

Policy Requirements and Challenges for Commercial Biochar Producers

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Agenda



- ▶ Biomass Controls Background
- ▶ Solving Problems with Policy
- ▶ Preventing Problems with Standards
- ▶ Economic Sustainability Policy
- ▶ 2030 Vision
- ▶ Next Steps

Biomass Controls Background



- ▶ Experience with biochar batch and continuous fed systems since 2010.
- ▶ Split off from ClearStak, LLC in 2015 as part of ISO 17025 EPA Emissions test lab certification.
- ▶ Focus on system controls, emissions reduction, and EPA compliance.
- ▶ Feedstock experience includes: slash, agricultural residues, cardboard, manure, cord wood, human solid waste, and municipal organic waste.

Solving Problems with Policy



▶ Feedstock is a Life or Health Hazard

- Prevent Forest fires
- Causes Disease

▶ Biochar for Environmental Remediation

- Filtration
- Sequestering Carbon

▶ Biochar Improves Economic Sustainability

- Reduces use of water
- Holds minerals

Feedstock Problem of Disease Prevention



Hawaii is the **last state** to enact a ban on new cesspools.

Approximately **88,000 cesspools in operation** and the state has been **approving about 800 new cesspools** annually.

“Cesspools provide no treatment, and inject about **55 million gallons of raw sewage into Hawaii’s groundwater every day**, potentially spreading diseases and harming the quality of drinking water supplies and recreational waters.” DEPARTMENT OF HEALTH

http://www.onsiteinstaller.com/online_exclusives/2016/04/rules_and_regs_minnesota_agency_proposing_to_ban_the_flushable_label_on_wip

Environmental Remediation

Example of Sequestering Carbon



► Existing Climate Standards and Policies

- SO/TC 265, 226, 285, 238, 255, 190
- The Gold Standard Foundation
- UNFCCC Clean Development Mechanism (CDM)
- American Carbon Registry (ACR)
- Verified Carbon Standard (VCS)

► Pricing Instruments

- Emissions Trading Systems (ETS)
- Carbon Taxes are Minimal (\$15-\$30/ton)

► Measurement and Tracking

- No easy way to measure and track output

► Renewable Portfolio Standards

Preventing Problems with Standards



- ▶ Path to Zero Carbon Emissions
- ▶ Safety for Operators
- ▶ Scalability of Solutions
- ▶ Quality of Output
- ▶ Reliability of Equipment
- ▶ Training for Users

Path to Zero Carbon Emissions



Cook Stove Emissions Standards

EPA NSPS

Boiler MACT, 40 CFR Part 63, Subpart DDDDD (5D)

According to the World Health Organization, cook stove smoke is a major contributor to indoor air pollution in developing countries causing approximately 4 million premature deaths annually and a wide range of illnesses. IWA 11:2012

Section 111 of the Clean Air Act authorizes the EPA to develop technology based standards which apply to specific categories of stationary sources.

Section 110 of the Clean Air Act requires states to submit to EPA State Implementation Plans (SIPs) which provide for the implementation, attainment, maintenance and enforcement of the National Ambient Air Quality Standards.

Suggested Policy Incentives that Support Solving Problems



- ▶ Infrastructure Capital Funding
- ▶ Tax Exemptions for Operation scaling
- ▶ Standards Development for permitting
- ▶ Combined Heat and Biochar (CHaB)
- ▶ Combined Heat & Power under 1 MW (CHP)
- ▶ Combined Cooking, Heating & Power (CCHP)
- ▶ Thermal/Chiller Technology
- ▶ Environmental Remediation
 - Filtration
 - Biogenic Waste
 - Tax exemptions for tipping fees

Human Waste to Biochar



ECONOMIC MODEL EXAMPLE

\$0.05
PER PERSON
PER DAY
\$200
PER TON*

1 TON
HSW
@ 85%
Moisture

20%
YIELD OF
BIOCHAR
(60 lbs)

\$3.33
PER LB.
BREAKEVEN**

*Based on Bill & Melinda
Gates Foundation Model

**Breakeven without
including tipping fees

CONCLUSION

**Processing biogenic waste without
a tipping fee is not economically viable**

How to Create Economic Sustainability Policy



- ▶ Start with the feedstock, not the application
- ▶ Tipping fees produce the best business models
- ▶ Energy offsets from production make the best ROI
- ▶ Sale of energy is the lowest ROI (Anaerobic Digester (AD) example)
- ▶ Trucking can be the highest expense (OPEX)
- ▶ Who is the competition? (AD or Ash)



2030 Vision



▶ **10%**

Biogenic Waste
Converted to Biochar

▶ **100%**

Thermal Energy of
Biochar Being Used

Develop Policies/Standards
that Support the Vision

- ▶ **Feedstock**
- ▶ **Emissions**
- ▶ **Energy Conversion**
- ▶ **Char Production Credits**

BIOGENIC WASTE PROCESSOR System Standards

COLD WEATHER

- ASTM
- EN 300 019

COOK STOVE METHOD

- TLUD
- ASTM 2515

EMISSIONS

- EPA NSPS
- ASTM 2515
- ISO/TC 285

- PM2.5
- PM10
- CO
- CO₂
- O₂

COMBUSTION EFFICIENCY/STACK LOSS

- B415

HEAT TRANSFER

- BTEC Efficiency Standards

POLLUTION CONTROL DEVICE

- AlO₂ Melting Point
- Thermal Aging
- Catalyst
- Bag House
- ESP
- Cyclone

BIOGENIC FUEL STANDARDS

- PFI
- CANplus
- ISO TC 238
- ISO 17225
- EN 14961-2 (ENplus)
- CEN/TC 335
- DIN 66 165
- ÖNORM M7 133

MOISTURE MEASUREMENT

- Bill Smith Method

CONTROLS

- IEC 61010
- FCC
- 508A
- RoHS

Standards Process

Training and Environment	CEU, OSHA
Standard Method	ASTM, ANSI, KEBS
Standard Acceptable Value	ASTM, GACC, SDG, Gold Standard 3.0
Regulatory Method	ISO
Regulatory Acceptable Value	US EPA, US DOE, States, WHO
Third Party Certification	UL, BV, TUV, ClearStak, Intertek, A2LA, NSF
Third Party Accreditation	ANSI-ASQ (AClass), UKAS, CNAS, NRTL

CHAR BOX

RESIDUAL CARBON

- ASTM D7573-09
- ASTM D6317-15
- ASTM C831-98 (2013)
- ASTM D5904-02 (2009)

PARTICLE SIZE

- ASTM D5158-98

METALS

- IC

PYROLYSIS

- ASME

MATERIALS AND CONSTRUCTION

- BS EN 303-5:2012

SAFETY

- ASTM

SURFACE TEMPERATURE

- Ambient + 60°C

OPERATING TEMPERATURE

- 1500°F

Next Steps

- ▶ **Federal/State Emissions Certification Process**
- ▶ **ISO Technical Committee 285, Clean Cook stoves and Clean Cooking Solutions.** GLOBAL ALLIANCE FOR CLEAN COOK STOVES
- ▶ **ANSI/ASME/ASHRAE Materials and Operational Safety Guideline**
- ▶ **US Biochar Incentives Draft and Guideline**
- ▶ **Sustainable Business Policy Models:**
 - By feedstock
 - By geography
 - By application
 - By competition





Contact Biomass Controls



Thank you for your time!

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Resource Links



- ▶ **Global Alliance for Clean Cookstoves**
- ▶ **ISO Technical Committee 285, Clean Cookstoves and Clean Cooking Solutions**
- ▶ **ISO Strategic Business Plan**
- ▶ **Clean Cookstove Catalog**
- ▶ **Cookstove Ted Talk**
- ▶ **Biomass Controls' Biogenic Solid Waste Processor**
- ▶ **Biochar White Paper**