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

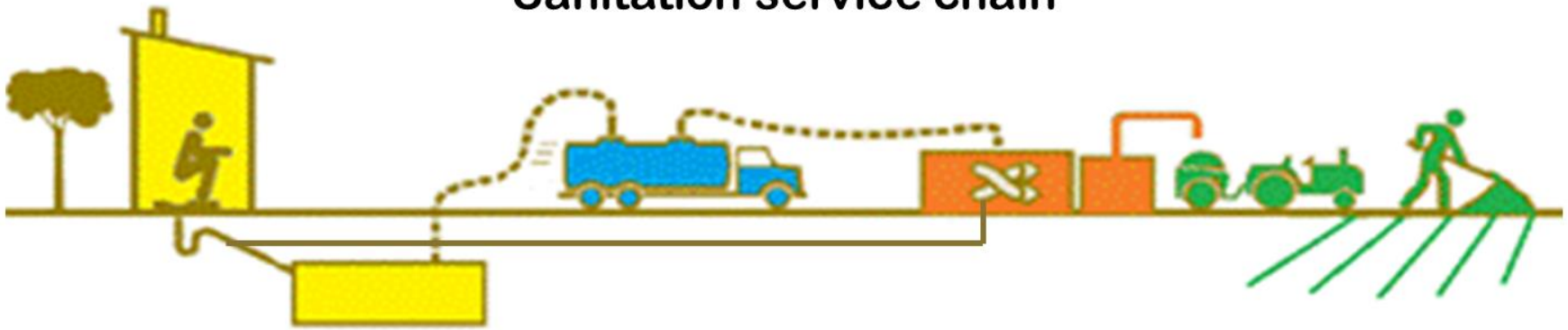
1) Volumes of faecal waste produced and safely managed – or not
2) Working with municipality and their data, validated by spot checks
3) Rapid – 6 days

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

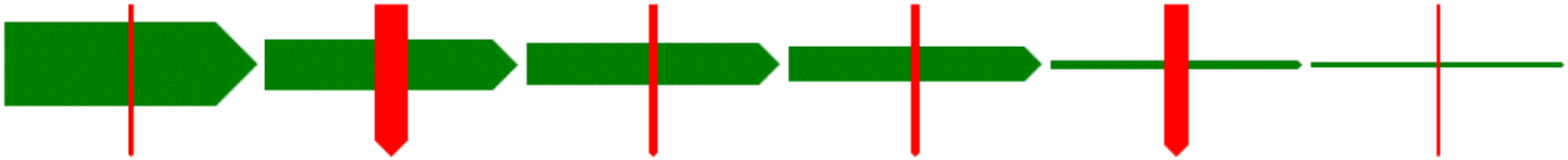


CAPTURE → CONTAINMENT → EMPTYING → TRANSPORT → TREATMENT → SAFE REUSE OR DISPOSAL

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

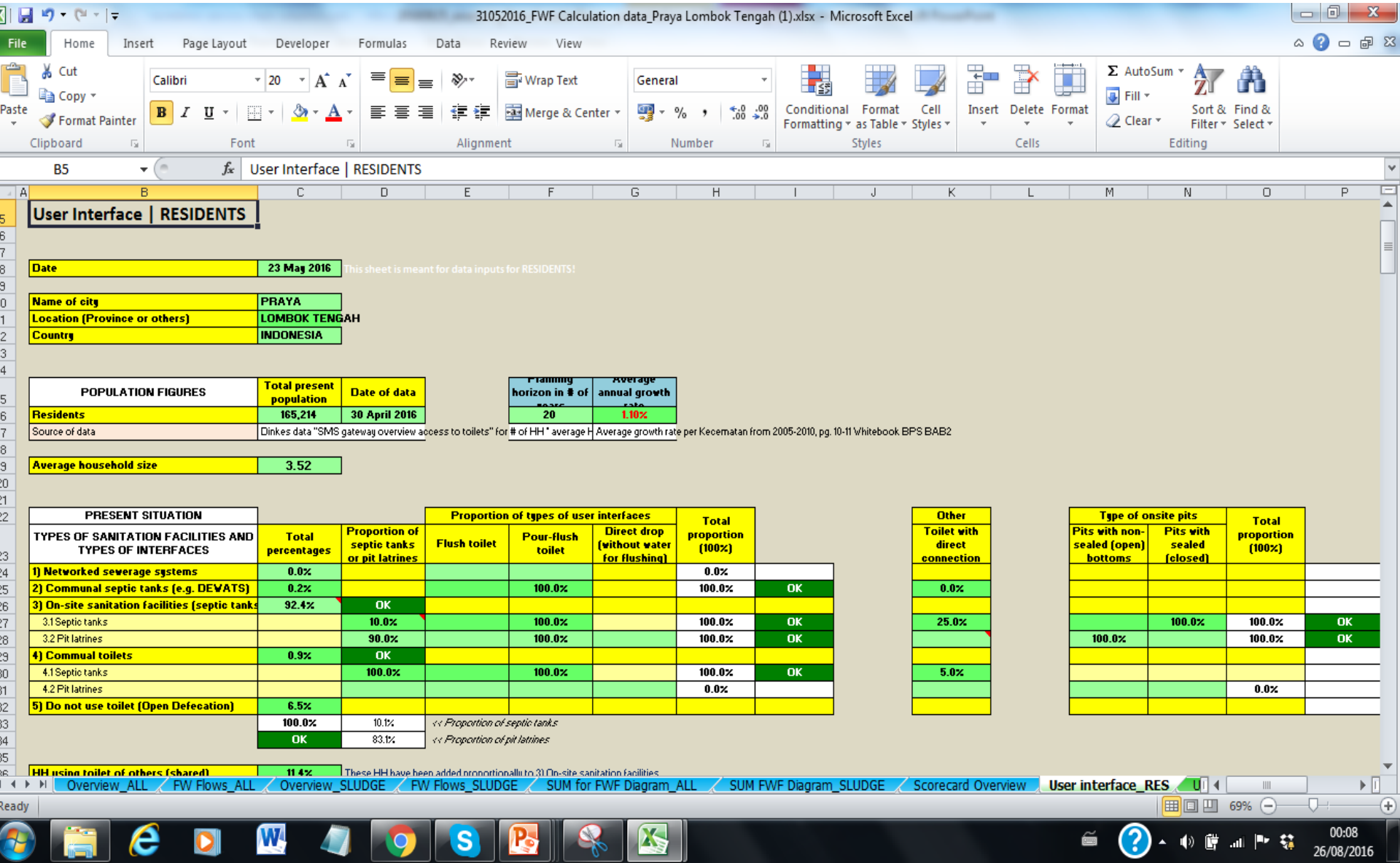
100% → 100% → 100% → 100% → 100% → 100%

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



Open defecation	Seepage or discharged to environment	Spillage	Spillage, illegal dumping and or leaking sewers	Ineffective treatment	Unsafe disposal and or reuse

Data input for volume calculations



Calculations

A4 | CAPTURE ELEMENT | CALCULATIONS

	A	B	C	D	E	F
61	**Type of interface used by residents**	**In #**	**In #**		**In %**	**In %**
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	**Totals**	165,000	205,000		100.0%	100.0%
67		165,000	205,000			
68		OK	OK			
69						
70	**Residents using septic tanks**	**In #**	**In #**		**In %**	**In %**
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	**Totals**	17,106	45,100		10.4%	2.0%
75						
76	**Residents using pit latrines**	**In #**	**In #**		**In %**	**In %**
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	**Totals**	137,169	159,900		83.1%	0.0%
80						
81						
82	**VOLUMES PRODUCED | RESIDENTS**	**NOW**	**IN FUTURE**		**NOW**	**IN FUTURE**
83						
84		In litres/day	In litres/day		In m^3/year	In m^3/year
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

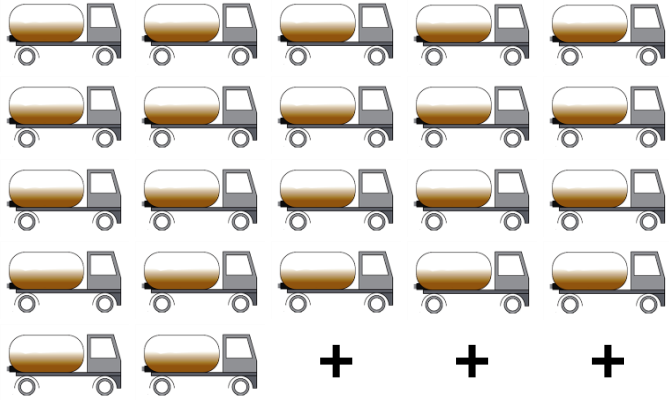
Interface_Treatment Sludge | Government & city wide issues | Capture Containment Sc | Capture volumes | Sheet1 | Cont

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

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

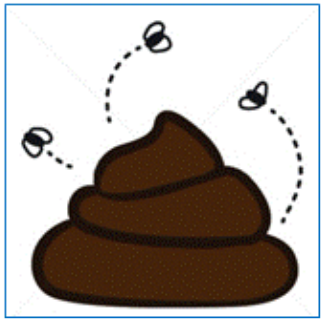
Data input for enabling environment

- **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%

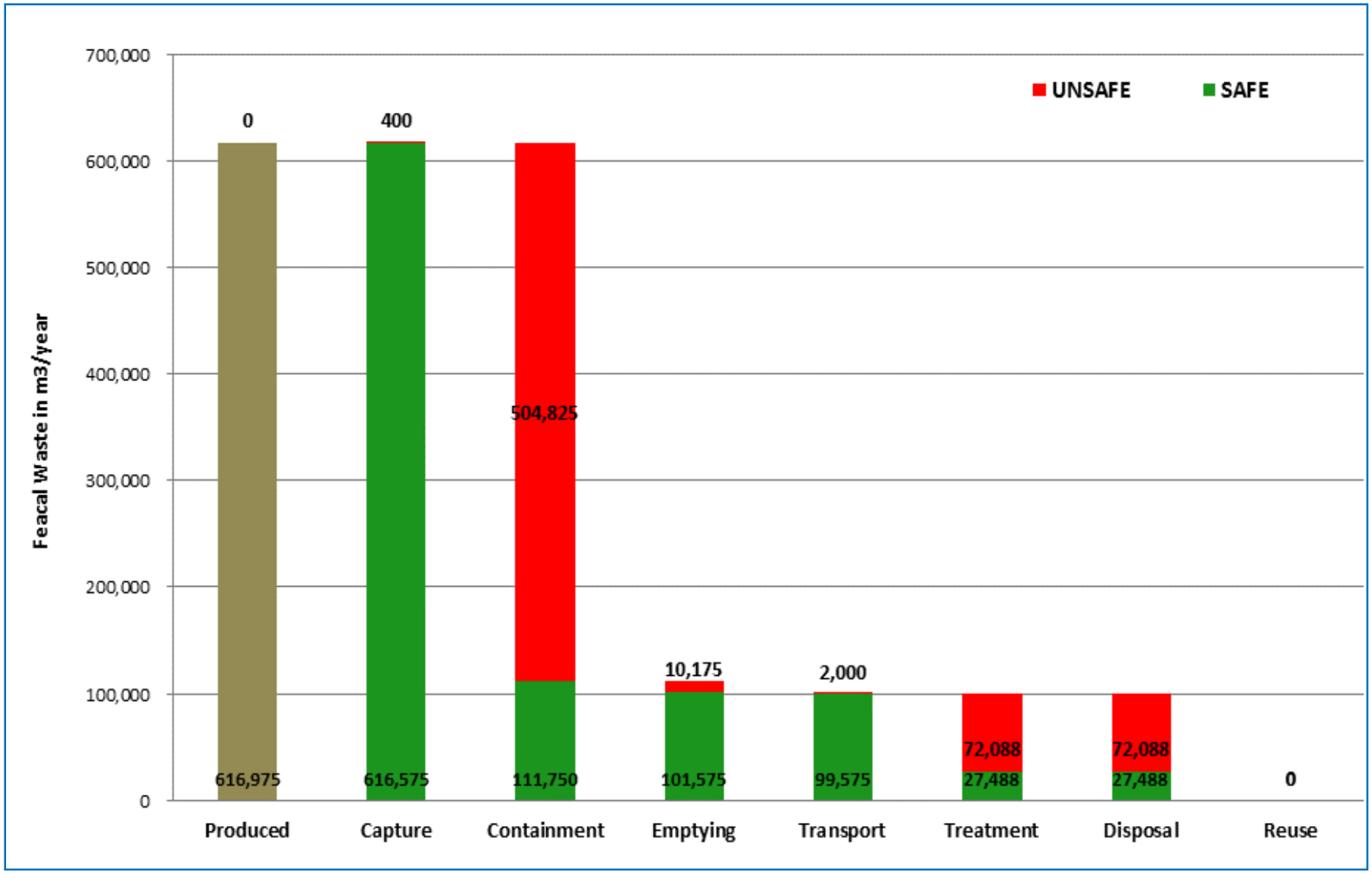


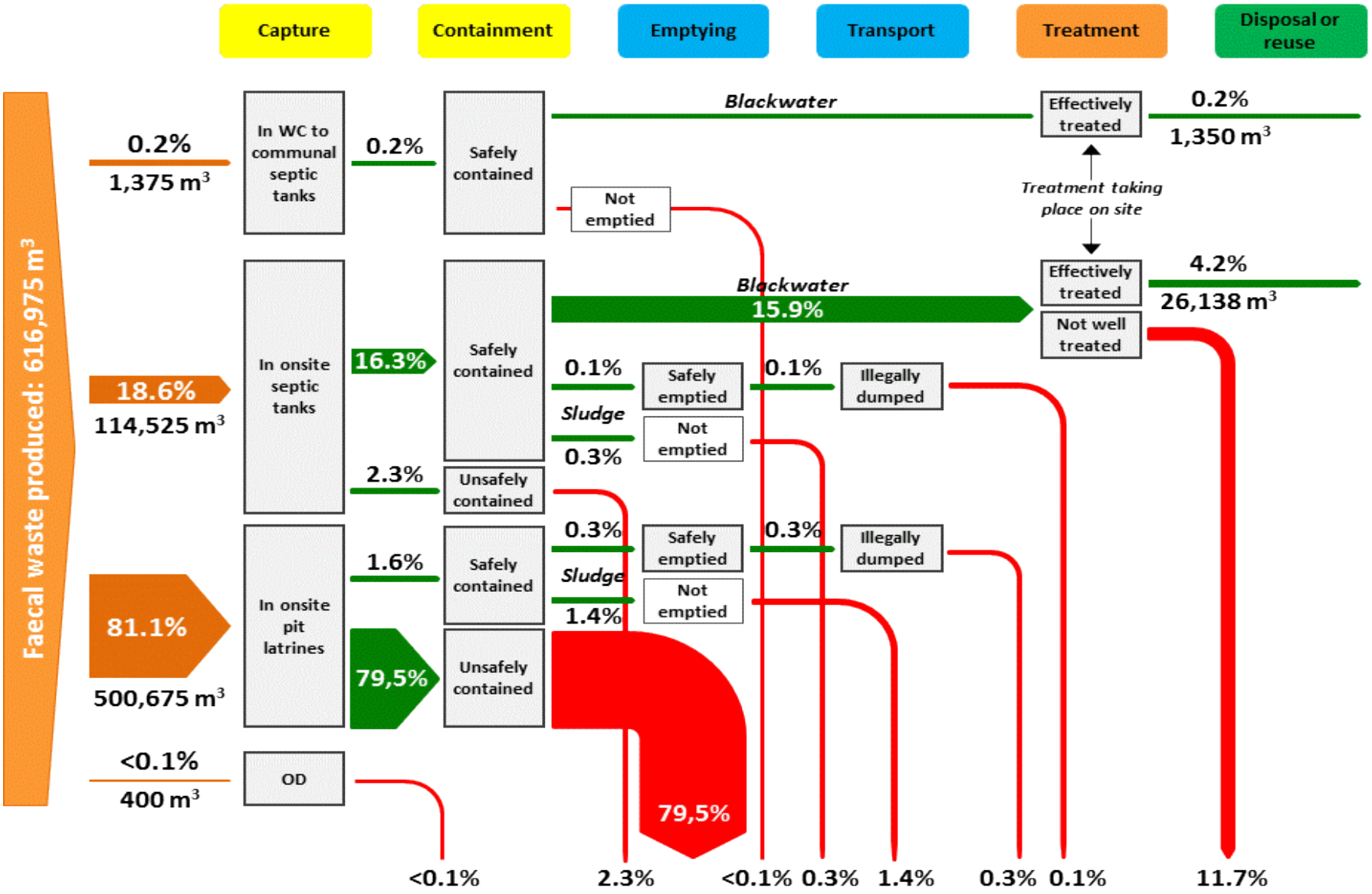
- 2.2%

- 15.5%

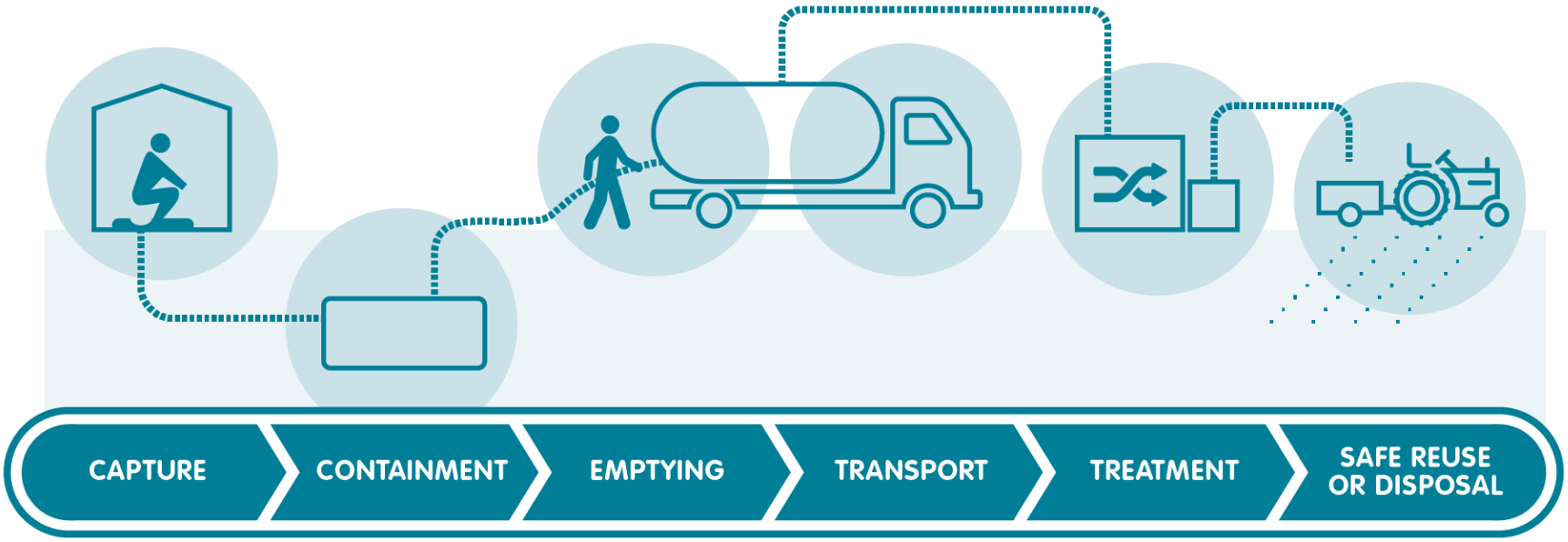
12,875 m^3 is produced annually	12,475 m^3 (~97%) is captured in a toilet	12,190 m^3 (~95%) is contained in a pit or tank	2,000 m^3 (~16%) is emptied	0 m^3 (0%) is treated and safely disposed or reused
Equal to some 2,100 desludging trucks	Only a small part is not captured in a toilet	A majority of onsite 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^3 is not emptied	2,000 m3 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.

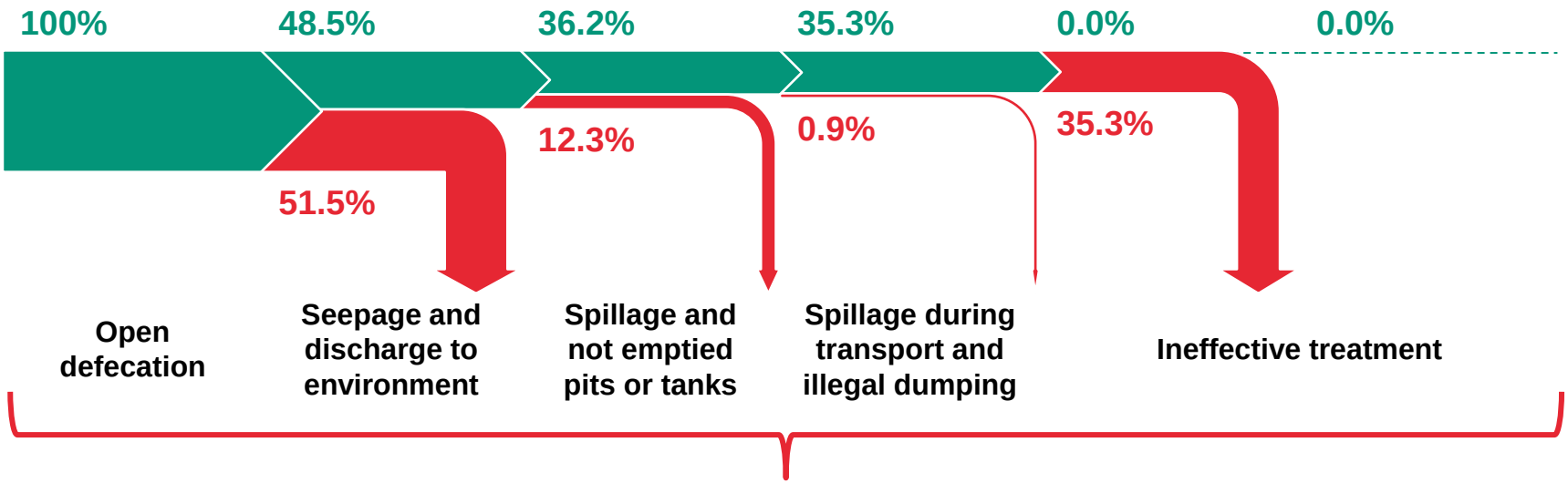

UNSAFE
SAFE
Feacal Waste in m3/year
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
0
400
504,825
10,175
2,000
72,088
72,088
616,975
616,575
111,750
101,575
99,575
27,488
27,488
0
Produced
Capture
Containment
Emptying
Transport
Treatment
Disposal
Reuse



589,500 m³ (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^3	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
Standards		44%		0%	0%	60%	0%	0%
Permits		67%		0%	0%	0%	0%	0%
Safety		N/A		0%	0%	N/A	N/A	N/A

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

Did all this help Pak Firman?

SANITATION FACILITIES	Users in number of HH	Users (HH)	Volume of waste produced	Volume of waste produced	Infrastructure investments	Investments per HH
	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
Totals and averages for investments	**530**	**1.1%**			**8,942,209,250**	**54,959,390**

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

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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

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VIEW RESULTS | HOME

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

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INPUT DATA | HOME

Rapid assessment tool

Results navigation menu

SLUDGE	FAECAL WASTE AND WASTEWATER
FLOW DIAGRAM	FLOW DIAGRAM
OVERVIEW	OVERVIEW
SUMMARY OF VOLUMES DIAGRAM	SUMMARY OF VOLUMES DIAGRAM
SUMMARY OF FLOWS	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
Ingeborg Krukkert, krukkert@ircwash.org

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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
www.ircwash.org

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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)

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 | SAFE REUSE OR DISPOSAL

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**