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Background

With restrictions placed by congress on burning human refuse, forward operating bases must find a sanitary method of disposing waste. Water flush toilets are currently being used, which requires constant water supply. This can be dangerous, as in the Afghanistan Conflict an average of 1 in 30 water convoys resulted in casualties. Due to high risk of casualties within resupply convoys it is necessary to decrease the water needed for sanitation facilities.

Design Goals

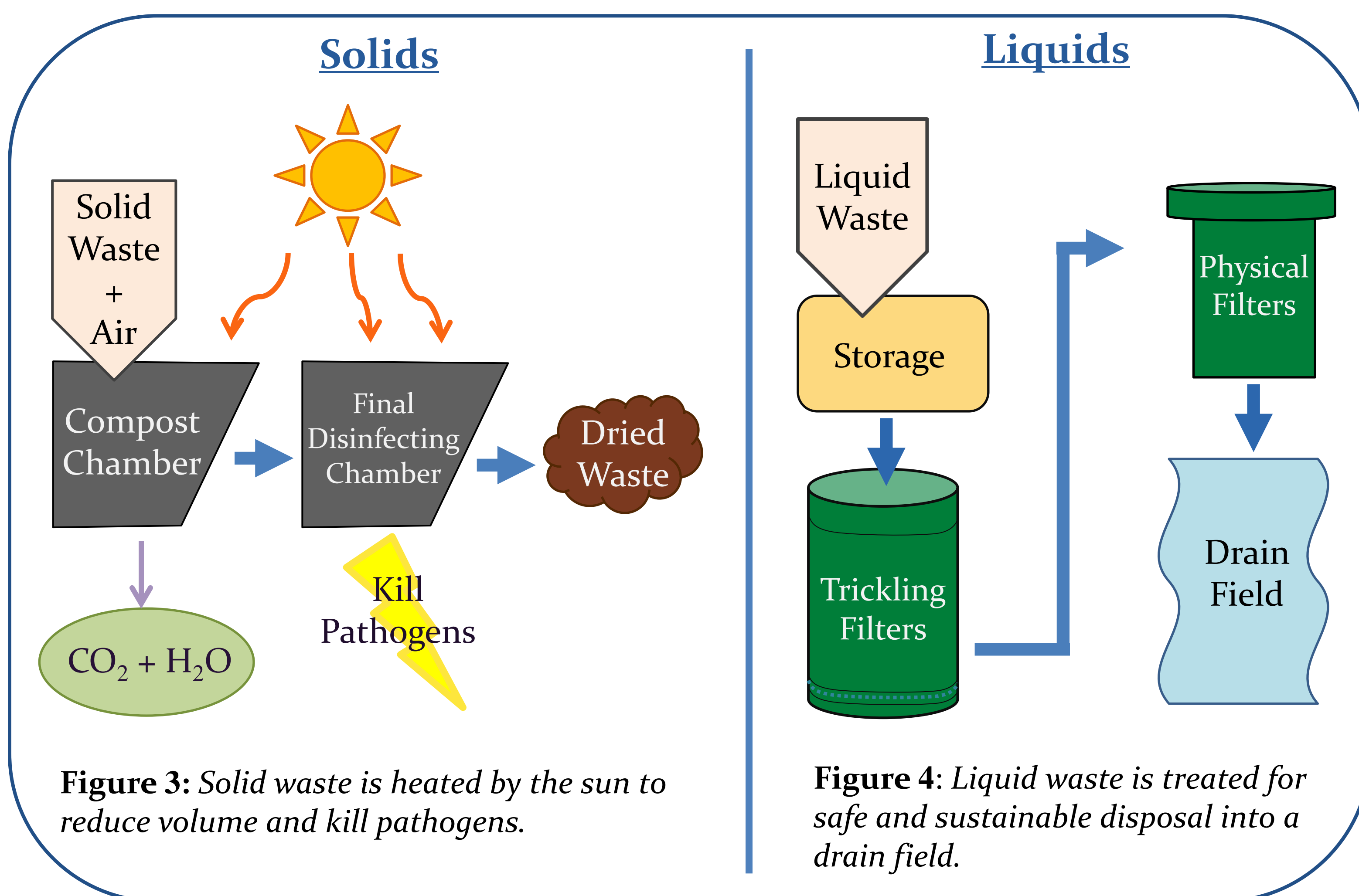
- Develop a Water-Efficient Latrine Facility
- Suitable for Southeast Asia
- Transportable (built into shipping containers)
- Reduce Waste Volume
- Zero Net Energy Usage
- Rapid Setup (0-24 hours)
- Low-Tech / Low Maintenance

Existing Latrine Analysis

Ranking: 1 Least Effective - 5 Most Effective

Criteria	Incinerating	Septic System	Aerobic Composting	Solar Enhanced Composting
Sustainability	1	1	4	5
User Comfort	1	5	3	3
Life Cycle Cost	2	3	5	5
Maintenance	3	2	3	4
Mobility	4	1	2	4
Total	11	12	17	21

Treatment Mechanisms



Design

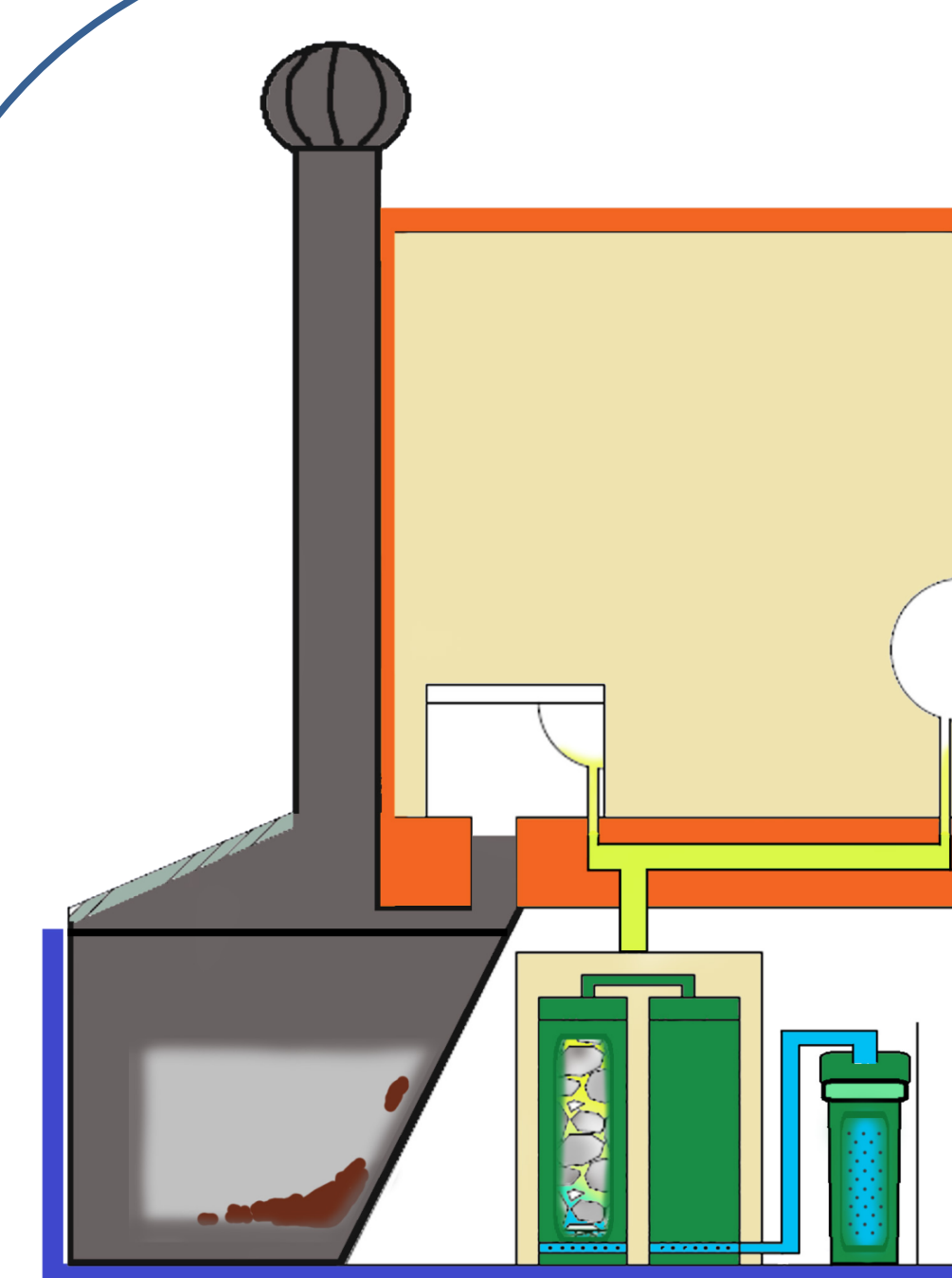


Figure 1: WETS Cross-section

The WETS facility has two main shipping container structures. The waste treatment area is contained in a half-height bicon container that is 10' x 4' x 8' (L x H x W). Stacked on top of the bicon is a tricon container (6.5' x 8' x 8') that houses the bathroom area. The tricon contains two waterless toilets and two waterless urinals.

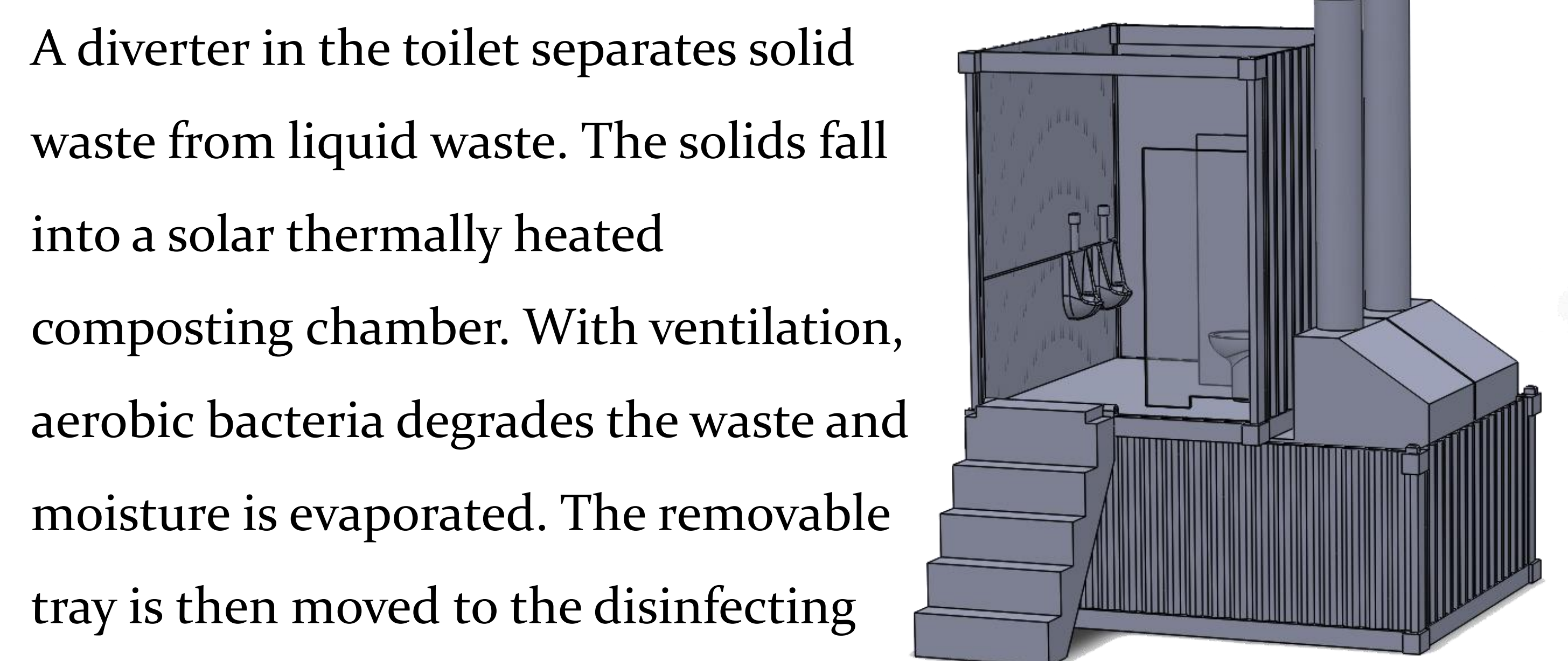


Figure 2: WETS Solidworks Model

A diverter in the toilet separates solid waste from liquid waste. The solids fall into a solar thermally heated composting chamber. With ventilation, aerobic bacteria degrades the waste and moisture is evaporated. The removable tray is then moved to the disinfecting chamber to finish killing pathogens.

The liquid waste treatment is uniquely designed for WETS. The urine is diverted into a four stage process that treats for pathogens, oxygen demand, and suspended solids demand before being discharged into a drain field.

Summary

Our WETS Facility helps the military save money and reduce casualties from supply lines by decreasing water use and output of waste better than current water flush restrooms. By using waterless latrines and treating the waste on site, costs and risks associated with the logistical demands of restrooms are minimized.

Future Work

- Test and validate waste treatment systems
- Create full scale facility for inspection
- Field study of WETS Facility in Southeast Asia

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