September 2023

Global Community of Practice (CoP) on decentralized chlorine use

PATH

EOS INTERNATIONAL

Please note: this webinar will be recorded.

Agenda

- Introduction to CoP and announcements
- Project spotlights
    - Results-based financing + Water safety
    - Multi-country costing analysis
- Discussion and wrap up

1 Introduction and announcements

2 Project spotlights

3 Discussion

Announcement

- **Reminder, new leadership:** Starting in June 2023, EOS International joined PATH as a co-secretariat of the CoP.
- **Expanded scope:** Create an open communication platform for sharing evidence, experiences, and approaches:
  - To stimulate the adoption of chlorine generators
  - To advance the conversation around scaled implementation of passive chlorinators.
- **Steering committee + survey results**

Purpose

- The decentralized chlorine production **Global Community of Practice (CoP) aims to be an international consortium** of civil society organizations, private-sector companies, and individuals committed to advancing innovative chlorine generation technologies and service delivery models for disinfection and water treatment.
- The CoP will function as a **global learning, networking, and advocacy alliance** aiming to stimulate collaborative and transparent discussion among partners on lessons learned, evidence gaps, and candid feedback on challenges faced through the deployment and use of on-site chlorine generators and passive chlorination.
- The CoP seeks to **build on increasing global momentum and integration** of onsite chlorine generators and passive chlorination approaches in WASH services across the globe.
- We seek a diverse, inclusive, and equitable platform that **fosters open and honest communication** and encourages a broad range of views and backgrounds. Please reach out with any suggestions, comments, or topics you wish to highlight.

Impact

- **Reduce the burden of water-borne diseases** in low-and middle-income countries by supporting the use of chlorination technologies for decentralized water treatment in household and community-based water systems.

- **Reduce the burden of hospital-acquired infections** in low-and middle-income countries by supporting the use of chlorination technologies for improved infection prevention and control practices in healthcare facilities.

CoP structure

- Voluntary & open to all
- Complement to Global WASH in HCF CoP
- Quarterly meetings with rotating topics
- Previous meetings covered:
  - Technologies
  - Service models
  - Emerging evidence
  - Innovation
- Slides and recording available here:
  - https://www.washinhcf.org/cop/

Steering Committee

- Alex Mwaki, Safe Water & AIDS Project, Kenya
- Amy Pickering, University of California, Berkeley, USA
- Hachem Znaidi, WataTechnology, Switzerland
- Jason Lopez, Millenium Water Alliance, USA
- Joseph Owusu-Ansah, Safe Water Network, Ghana
- Merel Laauwen, University of Oxford, UK
- Ramesh Bohara, Swiss Water and Sanitation Consortium, Switzerland
- Saskia Nowicki, University of Oxford, UK
- Katya Cherukumilli, University of Washington, USA
- Denis Okello, Kabale University, Uganda

Survey Results – 24 respondents

- 95% interested to very interested in learning more about passive chlorinators
- 45% of respondents already implement and/or research chlorinators, another 30% planning future research or implementation
- 65% respondents work in Sub-Saharan Africa, 30% in Latin America and the Caribbean
- 2250 passive chlorinators currently installed, serving approximately 2.9 million people globally

Future topics (ranked list)

1. Institutional use
2. Operation and maintenance
3. Compatibility with chlorine generators
4. Scalability
5. Supply chains
6. Health impacts
7. Monitoring and evaluation
8. Climate resilience
9. Sensor-based modeling
10. Handpump compatibility
11. Innovative mechanisms for financing
12. Management models

There is specifically a lot of interest in applications and management in institutional settings as well as the financial implications involved with implementation.

1 Introduction and announcement

2 Project spotlights

3 Discussion

Results-based funding for safe drinking water services

Dr Saskia Nowicki,

School of Geography and the Environment, University of Oxford

FundiFIX SafePani সেফপানি UPTIME global

UK International Development

Partnership | Progress | Prosperity

UNIVERSITY OF OXFORD

Payment by results / Results-based funding

Key principles:

Payments are made for pre-agreed results (outcomes not inputs)

Implementer has discretion over how results are achieved

Independent verification of results ensures transparency and accountability

Why use RBF Instruments?

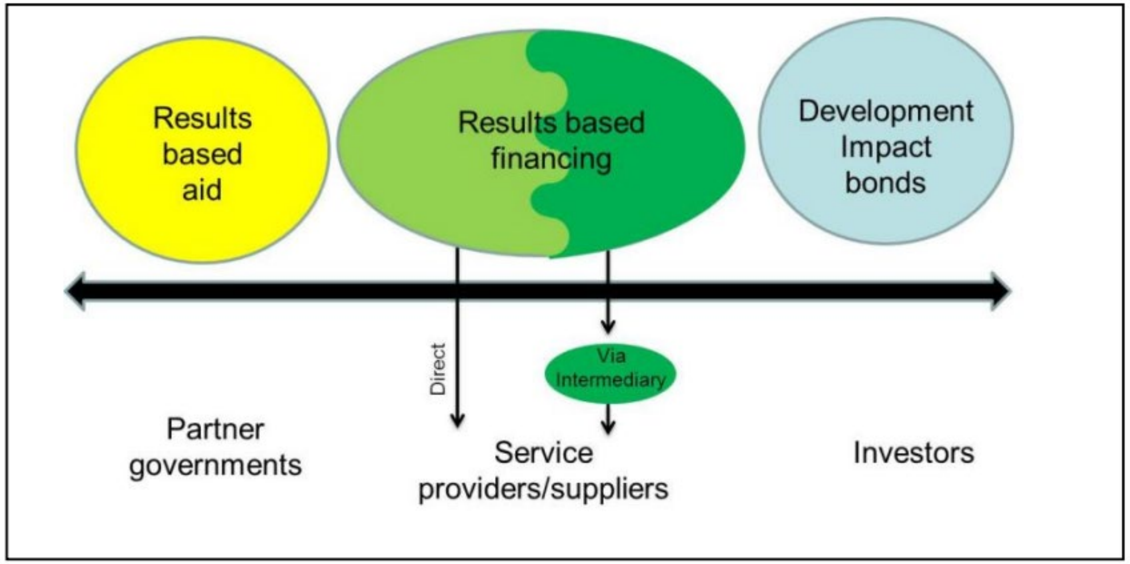
Rewards efficiency and effectiveness

Can encourage structural change to address bottlenecks that hinder achievement of results

Risk mitigation tool for funders

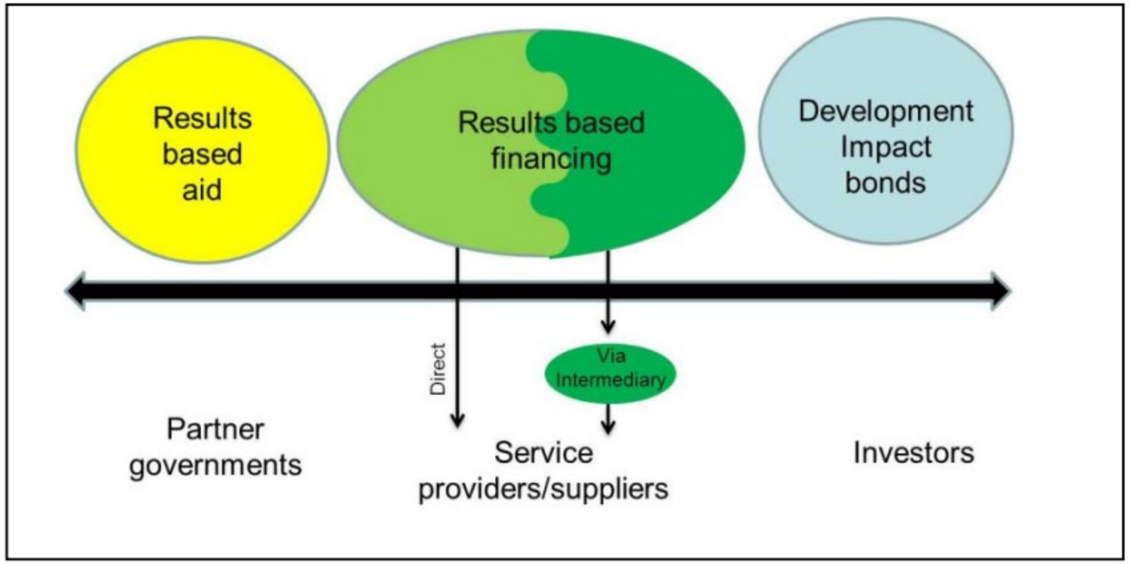
Proof of concept can attract additional private sector funding

PbR in International Development



RBF for safe drinking water

PbR in International Development

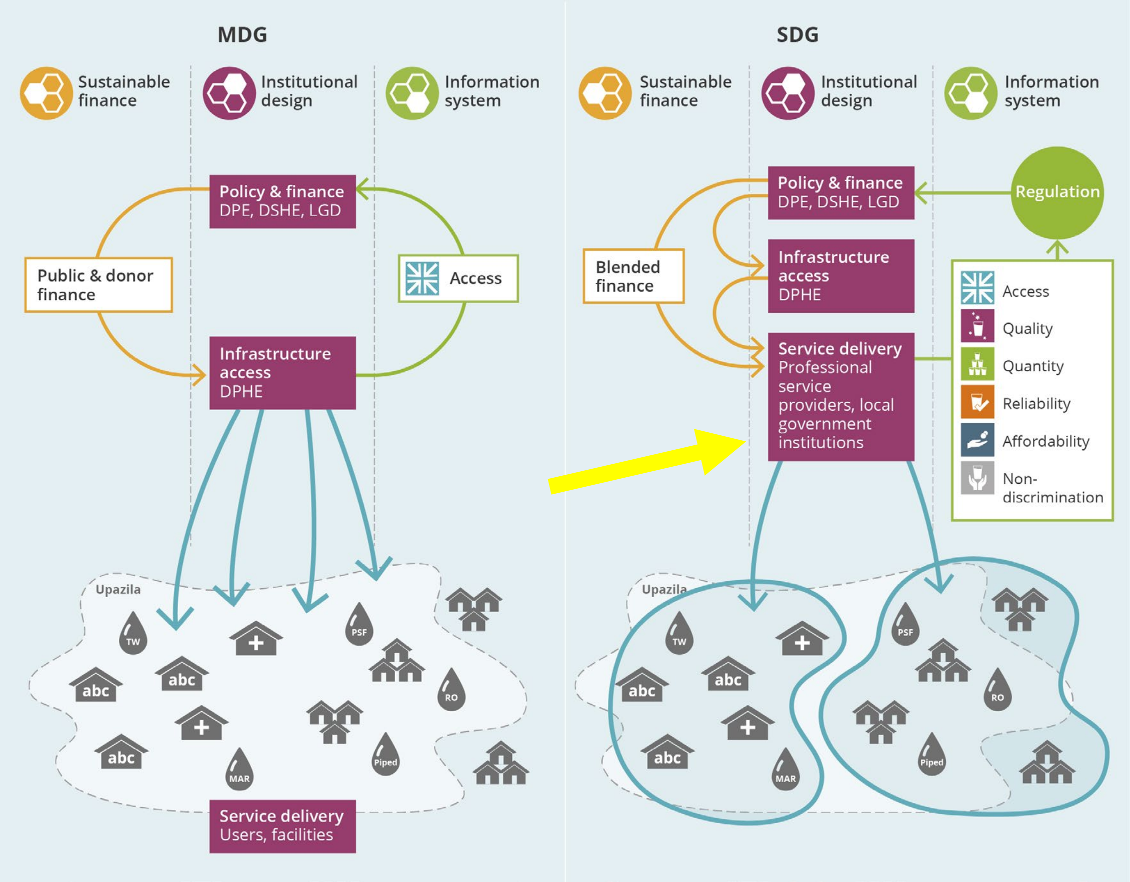


Professional water service provision

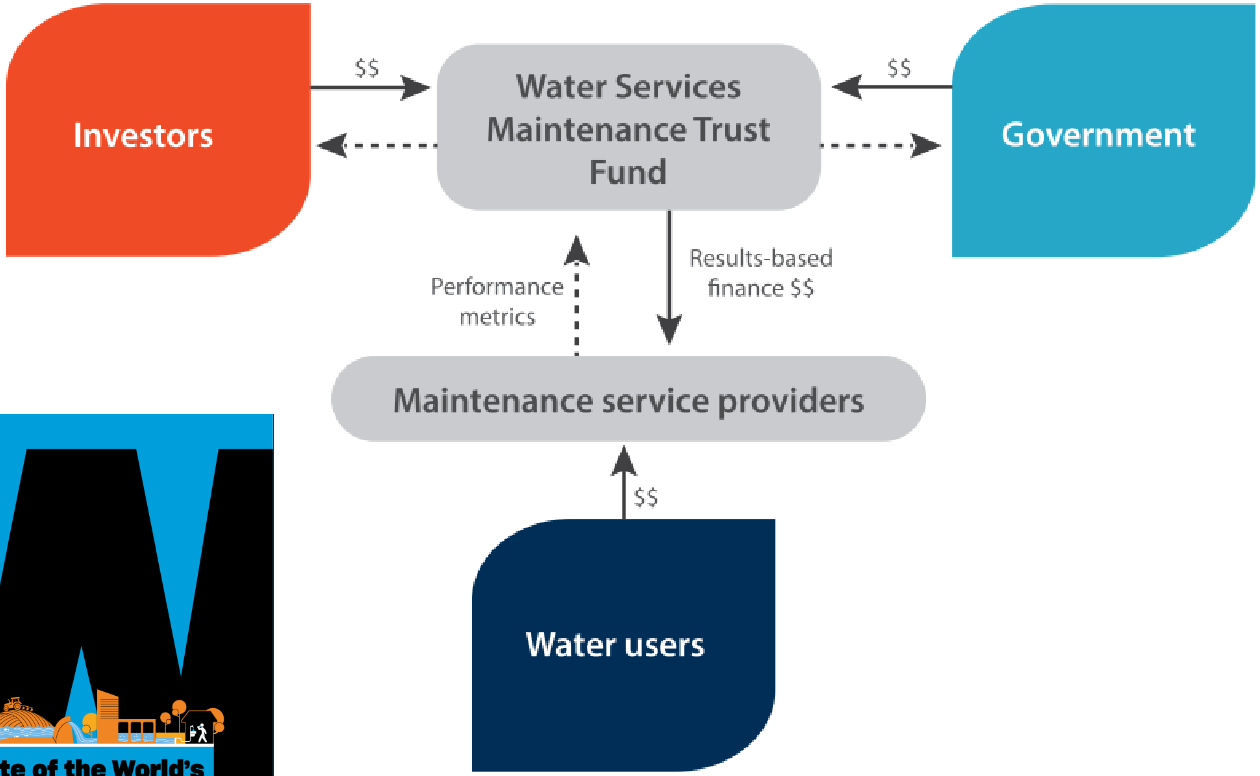
Institutional restructuring to allocate responsibility for service delivery

Extending focus from infrastructure to dimensions of service

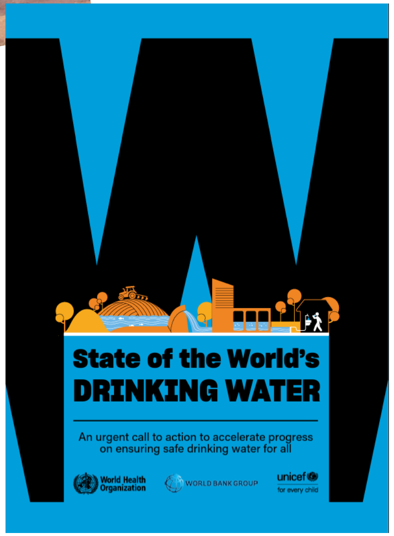
Moving beyond unsupported CBM and public-private dichotomy towards risk sharing between civil society, market, and government



Professional water service provision in Kitui, Kenya

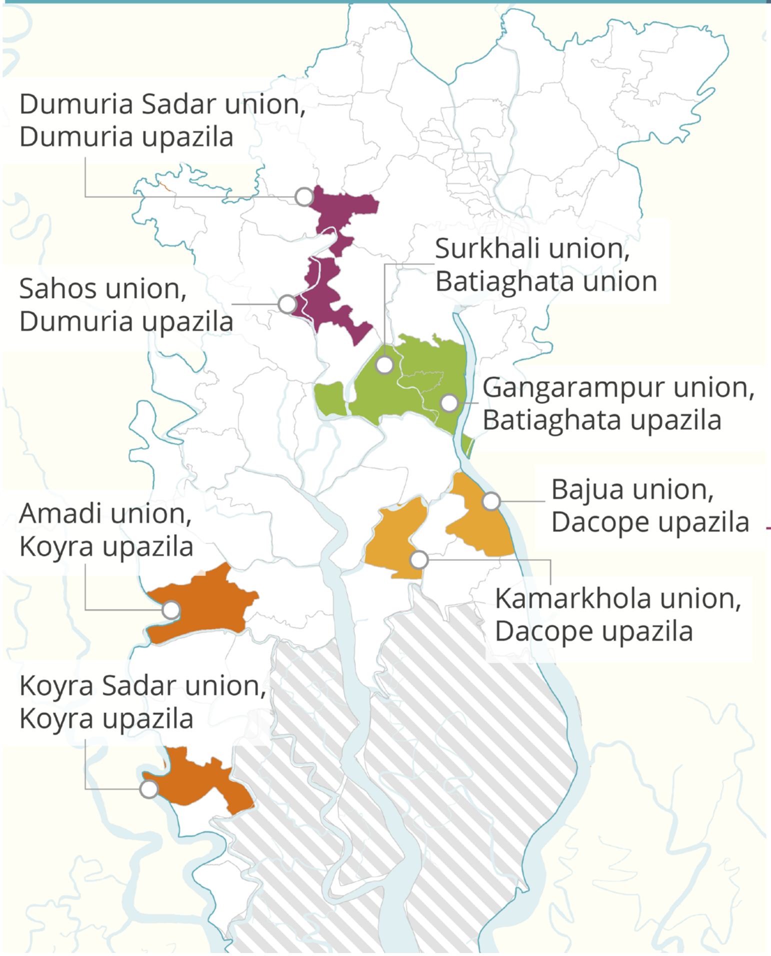


FundiFIX



Professional water service provision in Khulna, Bangladesh

Service area: 8 unions in Khulna district



SafePani Pilot Phase (2021–23)

Institutions:

135
Primary schools

35
Secondary schools

33
Healthcare centres

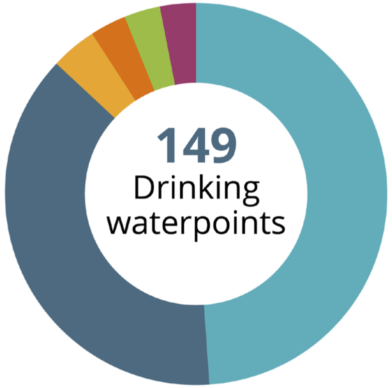
Benefitting:

29,000
Students

900
Daily outpatients

1500
Teaching & healthcare staff

10,000
Community members



- 49% Deep tubewell
- 38% Rainwater harvesting
- 4% Piped connections
- 3% Reverse osmosis
- 3% Shallow tubewell
- 3% Solar water desalination unit

Impacts

(as of January 2023)

Repair and maintenance:

96%
Within 48 hours of report breakdown

Sanitary inspection:

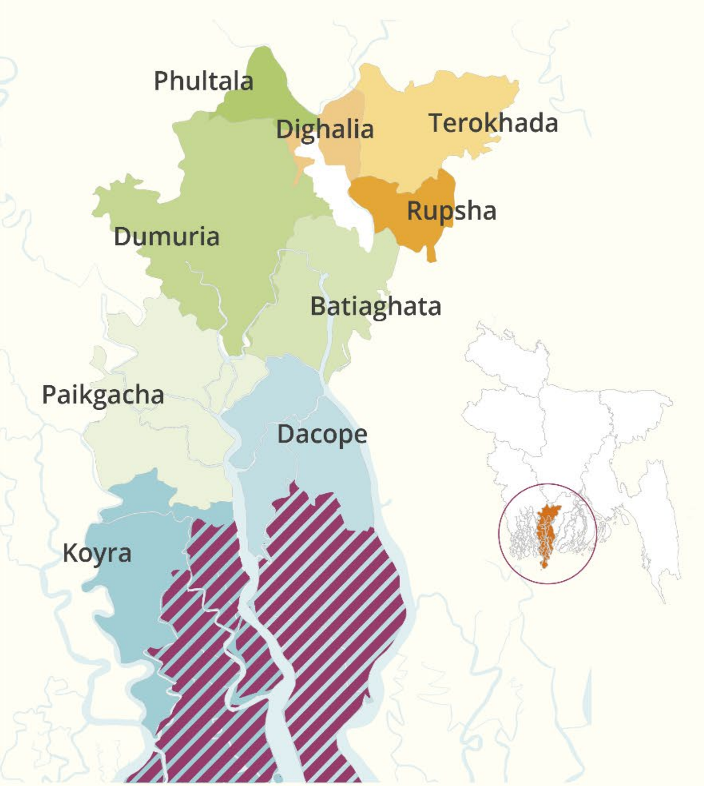
98%
Have low risk (rise from 70% at baseline)

Water quality:

100%
Water systems free of *E.coli* (rise from 60% at baseline)

Professional water service provision in Khulna, Bangladesh

Service area:
Khulna district (9 upazilas)



SafePani 2024 to 2030

Results based funding

c.USD 300,000 pa

50% Government of Bangladesh

50% Uptime Catalyst Facility

Outputs

~1600
safely managed drinking waterpoints

320,000
students served in 1700 schools

9000
daily outpatients in 300 healthcare centres

Targets

Operation and maintenance

- Baseline technical assessment and rehabilitation
- Reported breakdowns being repaired within 48 hours

Water safety

- Sanitary inspection, baseline tests for arsenic, manganese and chloride, and 6-monthly tests for *E. coli*
- Prompt disinfection of sources upon detection of faecal contamination

Reporting and verification

- Quarterly reports on key performance metrics related to water quality, service reliability, and volumetric use
- Independent verification of results to trigger results-based payments

Scaling-up RBF for safe water services

Results-based funding for safe drinking water

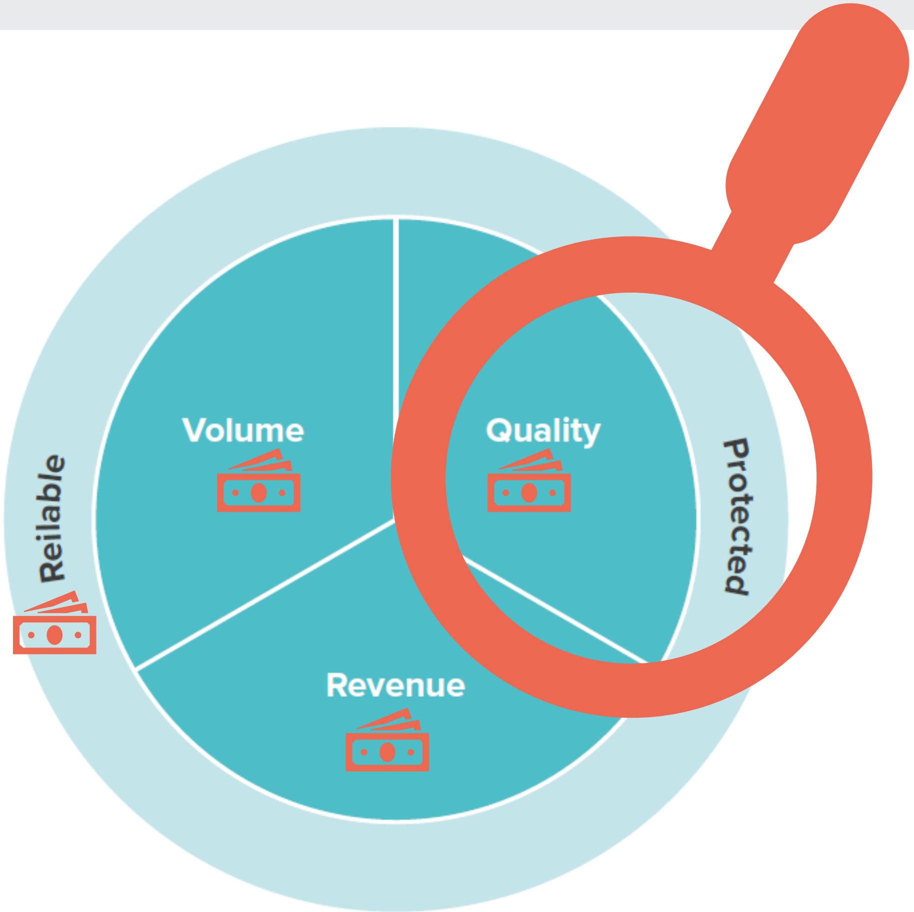
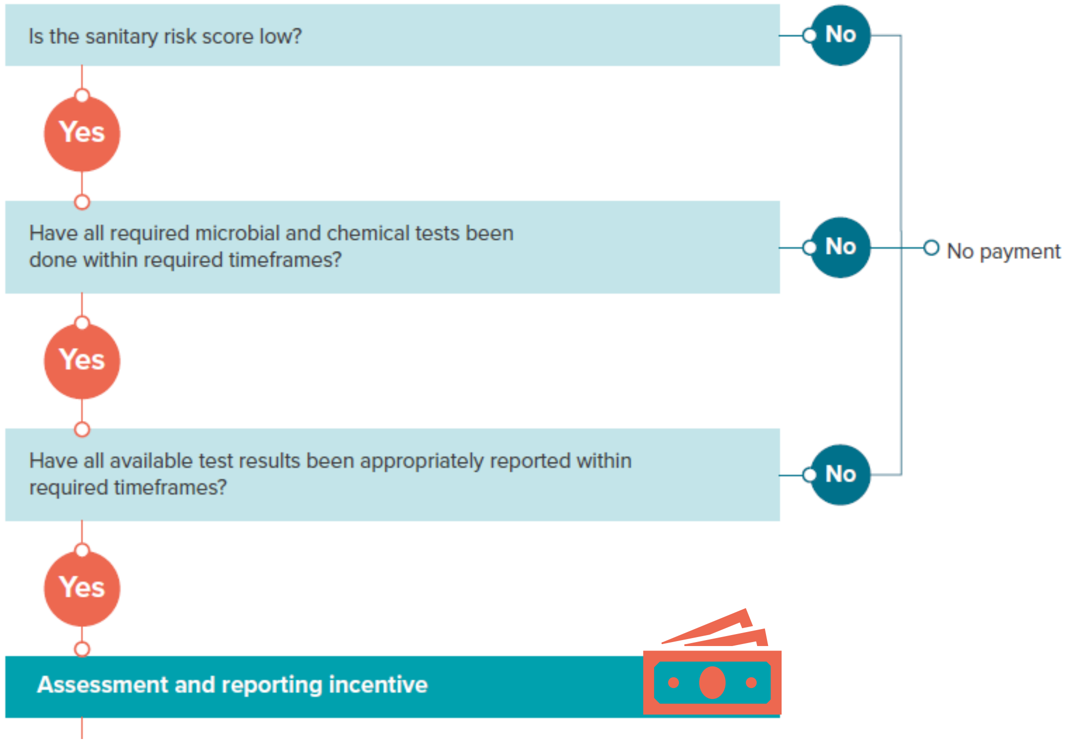


Figure 7: A results-based framework for protected and reliable drinking water services.

Results-based funding for safe drinking water

Stage 1 – assess & report

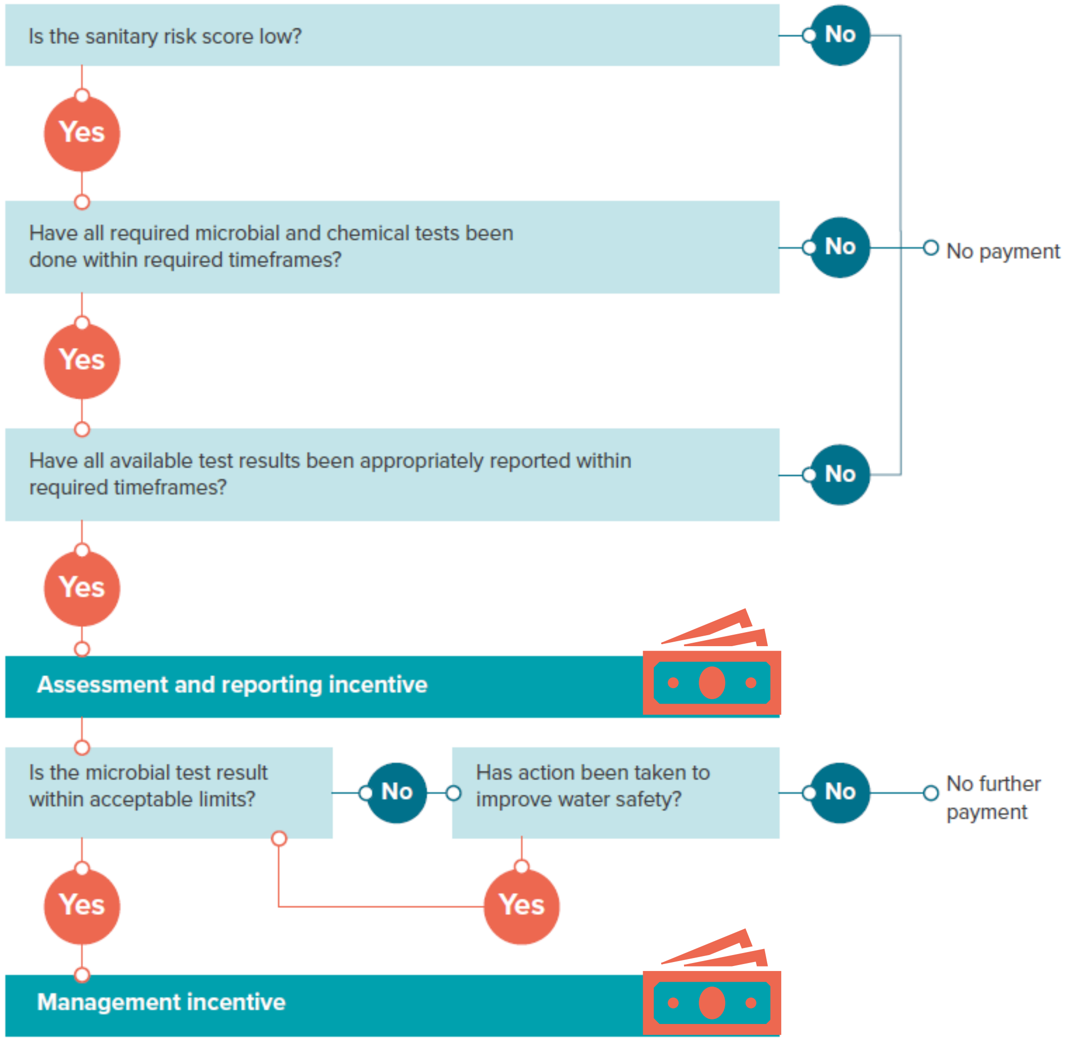
	Assessed	Waterpoint / system has a low sanitary risk. Water quality monitoring is up to date.
	Reported	Relevant authorities and community leadership are informed of water safety status.



Results-based funding for safe drinking water

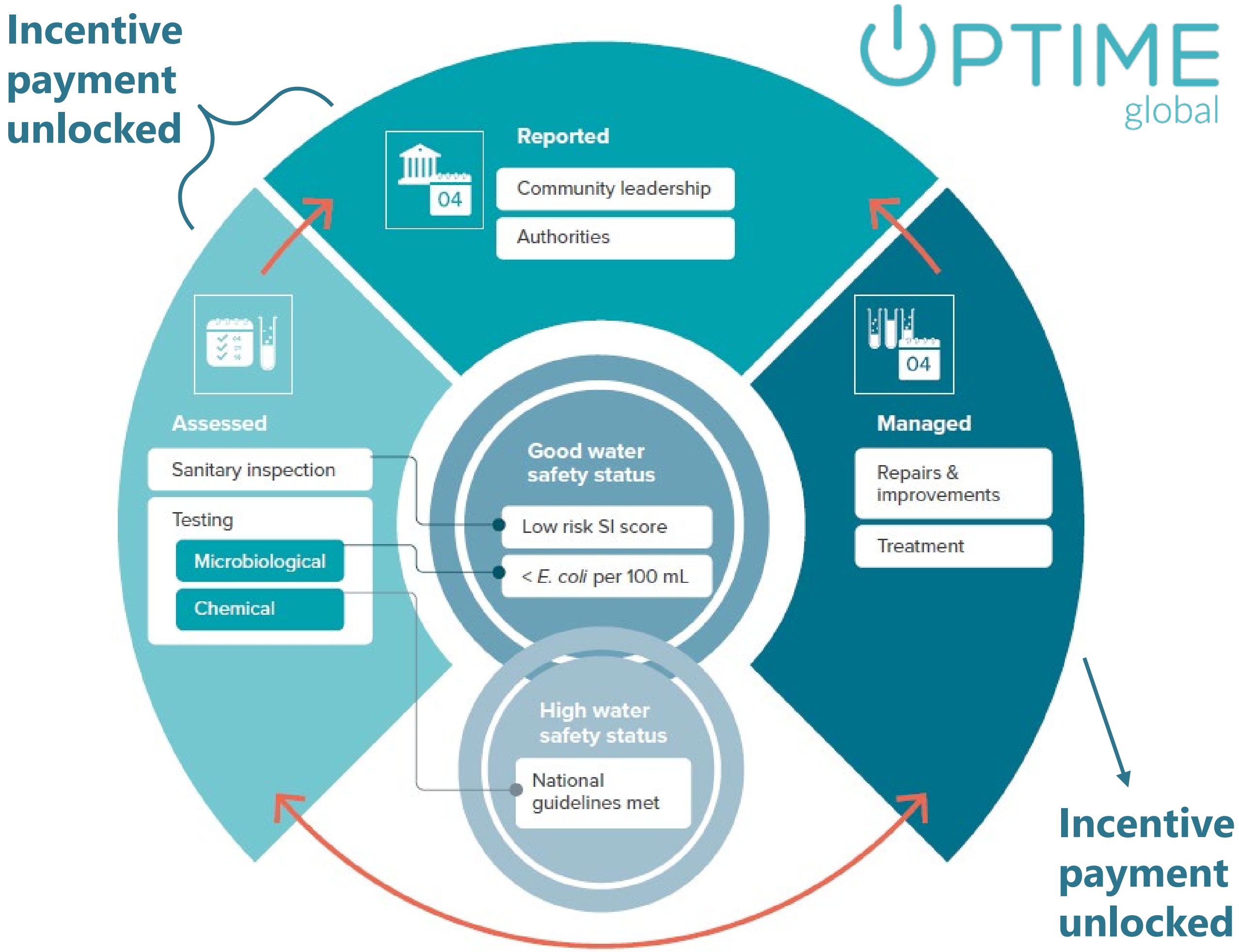
Stage 2 – manage

	Assessed	Waterpoint / system has a low sanitary risk. Water quality monitoring is up to date.
	Reported	Relevant authorities and community leadership are informed of water safety status.
	Managed	Good water safety status is maintained.



Results-based funding for safe drinking water

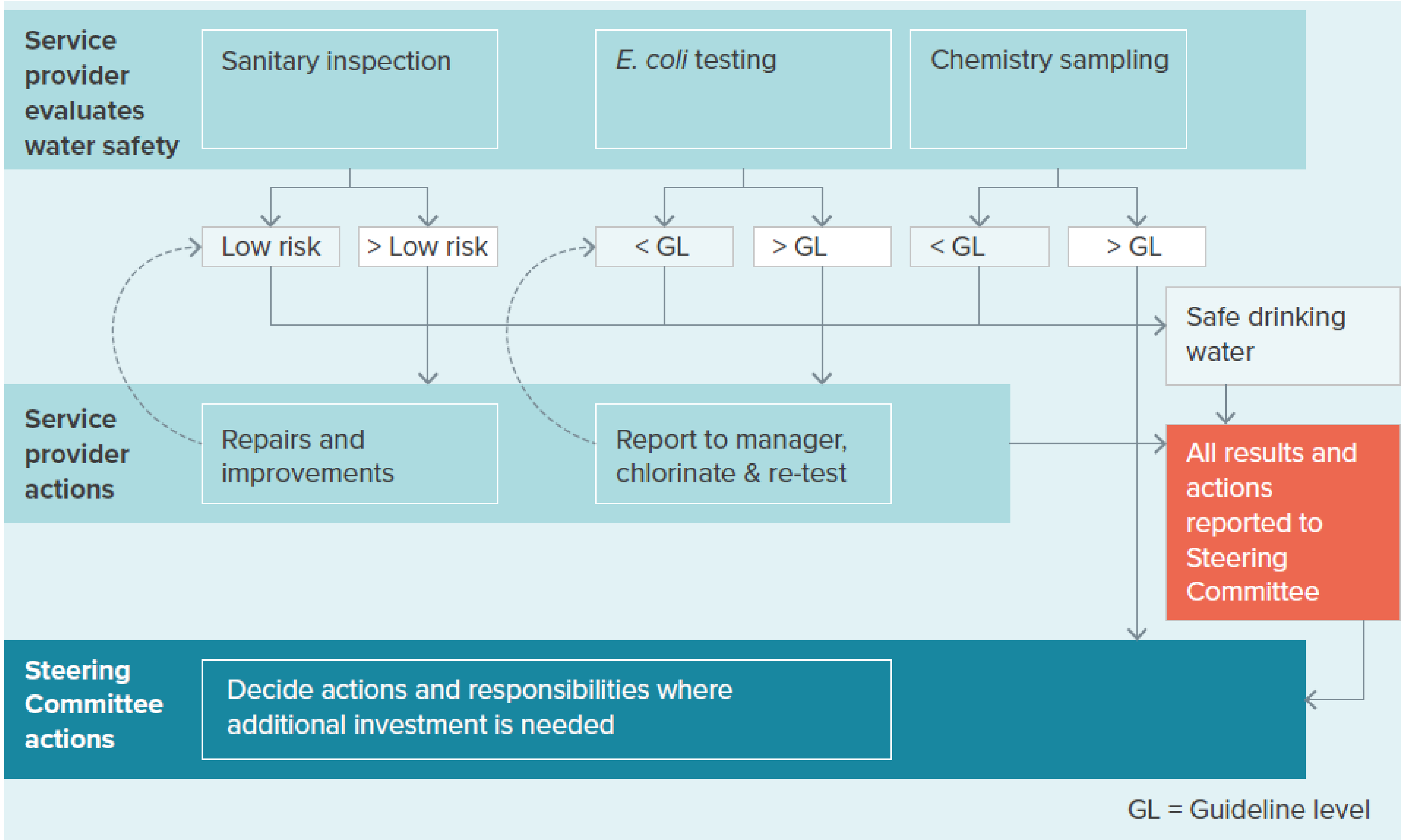
Charles, K., Nowicki, S., Armstrong, A., Hope, R., McNicholl, D. and Nilsson, K. 2023. ***Results-based funding for safe drinking water services: How a standard contract design with payment for results can accelerate safe drinking water services at scale.*** *REACH working paper 13. Oxford, UK: University of Oxford and Uptime Global*



SafePani water safety reporting structure

Hysawa (professional water service provider)

Government



Results-based funding for safe drinking water

Assess

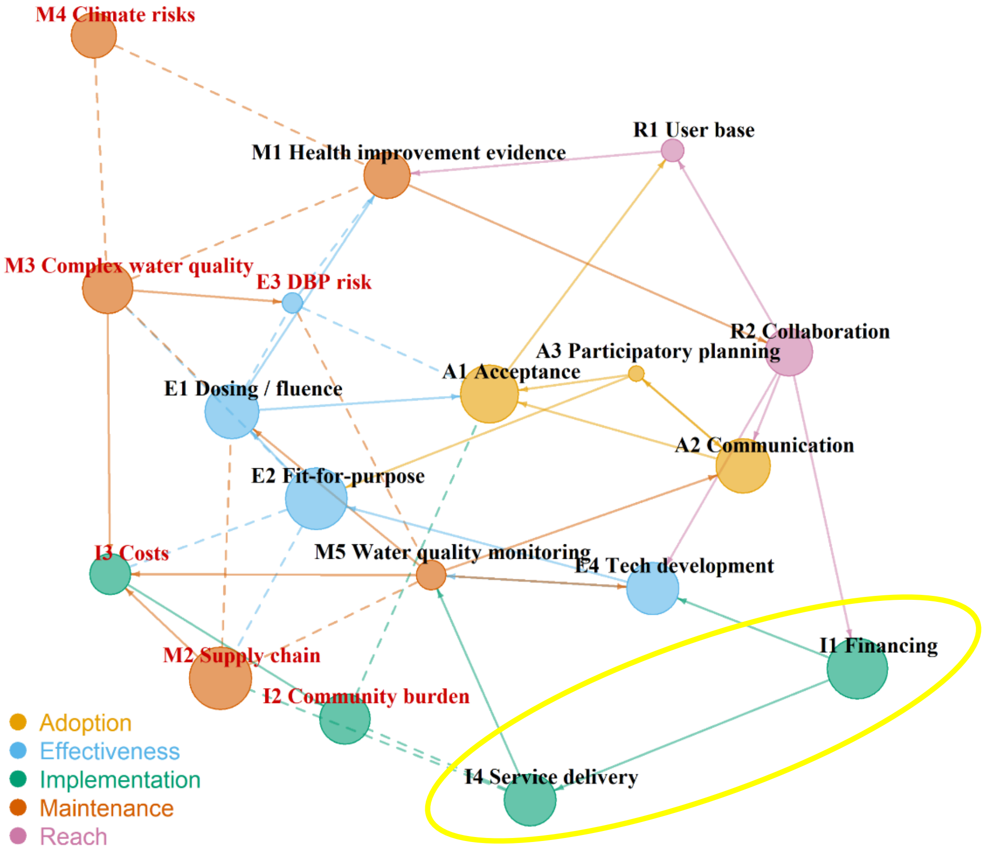
Report

Manage

Decentralised water treatment enablers and barriers

What can RBF do?

And not do?



Laauwen and Nowicki (2024). Reinforcing feedbacks for sustainable implementation of decentralised drinking-water treatment technology. In preparation.

Common challenges with results-based financing

Improving the enabling environment beyond financing

Implementers need to secure pre-financing

The costs and logistics of monitoring and validating results

Determining the appropriate incentive payment amount

Avoid encouraging cherry-picking

Coming up…

More data…

- Uptime pilot of RBF approach
- Chlorination costing analysis (including volatility of costs)

More innovation…

- Sensor-based monitoring
- Strengthening rural water regulation

More discussion…

- UNC Water and Health Conference side event
- Next CoP webinar

September 26, 2023

Multi-country Costing Analysis

Shan Hsu

Business Analytics Associate, Medical Device and Health Technology

PATH

Aqua Research STREAM Disinfection Generator

The STREAM Disinfectant Generator provides a continuous flow of 0.5% hypochlorite solution generated from common salt (NaCl) & water through electrolysis.

Chlorine concentration (FAC)	0.5%
Brine salinity	15 g/L
Chlorine production rate	4.8 L/hour
Chlorine generation mode	Continuous
Drinking water treatment rate	Up to 230,000L per day
Input power	110/220 V AC, 2 A, 50/60 Hz, 12 V DC, 16 A
System weight	8.2 kgs
Dimensions	42 x 33 x 17.3 cm

Costing analysis objectives

Comparing STREAM cost with commercial chlorine cost

Calculating annual production need to reach breakeven in 5 years

PATH

Costs included in the analysis

STREAM	Commercial chlorine
Upfront costs • Device cost • Shipping cost, taxes and duties, spoons, measuring cups, buckets, jerrycan, scales and batteries • Stepdown transformers, electrical extension cable	• Commercial chlorine costs
Recurrent costs • Salt • Water • Vinegar • Electricity	• Water cost for dilution

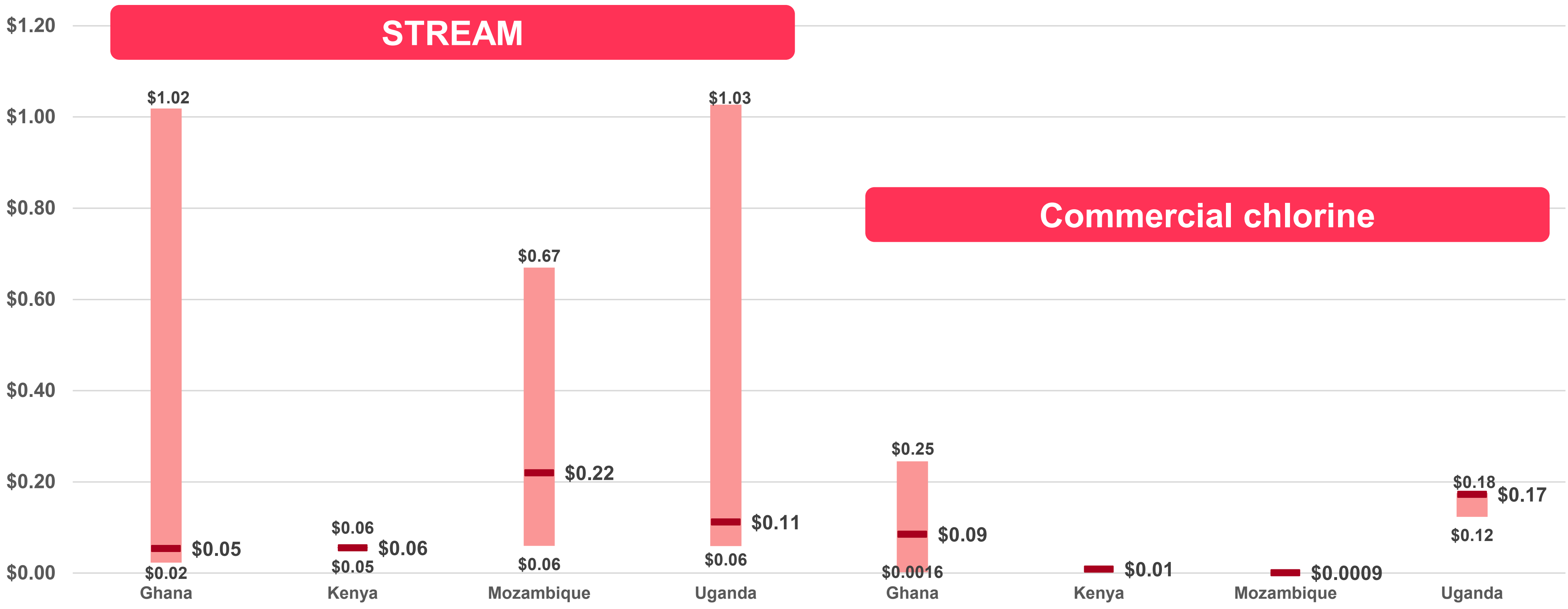
PATH

Baseline cost by country

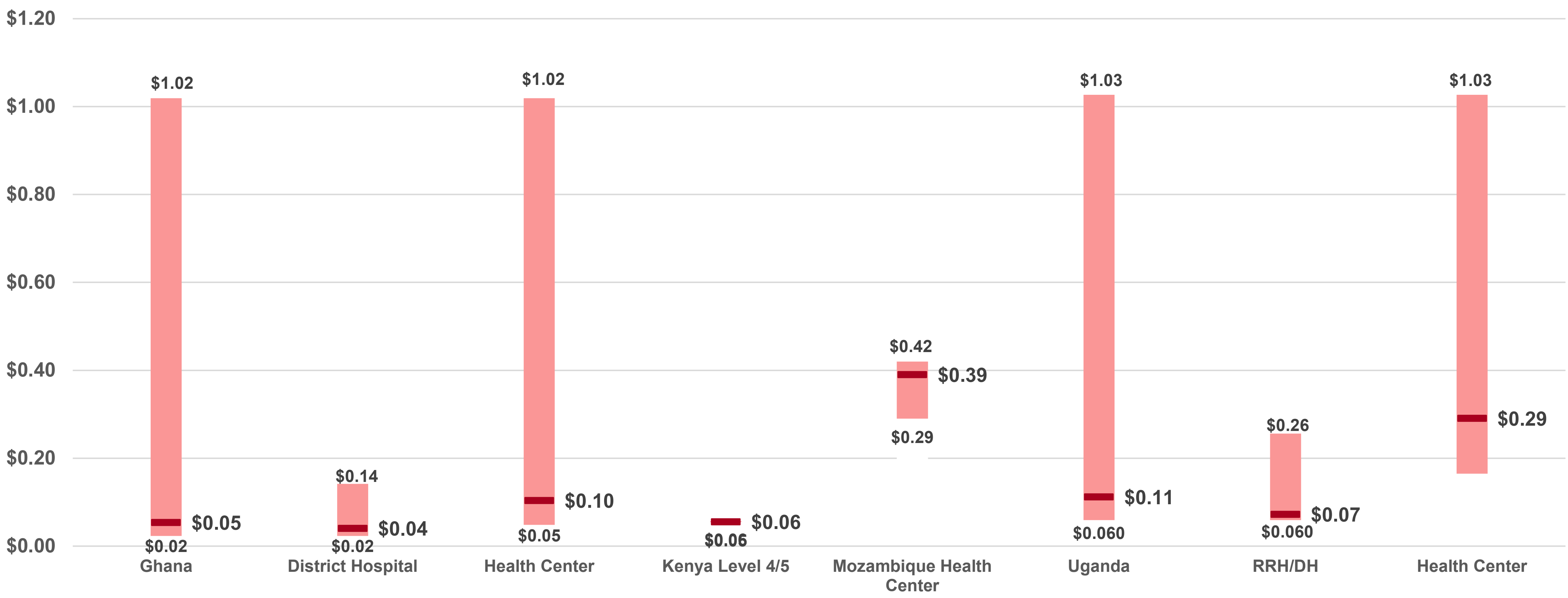
	Ghana	Kenya	Mozambique	Uganda
Water cost per m³	$0.5674	$3.8462	$0.5459	$1.4999
Electricity cost per kW	$1.8953	$1.6154	$0.1460	$0.3291
Salt cost per kg	$0.7588	$0.0038	$0.0000	$0.0010
Vinegar cost per L	$1.3694	$0.0154	$0.0004	$0.0049
0.5% commercial chlorine cost per L	$0.1219	$0.0055	$0.0000	$0.0002

PATH

0.5% Commercial Chlorine Cost per Liter in USD

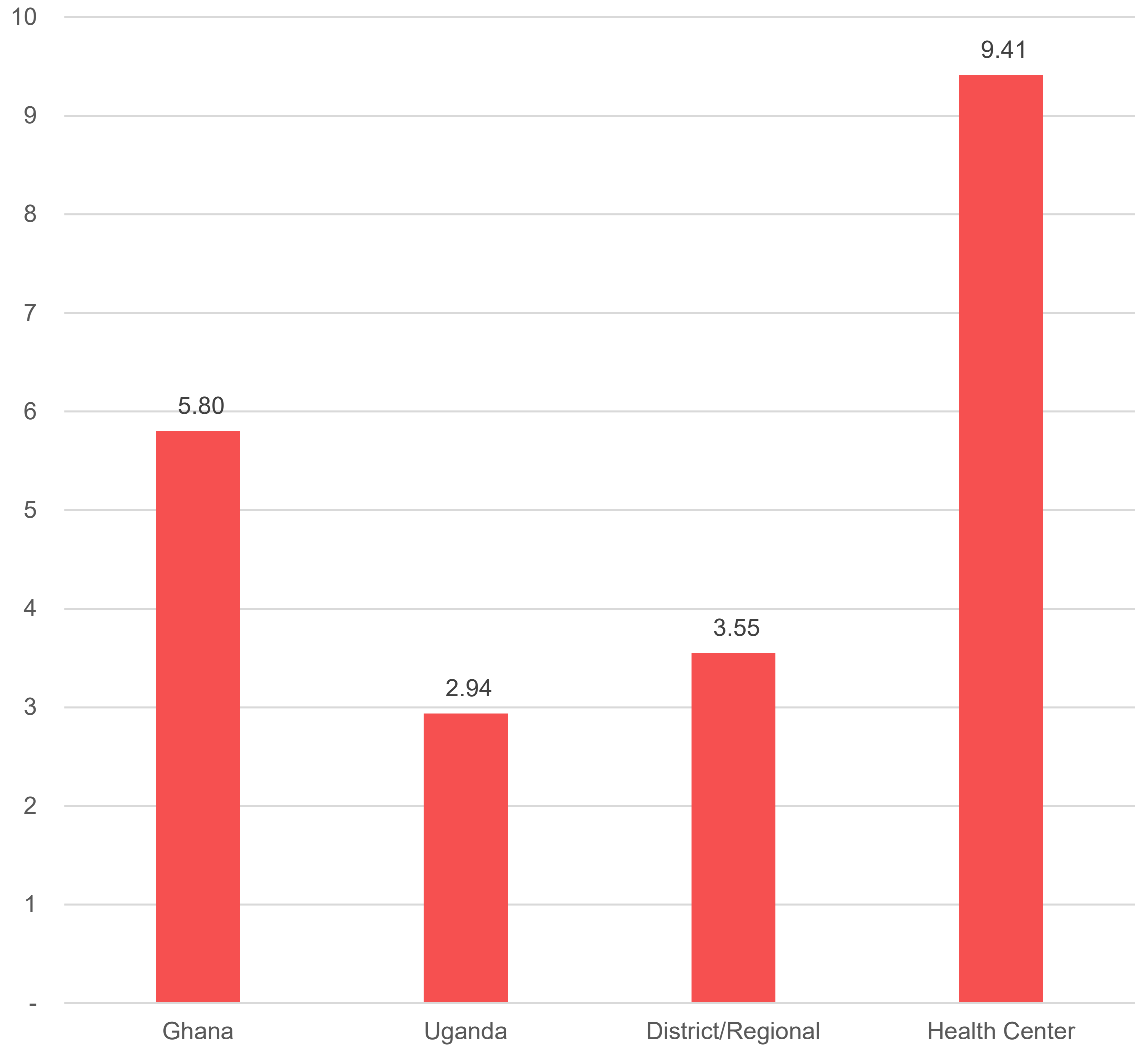


STREAM Chlorine Cost by level (per Liter in USD)



Number of Years to Reach Breakeven

- Ghana – 4 district hospitals and 3 health centers
- Uganda – 4 regional and district hospitals and 4 health centers
- The two bars on the left are average breakeven year for both Ghana and Uganda facilities.
- Regional and district hospitals have higher chlorine demand. Those facilities can reach breakeven with shorter time.



5-year Breakeven Annual Production Need

	Ghana	Kenya	Mozambique	Uganda
Average	12,003 L	102,349 L	NA	4,124 L
Minimum	1,086 L	101,260 L	NA	2,091 L
Maximum	32,591 L	102,349 L	NA	5,963 L

- Higher production volume will lead to lower chlorine cost per liter.
- 5-year breakeven annual production need is driven by variabilities of different cost components.
- Kenya has relatively high electricity cost and low commercial chlorine cost. It leads to higher annual production need to reach breakeven.
- Mozambique uses HTH for all surveyed facilities. The commercial chlorine cost is so low that none of the facilities can reach breakeven.

Cost is one important aspect to consider in terms of electrochlorinators, however it is not the only aspect. The quality of available chlorine, continued availability of chlorine, dilution requirement processes and challenges are some of the many other critical factors to consider.

PATH

Chlorine Quality Testing

A district hospital in Ghana has the extremely low commercial chlorine cost **$0.0107** comparing to other facilities **$0.1219**.

From costing perspective, this facility can never reach breakeven point even with the maximum production 34,560 L.

The liquid chlorine procured by the facility is 25 GHS for 25 Ls with 5.5% concentration

However, the commercial chlorine tested at 0-0.1% mg/L, posing significant risks to patients

	Commercial Chlorine	STREAM Chlorine
Sample 1	0.1%	0.5%
Sample 2	0%	0.5%
Sample 3	0.1%	0.4%

Total Cost of Ownership Analysis

Costs from previous analysis

Upfront Cost

- Device cost, shipping, taxes and duties, spoons, measuring cups, buckets, jerrycans, scales and batteries
- Stepdown transformers and electrical extension cable

Recurrent Cost – water, electricity, salt and vinegar

Other cost components

Installation costs – in-country device transportation, technician transportation and installation labor costs

Training costs – initial training and refresher training

Repair and maintenance costs

- Maintenance and cleaning labor costs, water quality test strips
- Repair labor costs, technician transportation, spare parts

Communication costs

Hub and spoke model costs

- STREAM stabilization cost
- Transportation cost to lower level

For more information contact:

Shan Hsu

jhsu@path.org

PATH

1 Introduction and announcement

2 Project spotlights

3 Discussion

Next call

January 2024

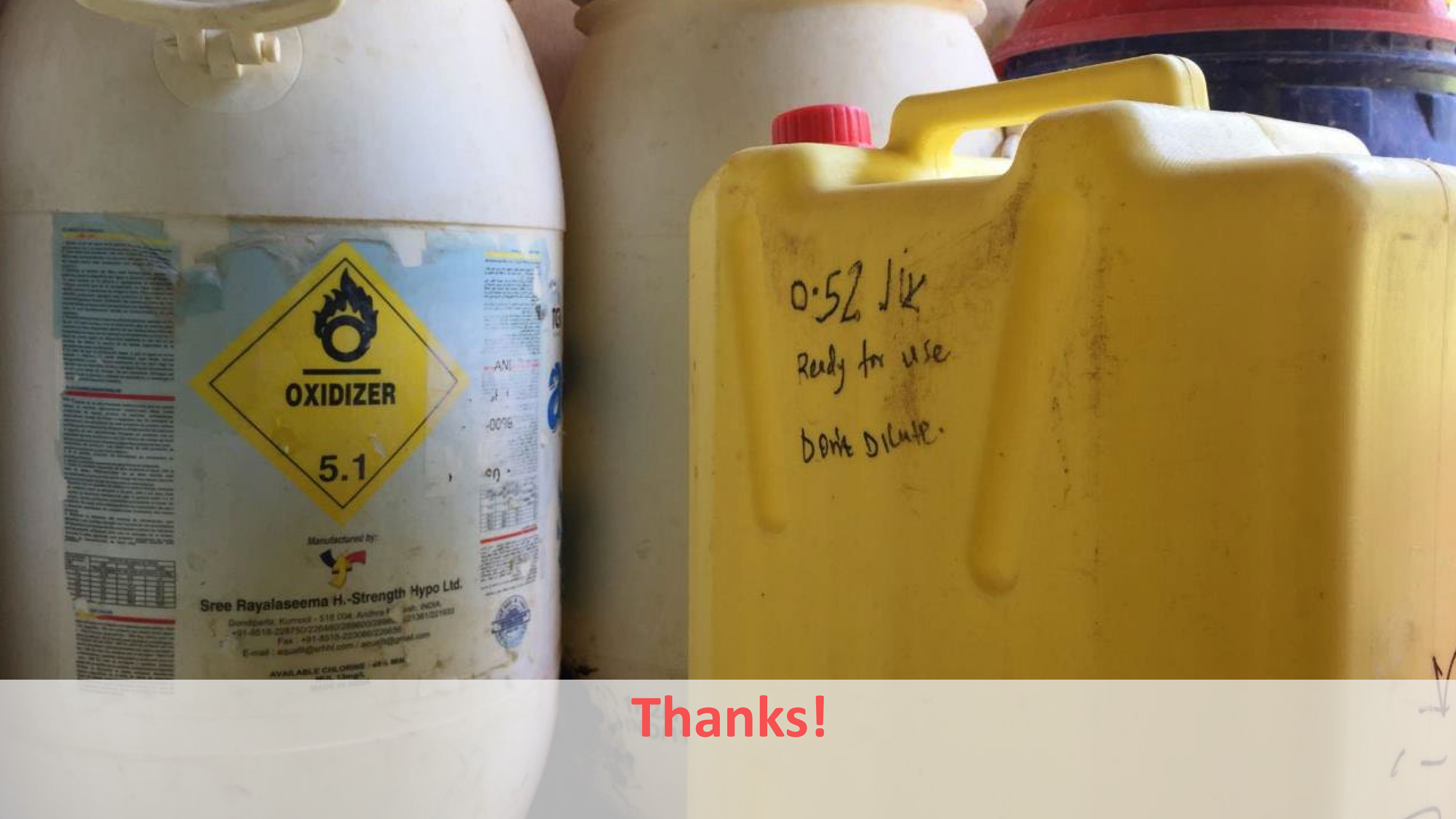
Topic: TBD

Have a topic you (or others in the CoP want to learn more about?

Send us ideas directly:

Adam Drolet - adrolet@path.org

Megan Lindmark - megan.lindmark@eosintl.org


OXIDIZER
5.1
Manufactured by:
Sree Rayalaseema H.-Strength Hypo Ltd.
0·52 lit
Ready for use
Dont Dilute.

Thanks!