



**BIOMASS  
CONTROLS** PBC

# Sanitation in the Circular Economy Overview for



**ADB**

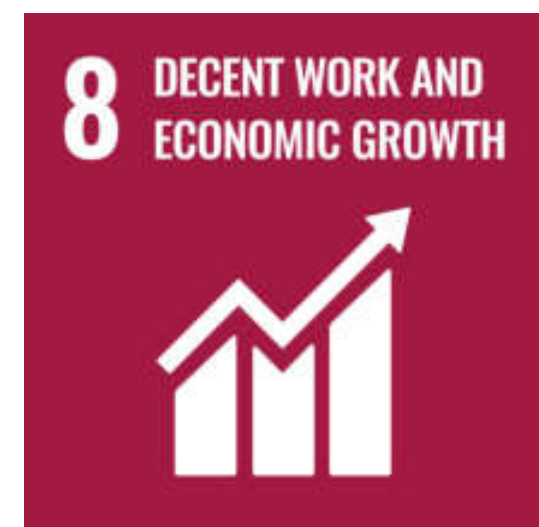
**ADB e-Marketplace for a Water-Secure and Resilient Asia and the Pacific**

20 October 2021





Our **vision** is to become a world leader in **decentralized**, community scale **non-sewered** thermal sanitation solutions that significantly impact our climate, quality of life, equity and access in served areas.







**Globally,**  
**80%**  
**of wastewater**  
**flows back into**  
**the ecosystem**  
**without being**  
**treated or reused.**

UNESCO, 2017



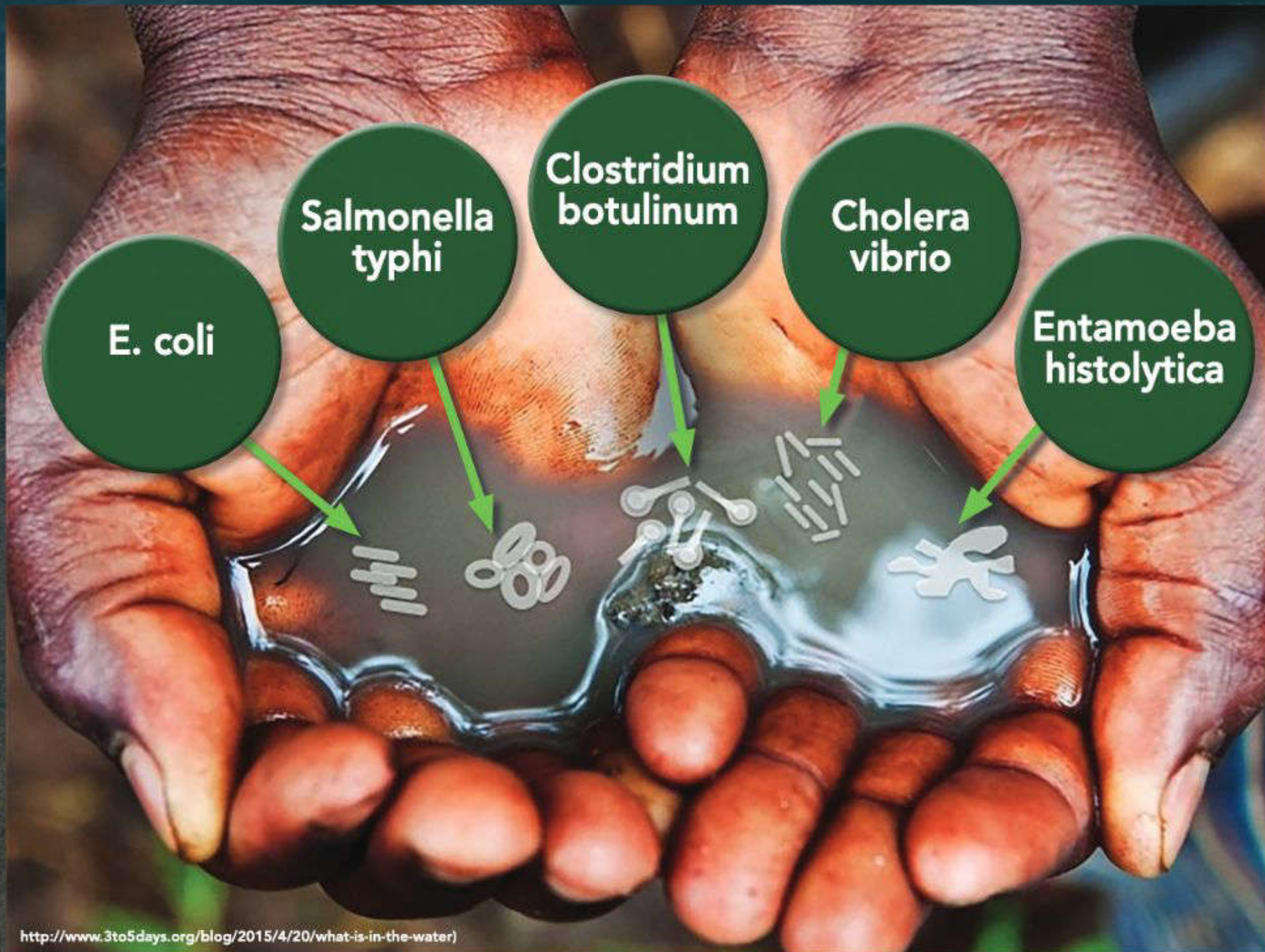


**200**

**MILLION TONS**

**of human  
excreta goes  
untreated  
every year.**





<http://www.3to5days.org/blog/2015/4/20/what-is-in-the-water>

**1.8**  
**BILLION**

use a source of  
drinking water  
contaminated  
with faeces.



# How Big is the Market?

“Economists estimate the market opportunity to provide water and sanitation services to all by 2030 at \$1 trillion. (United Nations Sustainable Development Goal #6).”

**GARY WHITE** | CO-FOUNDER WATEREQUITY





# Environmental & Social Impact

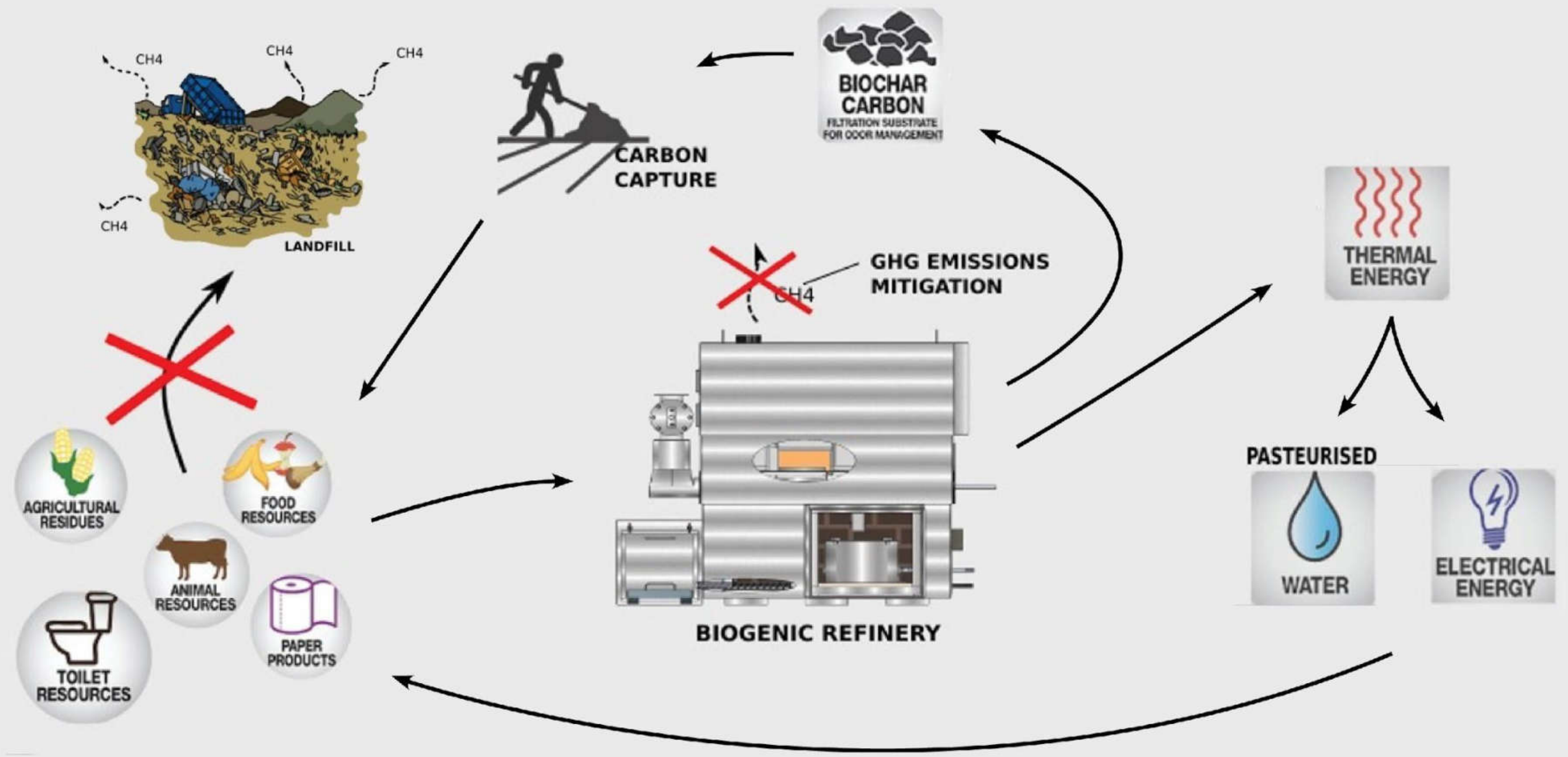
We have potential to impact 14 of the 17 UN SDGs.

- Treating feces and manure reduces greenhouse gases.
- Hiring women operators improves gender equity.
- Diverting biogenic materials into safe treatment protects water quality.





# Our Circular Economy Principles





# Biomass Controls Products



## Resource Recovery

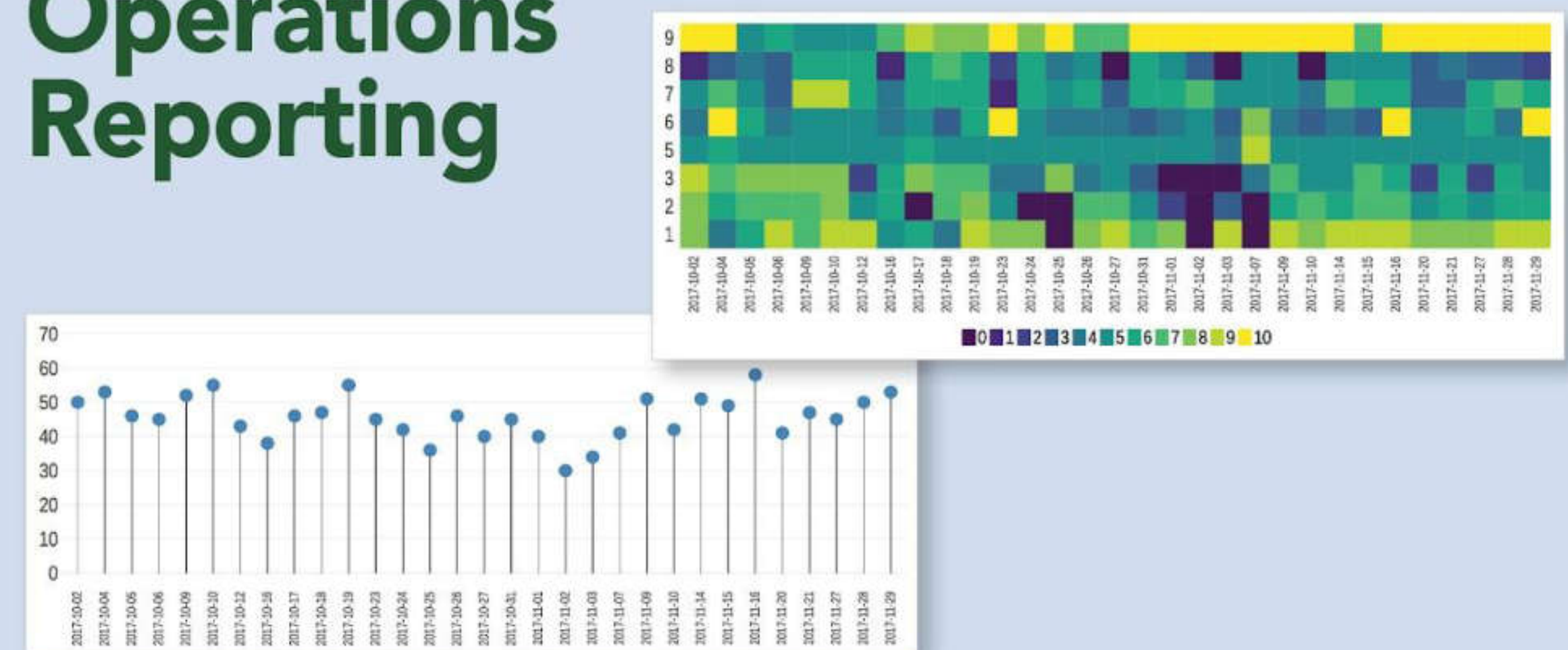


## Manufacturing & Patent Licensing

## Data Management



## Operations Reporting





# Traction | Milestones

2016-PRESENT	Alaska rural community pilot at Kivalina
2016-PRESENT	Three India Pilot sites: Wai, Narsapur, Warangal
2018-PRESENT	Food Waste Pilot with Rochester Institute of Technology
2018-PRESENT	Toilet Board Coalition Accelerator Cohort
2019	MIT Technology Review, 10 Breakthrough Technologies
SEPTEMBER 2019	MFA OIL Company Convertible Debt Investment
2019-2020	USDA Dairy & Hog Manure Projects
2019-2020	Yield Lab Manure Challenge Finalist
2019-PRESENT	WaterEquity's Water Credit Investment Fund
2020 - PRESENT	Launch Alaska Accelerator Portfolio Finalist
2020 - PRESENT	Licensed Manufacturing Contracts in India and Africa
2021 - PRESENT	South Africa Installation
JULY 2021	Rebel Family LLC Convertible Debt Investment





# Intellectual Property Creation

## 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'n™
- 21 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

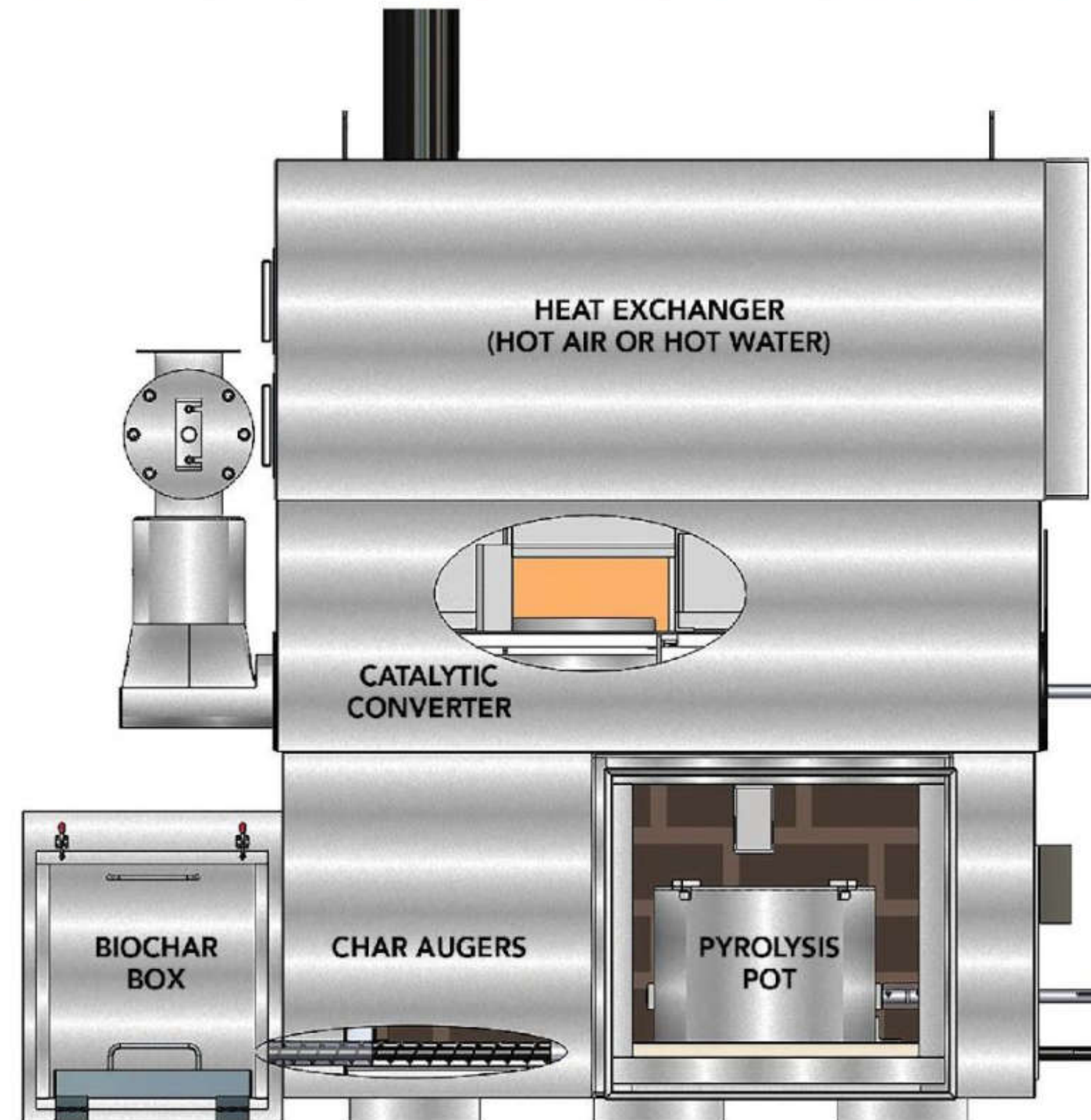
US Patent 9,709,267  
US Patent 10,001,276  
US Patent 10,247,413  
EU Patent Pending 13731576.8

### 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



# Global Market Opportunity

## Environmental Reduction of

- Odor
- Landfills
- Pathogens
- GHG Emissions
- Nutrient Leaching
- Forever Chemicals
- Soil Carbon Depletion

## Economic Savings in:

- Nutrient Recovery  
Cycle Times
- Commercial Fertilizer
- Volume Reduction
- Storage Investment
- Reuse Efficiency
- Compliance





# Environmental Impacts

Treatment of high moisture solids provides:

- 95% reduction of solids volume
- 50% reduction in GHG emissions
- Nutrient fixing in the biochar captures carbon for hundreds of years to improve soil organic content (SOC)
- Over 90% removal of persistent chemicals and pathogens
- Reduction of odor



# Biomass Controls Biogenic Refinery



## Overview:

- ❖ Thermochemical treatment solution for organic waste streams
- ❖ Fecal Sludge Treatment Solution for 500-50,000 people
- ❖ Size is about 2.1 meters cubed
- ❖ Pathogen free outputs
- ❖ Volume Reduction
- ❖ Nutrient Recovery
- ❖ Carbon Removal



# Competitive Advantage

## Differentiation / Competitive Advantage

- ▶ Pathogen-free outputs in less than 24 hours
- ▶ Scalable to communities of 50,000 people
- ▶ Real-time monitoring and reporting with mobile and web app
- ▶ Patents, Software and control technology Intellectual Property
- ▶ Operates in climates from above -40°C to 30°C

## Competition



**PYREG**





# A Scalable and Replicable Solution

Biomass Controls provides scalable, decentralized refineries to rapidly recover nutrients and treat for green resources including: manure, food waste, textiles, crop residues, human excreta and invasive species.



Red Dog, Alaska, USA



Woodstock, Connecticut, USA



Warangal, Telangana, India





# Biomass Controls Team

Our team has over 250 years of experience in technology, automation and global startups.



**Jeff Hallowell**  
Founder

Technology  
Background



**Derek DeSouza**  
CEO

Global Startup  
Experience



**Jeff Wong**  
CIO

Network  
Experience



**Alison Weber**  
Global Health  
Analyst

Gender Advocate



# Equity In & Access

Our Equity Principles are led by our commitment to license our technology to indigenous people for localization, operation and manufacturing.

India



Alaska





# Pathogen Free Resource Recovery



**“The opportunities from exploiting wastewater as a resource are enormous. Safely managed wastewater is an affordable source of water, energy, nutrients, and other recoverable materials.”**

UNESCO, 2017





# BIOMASS CONTROLS PBC

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