COST EFFECTIVE, CONSTANT, AND RELIABLE BIOCHAR PRODUCTION FROM ORGANIC WASTE AND BIOSOLIDS

Biosolids to energy and biochar, at Silicon Valley Clean Water

Dario Presezzi (CEO)
WHO ARE WE
3 YEARS OF STUDY AND TESTING

2013
Pilot of BioDryer (400kg) and Pyrolysis

2014
Full scale BioDryer (8 ton)
3 YEARS OF STUDY AND TESTING

2015

Contract with Silicon Valley Clean Water (Redwood City, CA)
7000 ton/year

2016

Full scale Biosolids to Energy and biochar Facility
PROCESS OVERVIEW
Use the biological energy

Reach 140°F in 10 hours

Works with an AI

Promote aerobic conditions

Remove Water in 48 hours
BIODRYER™

70% less HEAT ENERGY

- Gas Dryer
- BioDryer™

50% less ELECTRICAL ENERGY

- Gas Dryer
- BioDryer™
Designed for biosolids

SELF-SUSTAINED

Fully automated

Clean emission (no solid burning)

Produce heat, electricity and BioChar

90% volume reduction
PROCESS FLOW

2000 lb
25% Biosolid

Bio-Dryer
48 hours

720 lb
70% Biosolid

Pyrolysis
30 min

Heat

220 lb
BioChar

Heat and electricity
WET BIOSOLIDS (20% solid)

AFTER BioDryer™ (75% solid)

AFTER BFT-Pyrolysis (90% volume reduction)
THE FUTURE OF ORGANIC WASTE, WE BELIEVE IN

- ENERGY POSITIVE
- IN HOUSE TREATMENT
- ADDITIVE FREE
- VALUABLE BYPRODUCTS
Biochar
BIOCHAR PRODUCTION ISSUES

- Biochar is mostly produced in small scale plants (e.g., farms)
- High production costs
- Low quantity per year
- High price per ton
BIOCHAR PRODUCTION ISSUES

➤ No constant production
➤ Low consistency in biochar characteristics
➤ No cutting edge technology (small businesses)

➤ Consequences: biochar is not competitive

➤ The biochar industry needs the implementation of a sustainable industrial production model able to reduce the costs and become competitive

➤ This is possible through the utilization of industrial scale machines and sustainable feedstock
BIOCHAR PRODUCTION

IF

- Pyrolysis syngas is used for power production (electricity and thermal energy generation)
- The energy (electrical and thermal) can support the entire plant (biomass drying, pyrolysis, biochar cleaning and storage)
- Feedstocks is constantly available and is as close as possible to the biochar production plant
- Feedstock is an organic waste (income from feedstock)

THEN

- Consistent biochar characteristics and quality
- Low price
- Biochar become competitive
To achieve the goals of this production model, BFT designs biochar production plants able to:

➤ Use organic waste material as feedstock
➤ Reduce the material drying cost
➤ Have a self-perpetuating, high efficiency pyrolysis reactor
➤ Input Moisture content: up to 50% (depending of the feedstock)
➤ Input: 2,000 Ton per year (20% moisture)
➤ Output approximately: 600/700 Ton per year of Biochar
➤ Feedstocks: Green and yard Waste, Biosolids, Cereal production waste, nutshells, etc..
The biosolids derived biochar (BDB)

- BDB has **most of the same characteristics as biochar obtained from typical biochar feedstocks**, like wood chips or waste crops. BDB has received attention from dozens of universities worldwide because of its ability to acquire several new characteristics. Compared with a “regular” wood biochar, **BDB has a much higher nitrogen and phosphorous content.**
## BFT BDB BIOCHAR

<table>
<thead>
<tr>
<th></th>
<th>Wood Biochar</th>
<th>BDB</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.5</td>
<td>8.5</td>
</tr>
<tr>
<td>C (g/kg)</td>
<td>708</td>
<td>298</td>
</tr>
<tr>
<td>N (g/kg)</td>
<td>11</td>
<td>64</td>
</tr>
<tr>
<td>P (g/kg)</td>
<td>6</td>
<td>56</td>
</tr>
<tr>
<td>Density (lb/cf)</td>
<td>27</td>
<td>43</td>
</tr>
<tr>
<td>Surface area (m²/g)</td>
<td>40/400</td>
<td>176</td>
</tr>
</tbody>
</table>
## BFT BDB BIOCHAR

### Heavy Metal Leaching (EPA 7420 and EPA 6010)

<table>
<thead>
<tr>
<th>Metal</th>
<th>STLC Detected Value (mg/L)</th>
<th>STLC limit (mg/L)</th>
<th>TCLP Detected Value (mg/L)</th>
<th>TCLP limit (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>ND</td>
<td>5.0</td>
<td>ND</td>
<td>5.0</td>
</tr>
<tr>
<td>Barium</td>
<td>4.0</td>
<td>100</td>
<td>ND</td>
<td>100</td>
</tr>
<tr>
<td>Beryllium</td>
<td>ND</td>
<td>0.75</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Cadmium</td>
<td>ND</td>
<td>1.0</td>
<td>ND</td>
<td>1.0</td>
</tr>
<tr>
<td>Chromium</td>
<td>0.15</td>
<td>5</td>
<td>ND</td>
<td>5.0</td>
</tr>
<tr>
<td>Cobalt</td>
<td>ND</td>
<td>80</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Copper</td>
<td>5.6</td>
<td>25</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Lead</td>
<td>0.23</td>
<td>5.0</td>
<td>ND</td>
<td>5.0</td>
</tr>
<tr>
<td>Mercury</td>
<td>ND</td>
<td>0.2</td>
<td>ND</td>
<td>0.2</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>0.11</td>
<td>350</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.14</td>
<td>20</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Selenium</td>
<td>ND</td>
<td>1.0</td>
<td>ND</td>
<td>1.0</td>
</tr>
<tr>
<td>Silver</td>
<td>ND</td>
<td>5</td>
<td>ND</td>
<td>5</td>
</tr>
<tr>
<td>Thallium</td>
<td>ND</td>
<td>7.0</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Vanadium</td>
<td>ND</td>
<td>24</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Zinc</td>
<td>22</td>
<td>250</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

*ND (not detected)
BFT BDB BIOCHAR : Tomatoes plants test

Experiment in sandy soil. Water 2 liters every 4 days.
Experiment in sandy soil. Water 2 liters every 4 days.
THE BFT PROJECT AT SVCW

➤ dispose biosolids on-site

➤ treat **7,000 ton of biosolids per year**

➤ The BFT plant will use the BFT BioDrying technology, able to dry the biosolids cake **from 20% solid to 80% solid**

➤ The produced dry biosolids (Class A) will be treated with the **pyrolysis** reactor

➤ Through the pyrolysis, syngas and bio-oil will be produced and used for **energy production**

➤ The biosolids derived biochar obtained will be about **700 ton per year**.

➤ The BFT biosolids derived biochar production **will start in late 2016, and will be available for purchase in bulk (no retail)**

➤ Do you wanna tour? Contact us!
THANK YOU!