Minimum-flushing Toilet & Onsite Human Waste Processor

Beijing Sunnybreeze Technologies Inc

Build Something Impossible!

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Our idea

1st, remove liquid portion from human waste by evaporation
(1) to limit the total amount of black water from the origin source (2) to evaporate raw sewage to produce dry manure powder, (3) to pasteurize solid manure powder to kill pathogens, and (4) to disinfect fecal sludge as organic fertilizer and to recycle and reutilize resources.

"Reinvent the Toilet Challenge"
1, off the grid
2, low cost
3, remove all egg/pathogen/virus
4. Resources recovery
...

The Challenges
Technique Approach

- Toilet
  - Blackwater Tank
  - Onsite Waste Processor

- Low cost & the size suitable for Home
- Totally off the grid & Can be powered by Solar Energy

- Condensate water
- Pasteurize solid powder
1. Minimum-flushing Toilet

What's new & Why?

- Video 1
- Video 2

Macerator pump

Car washing machine
2、black-water tank & Why?

VS.
3、Onsite human waste processor

**Challenge**

1. Energy imbalance
2. Clogging by Scale
3. Low cost strategy

**Solutions**

A: Minimum flushing toilet
B: MVR evaporator

Self-clean by screw & ball

Build the equipment as like home appliance
Challenge-1

Solar Electricity is very limited... But Evaporation need a lot of energy

Balance the energy The Solutions is

A: Minimum flushing toilet- Limiting the amount of black water

But, not enough......So......

B: MVR evaporator
evaporation

Vapor

Evaporator

Fuel
MVR technology can save more than 95% energy!!!

- Vapor
- Evaporator
- Mechanical Compressor
- Heating instead the fuel
- Distilled water
MVR technology was applied in heavy Industry 50Y

Sunnybreeze Team effort on low cost/Family scale

MVR Human Waste Processor last year
<table>
<thead>
<tr>
<th>Typical industry MVR</th>
<th>Vs. Family Scale MVR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressor cost:</td>
<td>Vs. ~2 Hundreds $ or less</td>
</tr>
<tr>
<td>~ Millions $</td>
<td>Vs. ~800W or less</td>
</tr>
<tr>
<td>Power consumption:</td>
<td>Vs. 20~30 Kg or less</td>
</tr>
<tr>
<td>~ Mw</td>
<td></td>
</tr>
<tr>
<td>Weight:</td>
<td></td>
</tr>
<tr>
<td>~ Tons</td>
<td></td>
</tr>
<tr>
<td>Production Capacity :</td>
<td>Vs. Hundreds Liter/d</td>
</tr>
<tr>
<td>~ M Liter/d</td>
<td></td>
</tr>
</tbody>
</table>
A simple idea-Screw & Ball build a Self–Clean Onsite Human Waste Processor
Build A low cost/small size, Home Scale

Human Waste (MVR)
Onsite Processor
## THE QUALITY OF CONDENSATE WATER

<table>
<thead>
<tr>
<th>pH of artificial raw sewerage</th>
<th>pH of condensate water</th>
<th>processing capacity@1kwh</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4</td>
<td>7.32</td>
<td>12.5 L</td>
</tr>
<tr>
<td>5.1</td>
<td>7.25</td>
<td>11.4 L</td>
</tr>
<tr>
<td>8.2</td>
<td>7.22</td>
<td>13.7 L</td>
</tr>
<tr>
<td>9.1</td>
<td>7.23</td>
<td>9.6 L</td>
</tr>
</tbody>
</table>

\[ \text{TDS} = \text{Total dissolved solids} \]
Onsite Human Waste Processor

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MVR evaporator/processor

Testing Human Waste onsite Processor

Distilled Water

Black water

OUTPUT

Dry sludge
(1). The Minimum flushing system produces fantastic results.
(2) MVR technology can be one of the most promising plans to tackle the problems of the energy imbalance.
(3). The compressor we used in testing were not optimally designed for MVR and therefore, there is a lot of room for improvements
(4). There are still some problems we haven’t fully explored. These problems include the stability of the system and effective odor control.
Thank You!

Q&A

THANKS: This project is supported by BILL & MELLINDA GATES foundation