Suitability Analysis of Gasifier Genset for Powering Remote Biomass Conversion Technologies

Kyle Palmer
Research Engineer
Schatz Energy Research Center
Humboldt State University

Biomass Conversion Technologies

Biochar

Torrefier

Briquetter

Diesel generator

Gasifier Genset

Source: All Power Labs

Gasifier Genset

All Power Labs Power Pallet PP20

Gasifier

↓

Engine

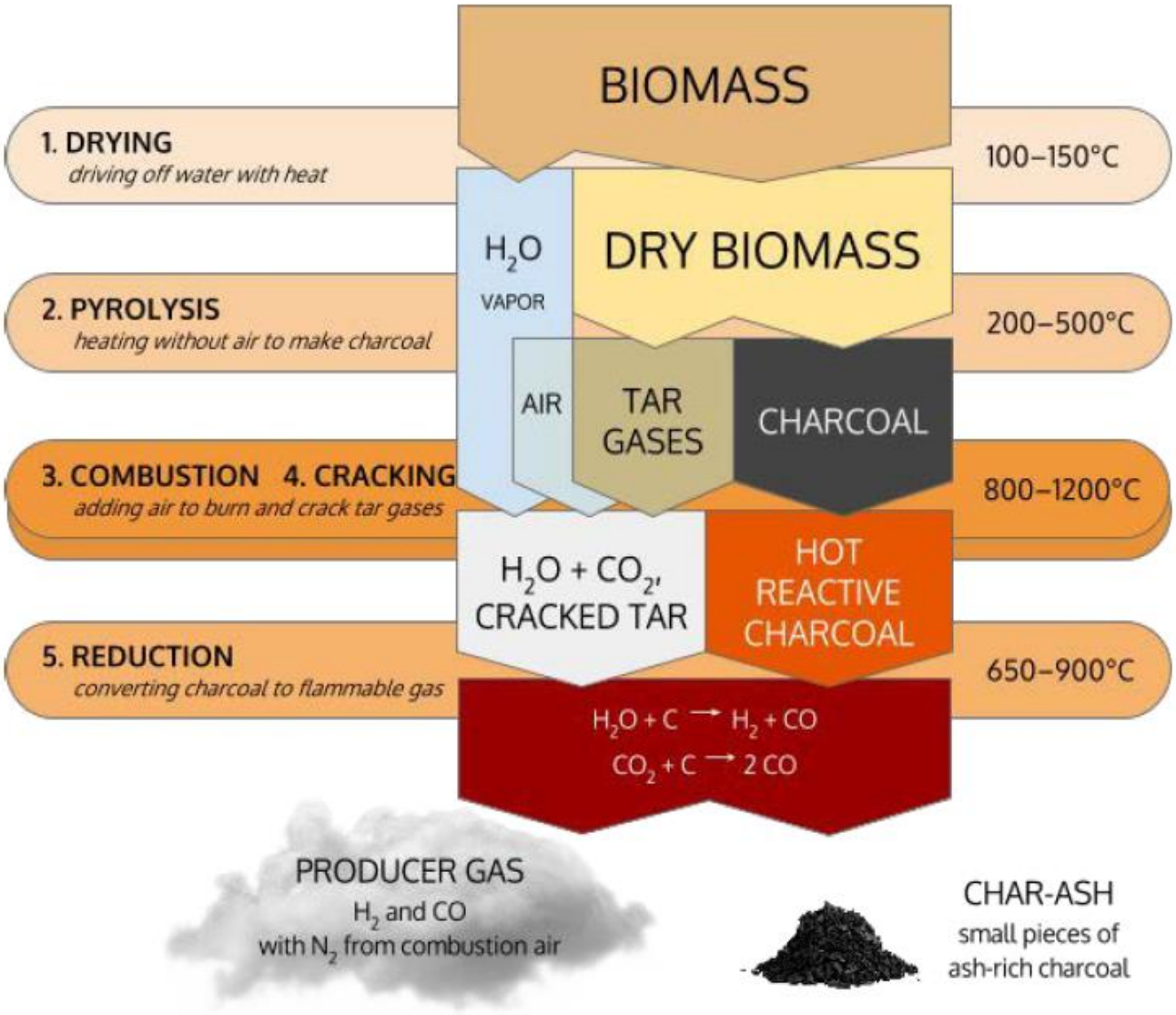
GM Vortec 3.0L 4 cyl
Gasoline Engine

↓

Generator

Mecc Alte NPE32-4
31 KVA

Source: All Power Labs



Source: All Power Labs

Source: All Power Labs

Feedstock

»All Feedstock must be screened to 0.5” – 1.5”

» Moisture content must be between 10-30%

Test Plan Outline

Lab Testing

Field Testing

Lab Testing Objectives

Evaluate feedstock type and moisture percentage

Species	Moisture %	Test Name
Tan oak	15%	TANO15
	25%	TANO25
Redwood	15%	REDW15
	25%	REDW25
Douglas fir	15%	DOUG15
	25%	DOUG25

All Power Labs

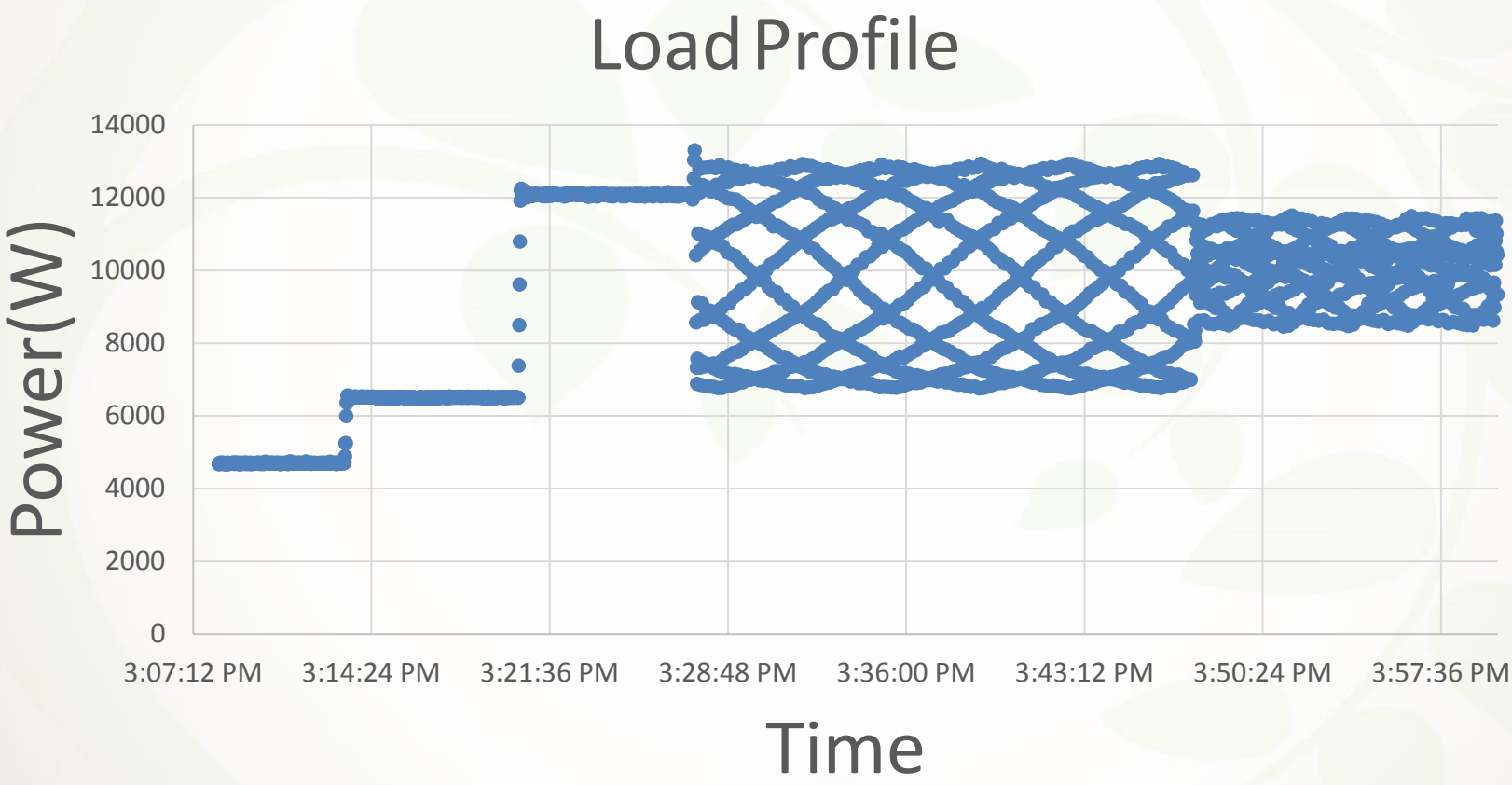
Lab Testing Objectives

Load variability and load following

Hot water heater elements inside 55 gallon drum

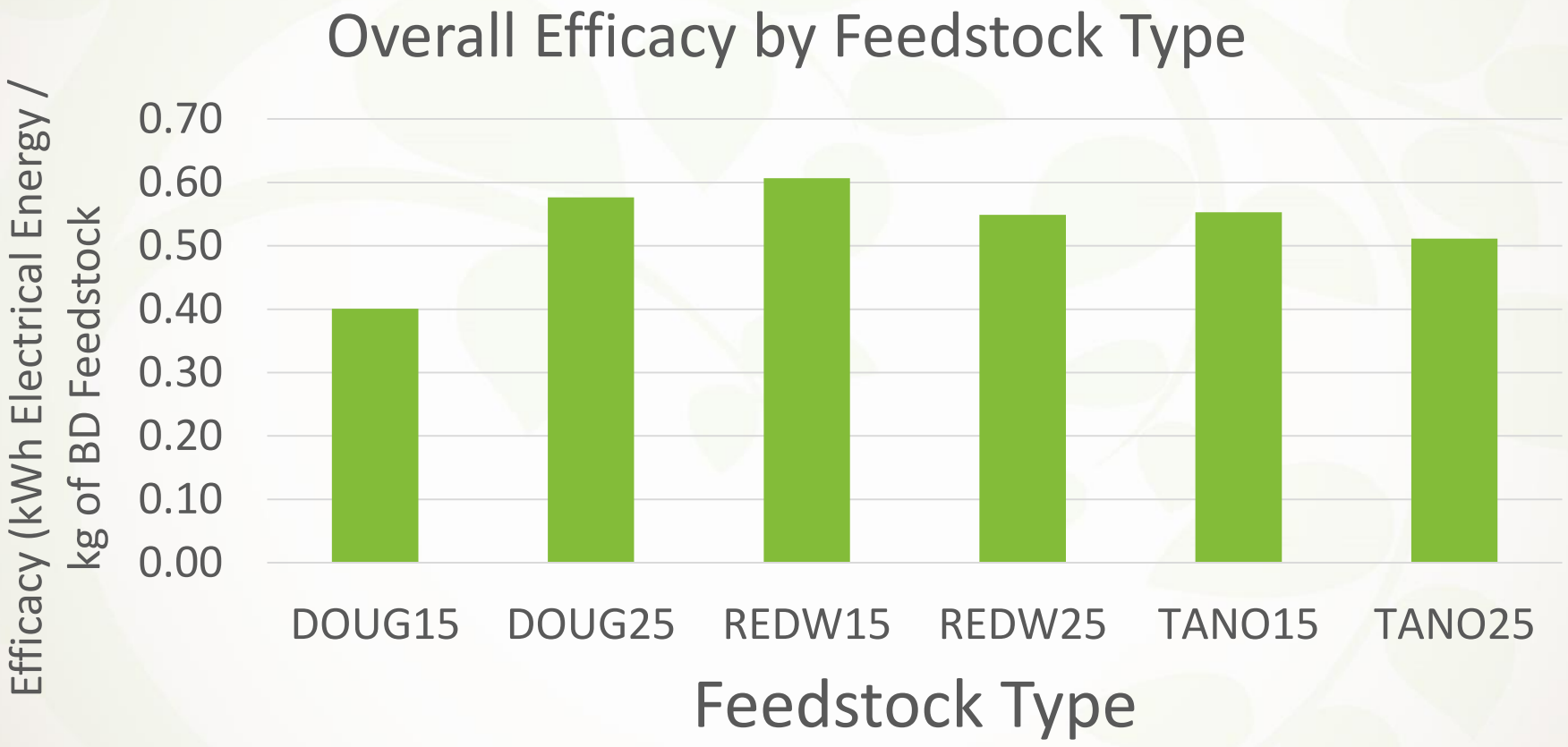
Lab Testing Objectives

Load variability and load following



Lab Results

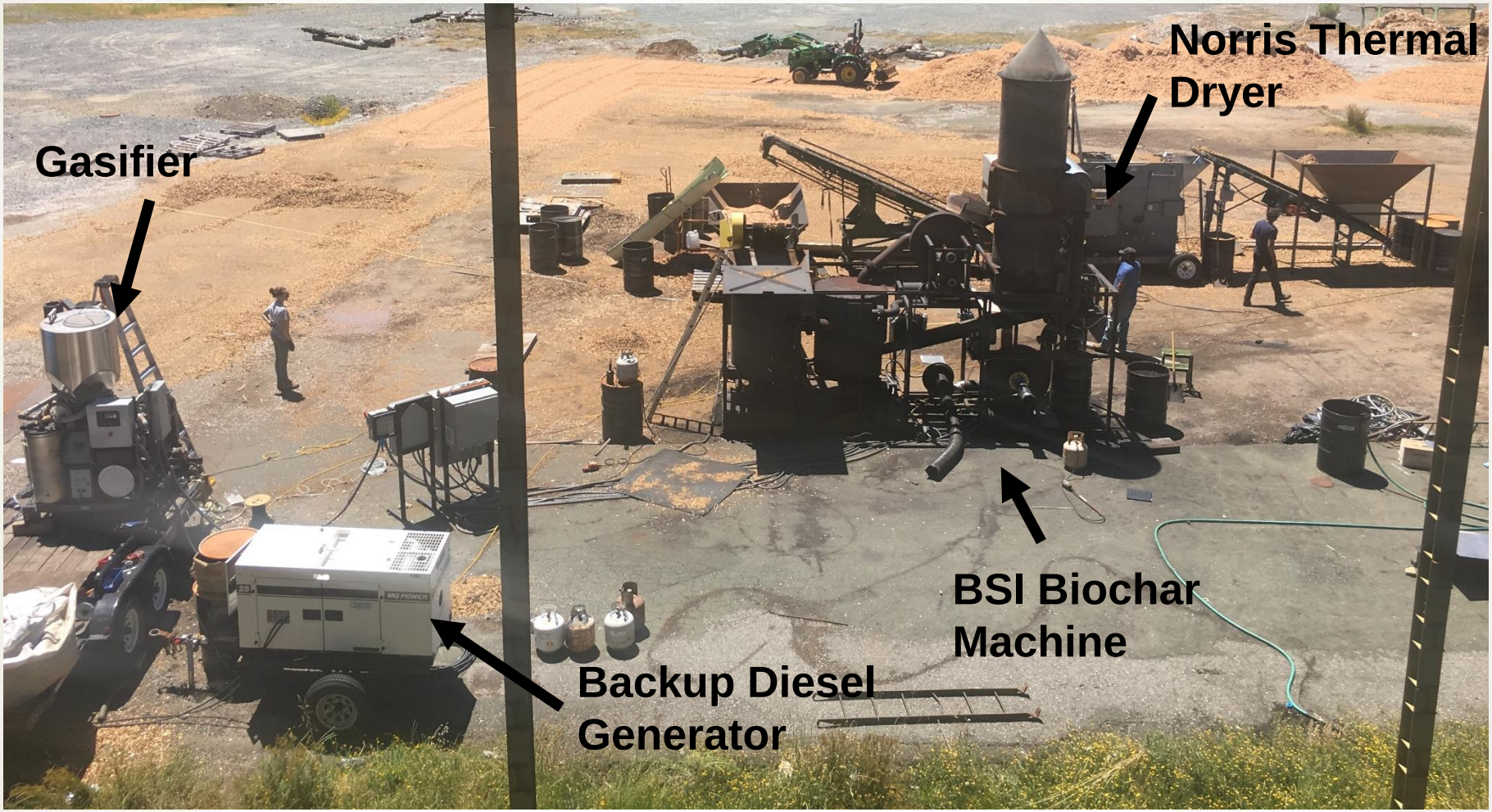
No significant difference in overall efficacy based on feedstock type



Field Testing

Field Testing

Loads between 6 and 12 kW



Field Testing

Field Testing Lessons Learned

SERC has demonstrated that a small gasifier genset can be used to power the biochar machine and the moisture management system for remote operations without diesel.

» The power pallet is capable of load following in field conditions.

» Operator needs a high degree of technological competency to successfully run and maintain gasifier genset.

»Reliability is lower than diesel generator. A backup generator is still necessary if system is not tolerant to downtime for maintenance.

Conclusions

» The Power Pallet is effective at converting biomass into electrical energy.

»As long as the feedstock is within the specification, the species and moisture content do not play a major role in in overall efficacy.

»A fair amount of skill and attention is required to keep the operation functional.

»It *is* possible to run a remote biomass conversion system from a wood chip feedstock.

Questions?