



# Assessing faecal waste flows and practices

26 August 2016

SFD meeting, Stockholm  
Ingeborg Krukkert

Supporting water sanitation  
and hygiene services for life

# Praya – Lombok, Indonesia



PAK FIRMAN – CITY LEVEL



PAK SUGENG – PROVINCIAL LEVEL



# Why?

To support city authorities and city planners in future sanitation interventions

To support them in getting a good understanding of both the current and future situation, so that:

- real issues are addressed;
- priority is given to those issues that will bring the most benefit in terms of environment and health outcomes;
- public funds are spent wisely

## Focus of the tool

- 1) Volumes of faecal waste produced and safely managed – or not
- 2) Working with municipality and their data, validated by spot checks
- 3) Rapid – 6 days



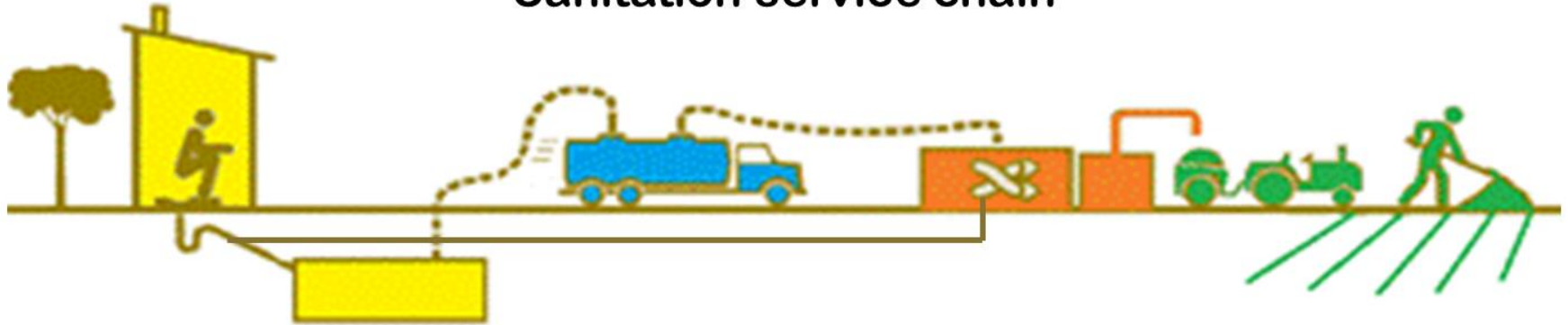
# How?



- Calculate volumes of faecal waste for each of the six elements
- Assess if and where faecal waste flows into the open environment
- Visualising the decrease in safely managed waste along the chain

# The sanitation service chain

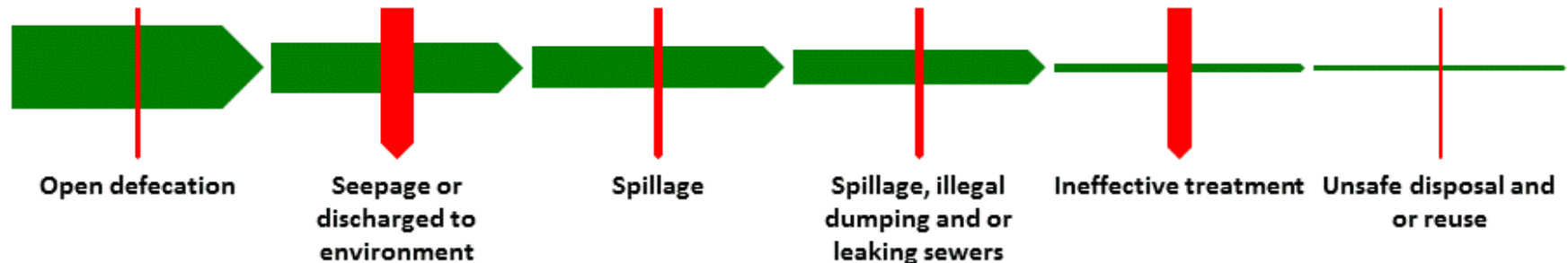
## Sanitation service chain



Ideally all human waste produced ends up safely at the end of the chain



In reality much of the human waste disappears somewhere along the chain



# Data input for volume calculations

31052016\_FWF Calculation data\_Praya Lombok Tengah (1).xlsx - Microsoft Excel

File Home Insert Page Layout Developer Formulas Data Review View

Clipboard Font Alignment Number Styles Cells Editing

B5 User Interface | RESIDENTS

**User Interface | RESIDENTS**

Date: 23 May 2016 this sheet is meant for data inputs for RESIDENTS!

Name of city: PRAYA  
 Location (Province or others): LOMBOK TENGAH  
 Country: INDONESIA

POPULATION FIGURES	Total present population	Date of data	Planning horizon in # of years	Average annual growth rate
Residents	165,214	30 April 2016	20	1.10%
Source of data	Dinks data "SMS gateway overview access to toilets" for # of HH* average H Average growth rate per Kecamatan from 2005-2010, pg. 10-11 Whitebook BPS BAB2			

Average household size: 3.52

PRESENT SITUATION TYPES OF SANITATION FACILITIES AND TYPES OF INTERFACES	Total percentages	Proportion of septic tanks or pit latrines	Proportion of types of user interfaces			Total proportion (100%)	Other Toilet with direct connection	Type of onsite pits		Total proportion (100%)
			Flush toilet	Pour-flush toilet	Direct drop (without water for flushing)			Pits with non-sealed (open) bottoms	Pits with sealed (closed)	
1) Networked sewerage systems	0.0%				0.0%					
2) Communal septic tanks (e.g. DEWATS)	0.2%			100.0%	100.0%	OK				
3) On-site sanitation facilities (septic tanks)	32.4%	OK								
3.1 Septic tanks		10.0%		100.0%	100.0%	OK	25.0%	100.0%	100.0% OK	
3.2 Pit latrines		90.0%		100.0%	100.0%	OK		100.0%	100.0% OK	
4) Communal toilets	0.9%	OK								
4.1 Septic tanks		100.0%		100.0%	100.0%	OK	5.0%			
4.2 Pit latrines					0.0%				0.0%	
5) Do not use toilet (Open Defecation)	6.5%									
	100.0%	10.1%	<< Proportion of septic tanks							
	OK	83.1%	<< Proportion of pit latrines							
HH using toilet of others (shared)	11.4%	<small>These HH have been added proportionally to 3) On-site sanitation facilities.</small>								

HH using toilet of others (shared): 11.4%

Taskbar: Overview\_ALL, FW Flows\_ALL, Overview\_SLUDGE, FW Flows\_SLUDGE, SUM for FWF Diagram\_ALL, SUM FWF Diagram\_SLUDGE, Scorecard Overview, User interface\_RES

System tray: 00:08, 26/08/2016



# Calculations

A4		fx		CAPTURE ELEMENT   CALCULATIONS		
A	B	C	D	E	F	
61	<b>Type of interface used by residents</b>	<b>In #</b>	<b>In #</b>		<b>In %</b>	<b>In %</b>
62	1) Flush toilets	0	0		0.0%	0.0%
63	2) Pour-flush toilets	154,275	205,000		93.5%	100.0%
64	3) Direct drop (without water for flushing)	0	0		0.0%	0.0%
65	5) Do not use toilet (Open Defecation)	10,725	0		6.5%	0.0%
66	<b>Totals</b>	<b>165,000</b>	<b>205,000</b>		<b>100.0%</b>	<b>100.0%</b>
67		165,000	205,000			
68		OK	OK			
69						
70	<b>Residents using septic tanks</b>	<b>In #</b>	<b>In #</b>		<b>In %</b>	<b>In %</b>
71	2) Communal septic tanks	380	4,100		0.2%	2.0%
72	3) On-site sanitation facilities   SEPTIC TANKS	15,241	39,975		9.2%	0.0%
73	4) Communal toilets   SEPTIC TANKS	1,485	1,025		0.9%	0.0%
74	<b>Totals</b>	<b>17,106</b>	<b>45,100</b>		<b>10.4%</b>	<b>2.0%</b>
75						
76	<b>Residents using pit latrines</b>	<b>In #</b>	<b>In #</b>		<b>In %</b>	<b>In %</b>
77	3) On-site sanitation facilities   PIT LATRINES	137,169	159,900		83.1%	0.0%
78	4) Communal toilets   PIT LATRINES	0	0		0.0%	0.0%
79	<b>Totals</b>	<b>137,169</b>	<b>159,900</b>		<b>83.1%</b>	<b>0.0%</b>
80						
81						
82	<b>VOLUMES PRODUCED   RESIDENTS</b>	<b>NOW</b>	<b>IN FUTURE</b>		<b>NOW</b>	<b>IN FUTURE</b>
83						
84		<b>In litres/day</b>	<b>In litres/day</b>		<b>In m<sup>3</sup>/year</b>	<b>In m<sup>3</sup>/year</b>
85	1) Networked sewerage systems	0	0		0	0
86	1.1 Flush toilets	0	0		0	0
87	1.2 Pour-flush toilets	0	0		0	0
88	2) Communal septic tanks	3,800	41,000		1,375	14,975

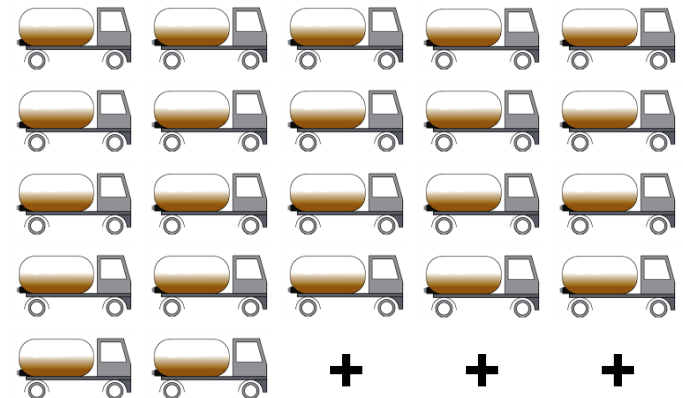
# Reporting for each element



## Volumes of faecal waste produced

A total of **617,000 cubic metres of faecal waste is produced annually** by residents and non-residents

Equivalent of  
> 560,000 private trucks  
> 102,000 public trucks



**13,000 cubic metres of faecal sludge is produced annually**, equal to some 2% of the total amount of faecal waste produced

CAPTURE

CONTAINMENT

EMPTYING

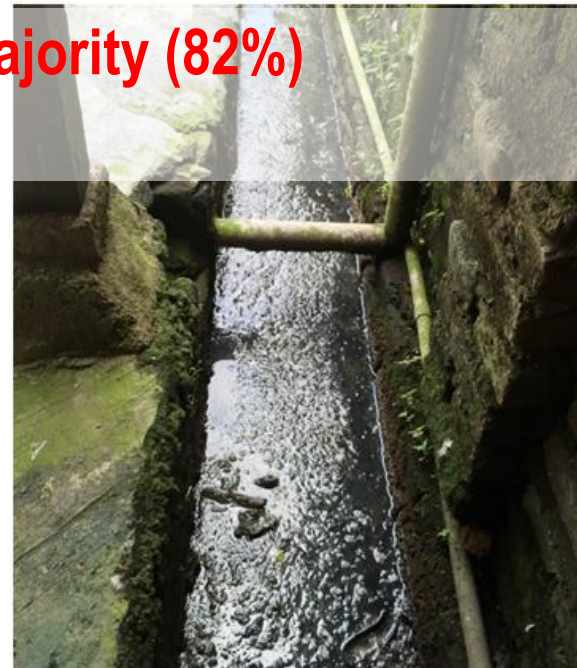
TRANSPORT

TREATMENT

SAFE REUSE  
OR DISPOSAL

# Volumes of faecal waste contained

18% of the faecal waste is contained safely, **the vast majority (82%) is not contained safely** and is lost onsite



# Data input for enabling environment

## Planning

- ▶ National
- ▶ City

## Budgets

- ▶ Sanitation infrastructure budget
- ▶ WASH operational budget
- ▶ Infrastructure budget
- ▶ Operational budget

## Standards and regulations

- ▶ Building regulations
- ▶ Safety standards
- ▶ Sewage treatment effluent standards
- ▶ Communal septic tank effluent standards
- ▶ Disposal standards
- ▶ Reuse standards

## Permits

- ▶ Permits and permissions
- ▶ Business licences and permissions

## Safety

- ▶ Safety practices manual providers
- ▶ Safety practices mechanical providers

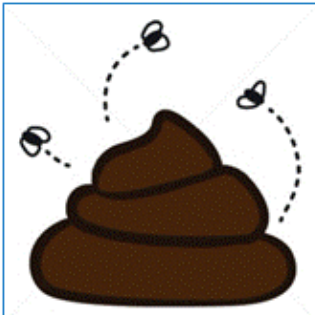


# Visualisation



- 3.1%

- 79.1%



- 2.2%

- 15.5%

12,875 m<sup>3</sup> is produced annually

12,475 m<sup>3</sup> (~97%) is captured in a toilet

12,190 m<sup>3</sup> (~95%) is contained in a pit or tank

2,000 m<sup>3</sup> (~16%) is emptied

0 m<sup>3</sup> (0%) is treated and safely disposed or reused

Equal to some 2,100 desludging trucks

Only a small part is not captured in a toilet

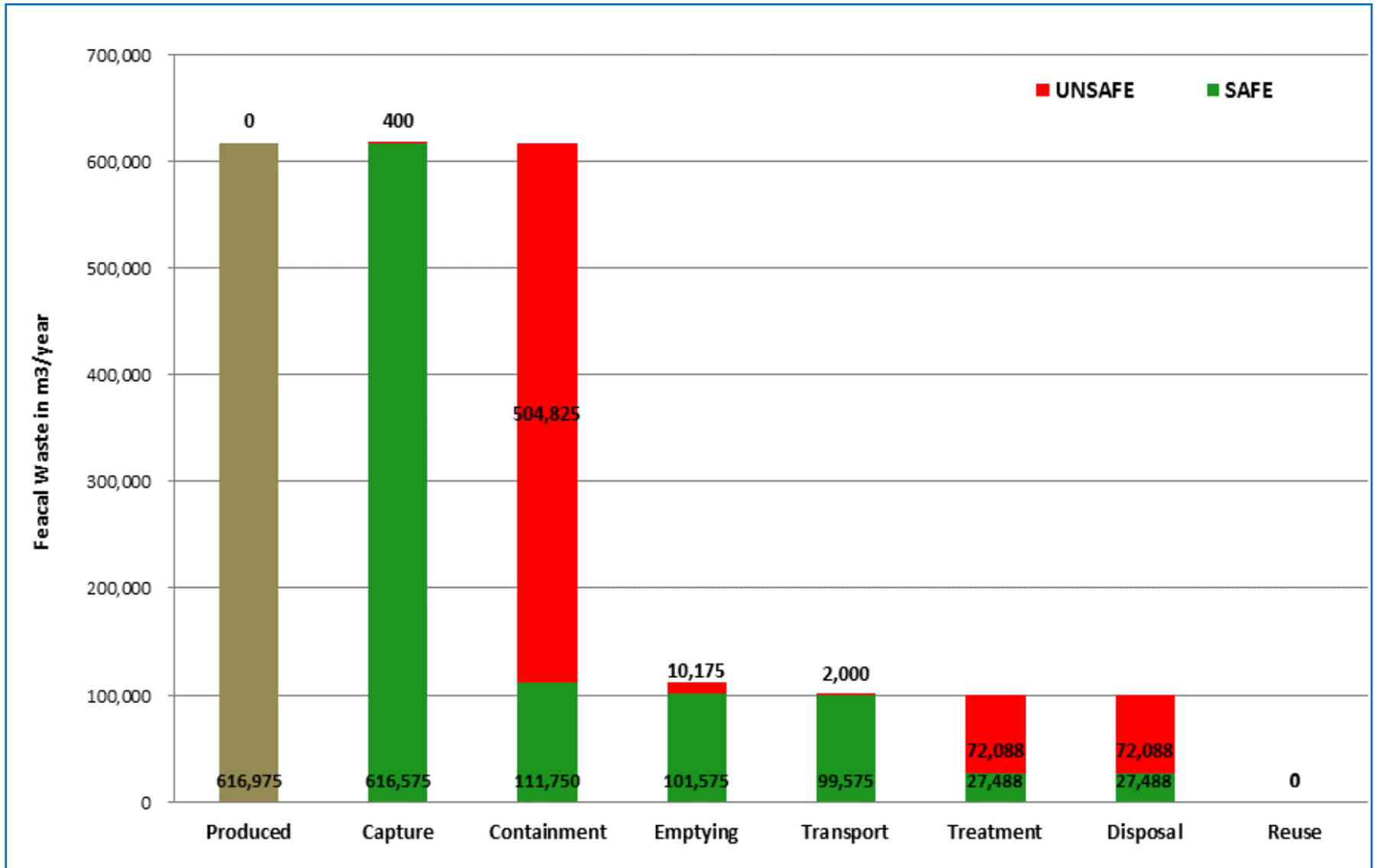
A majority of onsite pits and tanks are unsafe; it is assumed that the sludge will require emptying

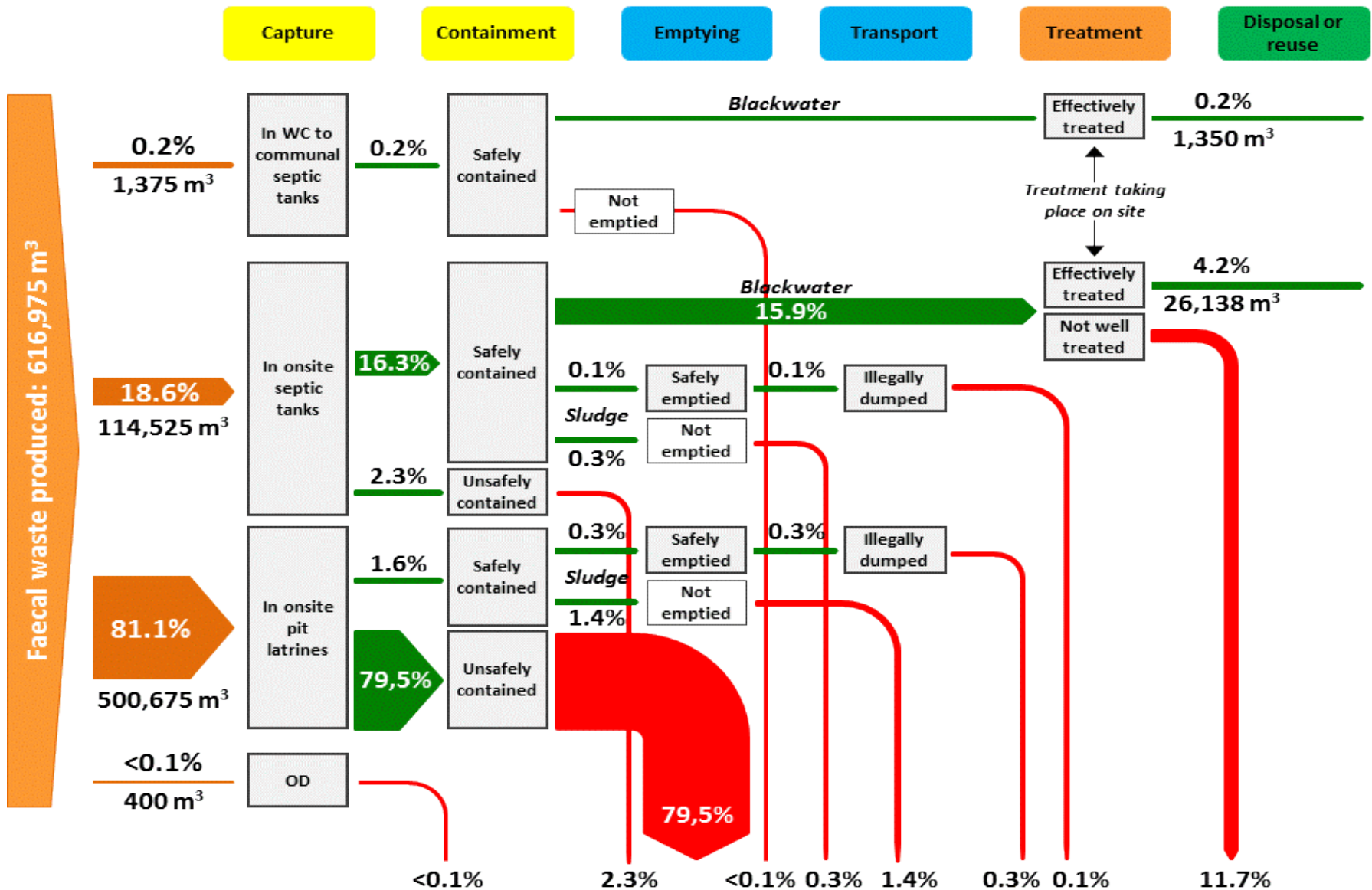
Equal to 330 desludging trucks; current demand is one truck per day

Some 10,000 m<sup>3</sup> is not emptied

2,000 m<sup>3</sup> is illegally disposed in the environment

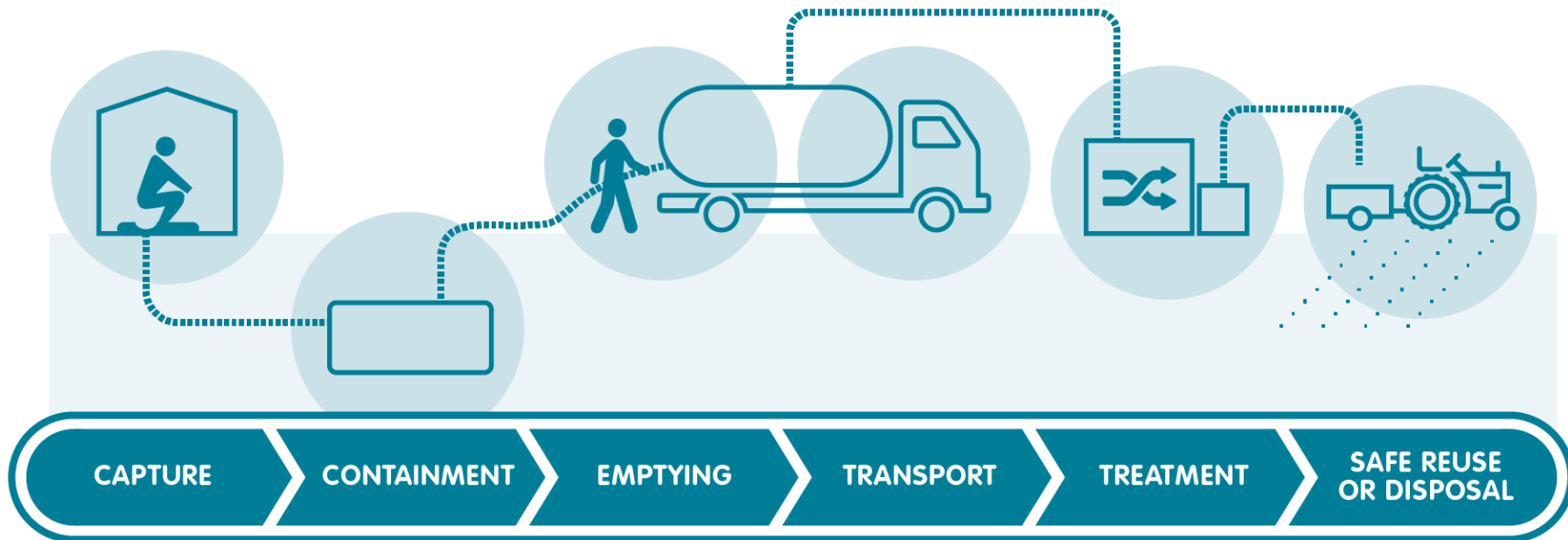
A regular desludging system (once every two years) would mean that some 6,200 cubic metres of sludge (equal to some 1,000 desludging trucks) would have to be emptied, transported and treated annually.



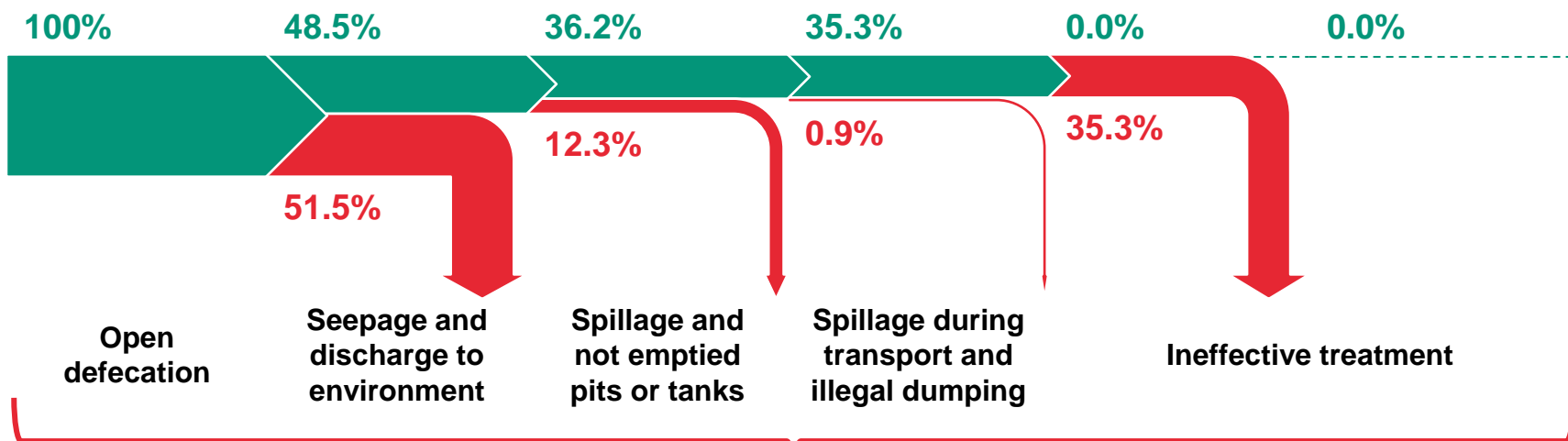


**589,500 m<sup>3</sup> (95.5%) of faecal waste ends up untreated in the environment each year**





### Faecal sludge diagram



**100% of unmanaged faecal waste ends up in the environment.**

# Score cards

## Summary of faecal waste flows

	Produced	Capture	Containment	Emptying	Transport	Treatment	Disposal	Reuse
Totals in m <sup>3</sup>	616,975	616,975	111,750	111,750	101,575	99,575	99,575	0
Totals in %	100.0%	100.0%	99.9%	18.1%	16.5%	16.1%	16.1%	0.0%
Safe		99.9%	18.1%	16.5%	16.1%	4.5%	4.5%	0.0%
Unsafe		0.1%	81.8%	1.6%	0.3%	11.7%	11.7%	0.0%

## Overview of faecal waste management related score card results

	Overall	Capture	Containment	Emptying	Transport	Treatment	Disposal	Reuse
Planning	56%							
Budgets	43%	NA	NA	NA	NA	NA	NA	NA
Standards		44%	0%	0%	60%	0%	0%	0%
Permits		67%	0%	0%	0%	0%	0%	0%
Safety		N/A	0%	0%	N/A	N/A	N/A	N/A

Notes: NA = Not Available; N/A = Not Applicable

# Did all this help Pak Firman?

	Users in number of HH	Users (HH)	Volume of waste produced	Volume of waste produced	Infrastructure investments	Investments per HH
SANITATION FACILITIES	In #	In %	In m3	In %	In IDR	In IDR
1) Networked sewerage systems	0	0%	0	0%	0	0
2) Communal septic tanks (DEWATS)	108	0.23%	1,375	0%	4,899,980,000	45,390,220
3) On-site sanitation facilities	38,004	81%	487,625	87%	0	0
4) Communal toilets	422	0.9%	5,425	1%	4,042,229,250	9,569,170
5) Used toilet of others (shared)	5,351	11%	68,675	12%	0	0
6) Do not use toilet (open defecation)	3,051	7%	400	0.1%	0	0
<b>Totals and averages for investments</b>	<b>530</b>	<b>1.1%</b>			<b>8,942,209,250</b>	<b>54,959,390</b>

OD is not the largest waste producer

Total sanitation budget for sanitation facilities that benefit only 1.23% of the HH  
 These users produce the least waste

**What next?**

# Finalise interface for input & visualisation

K25

fx



Supporting water sanitation and hygiene services for life

INPUT DATA

VIEW RESULTS

## Rapid assessment tool

Faecal sludge / Wastewater flows and related issues



CAPTURE

CONTAINMENT

EMPTYING

TRANSPORT

TREATMENT

SAFE REUSE  
OR DISPOSAL

[Home](#)

[Results menu](#)

[Flow diagram ALL](#)

[Flow diagram SLUDGE](#)

[Overview ALL](#)

[FW Flows ALL](#)

[Overview SLUDGE](#)

[FW](#)

# Rapid assessment tool

## Data input navigation menu

CAPTURE AND CONTAINMENT questions:

RESIDENTS

NON RESIDENTS

EMPTYING and TRANSPORT questions

TREATMENT, DISPOSAL and REUSE questions

CITY-WIDE SCORE CARD questions

BUDGET SCORE CARD questions

PERMITS and STANDARDS SCORE CARD questions

NATIONAL STANDARDS for effluent and disposal and reuse

# Rapid assessment tool

## Results navigation menu

SLUDGE

FLOW DIAGRAM

OVERVIEW

SUMMARY OF VOLUMES DIAGRAM

SUMMARY OF FLOWS

FAECAL WASTE AND WASTEWATER

FLOW DIAGRAM

OVERVIEW

SUMMARY OF VOLUMES DIAGRAM

SUMMARY OF FLOWS

SCORECARD OVERVIEW



Fine-tune based on

Agra, India  
Siem Reap, Cambodia

feedback with professionals:  
Your feedback!







Visiting address  
Bezuidenhoutseweg 2  
2594 AV The Hague  
The Netherlands

Postal address  
P.O. BOX 82327  
2508 EH The Hague  
The Netherlands

T +31 70 3044000  
info@ircwash.org  
www.ircwash.org

Thank you

### More information

<http://www.ircwash.org/blog/plotting-urban-shit-volumes-and-practices-put-your-money-where-your-shit>

<http://www.theguardian.com/global-development-professionals-network/2016/jun/16/can-mapping-faecal-flows-cut-the-crap-in-developing-cities>

### Contact

Erick Baetings, [baetings@ircwash.org](mailto:baetings@ircwash.org)  
Ingeborg Krukkert, [krukkert@ircwash.org](mailto:krukkert@ircwash.org)

# IRC

Visiting address  
Bezuidenhoutseweg 2  
2594 AV The Hague  
The Netherlands

Postal address  
P.O. BOX 82327  
2508 EH The Hague  
The Netherlands

T +31 70 3044000  
[info@ircwash.org](mailto:info@ircwash.org)  
[www.ircwash.org](http://www.ircwash.org)

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CAPTURE

CONTAINMENT

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# Volumes of faecal waste emptied

15.1% of the faecal sludge is safely emptied; **76.8% of the faecal sludge is not emptied** (the remaining 8.1% is not captured (OD) or not contained safely)



**KURAS  
WC  
081 9090 111 99**

**SEDOT/KURAS  
WC  
081 805 707 700**

# Volumes of faecal waste transported

All the emptied faecal sludge is transported away from its point of origin; but **all of it is illegally dumped somewhere in or around the urban villages**



CAPTURE

CONTAINMENT

EMPTYING

TRANSPORT

TREATMENT

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# Volumes of faecal waste treated

At the most 4.5% of the wastewater contained in communal septic tanks is treated; **none of the faecal sludge is treated** in the absence of a treatment facility



# Volumes of faecal waste disposed/reused

Only 4.5% of the faecal waste (black water) produced is safely disposed; **all faecal sludge is disposed off indiscriminately in the environment**

