Critical Practices LLC

FUNDACIÓN IN TERRIS

The Earth Auger

An Ecological Toilet:

mechanized and 100% decentralized

Chuck Henry
critical.practices@gmail.com

Marcos Fioravanti
mtfioravanti@gmail.com

Critical Practices LLC

Vision:

To reinvent the toilet so that it is sustainable and accessible to all families.

We are developing several prototypes of decentralized toilets that are comfortable, safe, affordable and sustainable. These are ideal for rural and peri-urban areas that don't have sewer or where water is expensive or scarce.

Critical Practices LLC

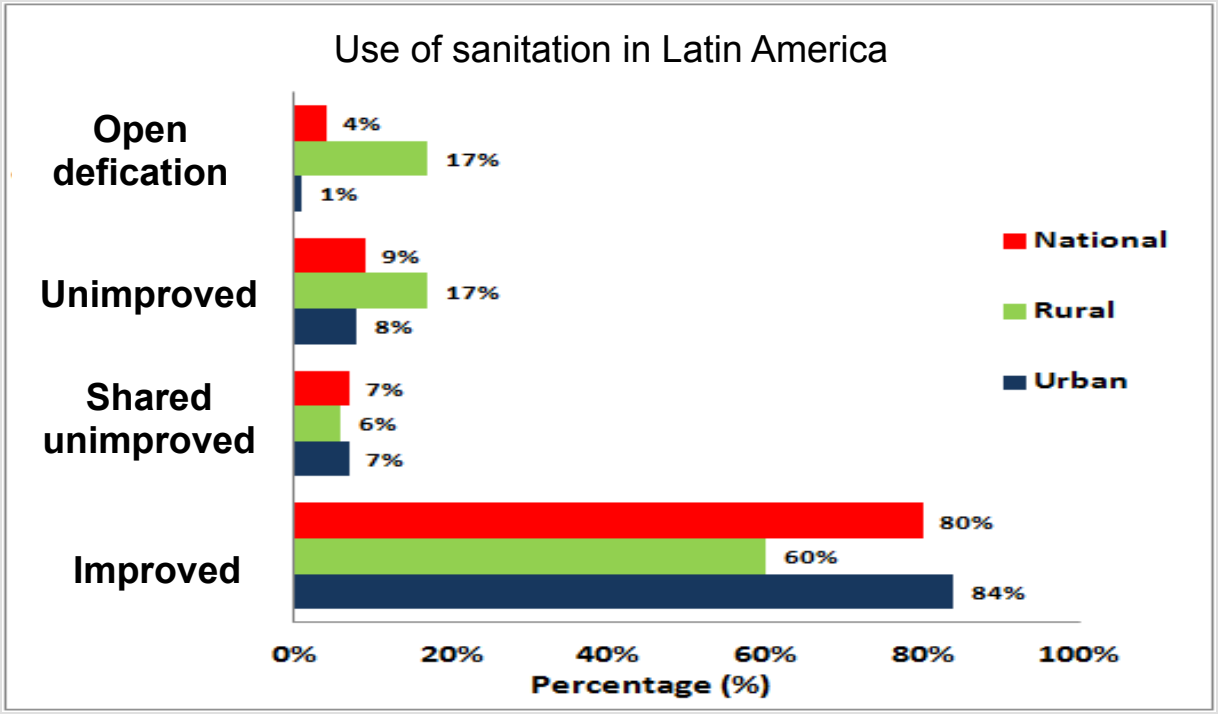
Global Situation

Worldwide, 2.5 billion people still lack access to improved sanitation.

Critical Practices LLC

Regional Situation

In Latin America the picture is similar: 120 million people lack access to improved sanitation, mostly in rural areas.



In Ecuador, it is estimated that about 3 million people do not have access to improved sanitation.

Población estimada para Latinoamérica en 2010: 590´082.000
Fuente: JMPD-UNDP, 2012. /Text: Infolatam, 2010

Critical Practices LLC

Our Project

We have been working on a project to "reinvent the toilet" since 2002.

We have designed and tested many composting toilets, mainly in the US and Ecuador, but also in Asia and Africa.

Critical Practices LLC

BILL & MELINDA GATES foundation

In 2011 we were selected by the Bill & Melinda Gates Foundation from among 2,600 proposals and received a Phase I grant to conduct an 18-month investigation of our new toilet concepts.

FUNDACIÓN IN TERRIS

Bill Gates premia propuesta de

baño ecológico

Modelo inicial

La Fundación Bill Gates invertirá en el desarrollo de un diseño de baño ecológico, que fue presentado por un ecologista ecuatoriano y dos estadounidenses.

Critical Practices LLC

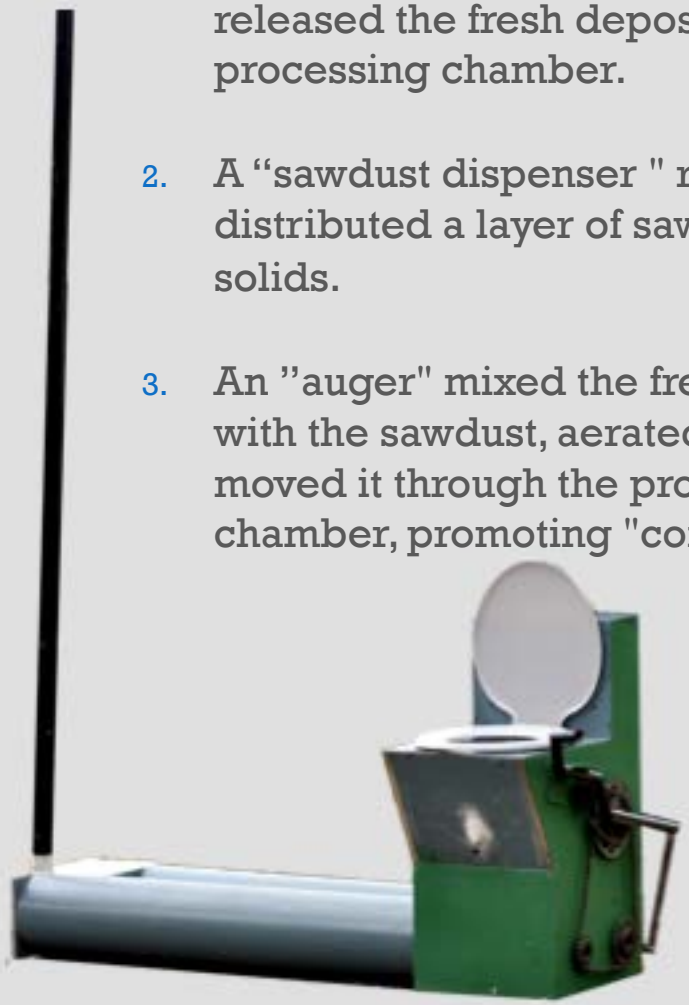
We developed two improved prototypes, with these features:

- They are low cost (as low as $150 depending on the prototype),
- They do not use or pollute water and require no power to operate,
- They have little odor problems, or flies and other disease vectors,
- They are safe, comfortable, and are easy to operate and maintain,
- They produce soil amendments through the separate handling of urine and solids; transforming the solids into compost.

Critical Practices LLC

Our prototypes were operated by a pedal that activated up to three simultaneous mechanisms:

1. A ”flush mechanism" captured and released the fresh deposits to the processing chamber.
2. A “sawdust dispenser " released and distributed a layer of sawdust on the solids.
3. An ”auger" mixed the fresh material with the sawdust, aerated the mix, and moved it through the processing chamber, promoting "composting".



* Versions tested in 2012. Currently the prototypes use gears instead of chains and have other improvements.

Our prototypes were tested by low-income families in a peri-urban area of Guayaquil.

Critical Practices LLC

FUNDACIÓN IN TERRIS

BILL & MELINDA GATES foundation

WIDE ACCEPTANCE: After 1.5 years, these families are still very satisfied with their "Earth Augers"

Yet, we've improved!

Critical Practices LLC

New project: scaling up

In July we received a Phase II grant from the Bill & Melinda Gates Foundation to continue development of our prototypes and begin the process of commercialization. Our goals are now to:

- To develop large-scale demonstrations of our new prototypes (a total of 300 to 500 toilets built and installed in Ecuador) in order to assess the acceptability, logistics, utilization of by-products (fertilizers) and fate (destruction) of pathogens.
- To develop a business plan for production, marketing, assembly and distribution that is sustainable and competitive, focusing first on Ecuador and Latin America, then the global marketplace.
- To develop a plan that promotes local economy and job creation.

Steps Completed

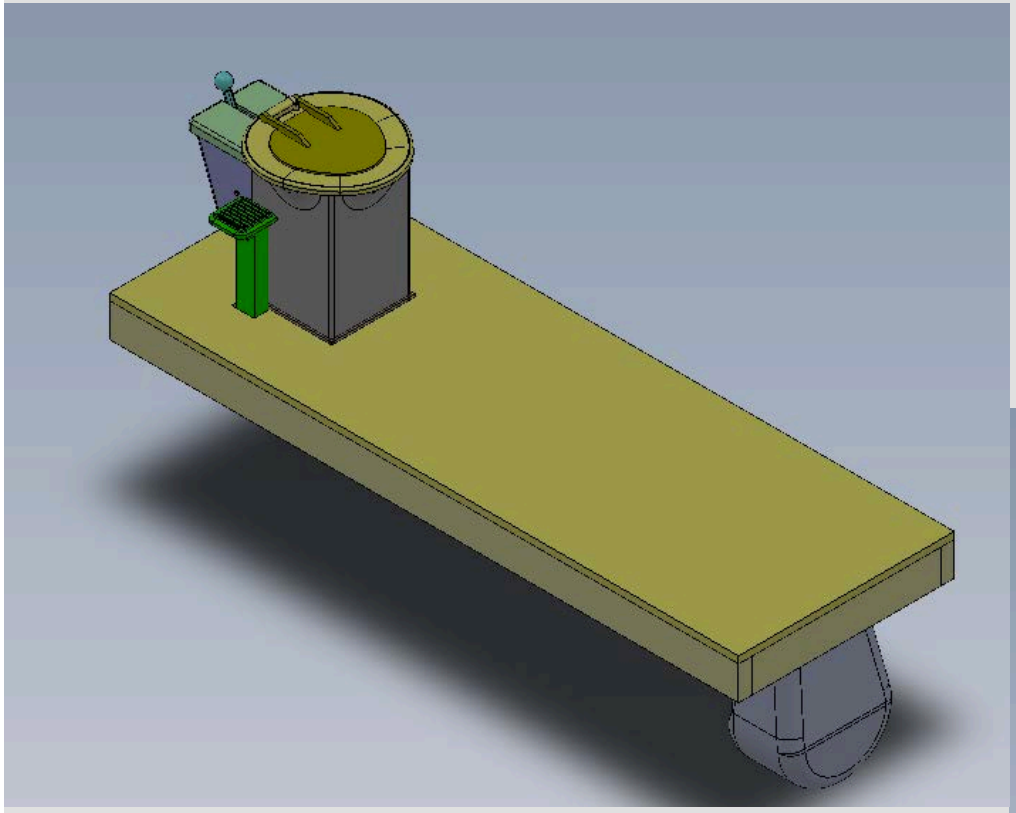
We modified, tested and improved our prototypes

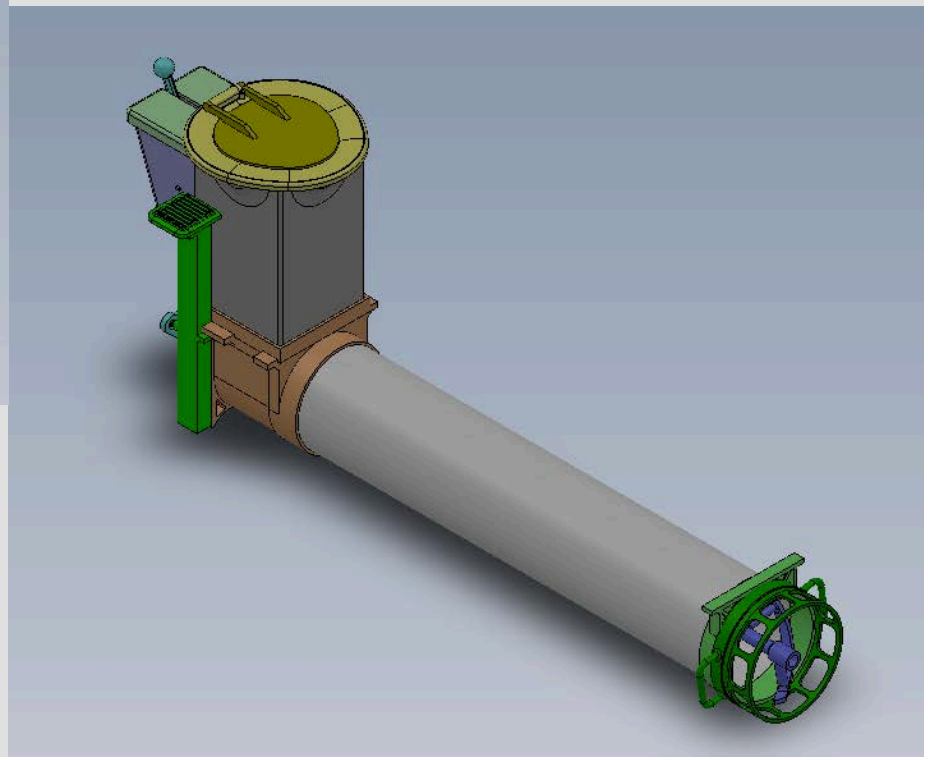
We have the commitment of Ecuadorian partners

We developed small-scale mass production techniques

Critical Practices LLC

2013 Basic Plus Prototype





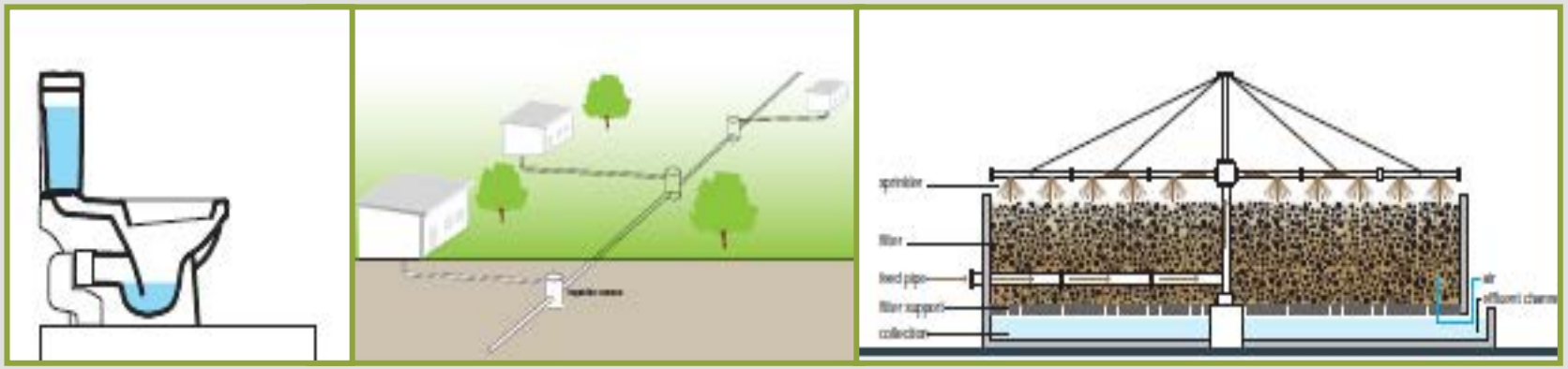
Why do we think that Ecuador… Latin America… the world is ready for a ‘toilet’ change?

Living in a poor urban or rural area of Ecuador, the most viable sanitation options are:

Critical Practices LLC

FUNDACIÓN IN TERRIS

1. Water flush/centralized treatment for family housing projects of >1000 people.



Fuente: Tilley, Elizabeth et al, 2008. Compendium of Sanitation Systems and Technologies. Swiss Federal Institute of Aquatic Science and Technology (Eawag). Dübendorf, Suiza.

- The investment per household is approximately $1,740. All sanitary fittings, bathroom sanitary components, cost of the treatment plant and its maintenance and operation for three years are included.

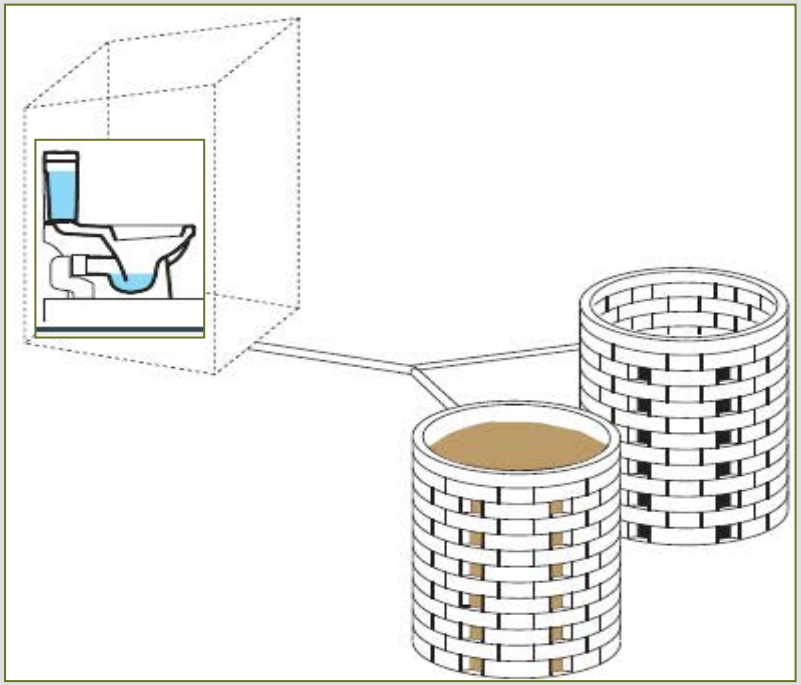
- If managed properly the treatment plant ensures that the wastewater has the quality to be discharged to a receiving body of water.

Living in a poor urban or rural area of Ecuador, the most viable sanitation options are:

Critical Practices LLC

FUNDACIÓN IN TERRIS

2. Water flush/septic infiltration for a house



Fuente: Tilley, Elizabeth et al, 2008. Compendium of Sanitation Systems and Technologies. Swiss Federal Institute of Aquatic Science and Technology (Eawag). Dübendorf, Suiza.

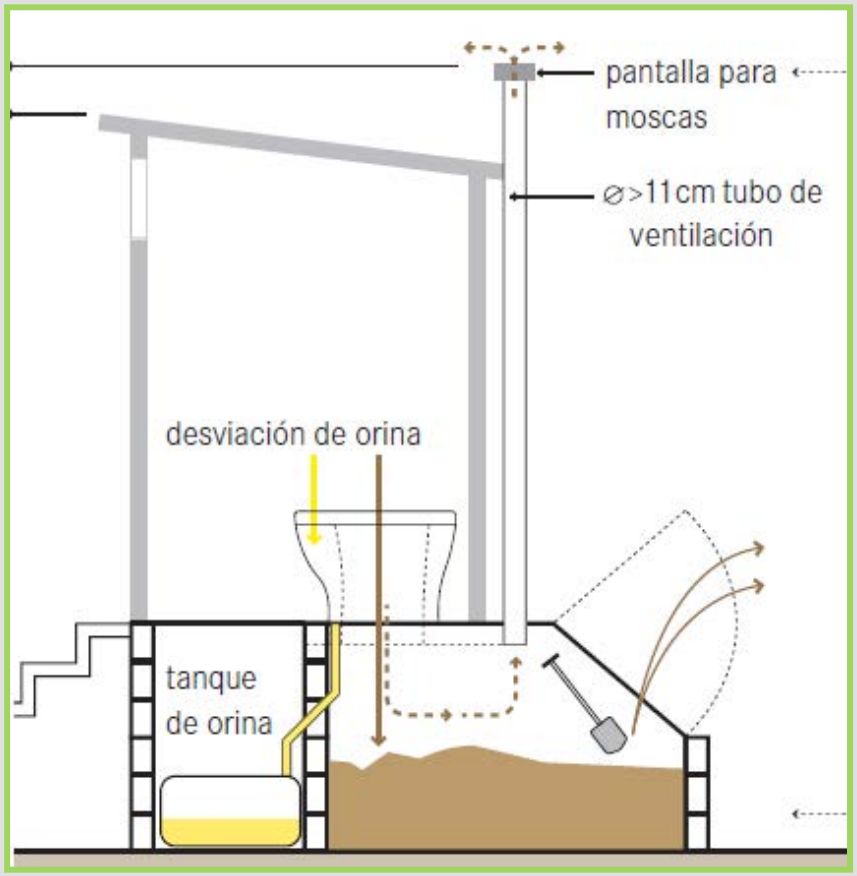
- The basic investment is $1,150, excluding the cost of housing and electrical installation.
- Groundwater contamination is possible, and soil infiltration capacity is not guaranteed.

Living in a poor urban or rural area of Ecuador, the most viable sanitation options are:

Critical Practices LLC

FUNDACIÓN IN TERRIS

3. Eco-toilet with reuse of by-products



Fuente: Tilley, Elizabeth et al, 2008. Compendium of Sanitation Systems and Technologies. Swiss Federal Institute of Aquatic Science and Technology (Eawag). Dübendorf, Suiza.

- The investment can range between $560 and $650 per household.
- It is the best choice in places where there is no water, because the system does not use or contaminate water. Does not use energy normally used to transport and treat wastes.
- In addition, by recycling human wastes and turn them into nutrient rich compost, added value to the system is generated.

Living in a poor urban or rural area of Ecuador, the most viable sanitation options are:

Critical Practices LLC

FUNDACIÓN IN TERRIS

4. The Earth Auger

The Earth Auger as a complete system. Including housing (can be adjacent to an existing structure), rainwater collection, sink and urinal, and underground greywater and urine 'fertigation' system.

- The investment can range from $200 to $350 per household.
- It's the best choice in places where there is no water, because the system does not use or contaminate water. Also doesn't use energy normally used to transport and treat wastes.
- In addition, by recycling human wastes and turning them into nutrient rich compost, added value to the system is generated.

The monetary investment… is less than all other options for improved sanitation in Ecuador…

Critical Practices LLC

FUNDACIÓN IN TERRIS

$ 1840	• Portable toilets
$ 1737	• Water flush/central treatment > 1000 people
$1497	• Water flush/sealed & pumped tank
$1154	• Water flush/cesspool & infiltration (shown prior)
$1054	• Water flush/public sewer connection
$564	• Eco-toilet (shown prior)
$200 - $350	• Our prototype eco-toilet**
$188	• Pit toilet

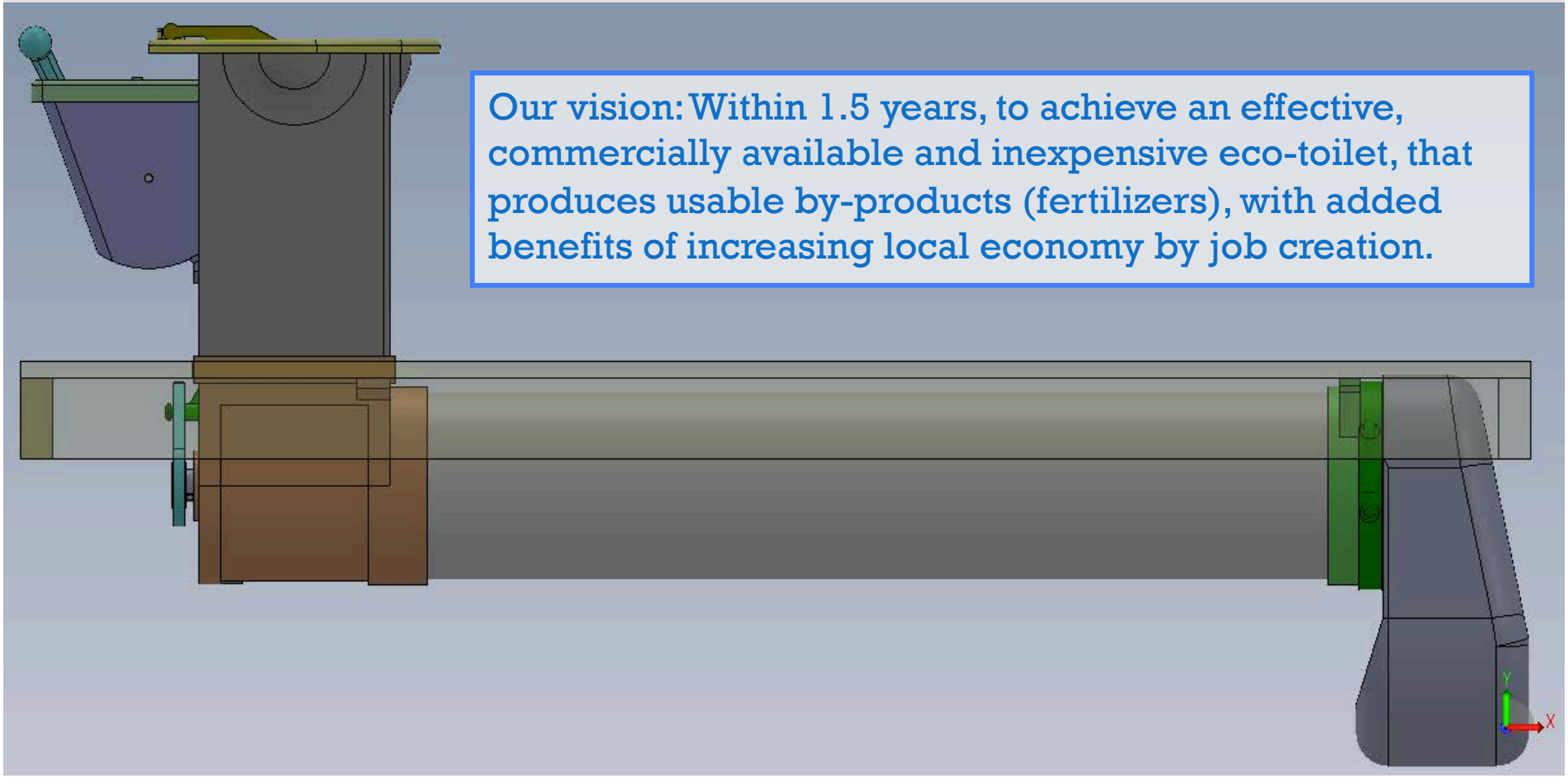
Notes:
Pit toilet and water flush/cesspool are considered unimproved sanitation systems.
** The price can drop by more than 30% if purchased on a large scale.
Source: Creative Environment, Environmental health, FCME, Mr. Martínez (2012).

- Composting toilets such as our prototypes would be the ideal complement to housing programs such as those by the Ecuador Housing Ministry. Currently, they annually average build of 13,600 houses/year. Other organizations average well over 10,000/year without any sanitation facilities.
- These toilets would also be ideal for:
  - Rural and agricultural farm
  - National parks and protected area
  - Ecological hostels

The Earth Auger
2013 Prototype

Critical Practices LLC

FUNDACIÓN IN TERRIS



Our vision: Within 1.5 years, to achieve an effective, commercially available and inexpensive eco-toilet, that produces usable by-products (fertilizers), with added benefits of increasing local economy by job creation.

Critical Practices LLC

FUNDACIÓN IN TERRIS