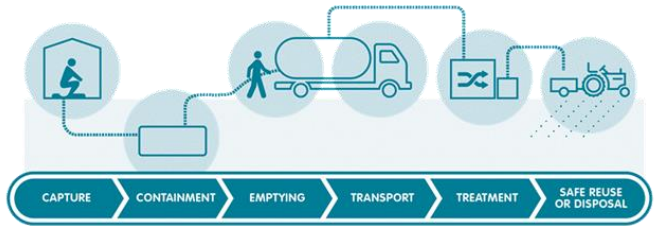




# Designing and Operating Sustainable Faecal Sludge Treatment in Refugee Settings

*The Red Cross' recent experience from Camp 18, Cox's Bazar Bangladesh*

PARTNERS

Bangladesh Red Crescent Society

BritishRedCross

SwedishRedCross

TECHNICAL SUPPORT

URBAN waters

CDDIndia
Water | People | Nature

MOTT MACDONALD

# Agenda

**Introduction and welcome** *Khairul Bashar - WASH Manager - Bangladesh Red Crescent Society*

**Context and transition to long term** *Debora Bonucci WASH Adviser British Red Cross*

**Design principle** *Krishna Konidena - Senior Project Manager - CDD India*

**Experience and operation** *Eng. Tapas Kanti Das – Senior WASH Engineer - Swedish Red Cross*

**Performance, lessons learned and next steps** *Eng. David Thomas - Sanitation Engineer - British Red Cross*

**Q&A** *Sarah Hayman WASH Adviser Swedish Red Cross*

# Context and transition

## WASH activities BDRCS

*Full sanitation chain in Emergency*

Since 2017 over 906,000 people displaced from Myanmar are living in congested camps in Cox's Bazar. In these camps over 50,000 functional latrines are maintained to provide necessary services.

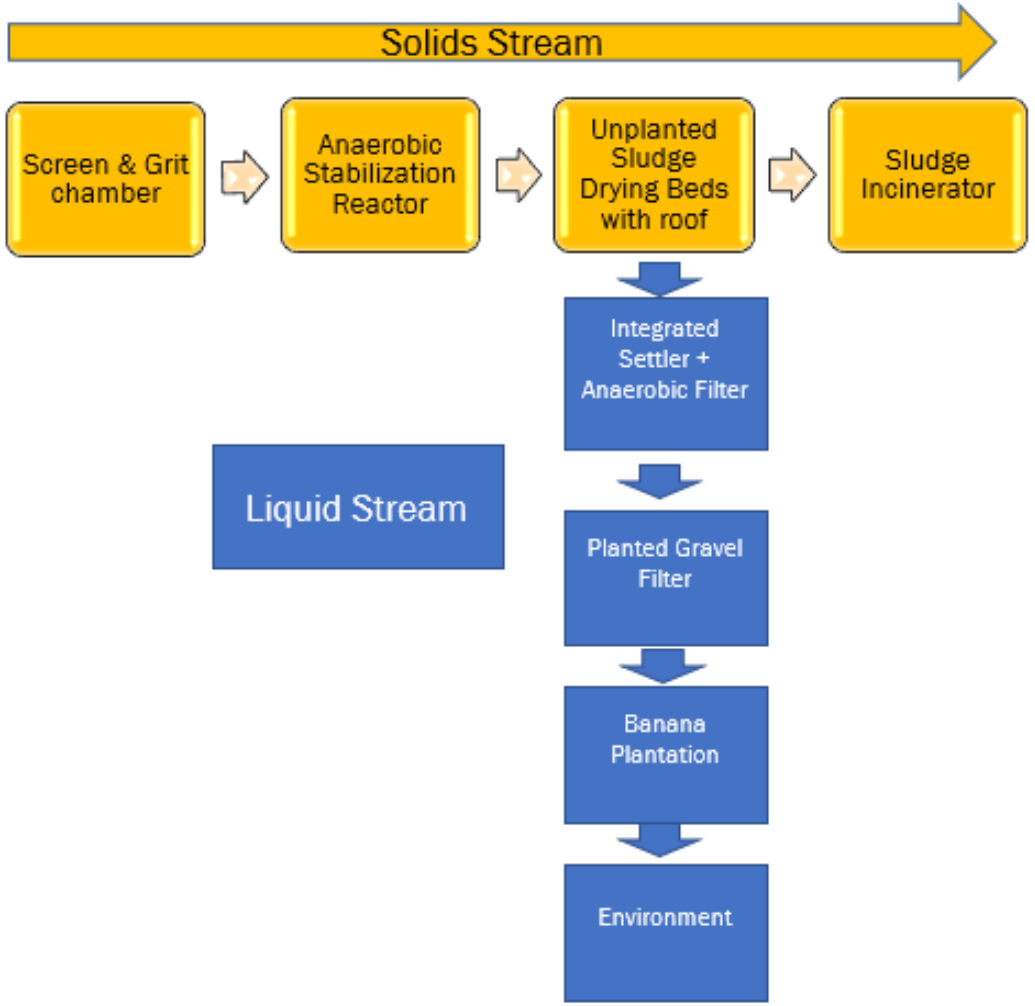
Bangladesh Red Crescent Society, BDRCS (in coordination with IFRC, and other National Societies) has constructed and is maintaining over 800 latrines, with the majority situated in camp 18 and camp 19.

# Emergency FSTP

**Treatment technology** lime stabilisation
**Treatment objective** pathogen elimination
**Treatment capacity** 5 m3/day (estimated 7,000 people)
**Site accessibility** site accessible on foot. Simple emptying & transport system established
**Life expectancy** relief and early recovery phase (in line with WASH sector strategy)
**Required skills** Simple and robust technology that is transferable to site workers
**End use / disposal** safe disposal of 0.5 m3 dried sludge per day

*Land allocated for facilities to wash and change into work/regular clothing, to clean and dry PPE and to store "dirty" material.*

# Design principles




**Key design considerations**

✓ low operational costs

✓ easy operation - extension of existing drying beds

✓ meet DoE standards for effluent discharge

✓ treatment capacity of 14-15 m3/day

✓ storage and treatment of excess sludge

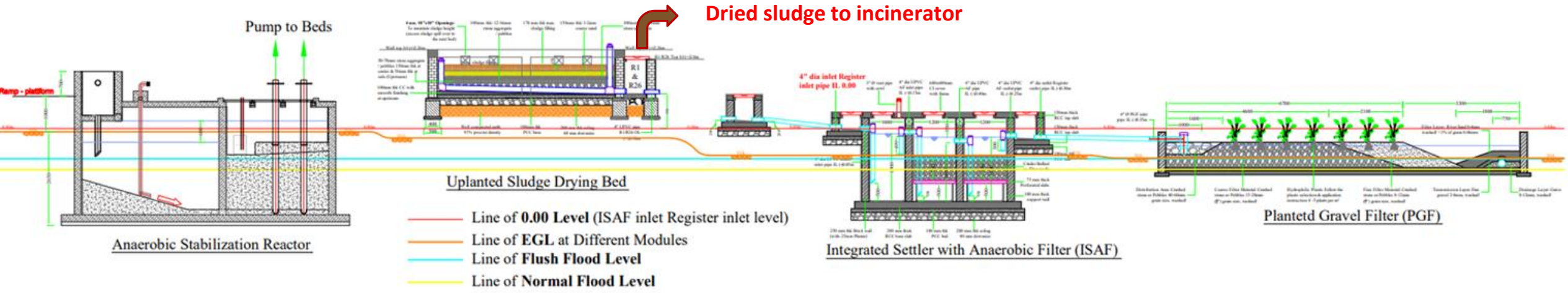
✓ able to buffer incoming peak loads

✓ robust design: modules of 6 m3/day

✓ land allocated for facilities to wash and change into work/regular clothing, to clean and dry PPE and to store “dirty” material.

✓ The design is accompanied by Standard Operating Procedures (SOPs) and a training trajectory for WASH officers and community volunteers.

# Design principle




| Stage | Sludge receiving station and stabilization reactor | Roofed drying bed | Anaerobic filter | Gravel/sand filter |
|---|---|---|---|---|
| Function | Removal of solid waste and grit, and sludge homogenization and organic solid reduction | Sludge dewatering and drying | Biological treatment of the drying bed effluent | Post-treatment of the effluent |

# Experience and operation

20,000 people
4,000 households
1,500 latrines

**Sludge treatment capacity** of 14 m3/day
**Treatment technology:** anaerobic treatment
**Treatment objective** pathogen elimination
**Life expectancy:** 20/25 years
**Capacity Sludge production** of 0.6 m3/person/day. FSTP in operation 6 days per week
**Footprint**: area of maximum 3,300 m2 (35,500 ft2)
**Compliance** with DoE standards for wastewater for effluent discharge
**Required skills** Simple and robust technology that is transferable to site workers
Low operational costs, low tech, no chemicals or moving parts.

A largely Nature Based Solution, treating feacal sludge of 20,000 people to ensure public health safety and minimize environmental impact


In line with DoE guidelines

Simple O&M

LAND USE 0.03m2 per person

# Experience and operation

## - layout plan -


Existing and old treatment plant

New sludge drying beds

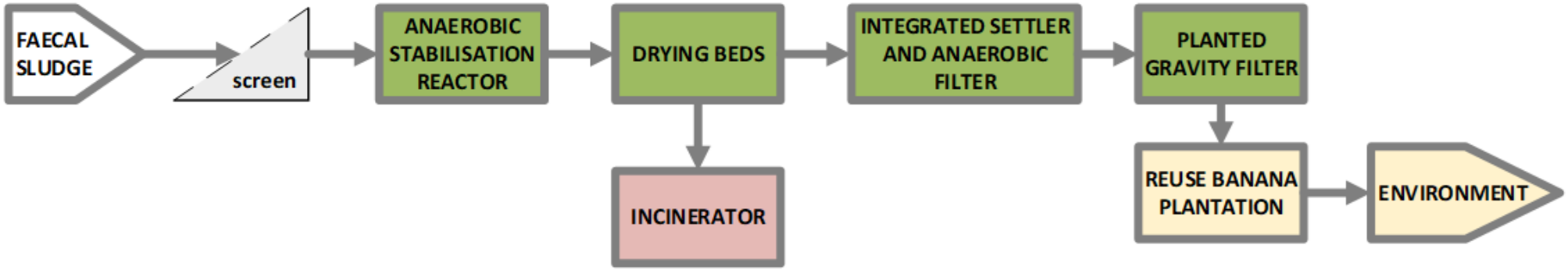
Gravel/sand filter & final outlet

Anaerobic filter

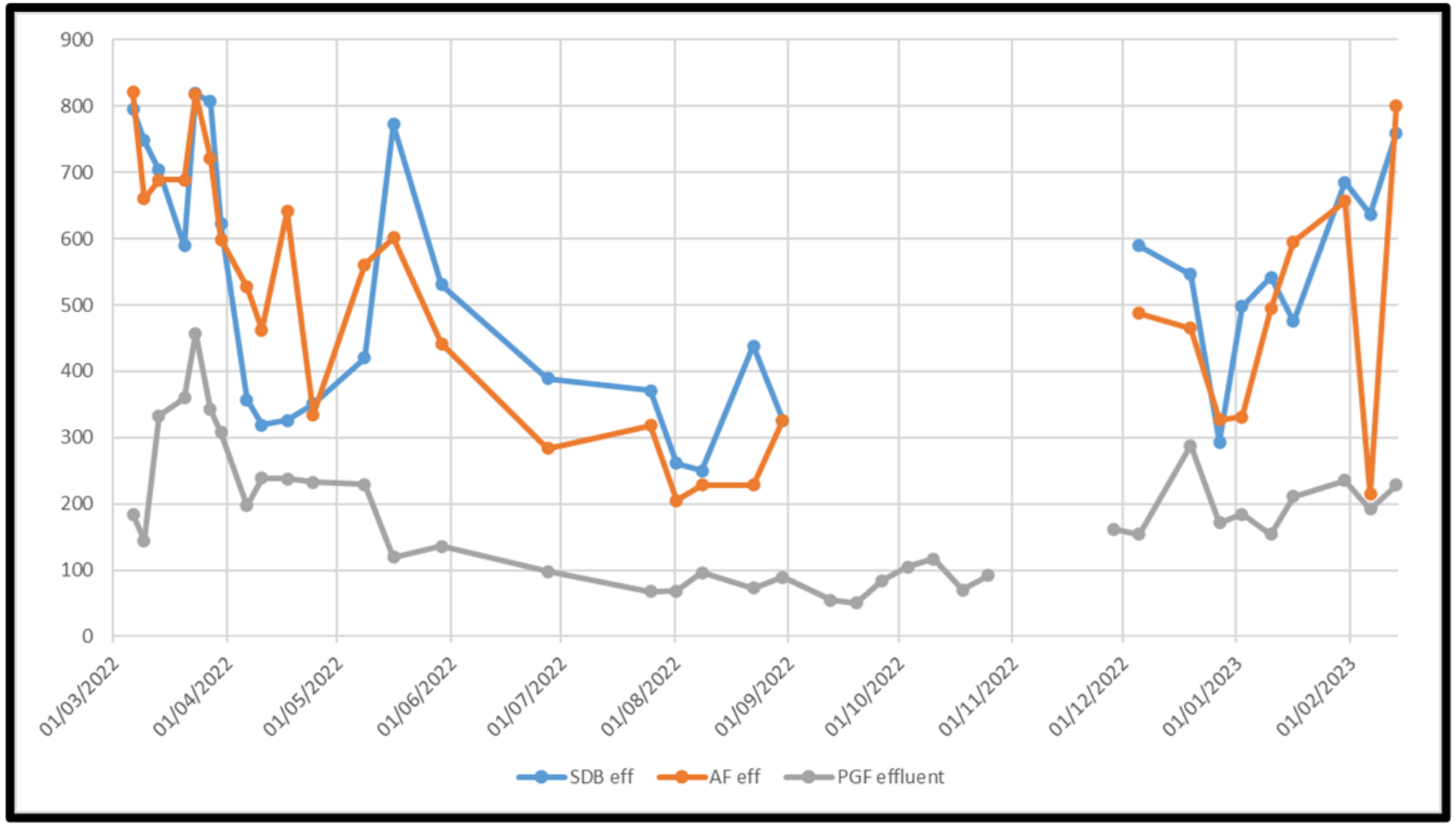
Receiving station & stabilization reactor

Existing old sludge drying bed

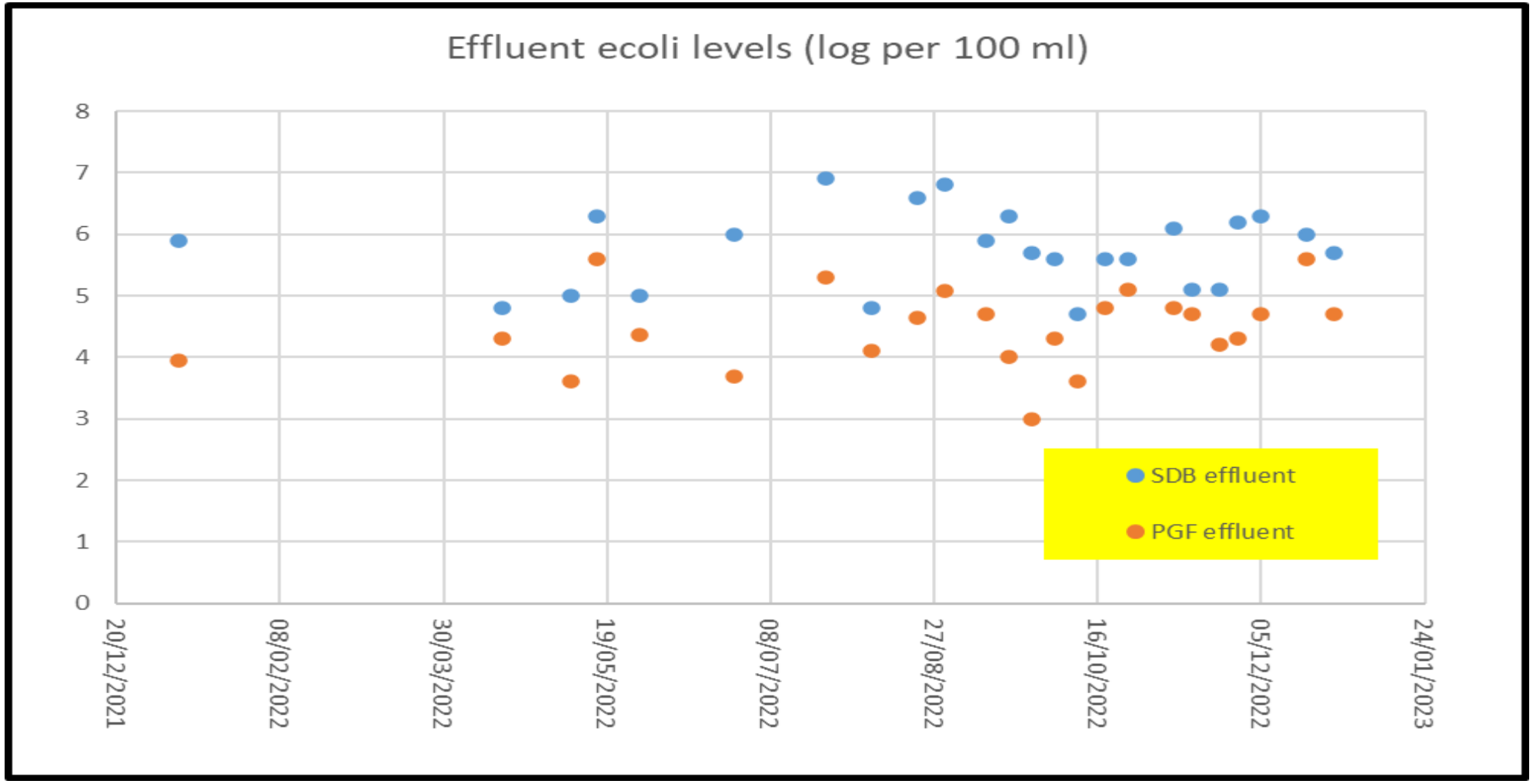
# Performance




# Performance - COD




# Performance - *E Coli*



# Value for money

**Faecal sludge capacity**: 14m3/d
**Population**: 20,000 population plant

**Opex:** FSTP Team (6 ) USD 600 /month
Sludge Team (34) USD 3400/month
**Capex:** USD 10/cap or USD 15,000 /m3

**Life span:** 20 years

# Lessons learned

- Red Cross movement **has the capacity** to design, build, commission and operate FSTPs in a refugee setting…
- …but with focused technical support from specialist FSTP design consultants.
- Professionally demanding on everyone involved ( +20 yrs experience in key roles) Not yet business-as-usual.
- Continuous monitoring of performance (i.e, lab) is vital to maintaining treatment effectiveness
- The transition from **emergency phase sanitation** to **long-term low-cost sustainable FSM** in a refugee setting entirely feasible. More expensive and less sustainable solutions buy you the time you need to enact a long-term solution.
- Aim to reduce manual handling of FS as quickly as possible.

# Next steps and closure

- Having successfully achieved it’s main treatment goals, efforts are now underway to increase the sustainability of the FSTP.
- This includes installing solar panels to operate the plant’s sludge pump, as well as finding alternatives to incineration
- Collaborating with on-going tree and grass planting, and anti-erosion initiatives within the camp;
- Burying the sludge in trenches and planting banana trees on top;
- Co-composting with domestic food waste;  solar pasteurisation.

# Q&A