From Waste to Value:

*Forest & Mill Residue to Drop-In Fuels*
RRB’s Management Team has Extensive Experience in Plant Construction and Ops

Terry Kulesa
CEO
- 17yrs biofuels
- $650M+ construcNon
- CoFounder/CEO, IR1
- Former VP OperaNons at Pacific Ethanol
- Former GM Ace Ethanol & Ethanol 2000
- MBA University of Minnesota

Jeff Manternach
CFO
- 13yrs biofuels
- $400M+ project finance
- $75M+ grant funding
- CoFounder/CFO, IR1
- Former VP Finance at Pacific Ethanol
- MBA, MS Natural Resources University of Michigan

Jim Moore
Dir. Engineering
- 13yrs biofuels
- $1B+ construcNon
- IR1 Group 5yrs
- 30+yrs design, engineering, project mgmt, construcNon
- Former Director of Engineering at Pacific Ethanol
- ProU, DTC, AMEC, UCB, S&B

Joe Winckler
Dir. OperaNons
- 23yrs biofuels
- $700M+ construcNon
- IR1 Group 6yrs
- Former GM of OperaNons at Pacific Ethanol
- Former PM at Ace Ethanol, Ethanol 2000

Experience
- Four senior execs w/ 1323yrs experience each in renewable fuels
- Worked together for 10+ years
- Financed, built, & operated 6 renewable fuels plants; operated 3 more
Forest Residue

“The potential for impact is substantial; ~ 4-6% of the continental U.S.’s annual emissions come from forest fires, healthy forestlands can sequester ~ 12% of the national emissions annually.”

Source: Redefining renewable biomass: A policy change with cascading outcomes (NARA Tribal Partnership Program: Moore-Drougas, Schwartz, James, and Durglo)
Forest Management Costs

Fighting Forest Fire = $5,000 per acre

Forest Thinning = $500 per acre
Growing Problem in Western Forests

Total Federal Fire Area & Suppression Costs

- Total Fed Cost ($ Millions)
- Acres (Thousands)
- Linear (Total Fed Cost ($ Millions))
- Linear (Acres (Thousands))

National Interagency Fire Center – Suppression Costs
Timber Residue & Mill Waste

Currently burned

Private Timberlands

Harvest Residue

Logs

Debarker

Trucked

Trucked

Bark Chips

White Chips
RRB Conversion Process Overview

140,000 bdt/yr of Woody Biomass
- Forest Residue
- Sawmill Residue

Gasifier

Fischer-Tropsch

Hydroprocessing

15 MGY of Renewable Drop-In Fuels

- 40% Jet - ASTM D7566
- 40% Diesel - ASTM D975
- 20% Naphtha – ASTM D3735
RRB applies commercially proven FT process at biomass scale

Fischer-Tropsch
Germany, 1920’s

Sasol, Shell & Others
Coal or natgas feed only;
No ability to scale down
-------
100,000 bbl/day

Gasification
England, early 1800’s
(Baltimore Gas Works, 1816)

Hydroprocessing
Russia, 1930’s

Red Rock Biofuels
Modular and Scalable;
Biomass/NatGas flexible
-------
1,000 bbl/day
via novel technology
RRB Conversion Process & Products

1. **Pyrolysis**
   - Produce Syngas

2. **Fischer Tropsch**
   - Form Hydrocarbon Chains

3. **Hydroprocessing**
   - Separate into 3 Liquid Fuels
     - Naphtha
     - Jet
     - Diesel

- External Heating
  (No wood combustion)
Project Location

Lakeview, OR
Lakeview has Ample Biomass Resources

Woody Biomass Availability
1.5 – 2.5x need
RRB’s Lakeview, OR Site:
Excellent Feedstock & Product

Logistics

- Feedstock availability
- Enterprise zone site
- Highway access
- Rail access
- Natural Gas

Site Layout

Greenfield Site
Fuel Off-Take Agreements
World Class Project Partners
Thank You!

Mary Dinh
Project Manager
maryd@redrockbio.com