



**CEPT University
All India Institute of Local Self Government
Urban Development Department, Government of Maharashtra**

***Workshop: Septage Treatment Technology
October 20-21st, 2016
Pune***

***MALAYSIA'S SANITATION AND SEWERAGE JOURNEY
- lessons learnt***

Dorai Narayana

MALAYSIA

Population:
30 million

Per Capita income:
US\$ 10,000

Water supply :
100% Urban areas
receive 24/7 piped
water

Sanitation:
open defecation
generally unknown
Direct discharges :
rare

Rural: pits with pour
flush

Urban :
sewered : >65%
Septic tanks 20%
Pour flush : 15%



SANITATION / SEWERAGE MANAGEMENT UNDER LOCAL AUTHORITIES



BASIC SANITATION IMPROVED

- Open defecation unknown
- Rural sanitation scheme – villages & estates
- direct discharges, primitive systems improved to pits / septic tanks

SHORTCOMINGS

- high ground water, sludge overflows
- desludging only on demand
- no sludge treatment
- sewerage built but not well managed
- poor control: Ineffective guidelines, designs, operations
- Inadequate funding
- Gross pollution of rivers, lakes, beaches

1994



FEDERALISATION & PRIVATISATION (CONCESSION)

IndahWater

Concession requirements:

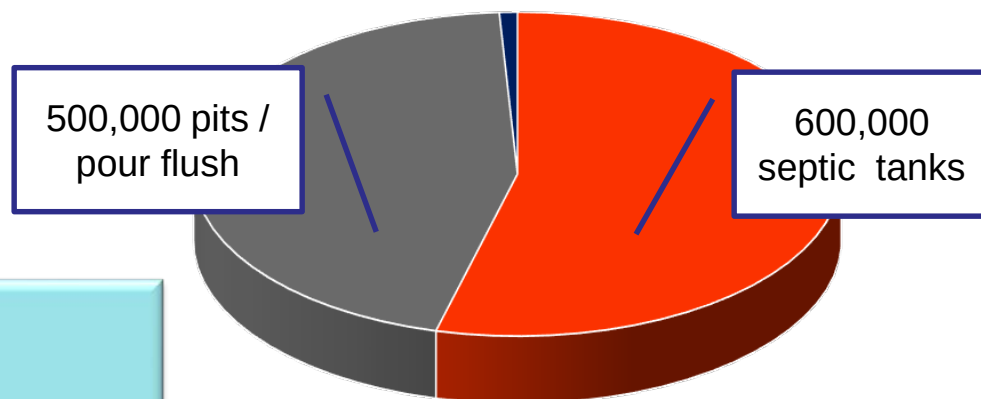
- Operate & maintain sewerage systems
- Sludge emptying & treatment
- Refurbishment & capital works
- Other associated work

Immediate challenge

- Database
- Schedule for emptying
- Tankers
- No treatment facility

Urban on-site systems

(estimated 1994)



- local authority data, ground survey
- tanker transfer from LA / purchase
- site acquisition, EA, approvals
- co treatment, trenching, drying beds,
- gradual upgrade
- education & awareness missed out
- reuse factor missed out

SEPTIC TANKS EMPTYING

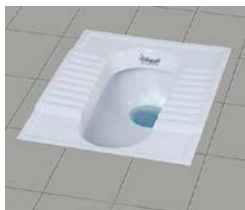
- demand vs scheduled



All owner wants if for the sludge to be emptied and taken away. Safety, spills, safe treatment & disposal are not his concern.



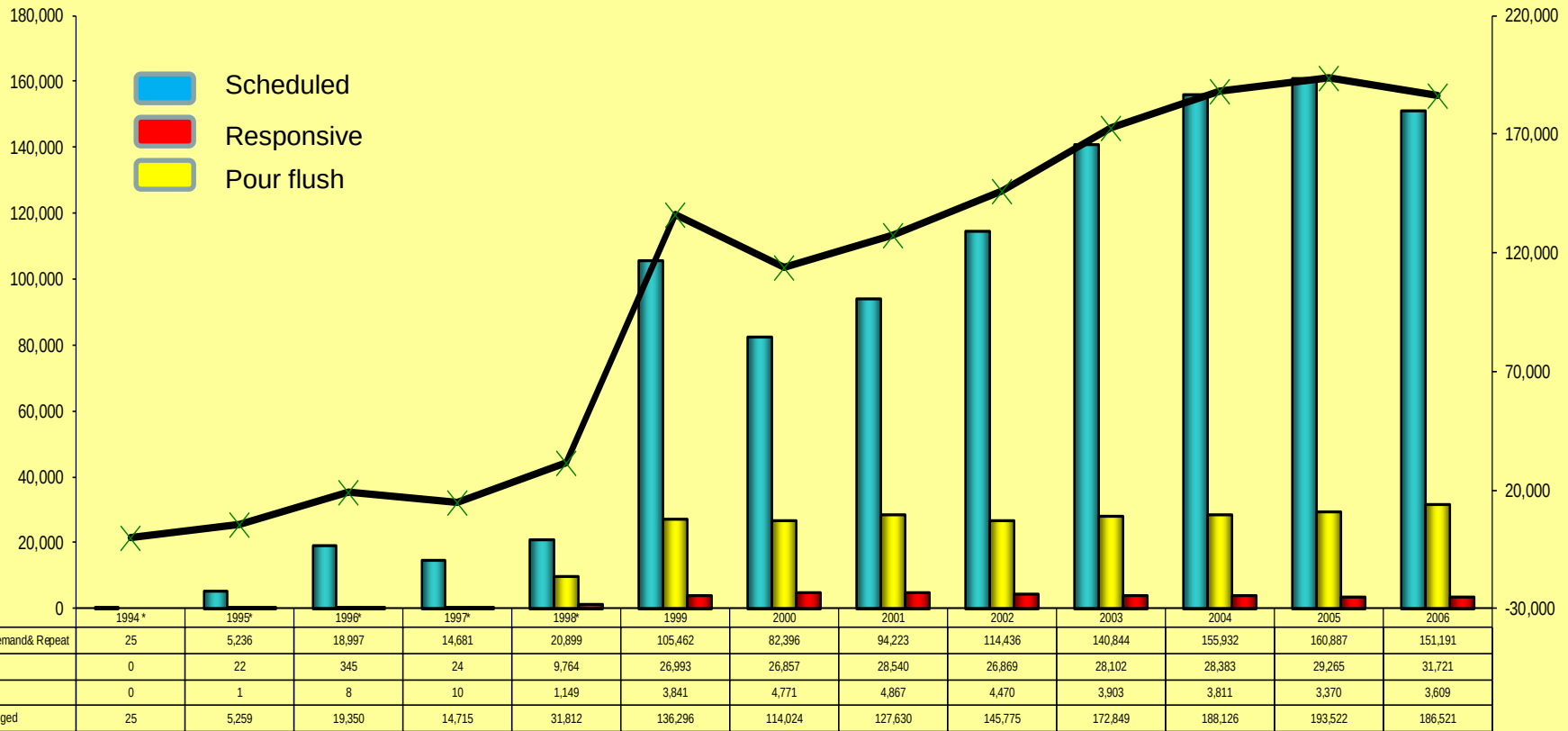
When owner faces problems of overflow or other symptoms, he requests emptying.



Owner is happy as long as he can use his toilet. He may be unaware of the septic tank. Effluent could very well be polluting the drains & rivers.

30%
success
rate

Desludging



SEPTAGE REMOVAL



TYPES OF TANKERS

↪ TYPE 2.5 m3

↪ TYPE 4.5 m3

↪ TYPE 11 m3

Sludge treatment site selection criteria

- Logistics
- Sufficient land area
- Flooding, Water table
- Soil type , Reasonably flat
- Sufficient buffer , compatible to neighbourhood
- Accessible
- Power / water supply
- Leachate / filtrate / liquor treatment facility

Environmental Impact Report & approval

- Conditions : duration, mitigation
- Monitoring : periodic, long term
- Data compilation & reporting

Trenching System:

Melaka

- Basic system
- Shallow trenches filled with wet sludge and covered
- Site selection criteria important:
 - Soil type
 - Ground water
 - Location
 - Access
 - buffer
- Monitoring of ground water and soil contamination must be undertaken



Drying bed system

Pangkor, Malaysia

- Faecal sludge from septic tanks / pits
- Screened sludge to drying bed
- Filtrate Liquid : co treated in STP
- Produces effluent and dry cake for composting / disposal



Sludge Lagoon system

Taiping

- Faecal sludge from treatment plants, septic tanks / pits
- Screened sludge to lagoon
- Produces effluent
- Will need to be dredged once in 10 years



Geobag System:

Kedah, Malaysia

- Basic system
- Geotextile bag filled with wet sludge
- Filtrate co treated in treatment plant
- Filled bags left to completely dry and stabilise with pathogen reduction
- Bags may be opened and solids disposed in landfill, composted or incinerated



Semi mechanised AVC system

: Kerteh, Malaysia

- Faecal sludge from septic tanks / pits
- Filtrate Liquid to be treated
- Produces dry cake for composting / disposal



Mechanical dewatering system

: Segamat, Malaysia

- Faecal sludge from treatment plants, septic tanks / pits
- Screened sludge to mechanical dewatering using belt/filter press or centrifuge
- Filtrate Liquid : co treated in STP
- Produces effluent and dry cake for composting / disposal



Centralised sludge treatment facility

: Klang, Malaysia

- Sewage + Faecal sludge from treatment plants, septic tanks / pits
- Screened sludge to mechanical thickener, digestion, dewatering using screw press
- Filtrate Liquid : co treated in STP
- Produces effluent and dry cake for composting / disposal



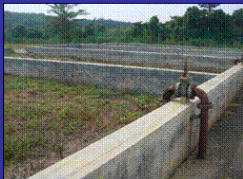
Sludge facilities

- **Dedicated sludge treatment facilities with Department of Environment approval nationwide**

IWK CURRENT SLUDGE FACILITIES



Trenching System : 31 Nos



Drying Beds : 1,799 Nos



**Sludge Lagoon System
: 1 Nos**



**Sludge Reception Facility
: 12 Nos**



**Mechanised Dewatering Unit
: 8 Nos**



Filter Press
83 units



Belt Press
58 units



**Centrifuge
19 units**



Ultimate Sludge Disposal/Reuse Strategies

Land application of sludge
onto rubber plantation



Composting



Land Reclamation

Methods of Disposal/Reuse

- Soil Improvement
- Land Reclamation
- Composting
- Construction Material
- Fertilizer
- Landfill

Rehabilitation of ex-
mining land.



Landfill



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FEDERALISATION & PRIVATISATION (CONCESSION)



IndahWater

1994

Investment in
refurbishment,
upgrading &
operations

Legal / regulatory &
institutional
frameworks

SEPTIC TANK
SERVICES ,
SLUDGE MANAGEMENT

CATCHMENT
PLANNING & LAND
RESERVATION

Developer
guidelines: quality
developer built
systems

Awareness,
education, training,
capacity building

Key Successes

- Driver – federal government : political push
- Policy governing sewage / sludge management
- Legislative (law & regulations)
- Defined responsibilities: developer, owner, operator, regulators
- Investment & infrastructure improvements: funding focus
- Guidelines, Operating instructions
- Appropriate technologies & gradual upgrading
- Economics : tariff, charges, subsidy
- Monitoring & Enforcement
- Awareness, education & communications
- Training & capacity building: people & skills

Issues faced

- With Federalisation : State & Local Governments left out
- Water / sewerage management separated
- Abrupt introduction of model based on full cost recovery from polluter.
- Flawed financial model – CAPEX / OPEX
- Land / town planning
- Asset aging , risks, rising expectations
- Cost recovery mechanisms
- Desludging , sludge disposal , Resource recovery issues
- Grey water
- Risk, nuisance & aesthetics

ESTABLISHING LINE OF SIGHT

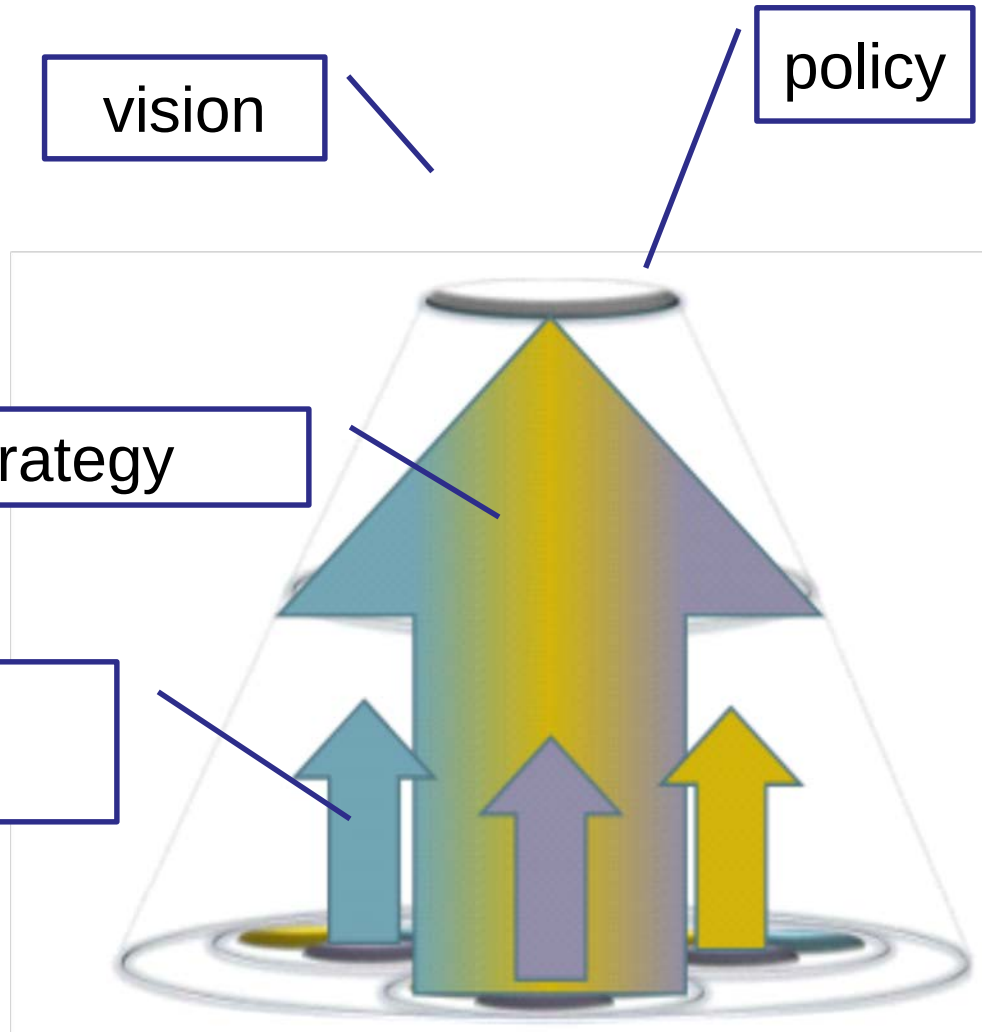
- Health
- Dignity
- Water pollution
- Environment
- Aesthetics
- Living space
- Affordable
- etc

vision

policy

strategy

Plans /
initiatives



Technology choices

FSM TECHNOLOGY CHOICE CONSIDERATIONS

- Regulations
- Socio cultural
- Financial / resources
- FSM Infrastructure
- Climate
- Sensitivity
- Land availability
- Market conditions

**LOCAL
FACTORS**

**Appropriate
strategy**

**FSM
Objectives
& priority**

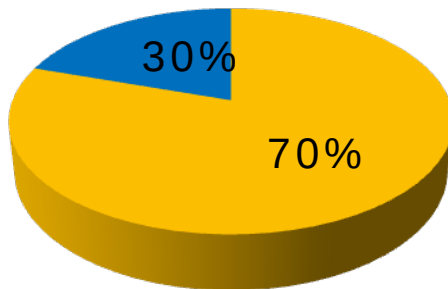
**Toilets / OSS / Emptying
/Collection & transport:
interventions & suitable
technology**

- Public Health & environment**
- Diseases
 - Water (surface / ground)
 - Soil
 - Living space & aesthetics
- Resource recovery**
- Bio solids
 - Water reuse
 - Energy

EQUITABLE COST RECOVERY MECHANISM

CAPEX APPORTIONMENT

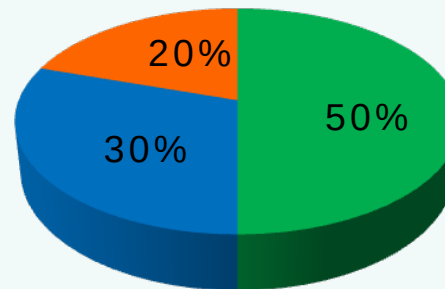
CAPEX items having direct impact on customers to be directly recovered through tariff. Balance to be covered from Government taxes



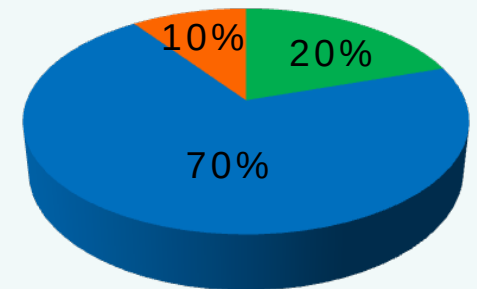
OPEX APPORTIONMENT

OPEX recovery from tariff/ environmental or other tax/ other business revenue in changing proportion as shown below:

INITIAL STAGE (20 Years)

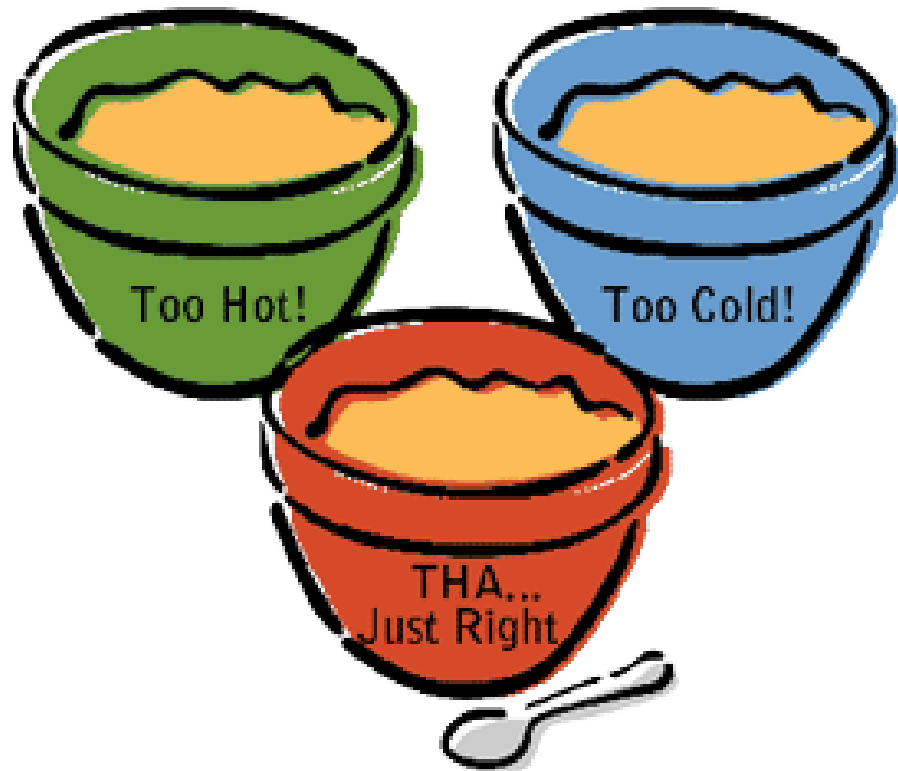


FINAL STAGE (Eventually after 2035)



■ Government Grant ■ Tariff ■ Environmental Tax ■ Ancillary Business

The Goldilocks Strategy



- *Consider local situation : appropriate technology*
- *simple, robust, reliable, low energy solutions*
- *incremental approach: improvement rather than achieving perfection*

CLOSING POINTERS

- Maintain line of sight
- Consider local situation : appropriate technology
- don't forget the future: changes
- imagine the system in 5 / 10 years time
- simple, robust, reliable, low energy solutions
- incremental approach: improvement rather than achieving perfection

***“Less than perfect decision”
is better than “no decision”***