

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

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Biosolids to energy and biochar, at Silicon Valley Clean Water

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WHO ARE WE



# 1 GOAL

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# 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





BIODRYER™

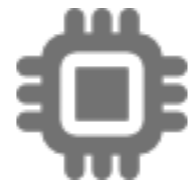
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Use the biological energy



Reach **140°F** in 10 hours



Works with an AI



Promote aerobic conditions

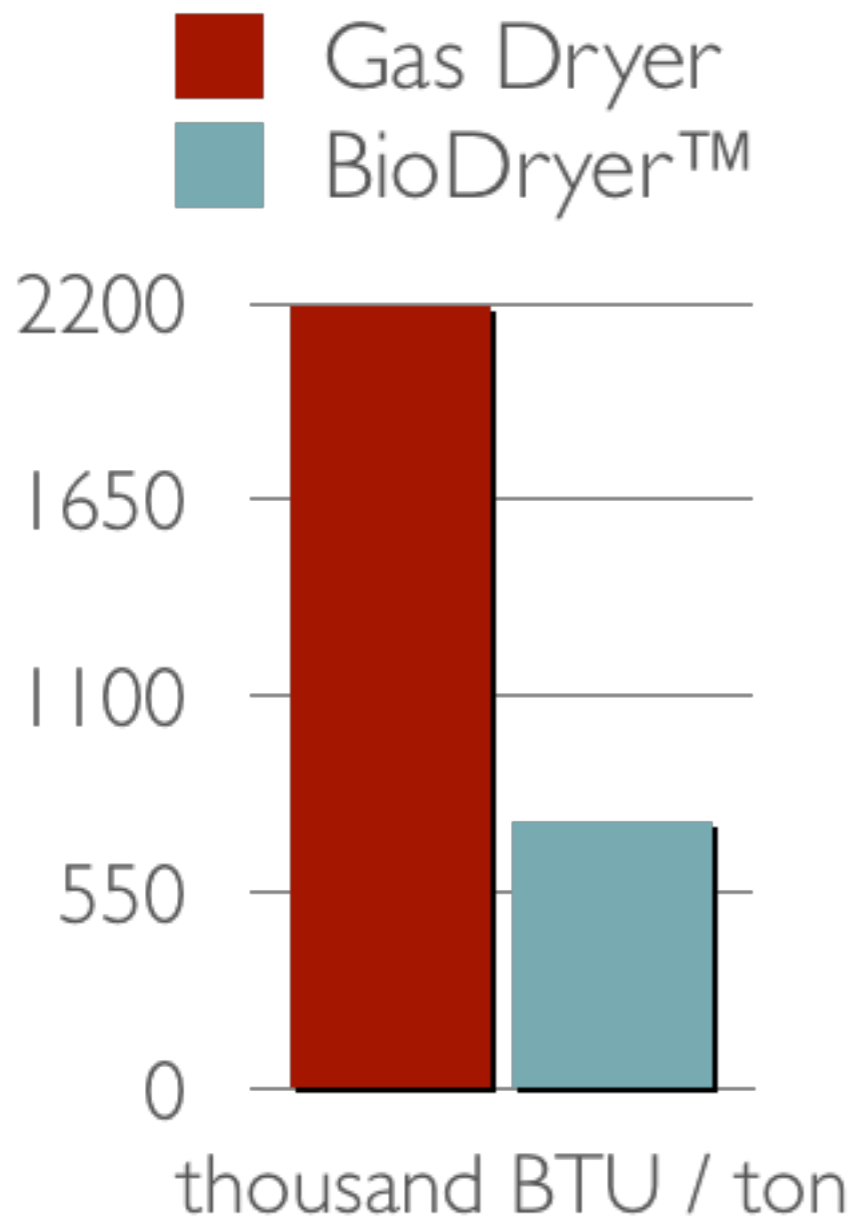


Remove Water in **48 hours**

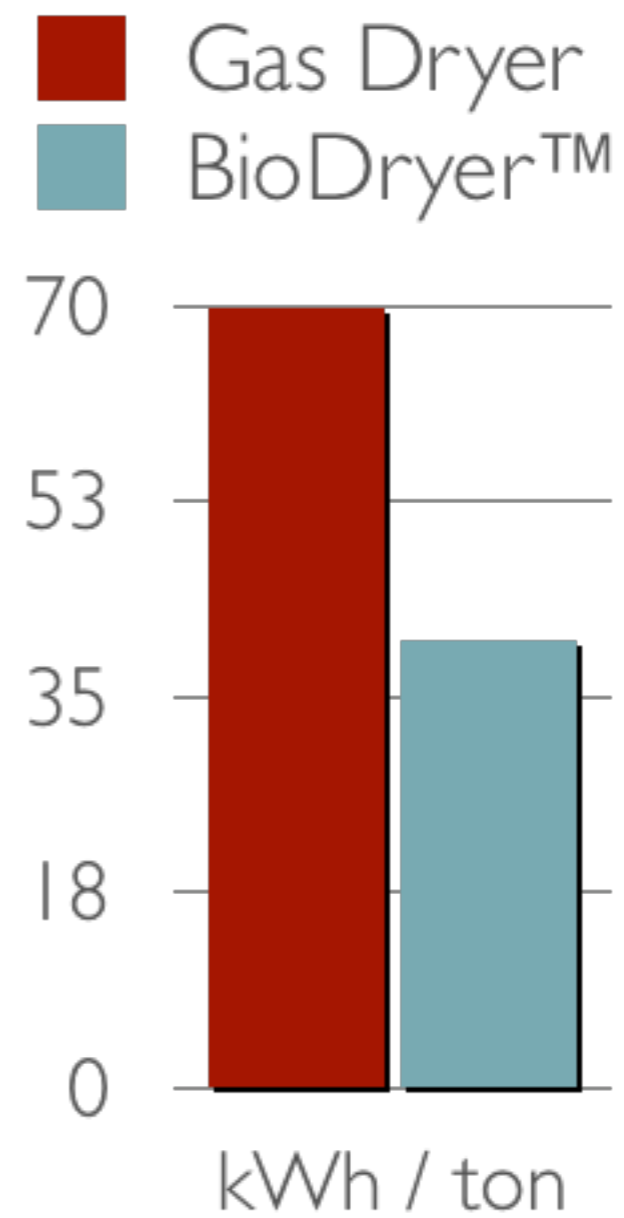


BIODRYER™

**70% less  
HEAT ENERGY**



**50% less  
ELECTRICAL ENERGY**





# BFT PYROLYSIS

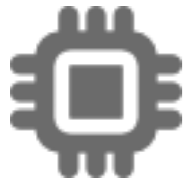
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Designed for biosolids



**SELF-SUSTAINED**



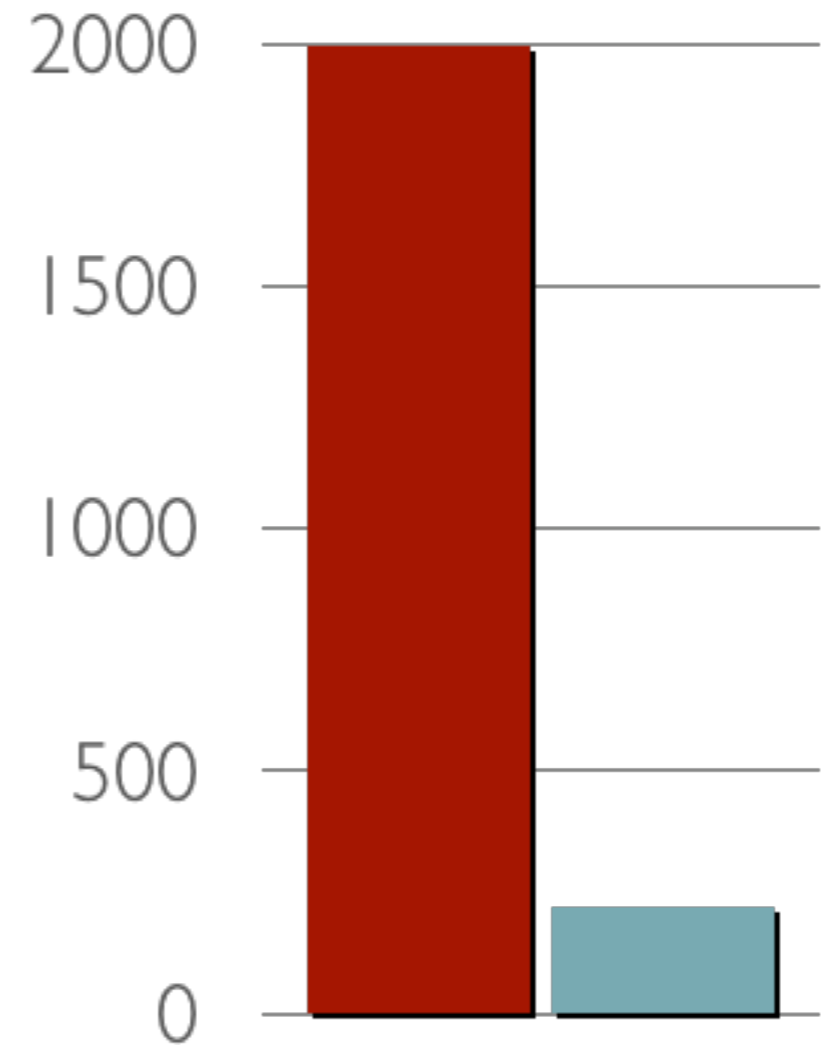
Fully automated



Clean emission  
( no solid burning )



Produce heat, electricity  
and BioChar



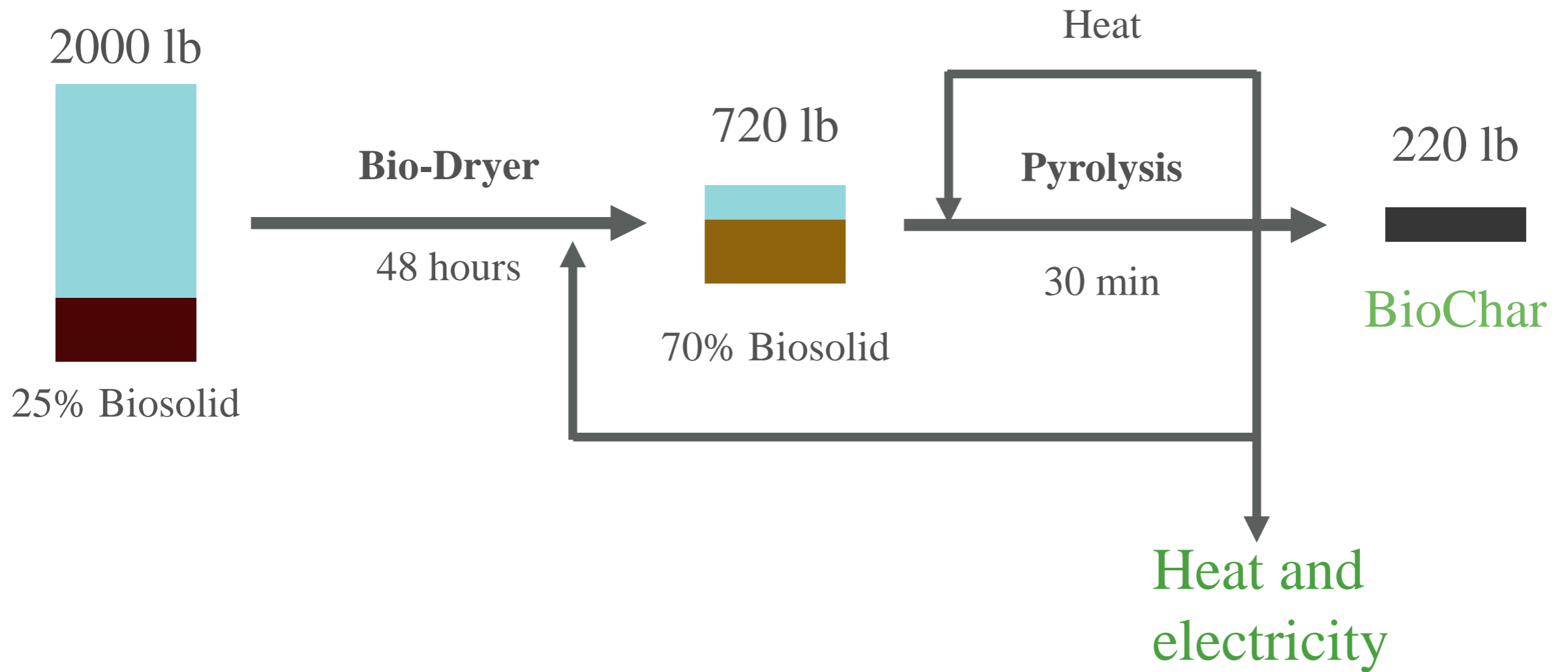
lbs

**90%**

**volume reduction**



# PROCESS FLOW



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

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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

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- ▶ 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

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## ➤ 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



# BIOCHAR PRODUCTION

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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..



# BFT BDB BIOCHAR

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## 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

	Wood Biochar	BDB
pH	7.5	8.5
C (g/kg)	708	298
N (g/kg)	11	64
P (g/kg)	6	56
Density (lb/cf)	27	43
Surface area (m <sup>2</sup> /g)	40/400	176



# BFT BDB BIOCHAR

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

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

\*ND (not detected)



# BFT BDB BIOCHAR : Tomatoes plants test

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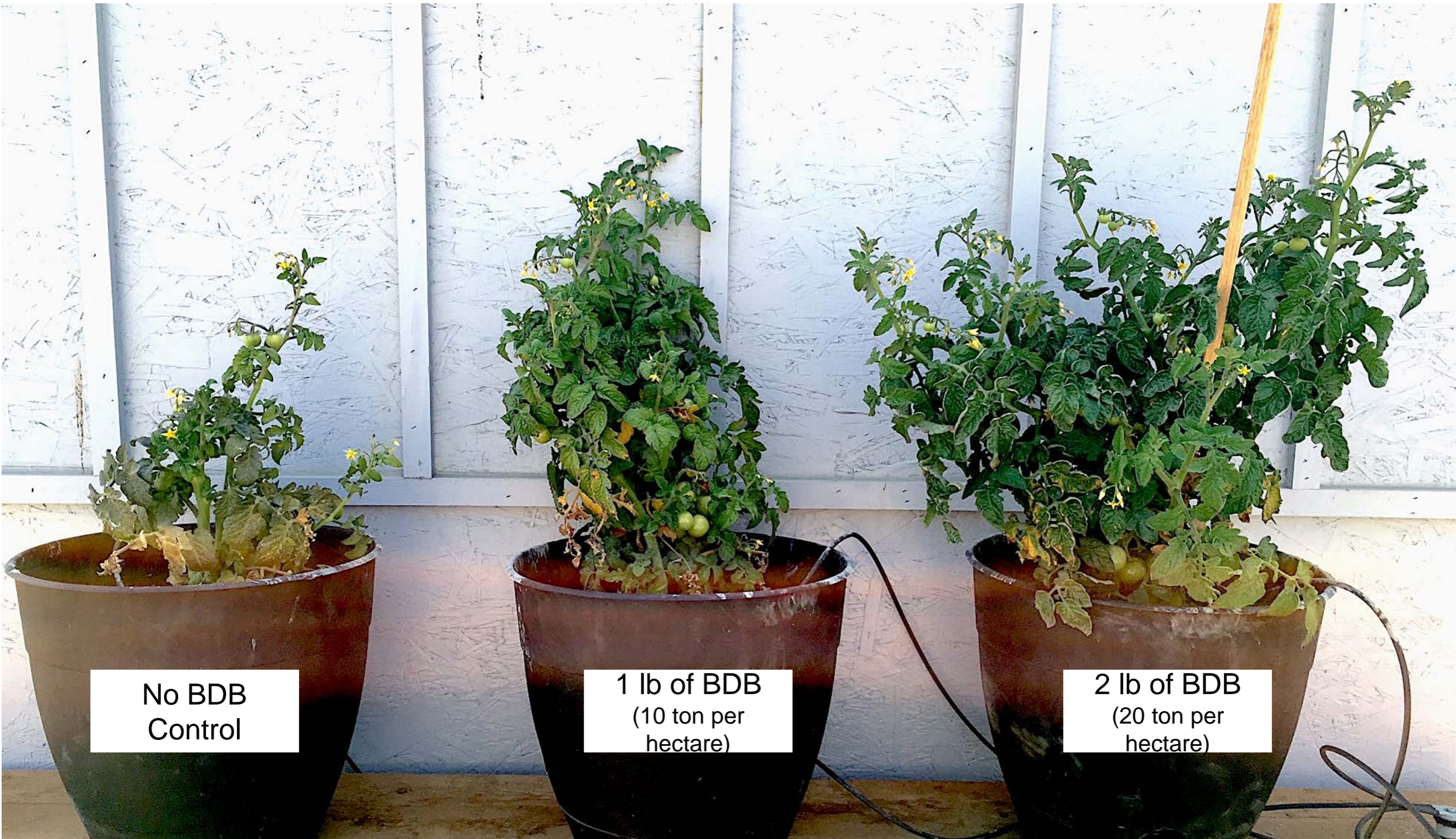


Experiment in sandy soil. Water 2 liters every 4 days.





# BFT BDB BIOCHAR : Tomatoes plants test



No BDB  
Control

1 lb of BDB  
(10 ton per  
hectare)

2 lb of BDB  
(20 ton per  
hectare)

Experiment in sandy soil. Water 2 liters every 4 days.

# THE BFT PROJECT AT SVCW

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- ▶ 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!



**BIOFORCETECH**  
*Corporation*