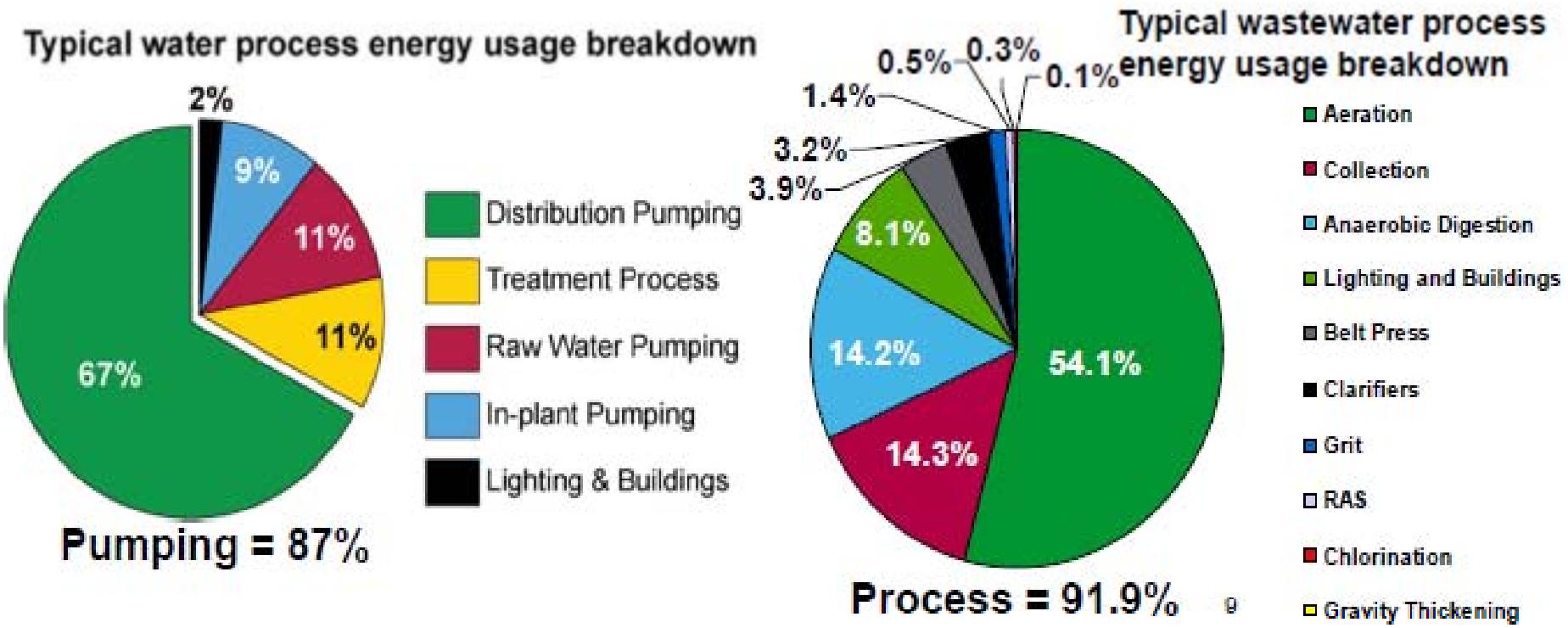


71-CITY SURVEY: IF ONLY THE LEAKAGES COULD BE PLUGGED

		Cost of total water supply (Rs/kl)	Cost after leakage loss (Rs/kl)
Metros	Bengaluru	13	21
	Chennai	12	17
	Indore	11	17
	Mumbai	11	15
	Delhi	9	18
	Dhanbad	9	11
	Hyderabad	6	11
	Jaipur	6	11
	Rajkot	6	8
	Vadodara	6	9
	Meerut	0.8	1
Class I	Aizwal	54	83
	Khanna	14	18
	Alwar	9	12
	Jodhpur	9	11
	Kozhikode	8	12
Class II & III	Nainital	17	20
	Mussoorie	17	24
	Raman	2	3
	Uttarkashi	2	3
	Goniana	2	2



Typical Water Production / Wastewater Treatment & Energy Use



Energy can make up 25-40% of the total operating cost of WWT facility

Source: Alliance to Save Energy

Thus, enormous potential of improving resource/energy efficiency in water management exists….

Approaches and practices could be…

- Preventive
  - Conservation of water (RWH)
  - Promotion of water efficient fixtures
  - Water auditing and planning of water sensitive cites
- Curative
  - Promotion of decentralized technologies,
  - Move from EM to natural systems (DWWTS, SBT, Phytorid, etc)
- Reactive
  - Improving given system efficiency itself

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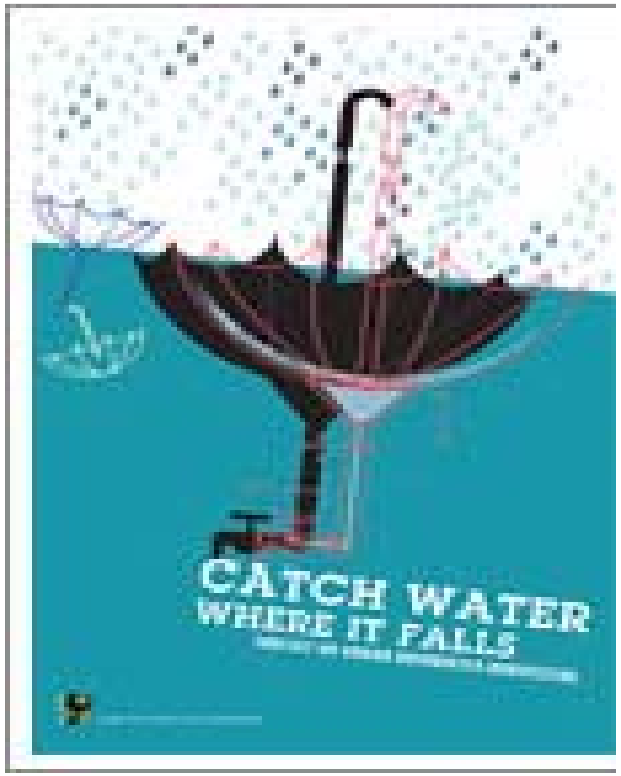
RWH has enormous potential

- 100 mm rain falling on 1 ha of land means 1 million liters of water
- Decentralized structures which reduce cost & losses of delivery



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Water Efficient Fixtures

- Extremely crucial reform for the water management in India especially cities
- Of the 135 lpcd water consumption nearly 30% is for flushing and 40% for bathing & washing
- Significant 35 % water savings through water efficient fixtures

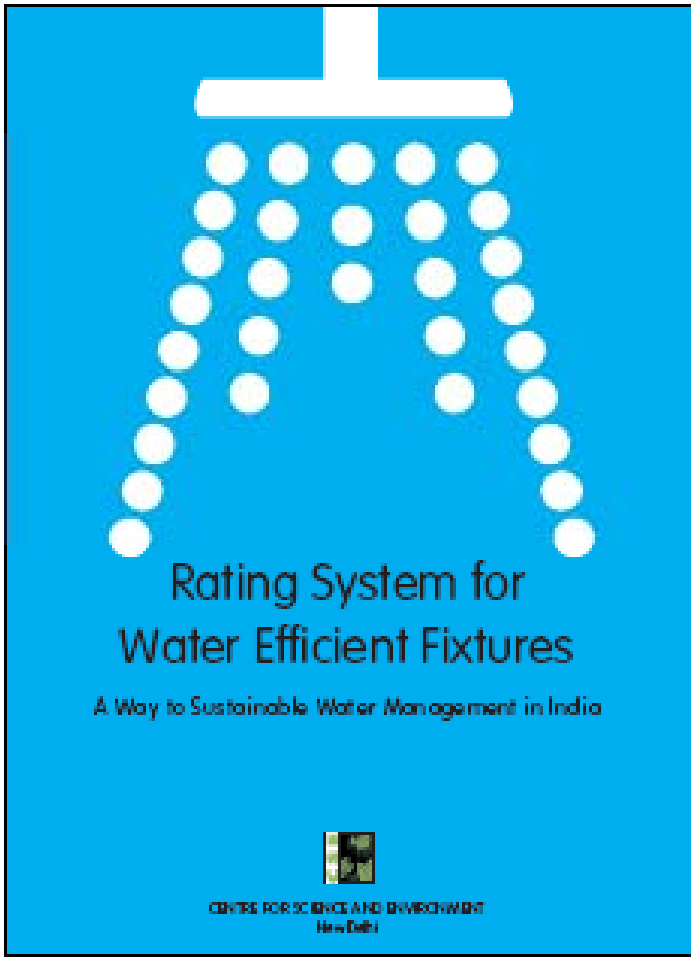
Water Efficient Fixtures

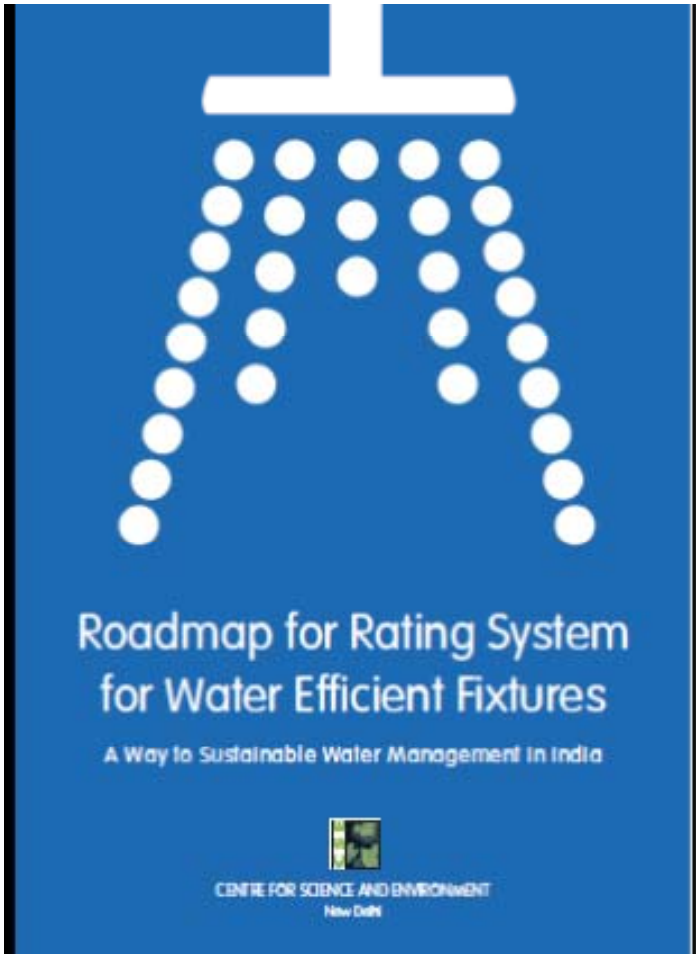
Fixture	Water use in standard fixtures	Water-efficient fixture	Water saved
Toilets	Single flush toilet uses 10-13 litres/ flush	Dual flush toilet in 3/6 and 2/4 litre models	4-11 litres/ flush
Urinals	4 liters; 10-13 litres if toilet pan is used	Sensor operated adjustable flush	2.2 – 10 litres per flush
Taps	10-18 litres/minute depending on pressure	Sensor taps	5.5- 15.5 litres/ minute
Showers	10-25 litres/minute	Flow restrictors	4-20 litres/minute

Source: Parryware Roca and others

CSE's Initiatives

Rating System for Water Efficient Fixtures part of the CSE's mandate as a CoE





Draft Rating System for Water Efficient Fixtures

Water Closets

- European water closet with cistern or flush valve using not more than 6 litres per flush.☆
- European water closet with dual flush cistern or flush valve using 6 litres for full flush and 3 litres for half flush.☆☆
- High-efficiency European water closet using 5 litres single flush.☆☆
- High-efficiency European water closet using less than 5 litres per flush.☆☆☆
- Combination or Asian / Indian pan using 6 litres per flush; cistern or flush valve.☆
- Combination or Asian / Indian pan using 6 litres per full flush and 3 litres for half flush; cistern or flush valve.☆☆

Urinals

- Urinal with flushing device using 4 litres per flush.☆
- Urinal with flushing device using 3 litres per flush.☆☆
- Urinal with flushing device using 2 litres per flush.☆☆☆

Shower Heads / Hand-held Showers

- Shower head with flow-rates of 9.5 lpm.☆
- Shower head with flow-rates of 7.5 lpm.☆☆
- Shower head with flow-rates less than 7.5 lpm.☆☆☆

Faucets

Faucets (Private use)

- Non-metered faucets or faucets with aerators with flow-rates of 8 lpm.☆
- Non-metered faucets or faucets with aerators with flow-rates of 5.7 lpm.☆☆
- Non-metered faucets or faucets with aerators with flow-rates less than 5.7 lpm.☆☆☆

Faucets (Public use)

- Metered faucets with or without aerators with flow-rates of 1 litre per cycle or non-metered faucets with flow-rate of 2 lpm.☆☆
- Metered faucets with electronic actuator with flow-rates of 1 litre per cycle.☆☆

Kitchen Sink Faucets

- Kitchen sink faucets or faucets with aerators with flow-rates of 8 lpm.☆
- Kitchen sink faucets or faucets with aerators with flow-rates of less than 8 lpm.☆☆

Handheld Bidet Spray (Ablution faucet with hose and trigger)

- Handheld bidet spray with flow-rates of 8 lpm.☆
- Handheld bidet spray with flow-rates of less than 8 lpm.☆☆

Dishwashers

- Dish washer with a Water Factor (the quantity of water used in liters per full machine wash and rinse cycle) of 22 litres:☆
- Dish washer with a Water Factor (the quantity of water used in liters per full machine wash and rinse cycle) less than 22 litres:☆☆

Clothes Washer

- Clothes washer with a Water Factor (the quantity of water in litres used to wash each cubic meter volume of machine drum capacity) of 5 liters for private use and 8 liters for public use:☆
- Clothes washer with a Water Factor (the quantity of water in litres used to wash each cubic meter volume of machine drum capacity) of less than 5 litres for private and less than 8 liters for public use:☆☆

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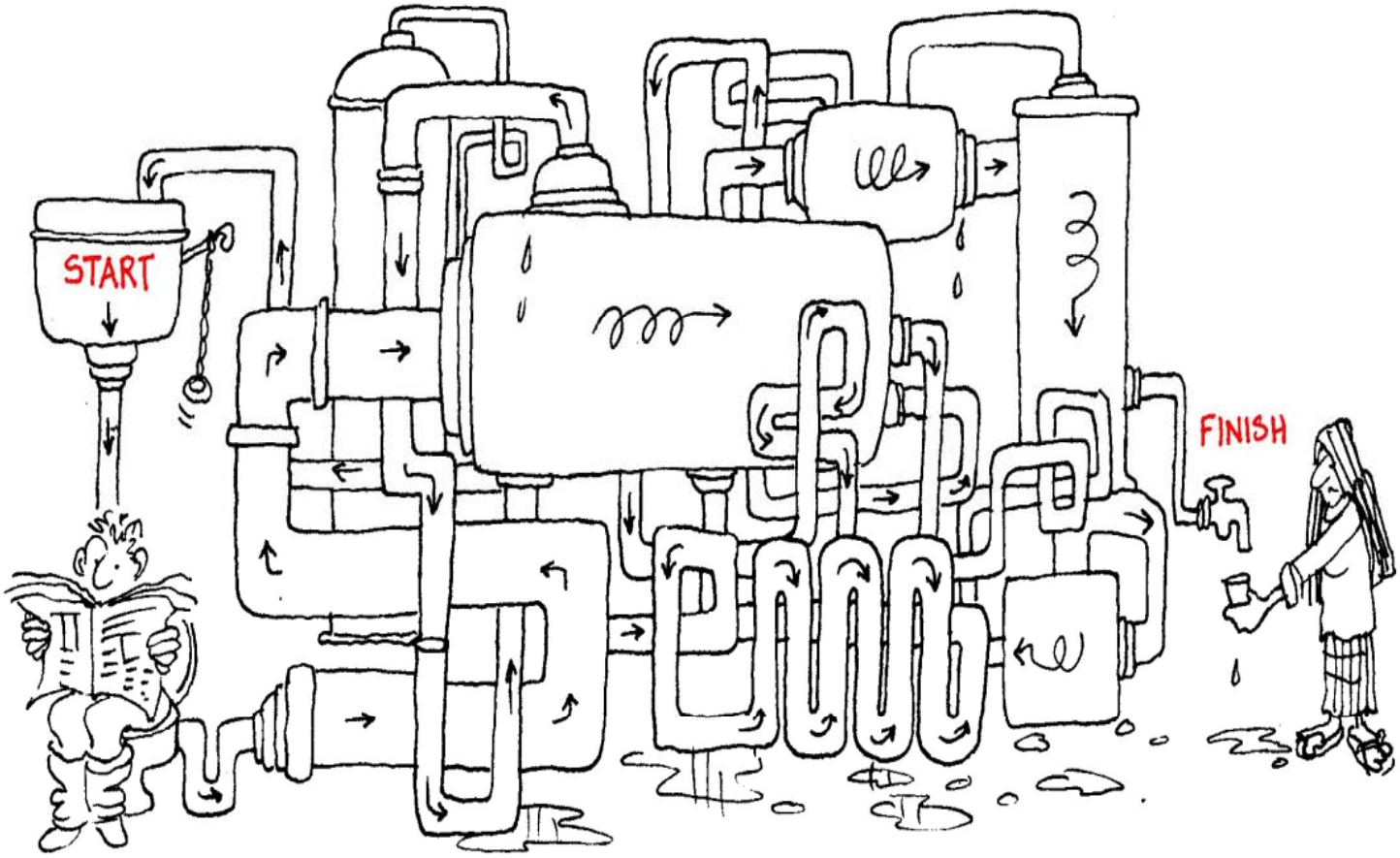
START
FINISH