



# WEST BIOFUELS

## GASIFICATION AND BIOCHAR

Western SWET Forum

November 2017

# Company Profile

## What?

- Biomass thermochemical conversion technology provider

## Why?

- Biomass will continue to be made
- New and innovative approaches to creating reliable, value-added products are needed

## Where?

- Fabrication & Testing Facility in Woodland

# Feedstock Focus – CA Made

Shells

Hulls

Prunings

Removals

Stalks

Forest

Urban



## Biochar as a Co-Product

- Renewable electricity from biomass cannot directly compete with solar, wind, hydro on electricity price alone
- Co-products are necessary to create a sustained market
- Heat is the most common co-product associated with biochar
  - Finding a reliable year-round heat application is challenging
- Biochar provides additional market value

# Biochar

## What is biochar?

- Carbon byproduct of thermochemical conversion processes
  - Torrefaction: 425-575F
  - Carbonization: 575-950F
  - Gasification: >950F
- Fixed carbon + ash
- Highly porous and adsorptive



West Biofuels biochar  
from Forest Residue

## How is it made

### 1) Feedstock is important!

- Inputs will be amplified
- Ash is important

### 2) Temperature

- Ash melting can cause slagging, which may reduce the quality of biochar and cause operational challenges
- Variability in pH, fixed carbon, and activity

### 3) Gasifier Configuration

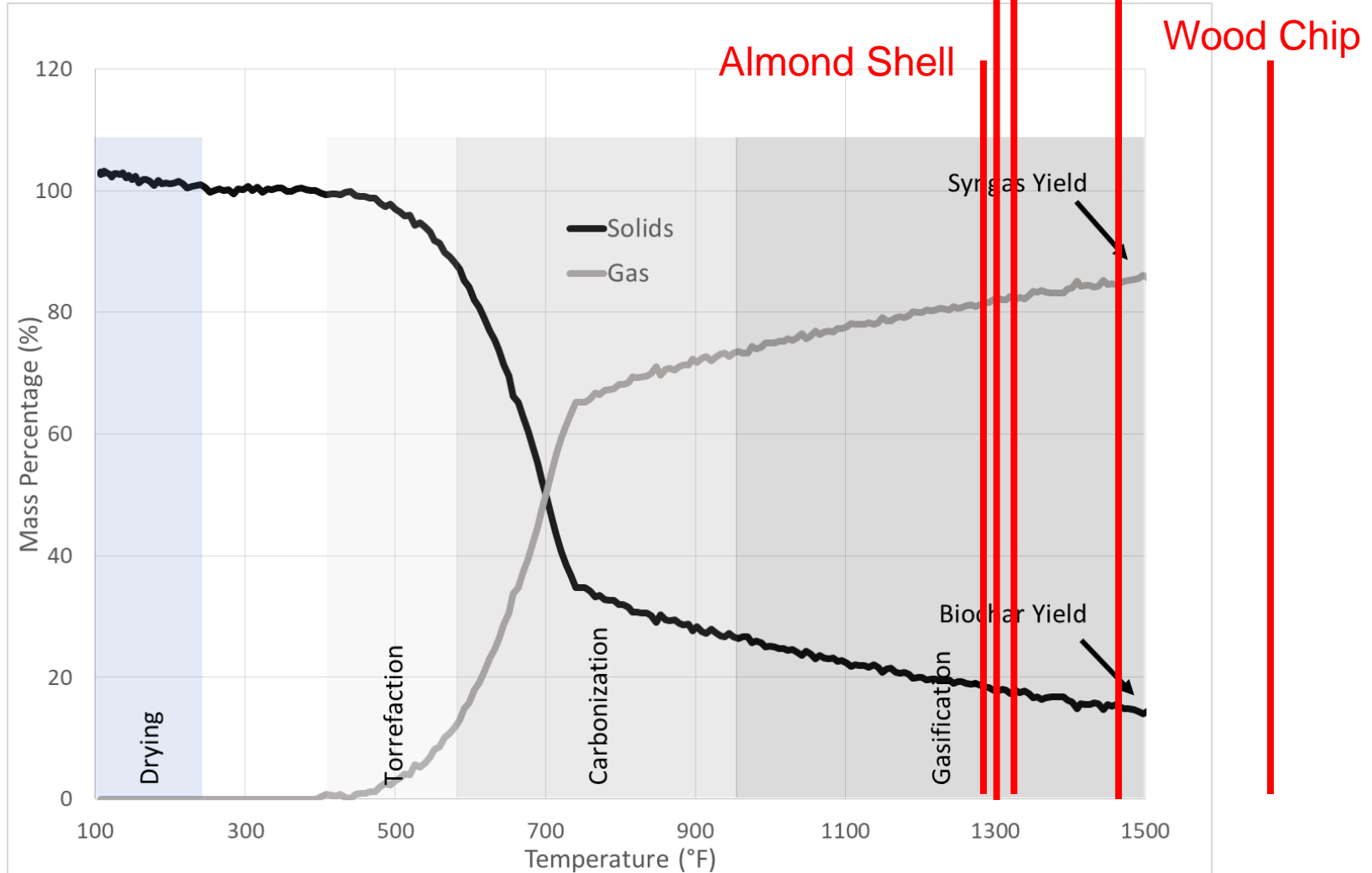
- Is biochar used as a gas filter?

## Feedstock

- Gasification should be specifically engineered to accommodate the feedstock

Feedstock Type	Avg. Ash Content
Almond Shell	3.62%
Pre-Mix Almond Hulls	7.73%
Pollinator Hulls	7.85%
Nonpareil Hulls	7.70%
Almond Wood	2.17%
Walnut Shell	1.04%
Forest Wood	1.08%
RDF (Urban)	15.12%
Biosolids	28.95%

# Temperature

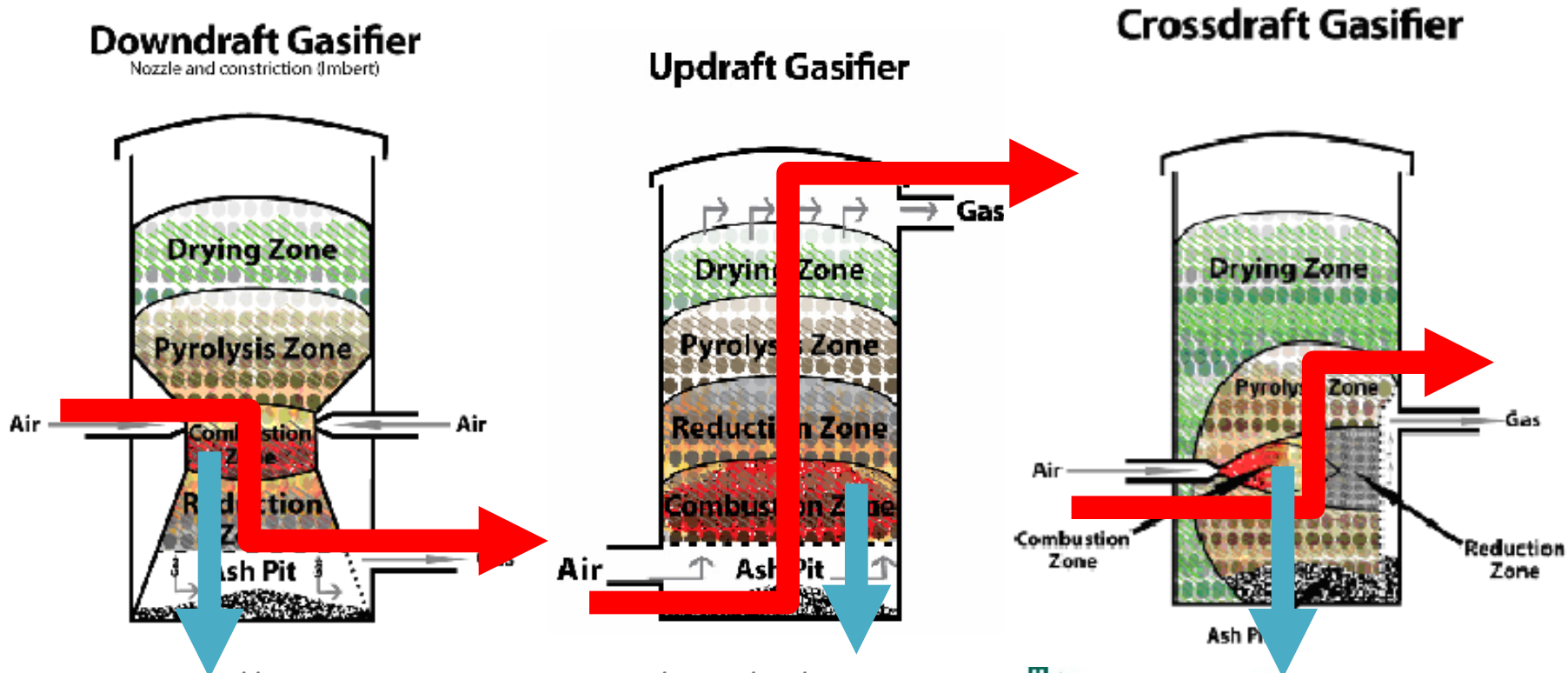


Indicates when slag will form based on the hottest (not average) temp in the system



# Technology

To make a good co-product, biochar can't be used as a syngas filter to remove tars.



Source: <http://www.enggcyclopedia.com/2012/01/types-gasifier/>

# Biochar Opportunity

## Biochar market

- Young market with limited supply
- Wholesale:
  - \$250 to \$2,000+ per BDT
- Retail:
  - \$0.75 - \$8 per pound (\$1,500 to \$16,000 per ton)
  - Sold across Home Depot, Amazon, Sears, and nurseries



FICFB Gasifier



Rotary Gasifier

## Gasification Technologies



CircleDraft Gasifier

# Contact West Biofuels

## Woodland Biomass Research Center

14958 County Road 100B

Woodland, CA 95776

Matt Summers

Chief Operating Officer

(530) 383-8260

[matt.summers@westbiofuels.com](mailto:matt.summers@westbiofuels.com)

Matt Hart

Director of Business Development

(650) 796-6288

[matt.hart@westbiofuels.com](mailto:matt.hart@westbiofuels.com)