ZYCLONE CUBE & SOLAR TOILET SYSTEM
Fecal sludge treatment system
HOW IT WORKS

FRONTEND
User encounters a conventional flush toilet with either a pedestal or squat plate flush interface.

URINE/FECES SEPARATION
The unique shape of the Zyclone results in a solid/liquid separation effectiveness of greater than 98%.

LIQUID PROCESSING (Illustration 1)
The separated liquid is firstly filtered in a plastic media chamber (2) to remove coarse solid particles. The next two chambers (3, 4) are filled with newly synthesized media at 2 cm and 1 cm diameter, respectively. In the anaerobic chamber (3), the organic loading is reduced prior to an aerobic chamber (4) equipped with microbubble aeration that further remove COD, TN, and TP contents. In the next chamber (5), TN is greatly reduced by zeolite media in an anoxic condition. Chamber (6) is designed to recirculate the treated liquid to the anaerobic chamber (3) in order to increase the overall treatment performance. The final chamber (7) is equipped with electrochemical electrodes that inactivate the remaining pathogens in liquid prior to discharge.

SOLID PROCESSING
The separated fresh fecal matter (solid) is collected in a chamber located below the Zyclone separator where it is disinfected and the moisture content is reduced by a screw-heating unit. The heating device inactivates helminths 4-5 log values and E. coli by 6 log value.

POWER SYSTEM
The system requires electricity.
THE TECHNOLOGY

Illustration 1. Zyclone cube

1. Zyclone
2. Up-flow filter
3. Anaerobic chamber
4. Aerobic chamber
5. Anoxic chamber
6. Recirculation unit
7. Electrochemical disinfection
8. Screw heating device
OFF-GRID COMBINATION SOLUTION

- Toilet system (1-4 toilets per unit)
- Pour flush (1.5 Liters) up to 130 users/day
- Flushing (3.0 Liters) up to 70 users/day
- Ability to retrofit in existing systems
- Encourages environmentally friendly FSM practices in areas with limited access to FSM services or with temporary solutions (e.g. camp/natural sites, festival events, refugee camps, medical triage)

PRODUCT IS APPROPRIATE FOR:
- Squat
- Pedestal
- Wash

Illustration 2. How the Zyclone cube can be integrated with a conventional toilet and solar energy toilet system design.

1. Solar panels
2. Adjustable roof
3. Inlet pipe
4. DIY toilet panel
Estimated daily operating cost 0.50 $/day
Estimated Capex (not available)
Zyclone cube size L 1.45 m x W 1.25 m x H 1.35 m
Maintenance requirements
- Media to be replaced every 3 years
- Electrodes to be changed every 3 years
- Fertilizer to be collected every month
Life expectancy 15 years
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