


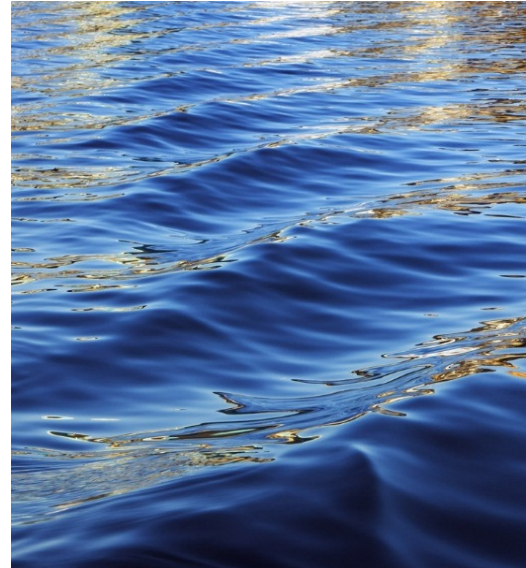


New Standards New Future

for Portable Sanitation and
Non-Sewered Waste Systems



Karleen Kos, Executive Director
PSAI



A Look at the Future for Portable Sanitation and Non-sewered Waste Systems

- I. The Situation and What's Behind It
- II. The World Comes Together
- III. Impacts on Portable Sanitation



Part I

THE SITUATION



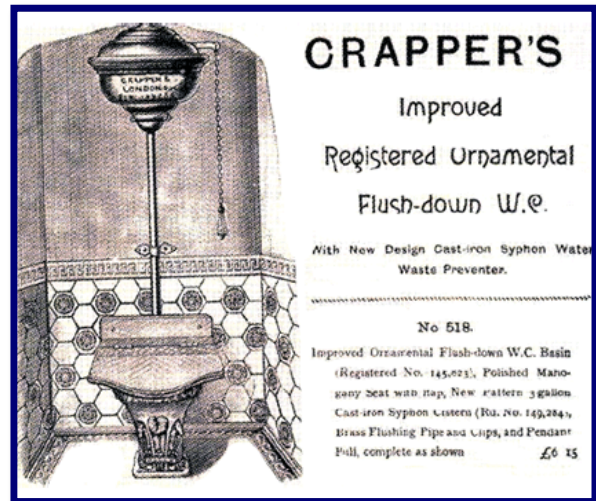
Situation

- ~2.4 billion people around the world do not have access to a toilet or latrine.
- ~673 million people still defecate in the open
- Diarrheal disease is the second largest killer of children under the age of 5, where ~297,000 die every year
- Issue of dignity and safety particularly for women and girls



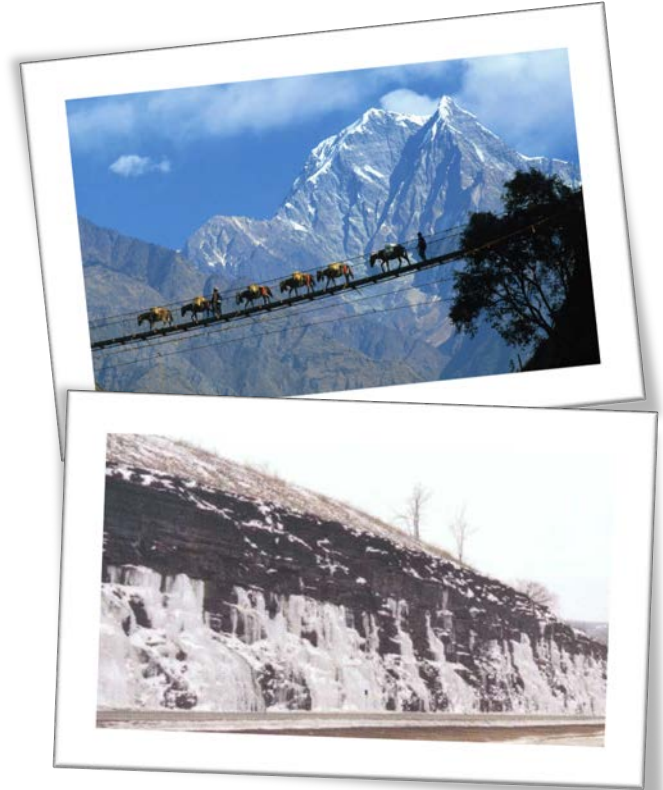
Why?

- Flush toilets have been around a while
 - Invented 1596
 - Widely adopted late 1800s

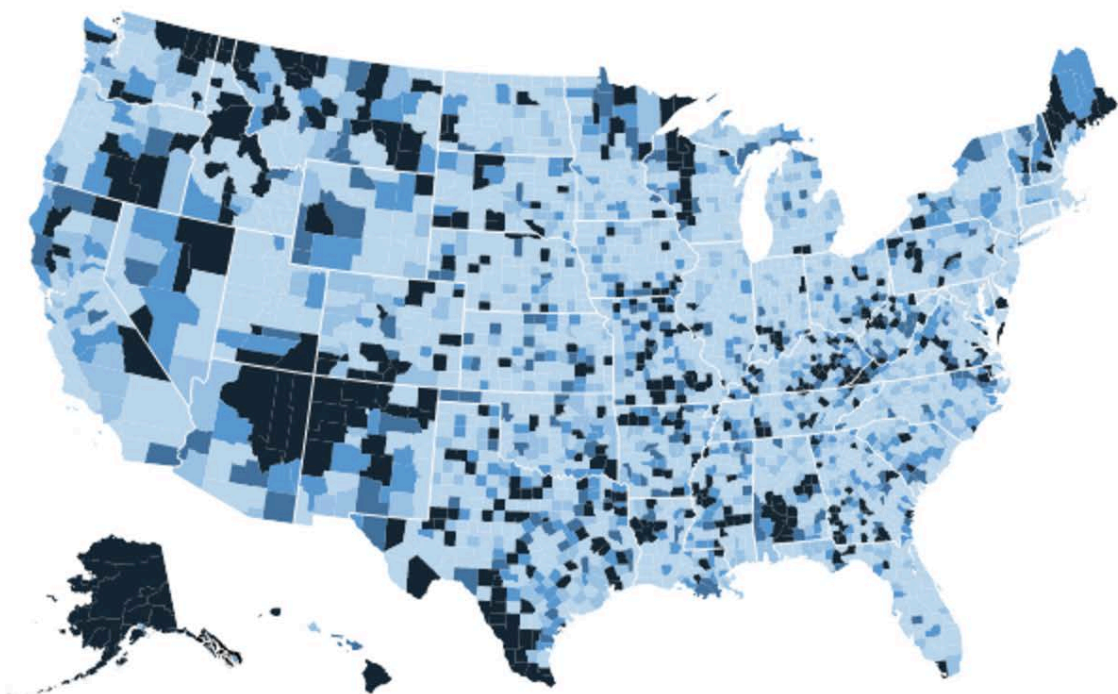


Challenges

- Lack of financial resources
- Lack of water
 - Toilets that require water in any amount are not practical
- Lack of infrastructure
 - Few if any treatment facilities
 - Limited water for traditional treatment even if facilities were there
 - Ground is not amenable to septic systems
 - Power is not always available/practical



Percent of housing units lacking complete plumbing facilities



Consider

- Census bureau: 630,000 households in the United States lack hot and cold running water, a bathtub or shower, or a working flush toilet
- That's 1.6 million people
- Cost to address: between \$3B and ??? depending on how you figure it – and the deck is stacked in our favor



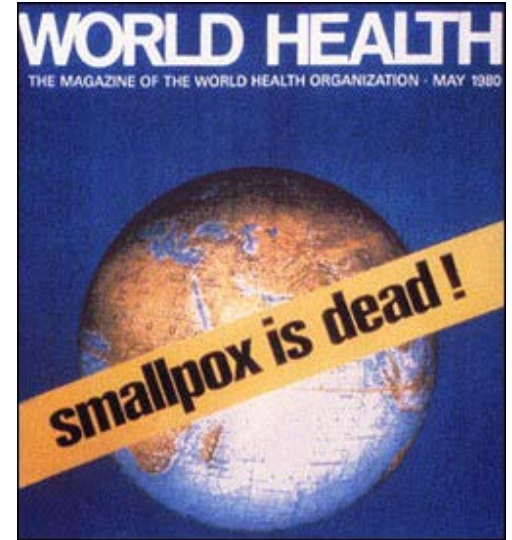
Analysis

Costs in 1967

- 1.5 million lives
- \$1.4 billion for treatment globally (\$10.1 billion today)
- \$92.8 million in the US for vaccines

Cost of eradication

- \$300 million over 12 years
- US contribution \$23 million
- USA saves the equivalent of its entire WHO contribution every 26 days because it doesn't have to vaccinate or treat the disease



Is it a technology problem?

YES!



FINDING TOILET SOLUTIONS

In the DEVELOPING world



THE PROBLEM

How can we destroy human born fecal pathogens such that they cannot make people sick and contaminate the local water supply without adding financial burden to the community?





The Human Factor

- We are “hard wired” to avoid contact with waste
- When offered latrines or portable toilets, people will resist and/or continue to use open defecation
 - India
 - South Africa
- Cultural traditions



Excreta is most common cause of disgust around the world.



Implication for Portable Sanitation

- Billions of people have nowhere to go
- When offered portable units, large numbers choose open fields
- To solve this problem, something different — feasible — affordable — aspirational — has to be offered.
- Whatever the “something” is will impact our industry in the developed world too



Part II

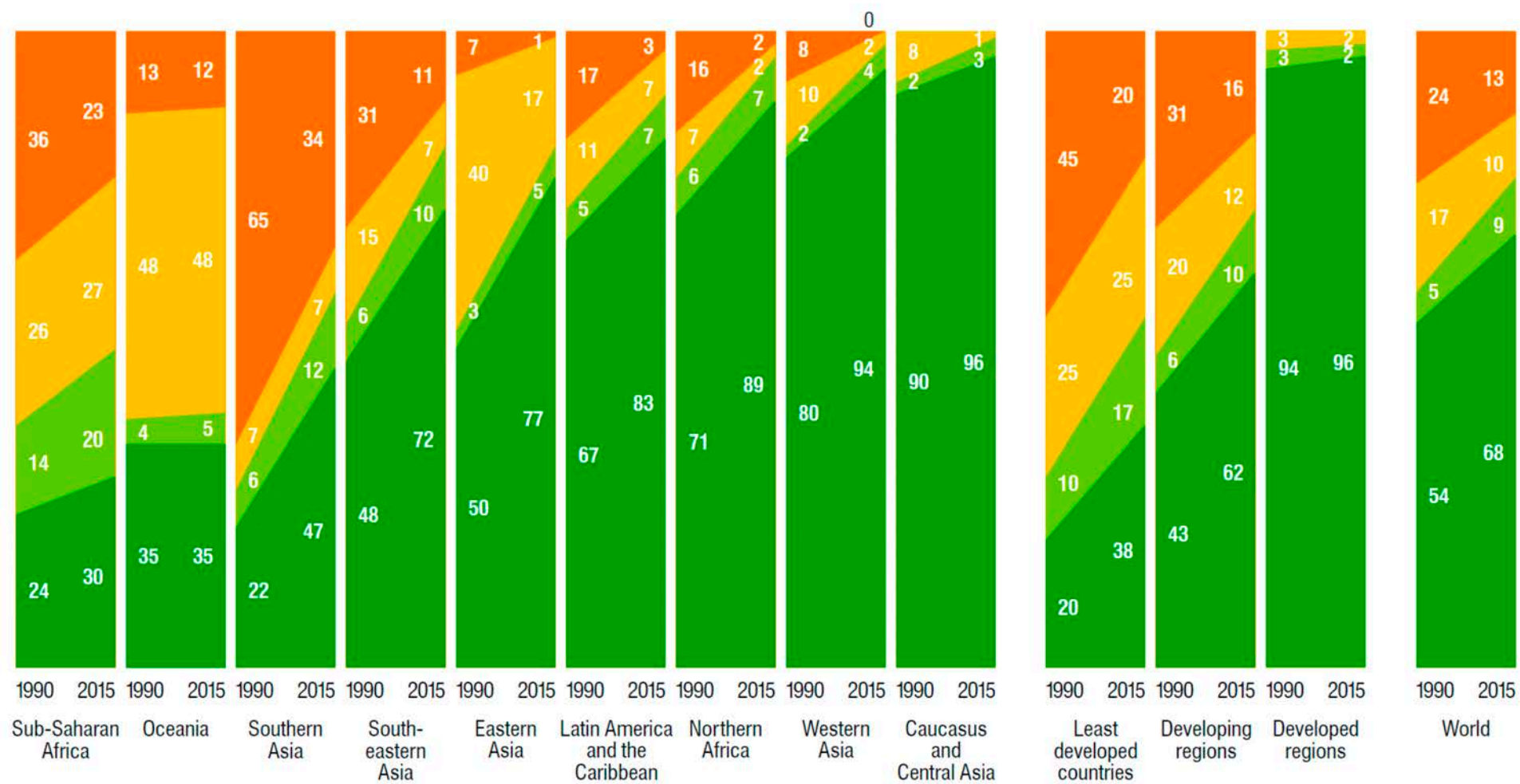
THE WORLD COMES TOGETHER



Millennium Development Goals

- Set by UN in 1990
- Goal 6: Ensure availability and sustainable management of water and sanitation for all
- Goal 7c: Halve the proportion of the population without sustainable access to safe drinking water and basic sanitation





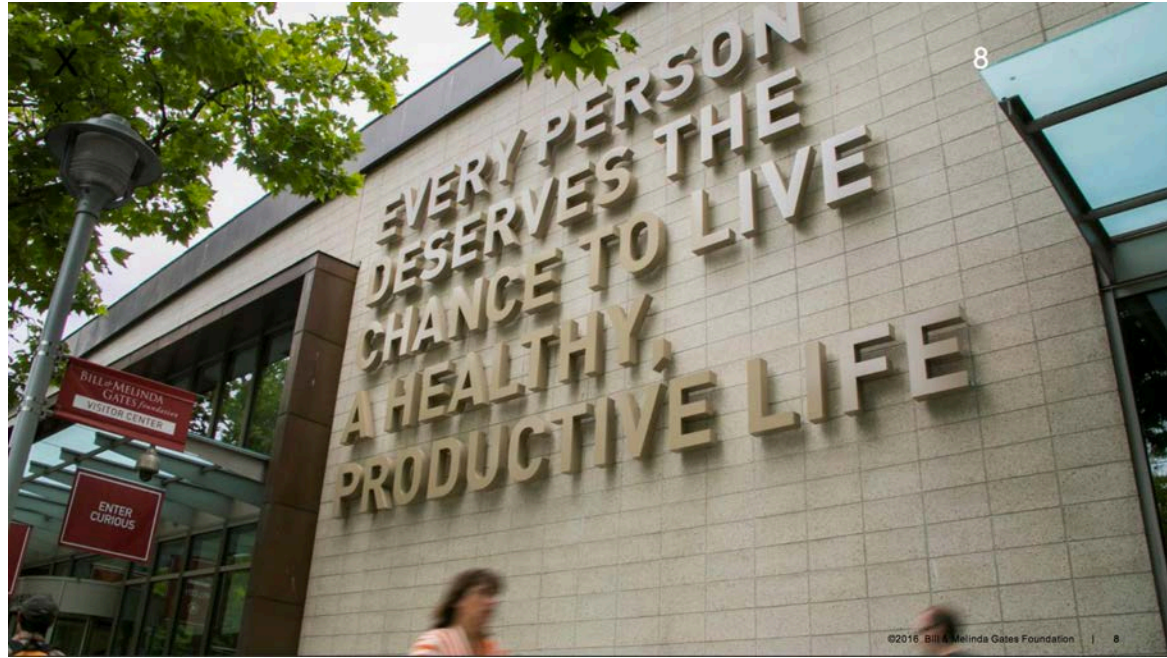
IMPROVED

SHARED

UNIMPROVED

OPEN DEFECATION

Enter the Bill and Melinda Gates Foundation

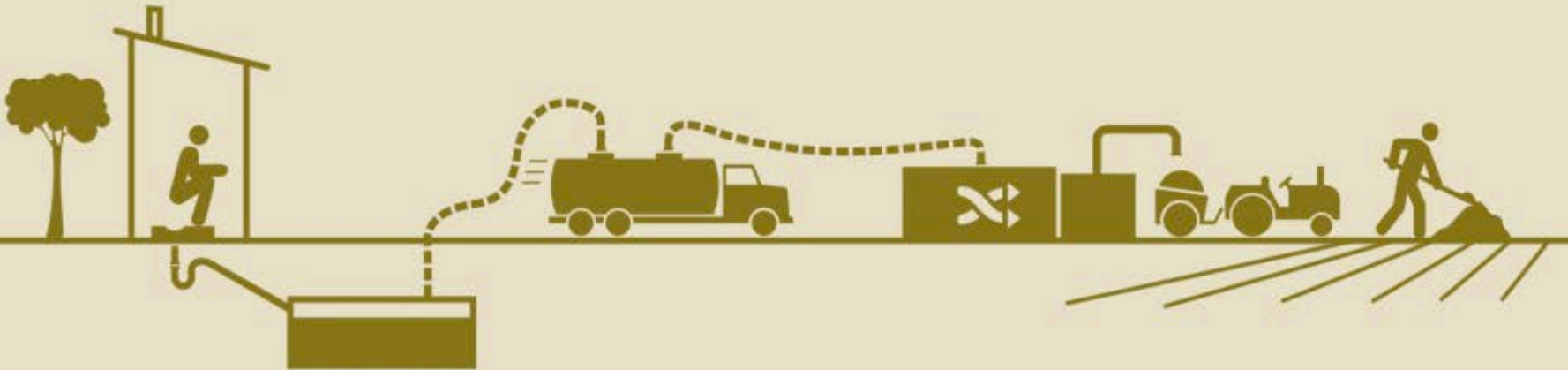


The Big Idea

Fix an important market failure by delivering services and products that meet customers' needs AND aspirations, compatible with 21st century technologies



Business Opportunities Along the Chain



CAPTURE



STORAGE



TRANSPORT



TREATMENT



REUSE

The Reinvent the Toilet Challenge

Aspirational “next generation” toilets

- Standalone toilet unit
- No piped-in water, sewer connection, or outside electricity
- Facility costs targeted at less than five cents per person per day
- Sustainable business model
- User experience is on a par with fully sewerred toilet



Sitting

Washing



Wiping



Squatting



Also Needed

- Waste treatment options for various-sized communities
- Ancillary products and services
- Proactive standards to promote rapid product development



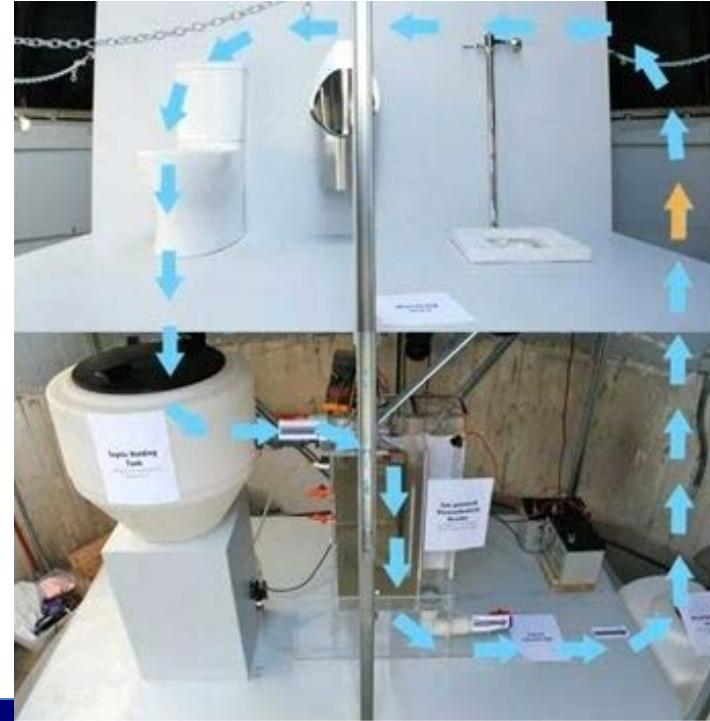
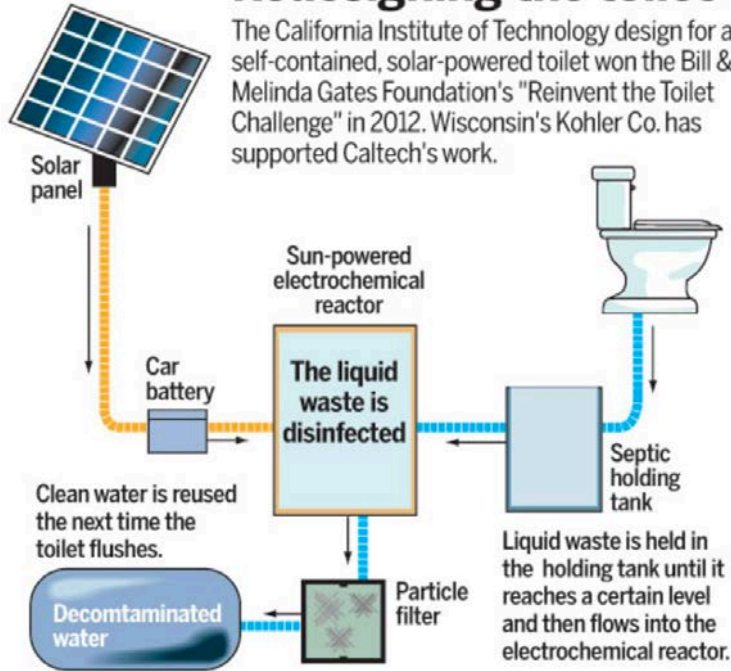
TOILET + WASTE PROCESSING IN ONE UNIT

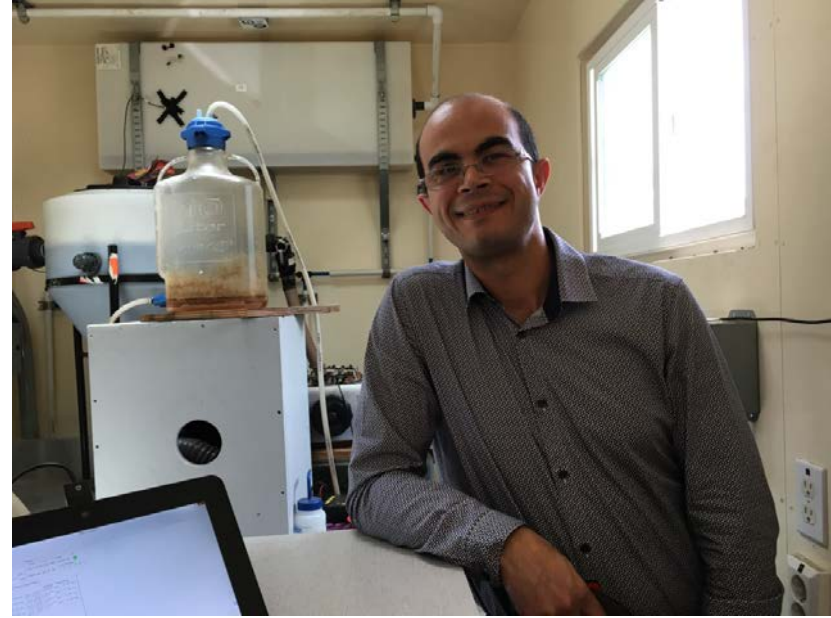


Cal-Tech/ Kohler

Redesigning the toilet

The California Institute of Technology design for a self-contained, solar-powered toilet won the Bill & Melinda Gates Foundation's "Reinvent the Toilet Challenge" in 2012. Wisconsin's Kohler Co. has supported Caltech's work.







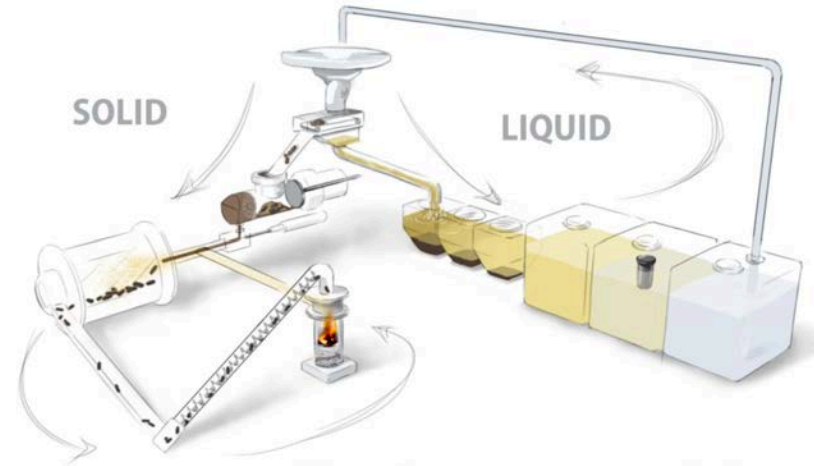
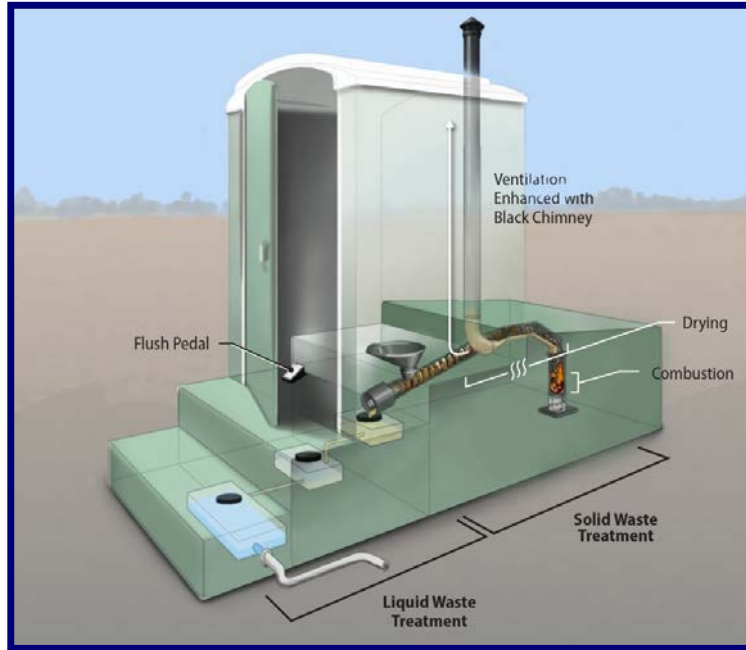
WC
厕所黑水处理回用系统
Black Fecal Wastewater Recycling System

 Eco-san
北京爱科森生态环保设备有限公司
Beijing Eco-san Environmental Protection Equipment Co., Ltd.

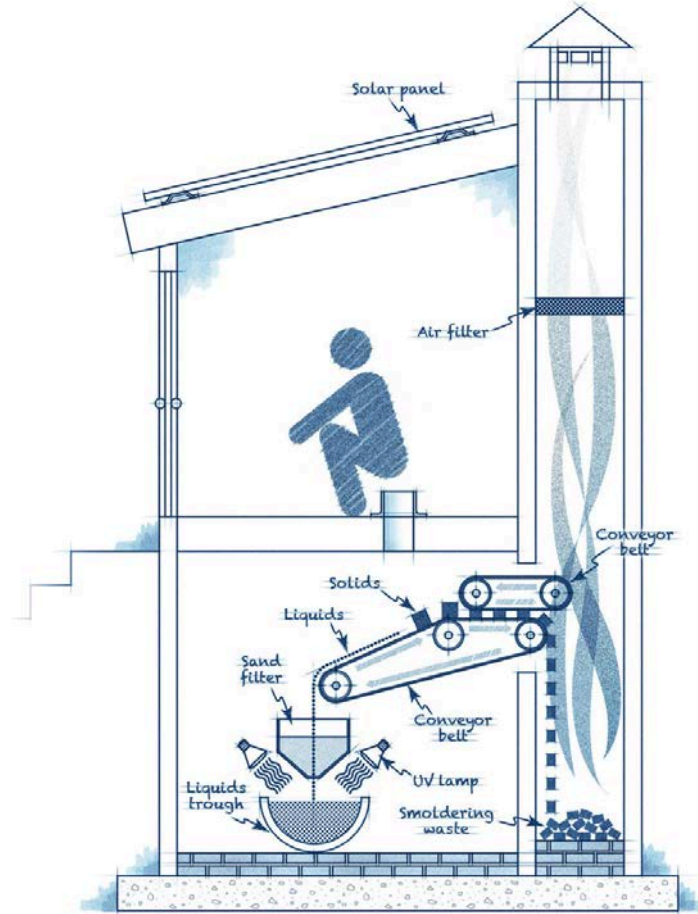
处理能力: 240-300人次/天	平均水量: 600吨/年
Capacity: 240-300 users times/d	Water-saving: 600m ³ /y
建设时间: 2015年	节约水量: 1800kwh/a
Construction Time: 2015.09	Power-saving: 1800kwh/y
Website: www.eco-san.cn Tel: +86-310-87195188 11P: +86-13901531926	



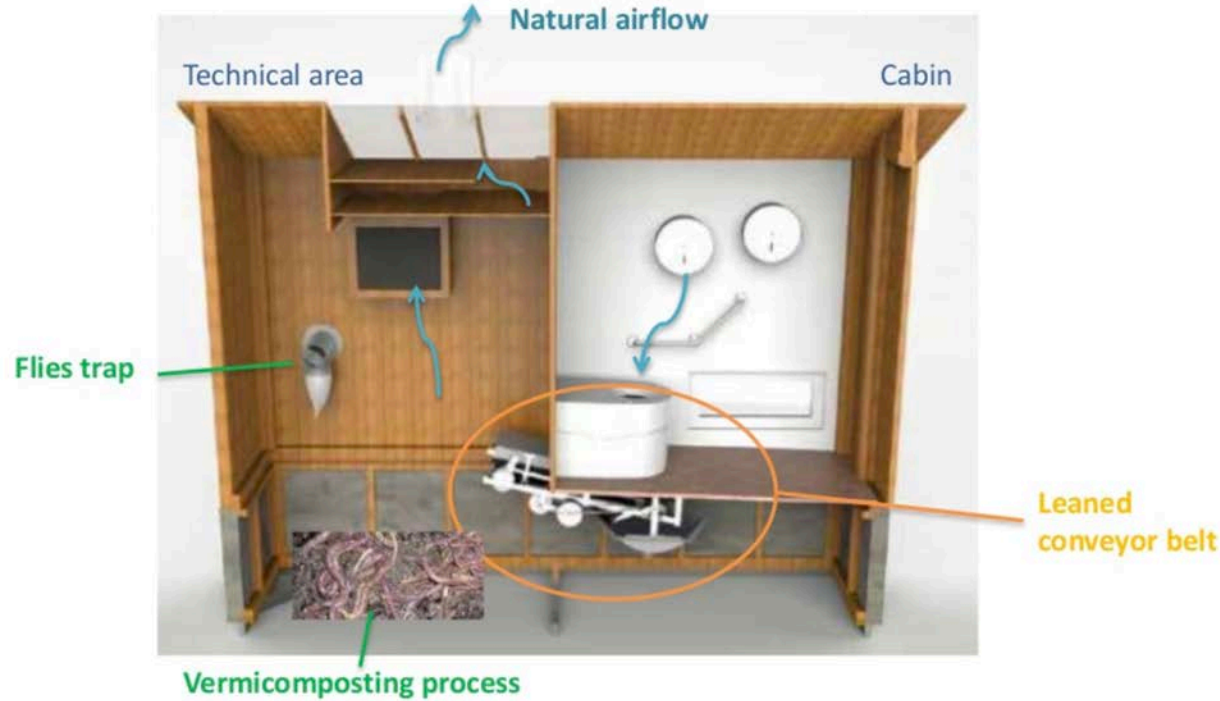
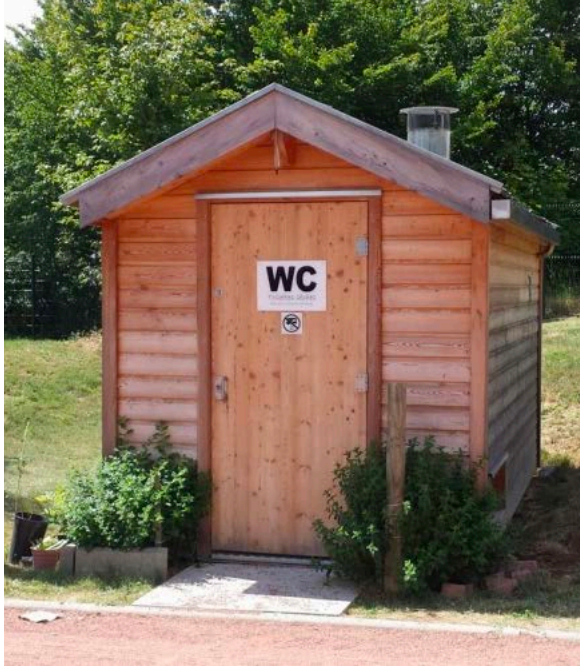
RTI with Duke and Colorado State



University of Toronto



Sanisphere



TOILET + WASTE PROCESSING OCCURS BOTH ON AND OFF SITE





The Diversion Toilet



Cranfield University



Scientists in the UK are currently field testing a waterless and inexpensive Nano Membrane toilet with energy-producing capabilities.



TOILETS ONLY



Loowatt



- Waterless and chemical-free technology
- Biodegradable film lines the toilet bowl
- “Flush” seals the film and waste, carries it to sealed storage area
- Clean toilet bowl for every visitor
- The film and waste are then treated in energy-generating systems
- Produces biogas and fertilizer



Eram Scientific e-Toilet



Meanwhile Everyone Knows

- Current wastewater treatment systems are expensive to build/operate
 - Infrastructure crisis in the US
- The growing world population means huge growth in human and animal waste
 - Often in places lacking water, power, good roads, and other infrastructure



Evolving Waste Processing Concepts

Focus on recovering resources from waste in a manner that is environmentally and economically positive



Onsite Waste Treatment

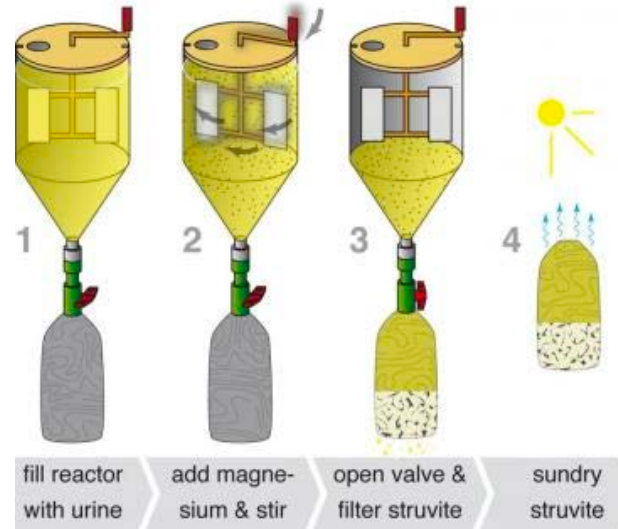


Urine Diversion and Reclamation

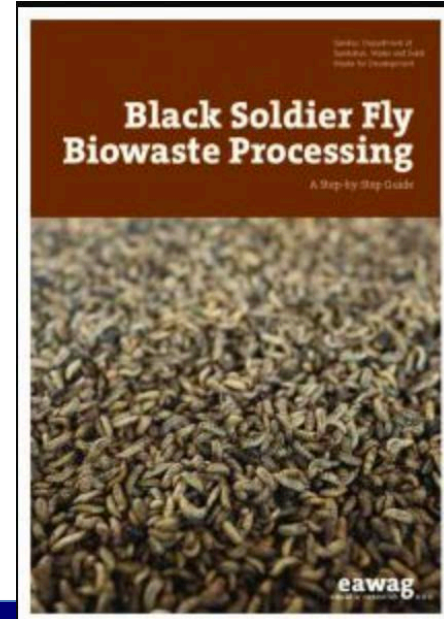
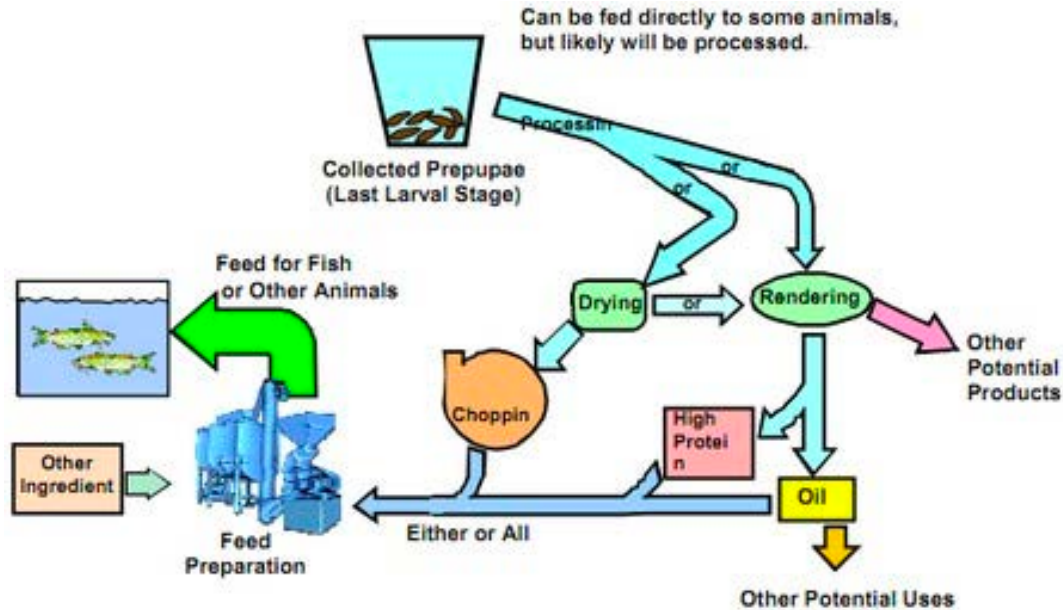
Direct land application



Struvite recovery



The BSF Waste Recycling Process



Janicki Omniprocessor



NEW Generator



Part III

IMPACTS ON PORTABLE SANITATION



What Will Happen

New technologies
emerge

PSAI engagement in
global standard setting
promotes synergies
with our industry

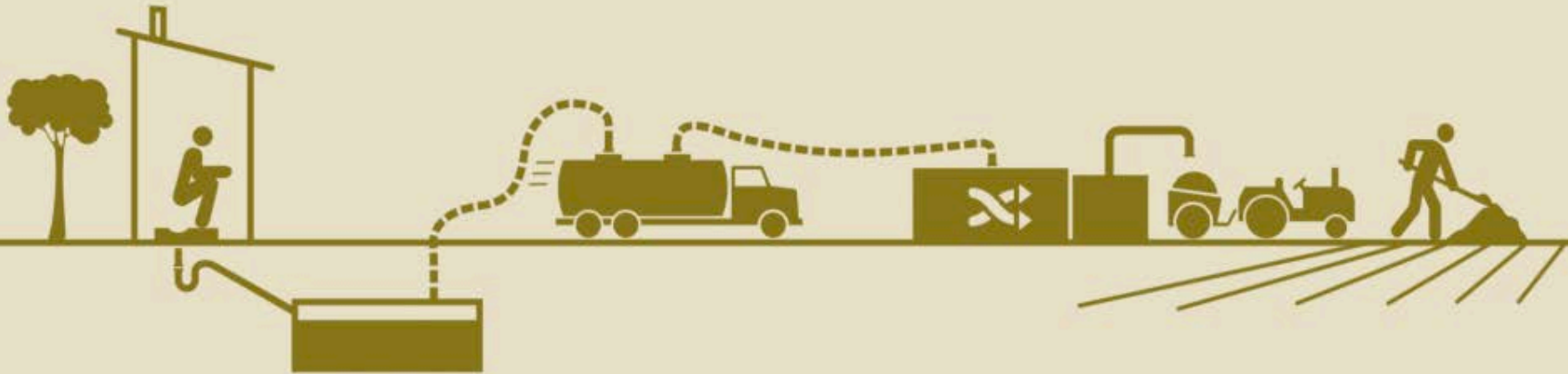
Adaptations address
challenges of disposal
and user experience

Reputation of the
industry improves;
everybody wins



New/Updated Management Standards

- Address operations for existing systems
- Eventually will likely address operating the new systems



CAPTURE >

STORAGE >

TRANSPORT >

TREATMENT >

REUSE

New Technical (Manufacturing) Standards

- Aspirational – “impatient optimists”
- Gates grants spurs speed, lowers cost of development
- Proactive standards will guide industry, be a resource for governments and users
- PSAI is participating, via ANSI



Currently

- ISO 30500 Standard for non-sewered sanitation systems
 - Next generation toilets that are prefabricated with integrated treatment units
 - General safety and performance requirements for design and testing
- ISO 31800 on fecal sludge treatment units
 - Prefabricated, community-scale resource-recovery units –
 - Safety and performance
- Urine reclamation standard (early stage of consideration)



New Standards

- It's not as easy as you think!
 - Simulating odor, texture, diarrhea for testing
 - Sitters vs squatters
 - Balancing priorities
 - Cost to certify
- If/when governments and NGOs adopt these standards, expect:
 - More market entrants
 - Variations on the technology (portable?)
 - Comparatively rapid departure from anything involving open solutions/contact with waste



What Does this Mean?



Facts and Educated Guesses

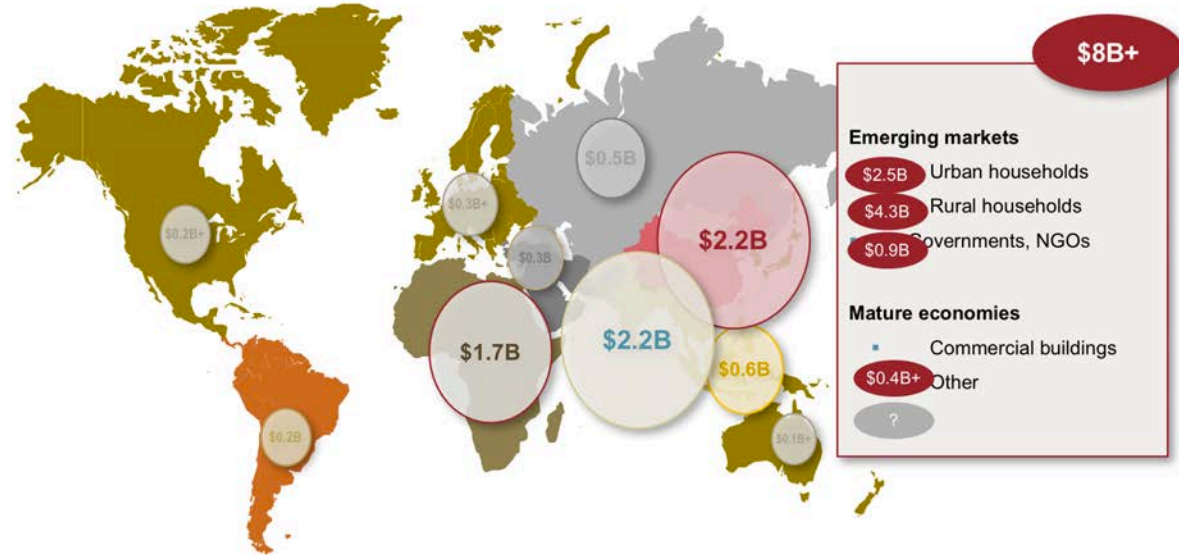
#1 Fact: This is happening, with or without the industry. We can be on the bus or under it.



Facts and Educated Guesses

A POTENTIAL **\$8B+** GLOBAL ANNUAL OPPORTUNITY
TO HELP MEET SANITATION NEEDS

Fact #2: It's
all about
developing
nations –
except that it
isn't.



Facts and Educated Guesses

Educated Guess #1: Global movement away from open tanks/users experiencing contact with waste

- Already not allowed in many countries
- As new affordable technologies and standards become the norm, the market will likely seize the opportunity to provide the no-contact experience everywhere



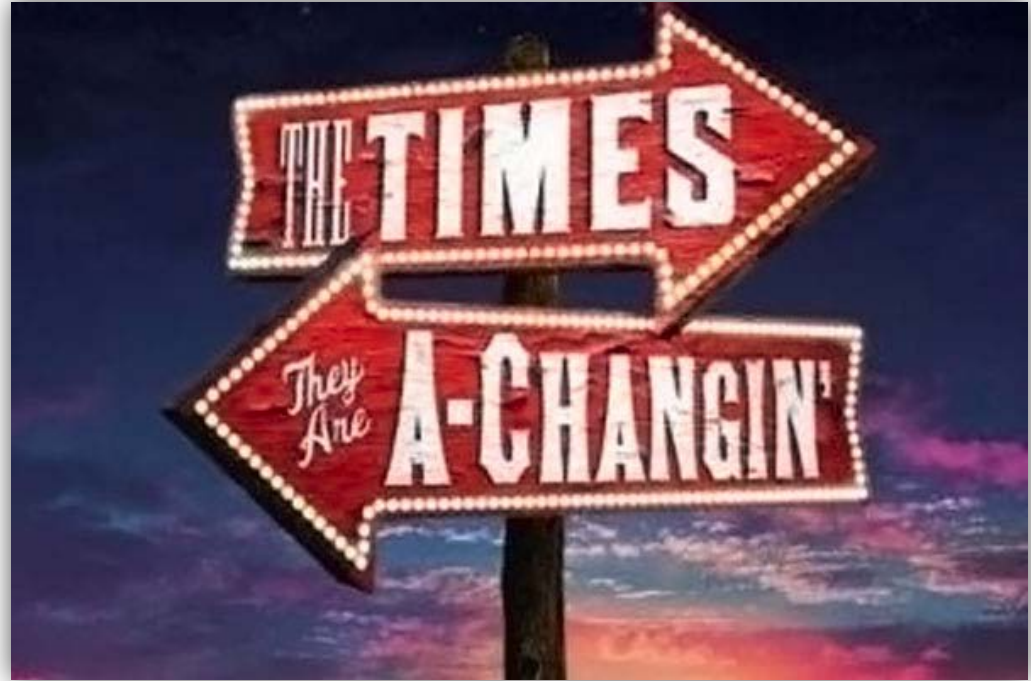
Facts and Educated Guesses



Educated Guess #2:
Some of the new technologies (toilets/treatment) will be adaptable to developed markets and to portable scenarios within the next 5-10 years.

Why?

- Possible alternative to septic tank and current models for waste disposal
- Large market for use in fragile environments
- May dramatically impact portable rental business over 10-20 years



Implications

- LPs → Tapes → CDs → MP3s → Streaming
- Equipment evolution (units, trucks, trailers, etc.)
- Service evolution
- Possible easing of pressure/dependence on treatment infrastructure
- New/different business opportunities
 - Long term, stationary rentals and service contracts
 - Sale of waste byproducts



Timing is Everything

- Public demand/desire for closed system: the lesson of cup holders
- Sustainable business models
- Regulatory/tax incentives



Thank You!

