



**IEA Bioenergy**  
Technology Collaboration Programme



# USA Country Update

IEA - T33 Meeting

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**Technology Collaboration Programme**

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# Updates on Commercialization Activities

- Fulcrum Sierra Biofuels
- Red Rock Bio
- Other commercialization activities
- USA Outlook - comments
- Q&A

# Fulcrum Bioenergy/Sierra Biofuels

Reno, Nevada

## Fulcrum Bioenergy/Sierra Biofuels: (10MM GPY)

- 1) MRF operational since 2016
  - a) 350,000 tons per year raw MSW -> 175,000 tons per year prepared MSW
- 2) Gasification/FT under construction
  - a) MSW feedstock/TRI indirectly heated fluid bed steam reforming gasifier
  - b) Johnson Matthey DAVY™/BP fixed-bed FT
  - c) Start-up in Q4 2020
- 3) Recently pivoted from jet fuel to FT wax
  - a) Off-take with Marathon Oil Co., Wax to be refined in Marathon's Martinez CA refinery
  - b) Other offtakers include United and Cathay Pacific, BP Air, World Fuels
  - c) FT jet fuel capability to be added in Phase II

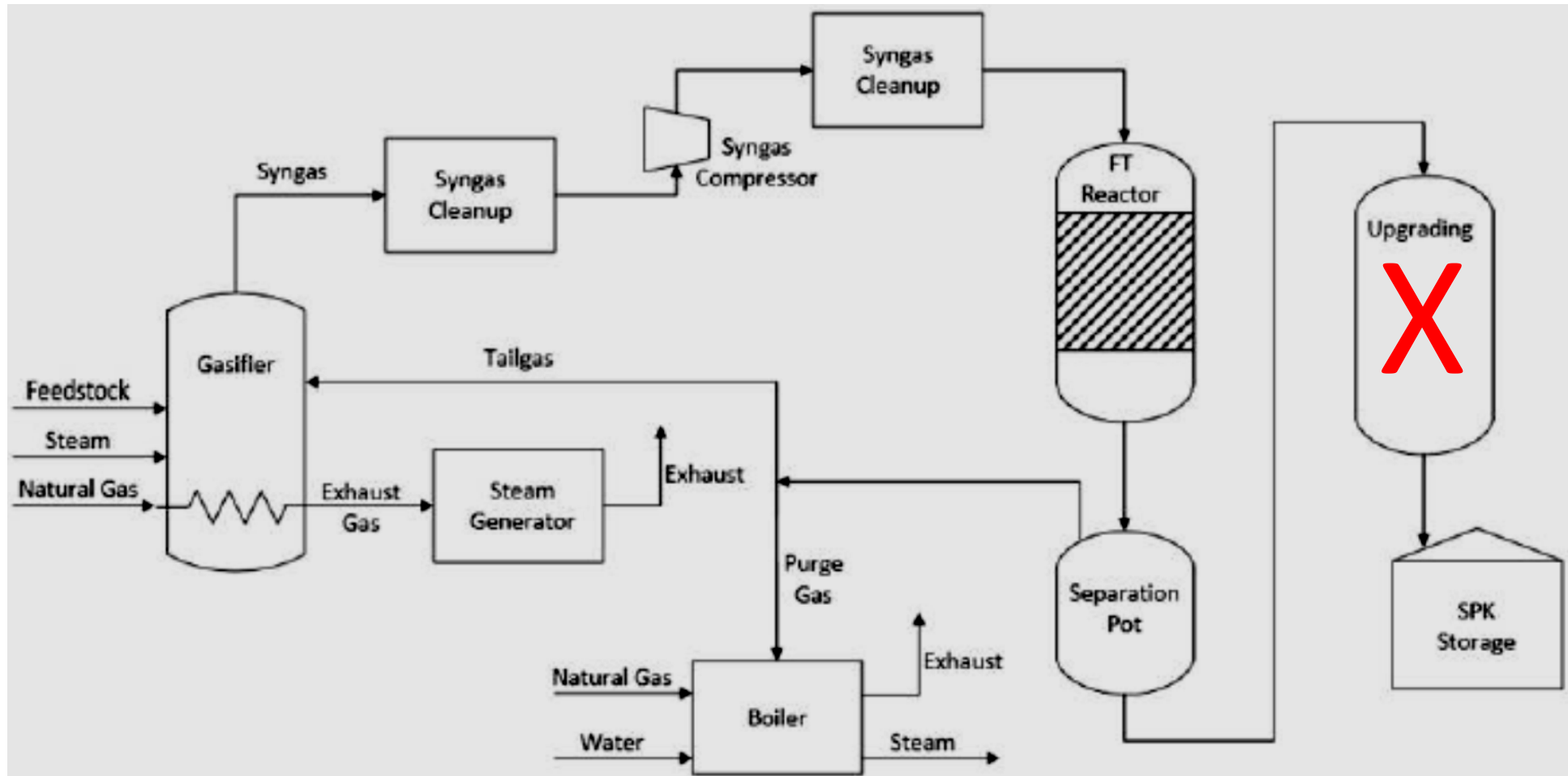
# Fulcrum BioEnergy/Sierra Biofuels

MRF - Currently Operational





# Fulcrum PFD



# Fulcrum BioEnergy/Sierra Biofuels

## Plant Construction Activities



<http://fulcrum-bioenergy.com/facilities/>



# Feedstock - Sorted MSW



# Red Rock Bio

## Project Details

- Pathway: gasification to Fischer-Tropsch
- Technology providers
  - Gasification: TCG Global steam reforming
  - FT technology: Velocys and Emerging Fuels Technology
    - Parallel FT trains
  - Hydroprocessing: Haldor Topsoe
- Feedstock: forest residue (136,000 tons per year)
- Products: cellulosic renewable jet, diesel, and naphtha fuels
- Offtakes: Southwest Airlines, FedEx Express
- First commercial project status
  - Site: Lakeview, OR
  - Capacity: 15 MGY
  - Anticipated construction completion: 4Q 2020



# RRB Groundbreaking

July, 2018



# Other Biomass Gasification Activities

- Aemetis/Lanzatech
  - 60 MM GPY cellulosic ethanol from agricultural wastes
  - Project 'on hold'
  - InEnTech gasifier no longer commercially available
- SunGas Renewables
  - Spinoff from GTI
  - Pressurized fluid bed technology
  - Incorporates catalytic tar reforming technology from Andritz and Haldor-Topsoe
  - Several FT projects 'under discussion'
    - First commercial deployment planned for Gulf coast USA to produce hydrogen or chemical precursors
- Other technology providers in the US
  - Frontline
  - ICM

Thanks for your attention!

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