

DOE Bioenergy Technologies Office (BETO) 2019 Project Peer Review

Red Rock Biofuels Project Update

March 5, 2019

Technology Session Area Review

Mary Dinh & Jeff Manternach

1: Goal Statement

Goal: Successfully construct and operate a 15 million gallon per year cellulosic jet and diesel biorefinery in Lakeview, OR

Relevance: First commercial cellulosic jet & diesel project in the world



1: Project Overview



1: Project Overview

Project and Site	<ul style="list-style-type: none"> ■ Advanced biofuels production facility converting woody biomass into renewable drop-in jet, diesel, and gasoline blendstock fuels — Convert waste woody biomass into ~15.1mm gallons/year of renewable cellulosic fuels
Feedstock	<ul style="list-style-type: none"> ■ 70% of annual feedstock requirement under long term contract
Offtake	<ul style="list-style-type: none"> ■ Jet Fuel: 100% of jet fuel to be sold to FedEx and Southwest
EPC	<ul style="list-style-type: none"> ■ EPC Contract with IR1 Group LLC
Economics	<ul style="list-style-type: none"> ■ \$200+ million construction ■ 500+ construction jobs ■ 31+ direct manufacturing jobs ■ 120+ feedstock processing & transport jobs



2 – Management Team (Approach)

- *Small, lean management team*
- *Flat structure*
- *Lean on trusted, experienced suppliers*



Jim Moore
Director of
Engineering

Mary Dinh
Project Mgr.



Pedro Palting
Operations Mgr.



Chris Wardle
Engineering
Mgr.



Terry Kulesa
CEO



Jeff
Manternach
CFO



Sue Primsky
Accounting
Mgr.



Krissa Mayer
Accountant



Joe Winckler
Director of
Operations

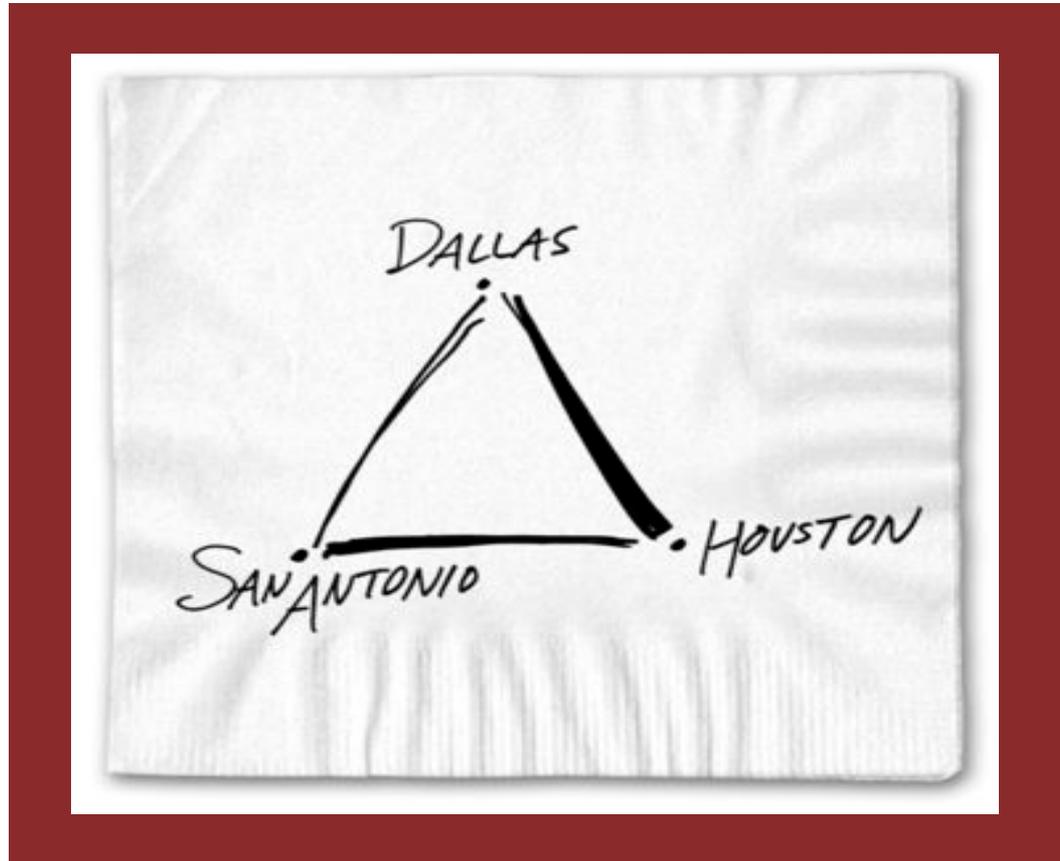


Terry Freeman
Construction
Mgr.



Terry Hall
Contracts Mgr.

2 – Project Development (Approach)



Credit: Southwest Airlines, Rollin King & Herb Kelleher, 1966, St. Anthony Hotel, San Antonio, TX

2 – Project Development (Approach)

RRB Presentation 2011



Project Strategy

Feedstock Supply and Product Offtake Agreements

- Lock in volume and price with fixed or indexed long term supply agreements
- Fixed or indexed price offtake agreements for plant output
- Avoid the historic pitfalls of the biofuels industry

Minimize Technology Risk

- Use of proven technology
- Flexible feedstock technology maximizes opportunities



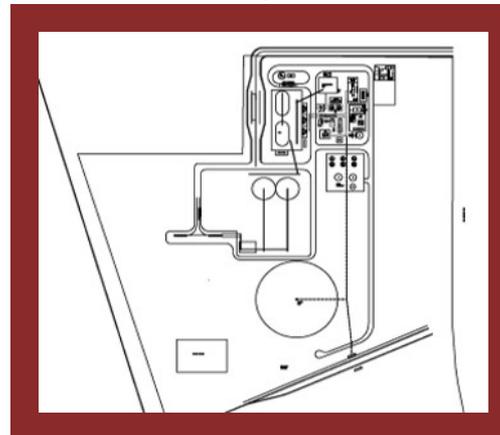
RRB Presentation Jan 2014



RED ROCK BIOFUELS

Red Rock Biofuels – Fort Collins, CO
Jeff Mantecacci - jmantec@redrockbio.com
Terry Kula - tkula@redrockbio.com

www.redrockbio.com
Red Rock Biofuels, Fort Collins, CO
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Site layout diagram showing the proposed facility footprint, including storage tanks, processing units, and infrastructure.

RRB Site Layout 2014



3D architectural rendering of the biofuels plant facility, showing the main processing building, storage tanks, and infrastructure.

RRB 3d model 2018

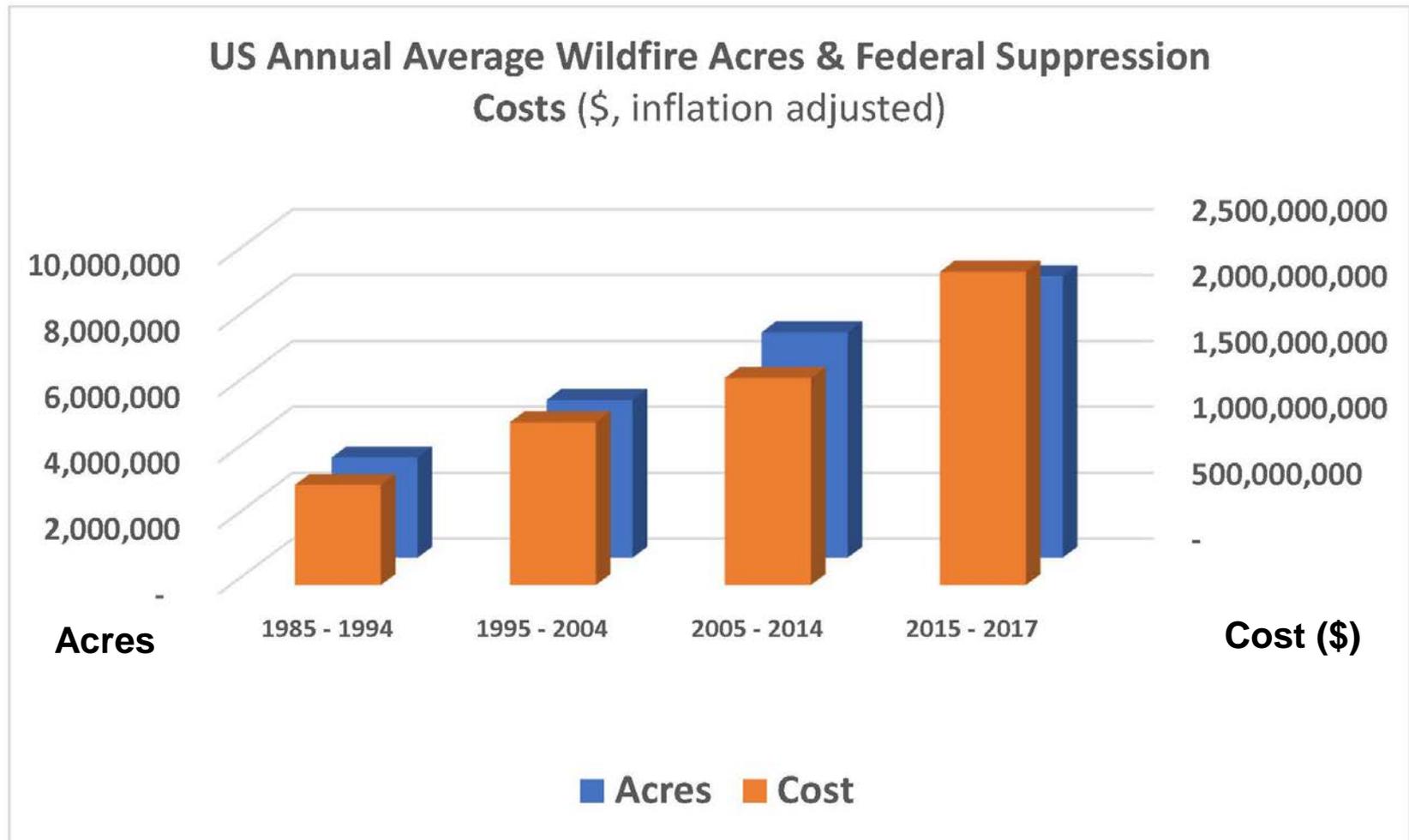
2 – Project Development (Approach)

A photograph of a large forest fire. In the center, a massive plume of bright orange and yellow flames rises high into the air, with thick black smoke billowing from it. The fire is surrounded by tall, dark evergreen trees, some of which are silhouetted against the bright light of the fire. The ground in the foreground is dark and appears to be covered in charred vegetation or ash. The overall scene is dramatic and intense, capturing the scale of the fire.

60,000 acre
Watson Creek Fire
Paisley, OR
2018

Klamath Falls News: Trees torching on the Watson Creek Fire near Paisley, Oregon. (Inciweb)

2 – Project Development (Approach)



2017: 10 million acres, \$2.9 Billion
2018: 7.7 million acres through 10/4

National Interagency Fire Center

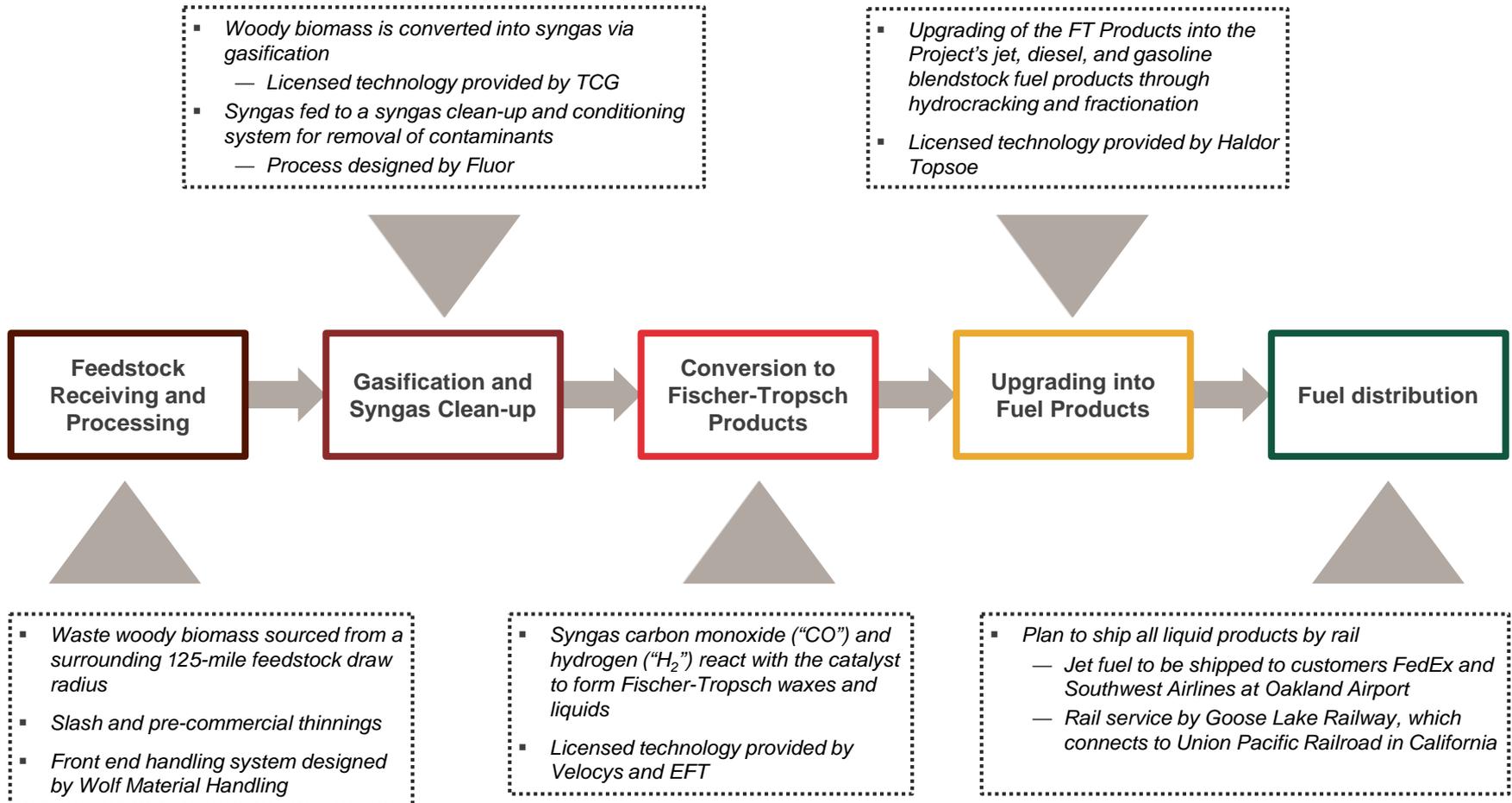


2 – Technical Approach

- Develop platform of next generation biorefineries, utilizing waste woody biomass to produce renewable jet and diesel fuels
- Help address rapidly growing problem of wildfire in Western U.S., make renewable heavy transport fuels
- Thermocatalytic conversion from the beginning

2 – Technical Approach

Biomass Conversion Process



3 – Construction Progress

- Greenfield construction project, ~18 months from start of work engineering through mechanical completion
- IR1 Group LLC (RRB's parent) is the Engineering, Procurement and Construction (EPC) Contractor

Challenges

- Manage engineering, fabrication and construction activities across about a dozen engineering firms, technology providers and construction contractors
- Deliver project on time and on budget

3 – Construction Progress (18 Jul 2018)



3 – Construction Progress (29 Jan 2019)



View of field fabricated tank construction, 29Jan2019, 3:45pm, facing W

4 – Relevance

“The creation of a robust, next-generation domestic bioenergy industry is one of the important pathways for providing Americans with sustainable, renewable energy alternatives.” – U.S. DOE BETO

U.S. DOE BETO: *About the Bioenergy Technologies Office: Growing America's Energy Future*,
<https://www.energy.gov/eere/bioenergy/about-bioenergy-technologies-office-growing-americas-energy-future>

4 – Relevance

“Scientific consensus: Earth's climate is warming”

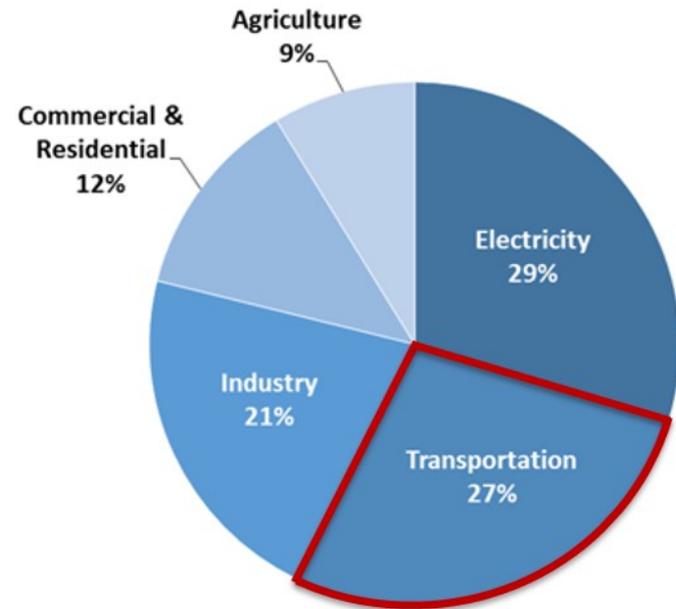


Credit: NASA Global Climate Change

4 – Relevance

- Transportation sector already major source of CO₂ emissions (27%)
- Growing population and standard of living will increase jet & diesel fuel use:
- **30% more diesel fuel by 2040**
- **50% more jet fuel by 2040**

Total U.S. Greenhouse Gas Emissions
by Economic Sector in 2015



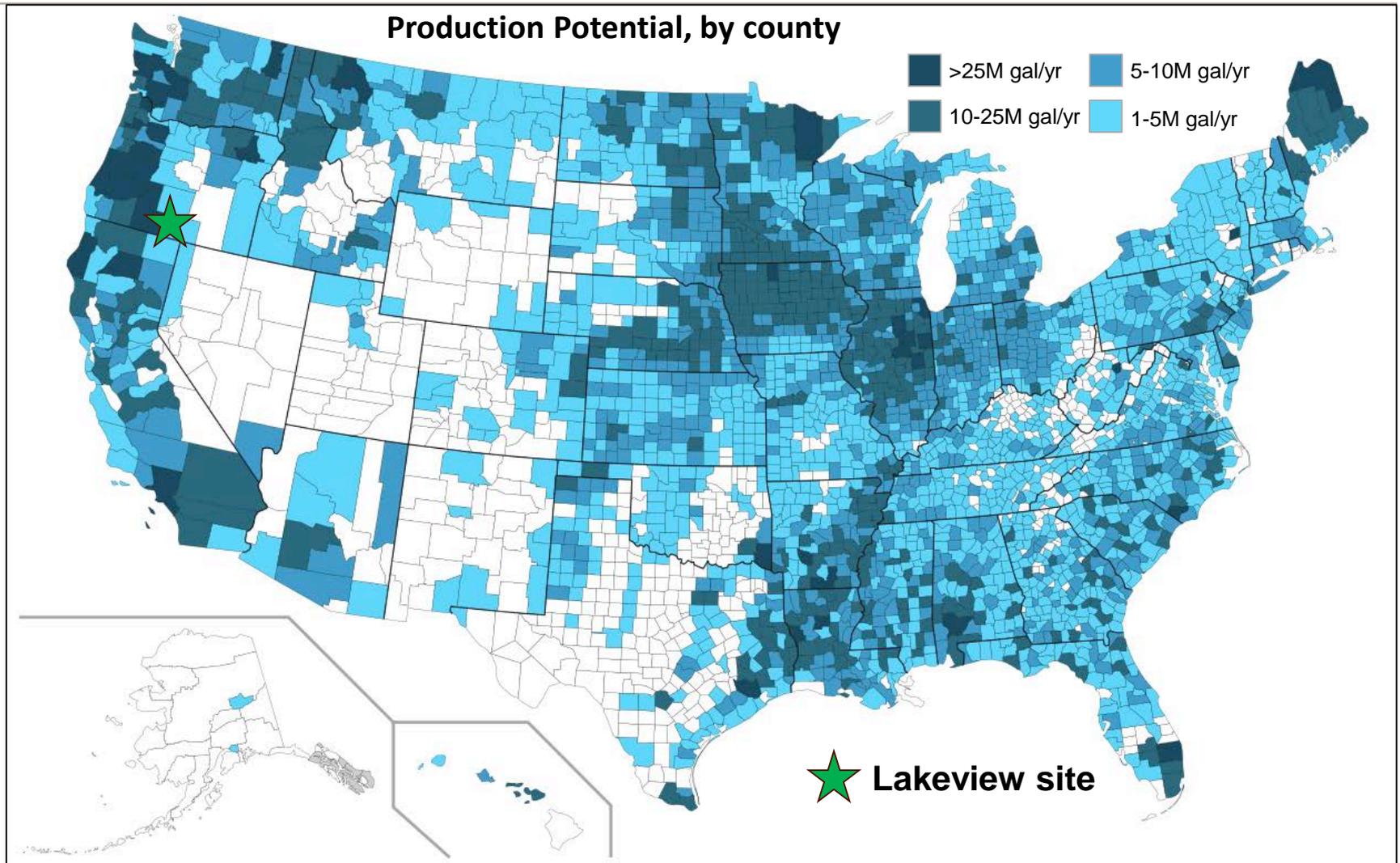
U.S. Environmental Protection Agency (2017). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015.

Credit: *International Energy Agency, World Energy Outlook 2016; Exxon Mobil 2017 Outlook; U.S. Environmental Protection Agency*

5 – Future Work

- *Complete construction of Lakeview by about the end of 2019*
- *Successfully operate Lakeview*
- *Build a portfolio of similar biorefineries to expand supply of renewable jet & diesel fuels and help reduce the impact of wildfire*

5 – Future Work



Credit: USDA BioSys database,

2015

Summary

- *Global climate change is both the biggest challenge of our generation and the biggest brass ring*
- *We are building a portfolio of biorefineries to produce low carbon, renewable jet and diesel fuels and reduce the impact of wildfire*



Winston Churchill, 1940:
“Victory, no matter how long and hard the road may be.”

Photo Credit: Yousuf Karsh, 1941.