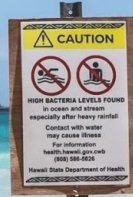




**WAI** WASTEWATER  
ALTERNATIVES &  
INNOVATIONS

**Maui County**  
**1/5/22**



**Stuart Coleman, Executive Director**

# Water Quality

## Currently:

- 86,000 gpd to injection wells in Maalaea
- 20+ injection wells

## In Maalaea:

- Contribute 17% of nitrogen and 73% of phosphorous flux to the nearshore system
- Contribute to algae growth in nearshore bay
- Coral declines primarily caused by sedimentation
- Multiple stressors reduce reef resilience



Photo: Sierra Club, Maui

# Civil Beat Article

## The Work To Convert Hawaii's Cesspools Continues

There is federal money on the horizon — and promising new technology too.

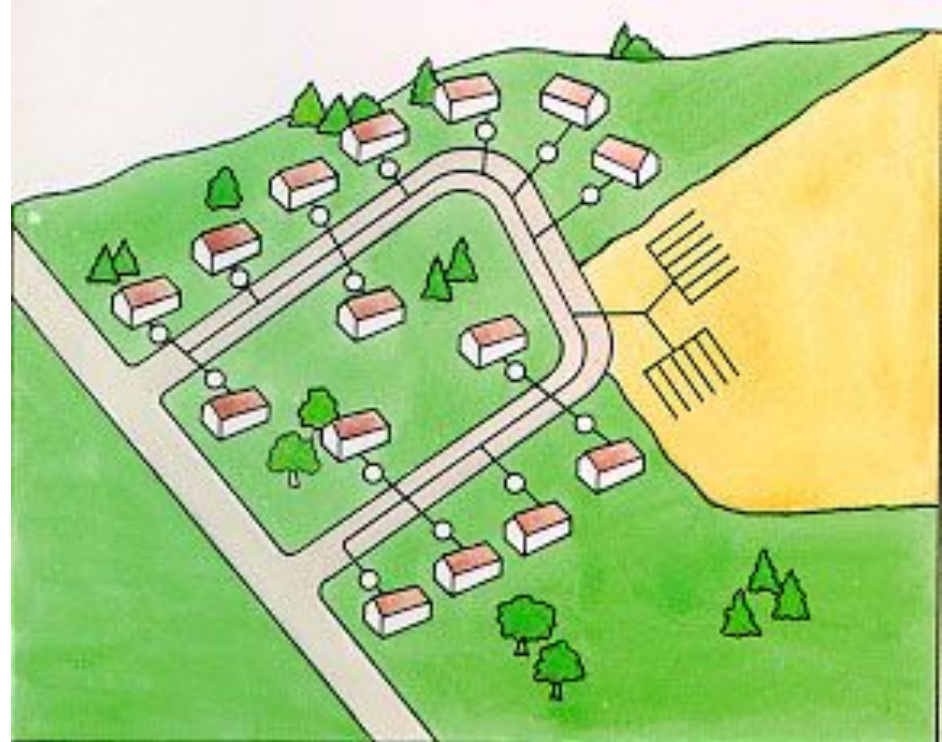
By Stuart Coleman

### The Middle Ground

Instead of big sewer plants or individual cesspool conversions, the best option for at least a third of the households in Hawaii currently on cesspools may be to connect to smaller “distributed sewage management systems,” as Sen. Schatz outlined.

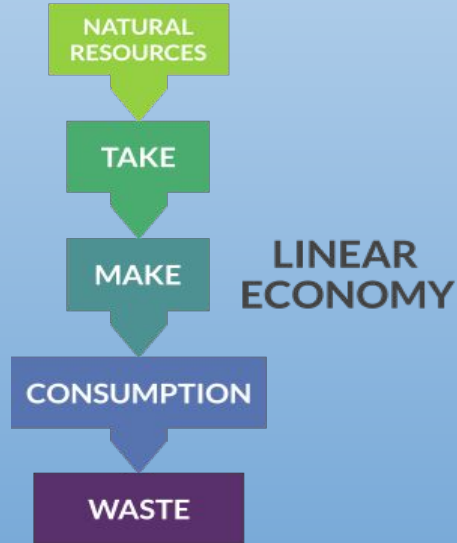
# Community-Scale Wastewater Systems

- Cluster or Decentralized Systems, can be Package Plants
- Middle ground between centralized sewer and Individual Wastewater Systems (IWS's)
- Ideally between 20 and 200 homes
- Opportunity to demonstrate a circular economy approach at a manageable scale
  - Resource recovery and re-use



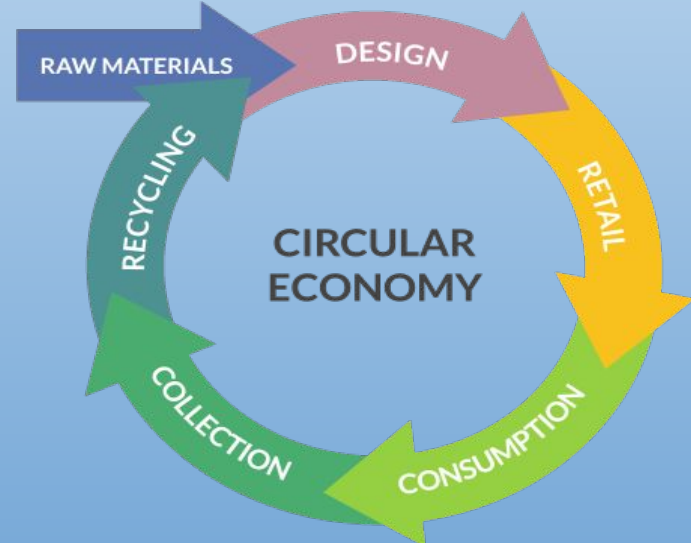
# Current Situation

- Liquids: Some treatment, then disposal into ocean/groundwater
- Solids: Dewatering, then burning or straight to landfill



# Proposed

- Treatment & reuse of liquids for irrigation
- Treatment & reuse of solids for recycling of nutrients

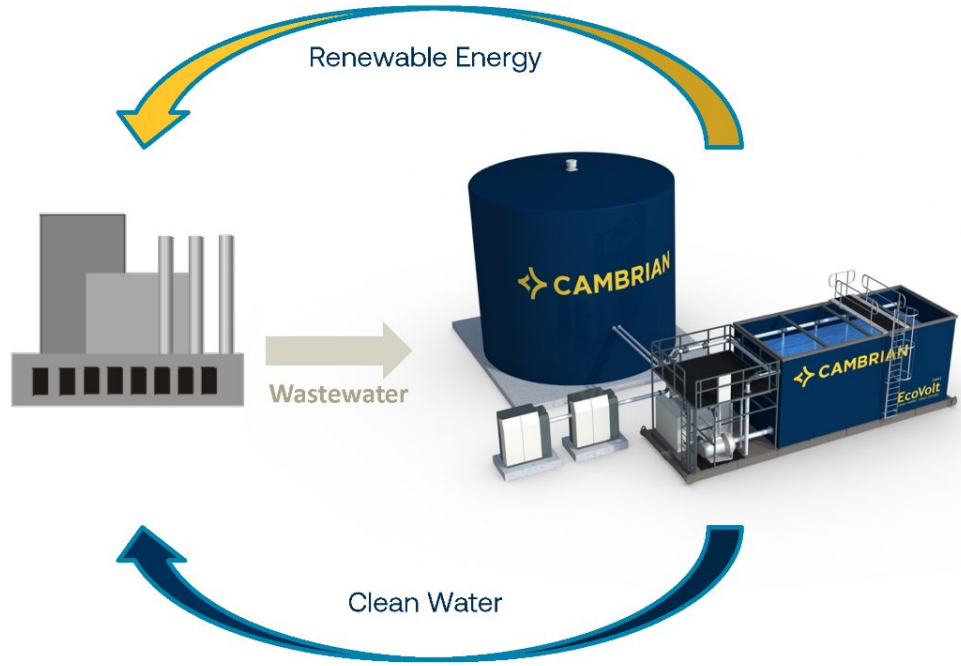


- Industry-leading innovator in recovering clean water and clean energy from wastewater
- Globally recognized, award-winning and patented solutions that can deliver clean water at less than utility rates with less carbon intensity
- Current focus on industrial and private municipal treatment - one of the fastest-growing segments of the \$700B+ global water market
- First in industry to offer “wastewater-to-clean-water-as-a-service” to industrial customers

Select Partners



# Cambrian's award-winning solutions recover clean water and clean energy from wastewater, as a service, cutting the cost, hassle and environmental impact of treatment

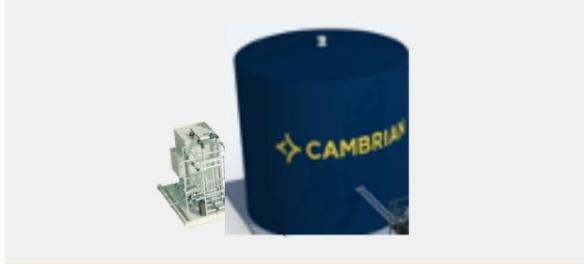


- Proprietary biological treatment processes with low opex
- Intelligent, data-driven operations
- Simple modular systems
- Sold as a service on a \$ / gallon basis

# Proven, Innovative Product Suite

## 30 Patents : Multiple National and International Awards

### EcoVolt Reactor®



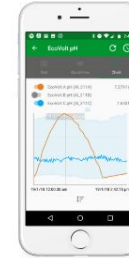
High Strength WW > Energy

### EcoVolt Mini®



Modular, Distributed Re-use

### Flow Logic™



Autonomous Control  
24/7 MONITORING & ANALYSIS  
REAL-TIME OPTIMIZATION  
REMOTE OPERATIONS

Automation and Data Services

### EcoVolt MBR®



Low Strength WW > Title 22 Reuse Water

### Bioviper®



Low Energy Treatment for Beverage & Municipal

- Focused on low opex resource recovery
- Robust to influent fluctuations
- Low energy demand / energy positive
- Data-driven labor and chemicals reduction



# Reuse: Irrigation



R-1 Water

## Biomass Controls **Global Patents and Patents Pending**

We protect our  
proprietary thermal  
refinery with:

- IEC 61010 Certified  
Controller Design
- Trademark our  
Data Driven  
Architecture kelv<sup>o</sup>n™
- 20 Awarded Patents  
and Several Pending

### Intelligent Oxygen Controller

US Patent 9,513,005  
US Patent 10,557,632

### Cyclone Separator with Catalyst

US Patent 9,789,440  
EU Patent Pending 15851933

### Catalytic Safety Device

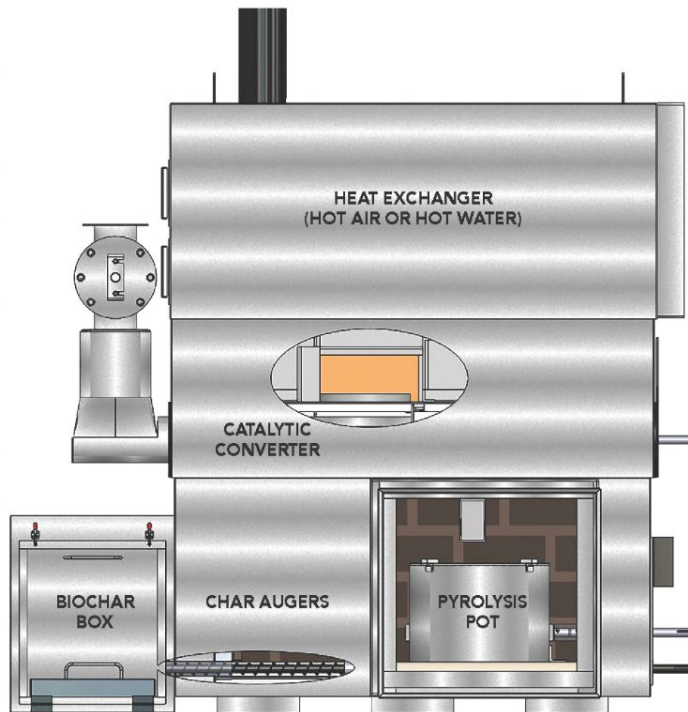
US Patent 9,709,267  
US Patent 10,001,276  
US Patent 10,247,413  
EU Patent Pending 13731576.8

### Biochar Carbonizer

Austria Patent 3143331  
German Patent 602015029909.4

### Controller for Clinker Agitator

US Patent Allowed 16/180,257



### Combined Heat, Power, and Biochar

US Patent Pending 14/656,577

### Intelligently Controlled Catalytic Converter

US Patent 8,812,162  
Australia Patent 2011323160  
Canadian Patent 2,815,827

### Fuel and Air Feed Controller

US Patent 10,139,166  
German Patent 60 2014 057 528.5  
Ireland Patent 3044513

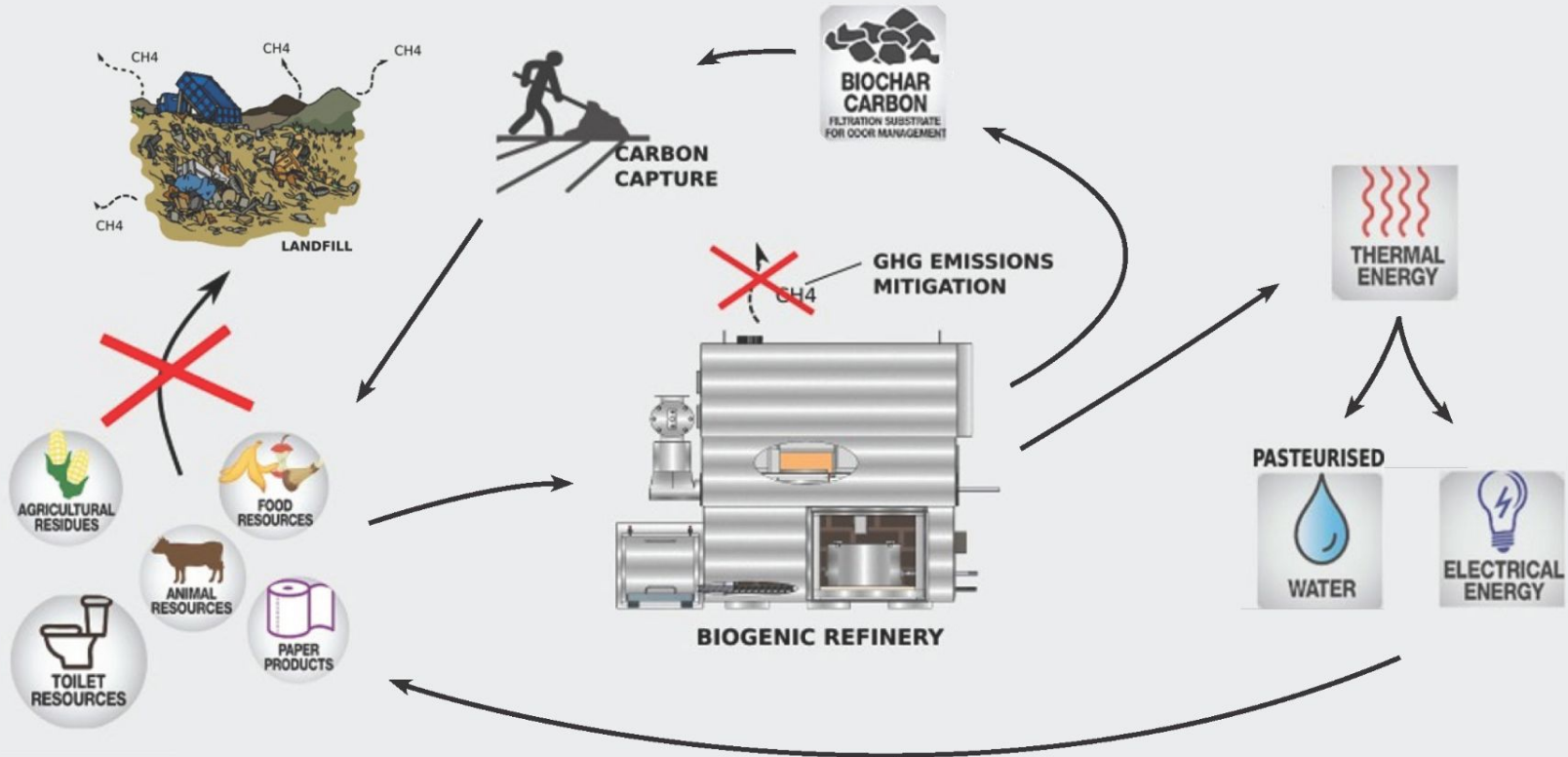
### Controller for Biofuel-Fired Boiler

German Patent 2635945  
Ireland Patent 2635945  
United Kingdom Patent 2635945

### Intelligent Temperature Controller

US Patent Pending 16/750,127

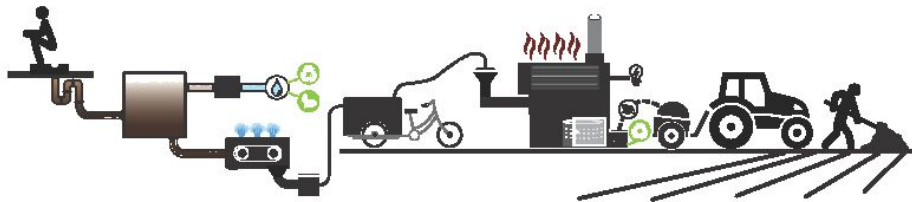
# Our Circular Economy Principles



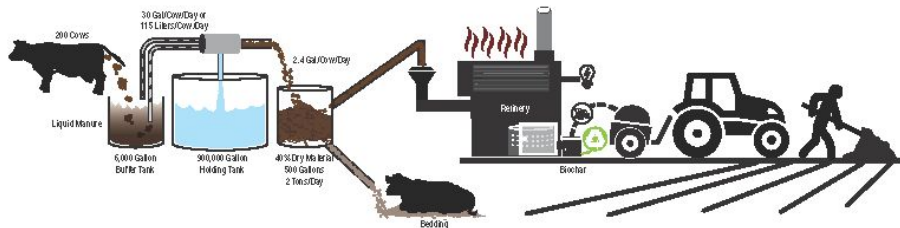
# Resource Recovery



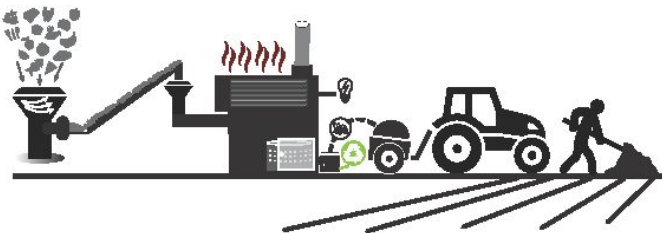
## Toilet Resources



## Livestock Resources



## Food Resources



# Benefits of Biochar

- Filtration
  - Stormwater runoff
  - Filter contaminants - heavy metals and Polycyclic Aromatic Hydrocarbons (PAHs)
  - May also filter nutrients, pathogens
- Soil amendment
  - May increase crop yields
  - Enhanced nutrients to soil
  - Enhanced water retention
- Carbon sequestration
  - Natural decomposition processes release CO<sub>2</sub> over time
  - Biochar is 70-80% carbon and more stable → Less CO<sub>2</sub> in atmosphere

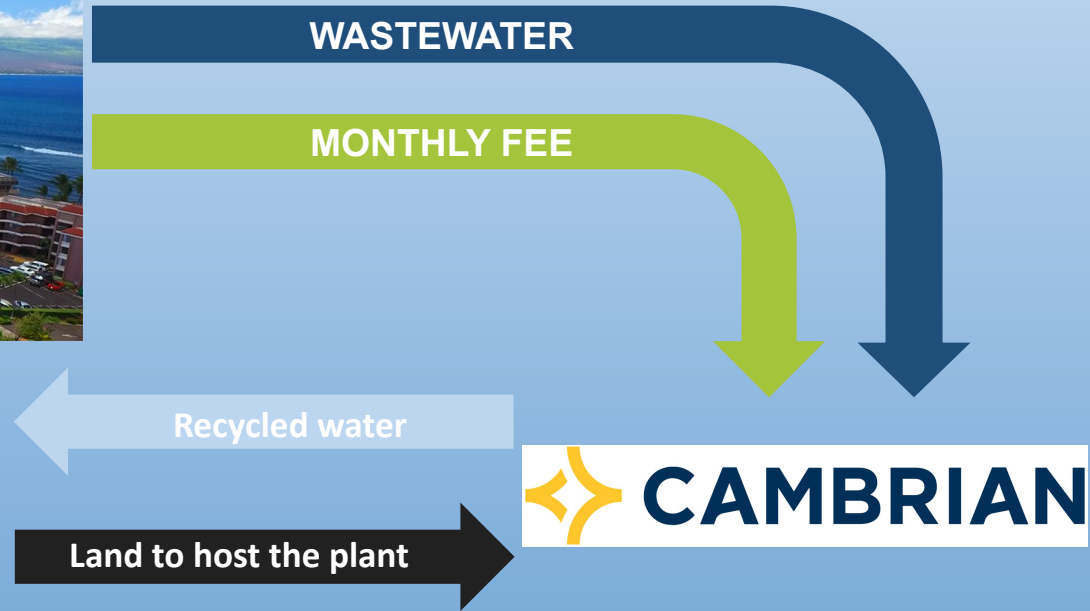


# MA'ALAEA TOWN

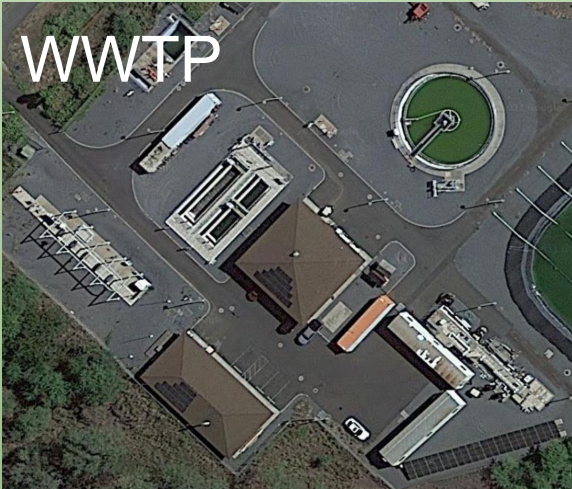
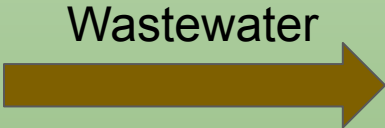
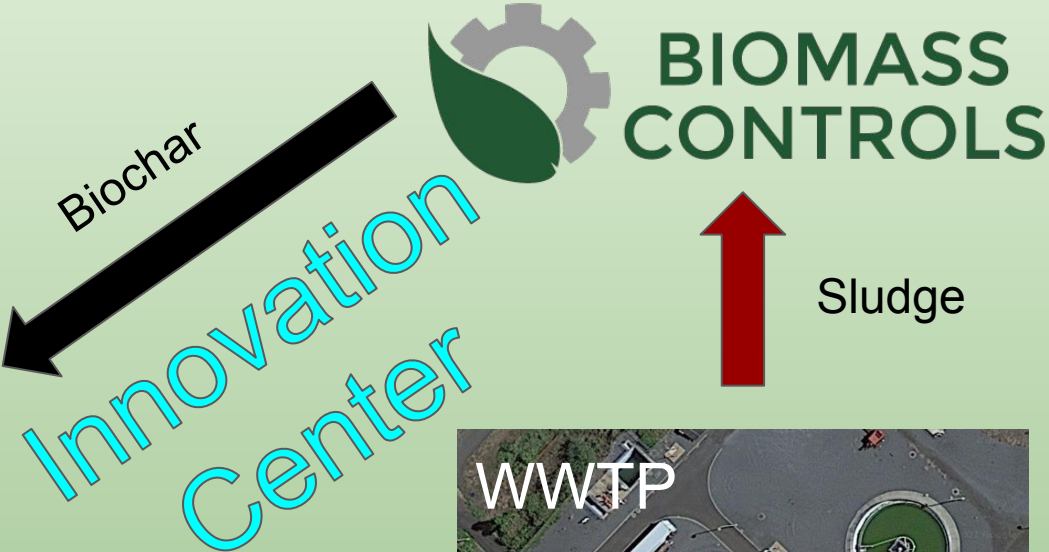
Wastewater “has had major effects on the Maalaea coral as well as the nearshore fisheries.” - Rep. Kahele



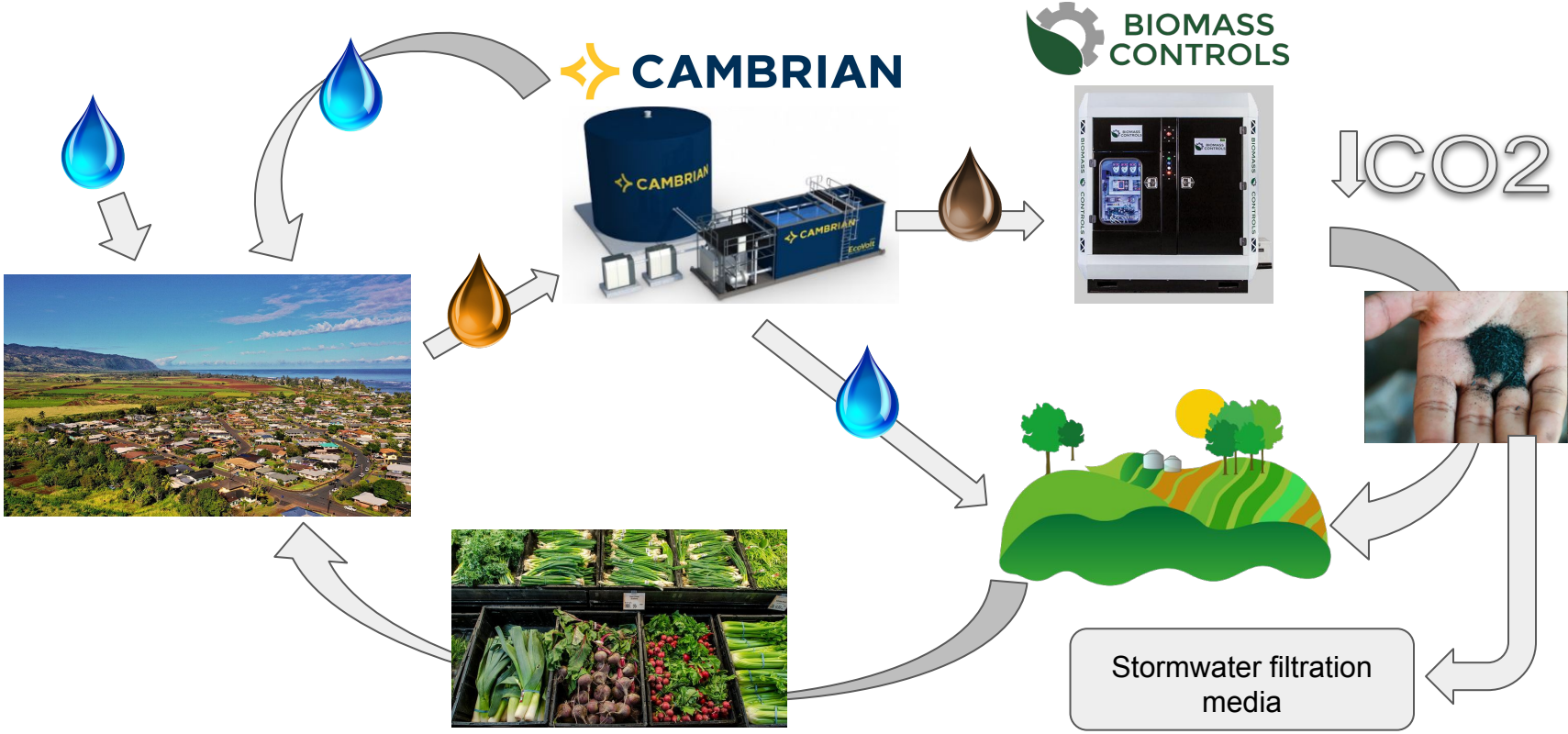
Agricultural Land



# Makena, Maui



# Community-Scale WW Treatment & Circular Economy







**WAI** WASTEWATER  
ALTERNATIVES &  
INNOVATIONS

**Mahalo**