

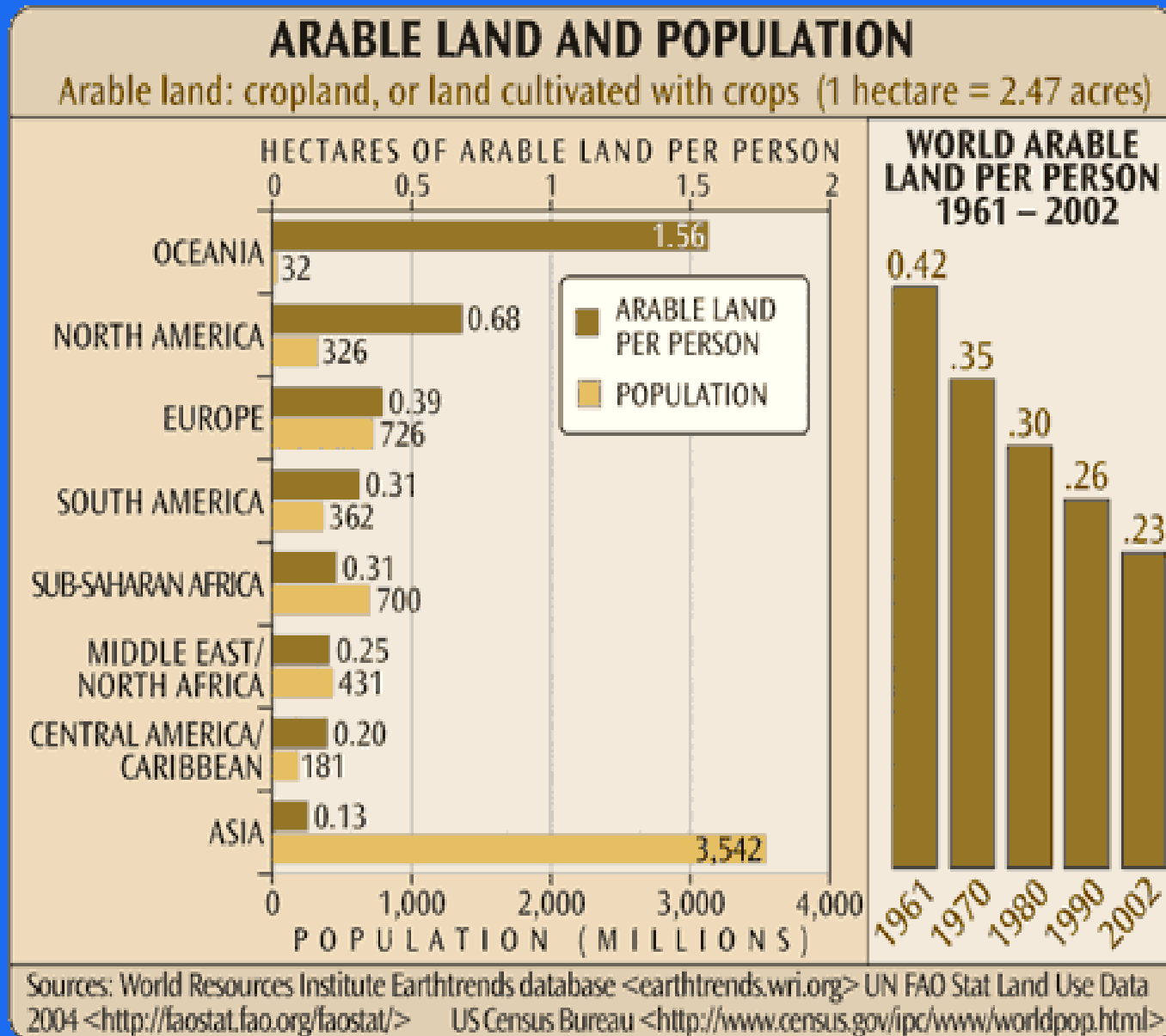
Hawaii



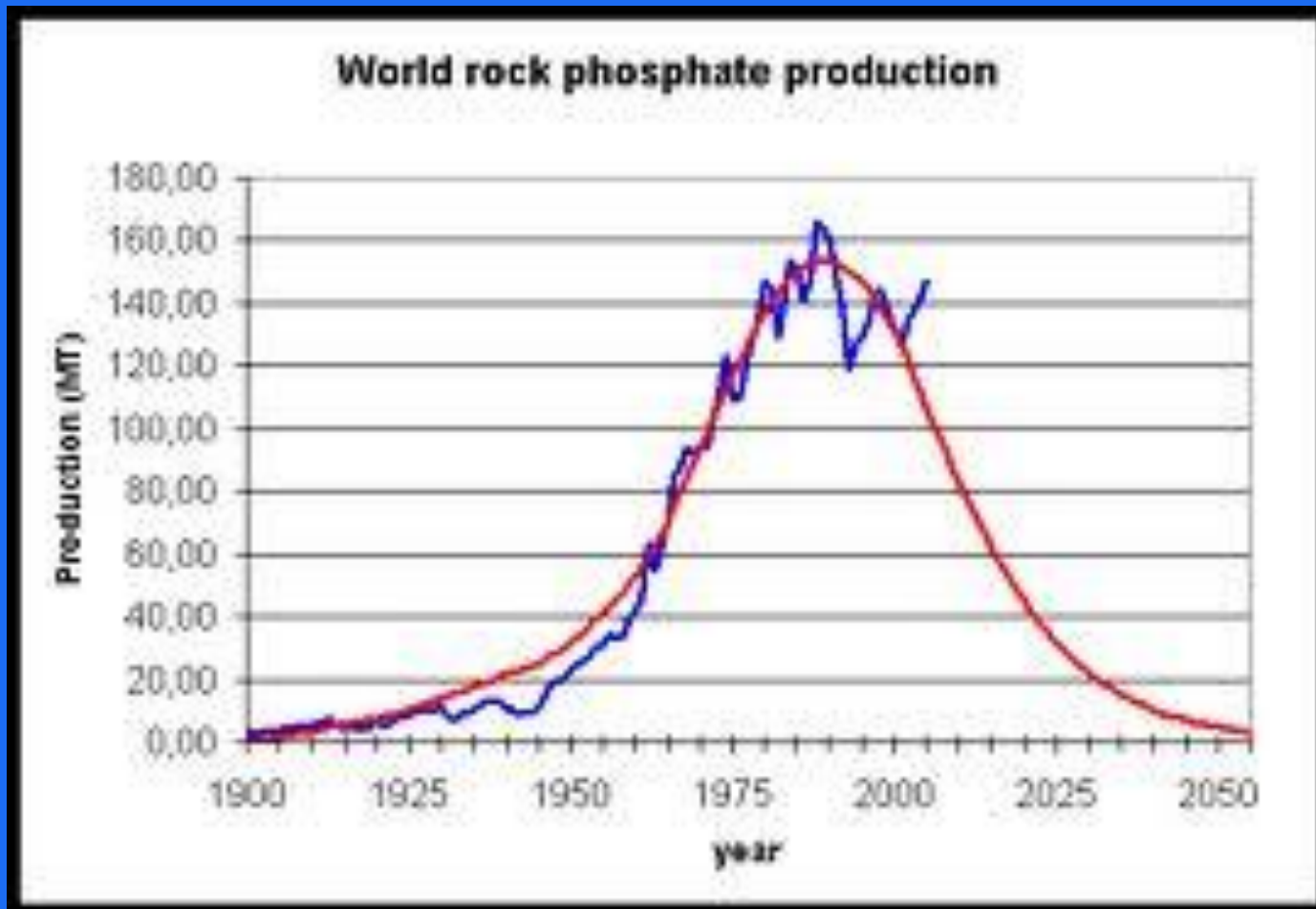
Our Fossil Fuel Heritage



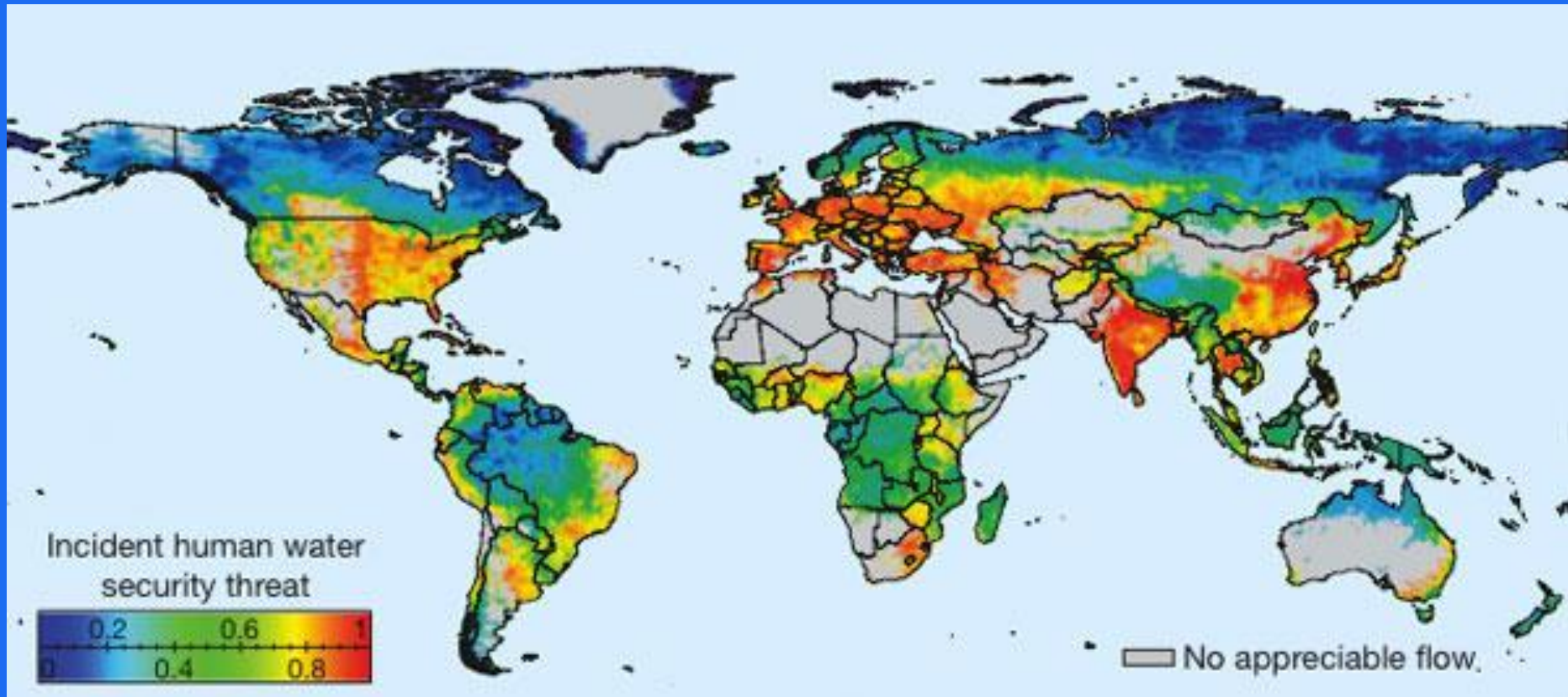
Arable Land and Population



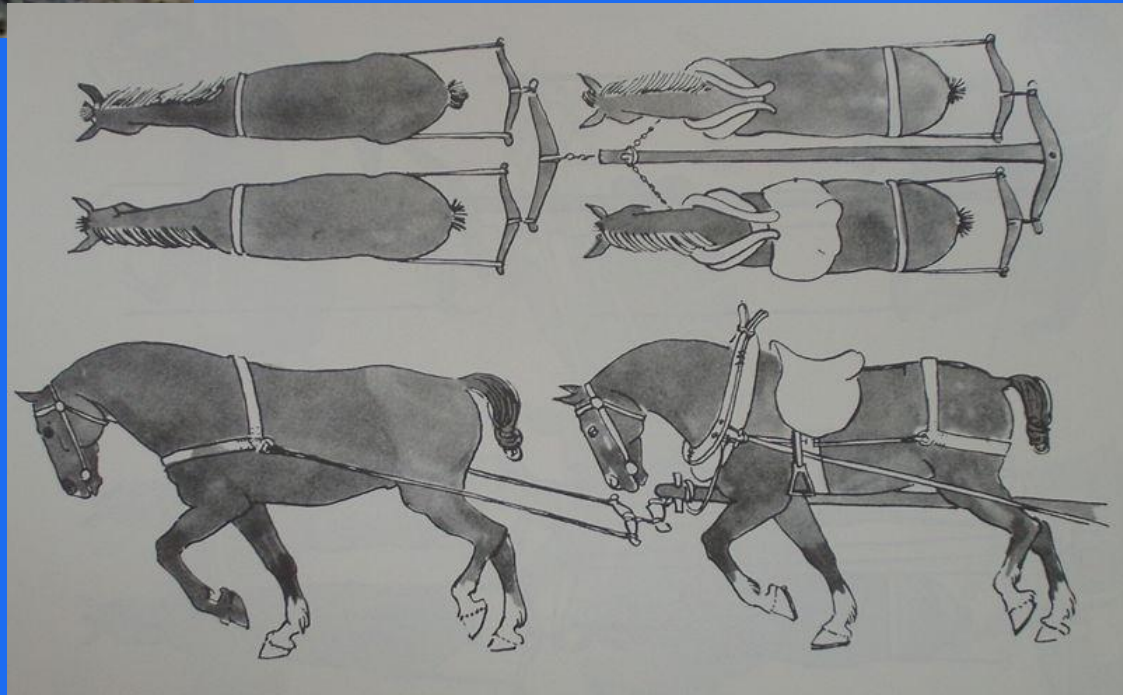
Rock Phosphate



There is not water everywhere....



Agricultural Energy Sources





Aquaponics is here!



Why Aquaponics??

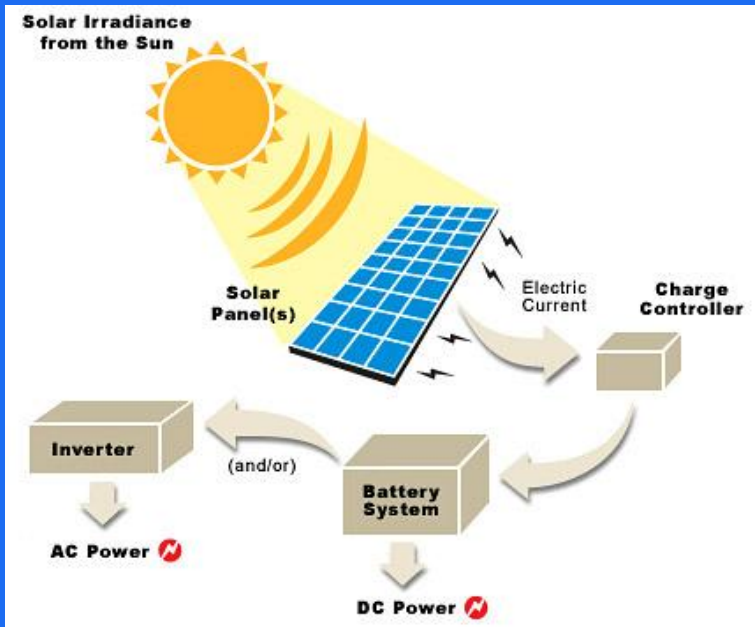
- Food production needs to become increasingly energy efficient and move away from oil. Aquaponics and hydroponics are the only food production methods we know that use electricity, which can be produced from alternate energy sources.
- Food production needs to become increasingly water-efficient and move towards methods such as aquaponics and hydroponics (in water-scarce areas)
- Food production in Hawaii needs to be distributed: as well as large producers, having many small food producers will give us better food security.
- Aquaponics is scalable and is perfect for small producers from backyard size for growing your own vegetables to sizes capable of economically supporting a family.
- Aquaponics grows fish and prawns, providing a source of protein.
- Aquaponics doesn't require fertile soil, or even soil for that matter.
- We know ten percent now of what we'll know in ten years about aquaponics.



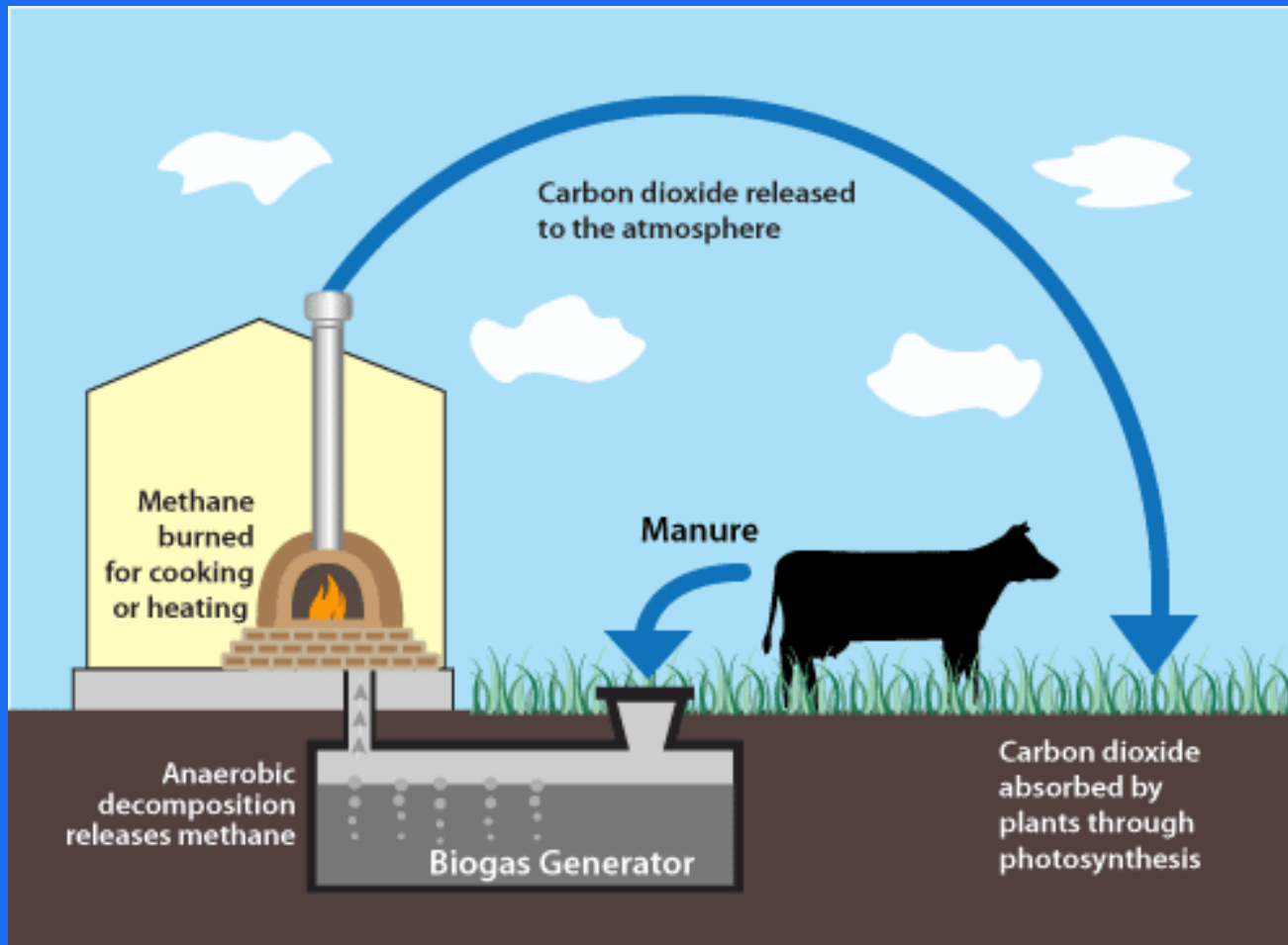
Humans make machines to solve their problems; a machine is a means to leverage energy







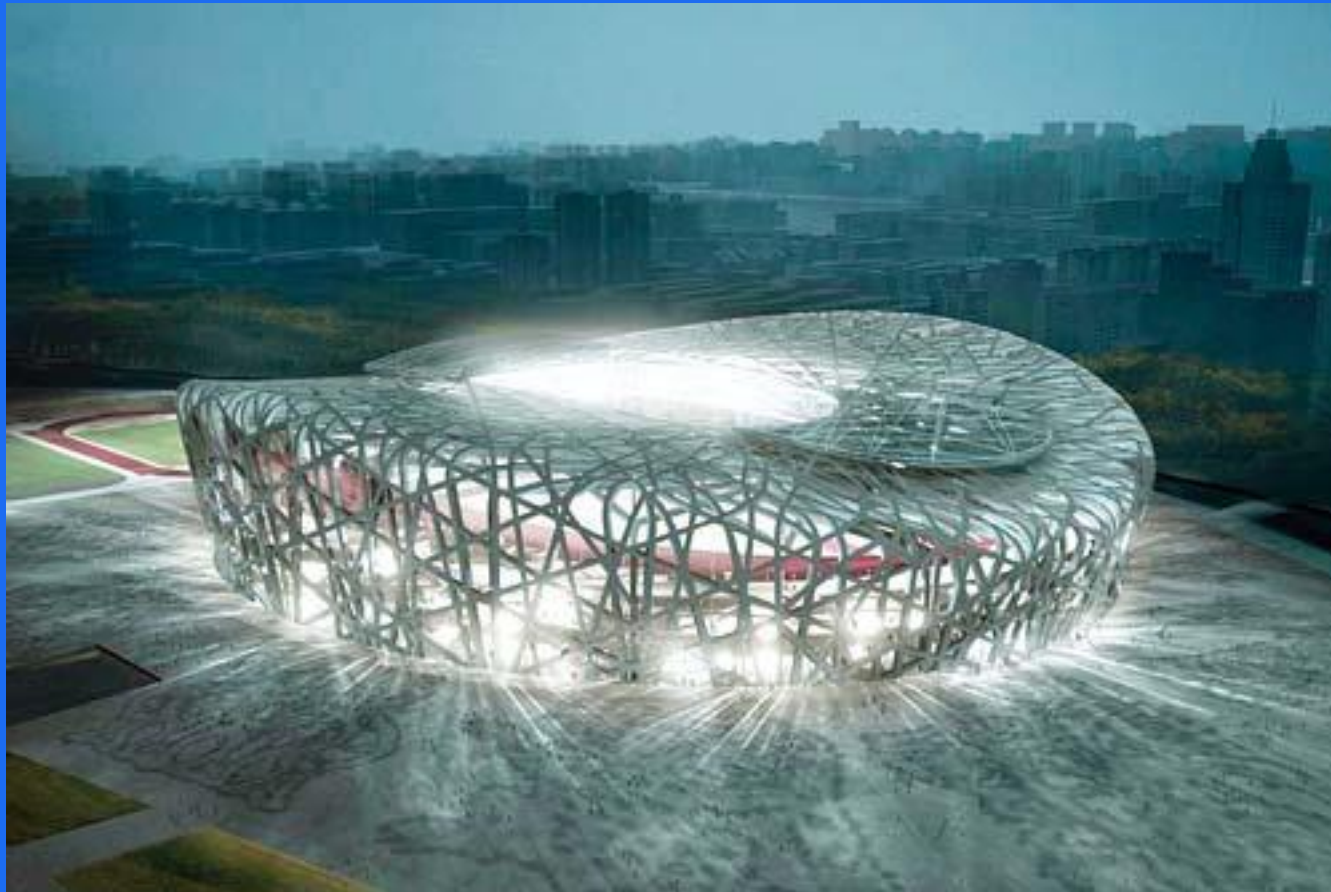
Biogas



Why The Aquaponic Solar Greenhouse??

- Food production needs to become increasingly independent from climate as the earth moves into a period of massive global climate change.
- Food production needs to become increasingly localized as transportation costs rise due to the rising cost of oil, thereby preventing the current strategy of growing food far from the areas it's consumed in.
- Food production in the world needs to be distributed:and decentralized: instead of a few large producers, we need many small food producers.
- Aquaponic Solar Greenhouses are economically built from locally available materials, and are perfect for small producers from backyard size for growing your own vegetables to sizes capable of economically supporting a family.

ETFE Structures



ETFE Structures



Simple Greenhouse



Under Construction



Under Construction



Under Construction



Under Construction



Under Construction



Under Construction



Under Construction



Under Construction



Under Construction



Under Construction





Under
Construction,
surfing the
beams (how
did that slide
get in here?)

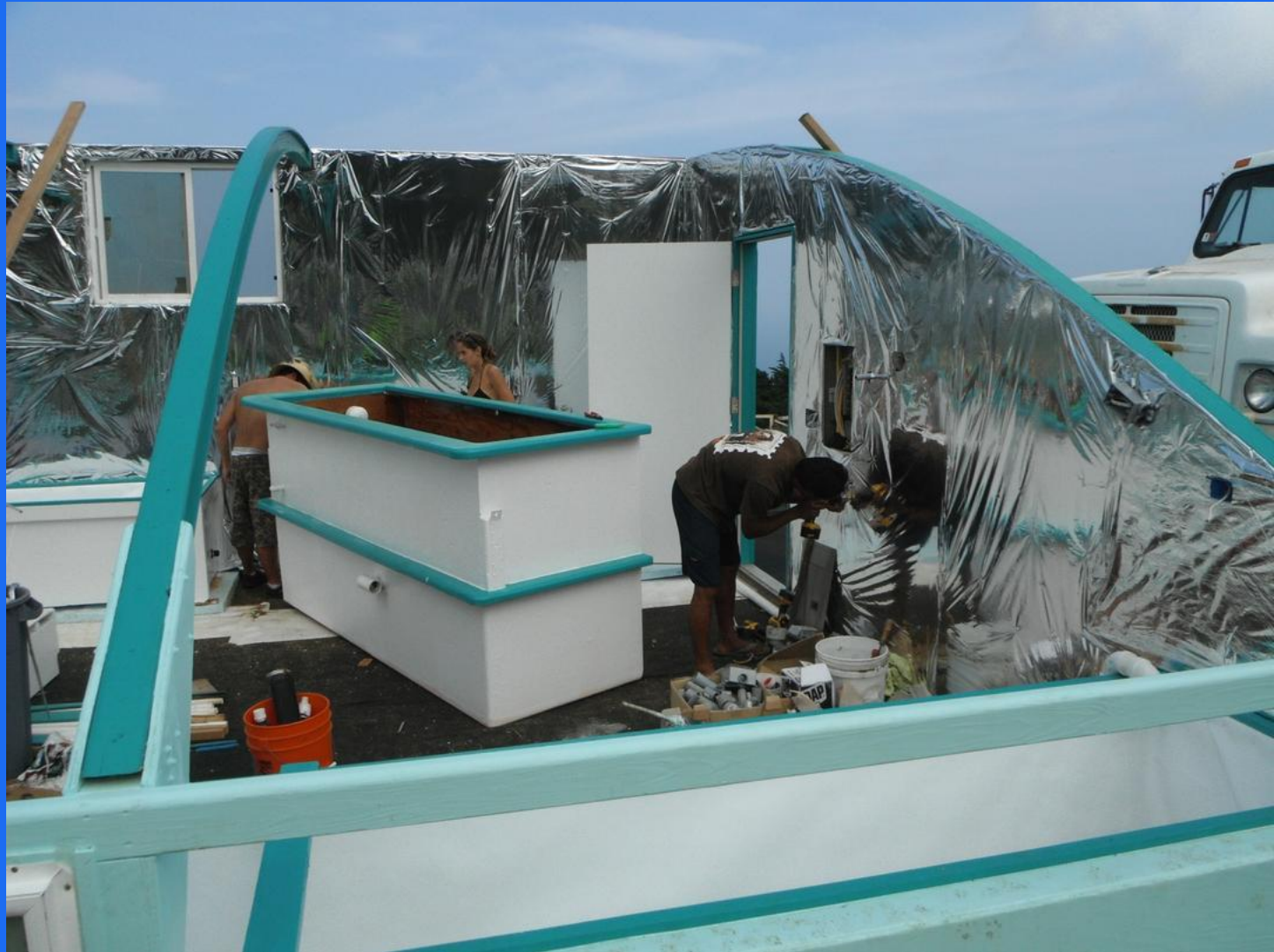
Under Construction



Under Construction



Under Construction



Under Construction, ETFE On





Under
Construction,
stretching the
ETFE

Under Construction, ETFE installation finished and “thonkable”



Some Perspective on ETFE



Some Perspective on ETFE





Geothermal
cooling ditch
with copper
cooling coil

Geothermal cooling ditch with Pex cooling coil



Simple and cheap barrel and plastic tubing heat exchanger for geothermal cooling



PV panels installed, in “down” position for cleaning





Unplugging the Hawaii Solar Greenhouse

Hawaii Solar Greenhouse alternate energy system





Free time.....



Friendly Aquaponics, Inc

- First fish into system November 2007 (based on UVI model), six aquaponics systems, a commercial tilapia nursery; Health Department certified vegetable processing facility completed in September, 2008
- USDA Organic Certification August 2008
- Food Safety Certification May 2009
- Current yield 2,200 lbs vegetables and 150 lbs fish per month.