Session 2-D – Aviation Biofuels: Are you Getting on Board?

Presented to: Biomass 2012: Confronting Challenges, Creating Opportunities
Sustaining a Commitment to Bioenergy

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Challenges Achieving Scale

- Capital
- Feedstock Resourcing
  - 1000 DTPD Minimum for Reasonable Scale
- Regulations
  - CO_2 Regulations
    - Increase Fuel Value
    - Uncertainties with Investors
  - NIMBY Regulations
    - Rialto Project – CA Permitting

Approach to Overcoming Challenges

- Capital
  - Smaller Plants
    - 1000 DTPD – 1500 DTPD – Target
    - <1000 DTPD
      - Too Expensive, Lose Economy of Scale
    - >1500 DTPD
      - Competitive Feedstock Difficult to Obtain
- Diversified products and offtakes
  - Renewable Fuels + Specialty Chemicals + Power
- Global Approach
  - H_2 Deficient Markets
  - Markets where Natural Gas is Expensive or Absent

Low Value Inputs to High Value Outputs

Bagasse

Ag Waste

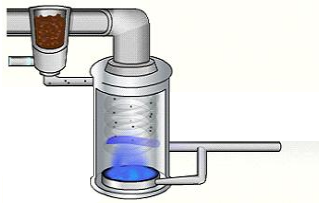
Grass

Switchgrass

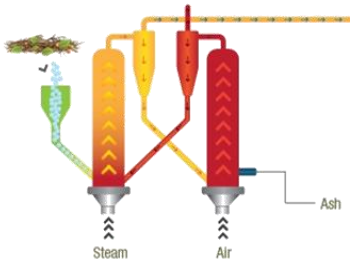
Wood / Timber

Other Biomass

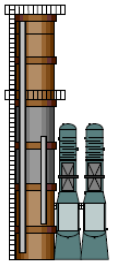
ClearFuels Biomass Gasification System



Rentech-SilvaGas Biomass Gasification System



Rentech Fischer-Tropsch Process



RENTECH

Commercially-Available Combined Cycle Power Block

Upgrading

UOP Upgrading System

uop

Diesel or Jet Fuel

RenDiesel®

RenJet®

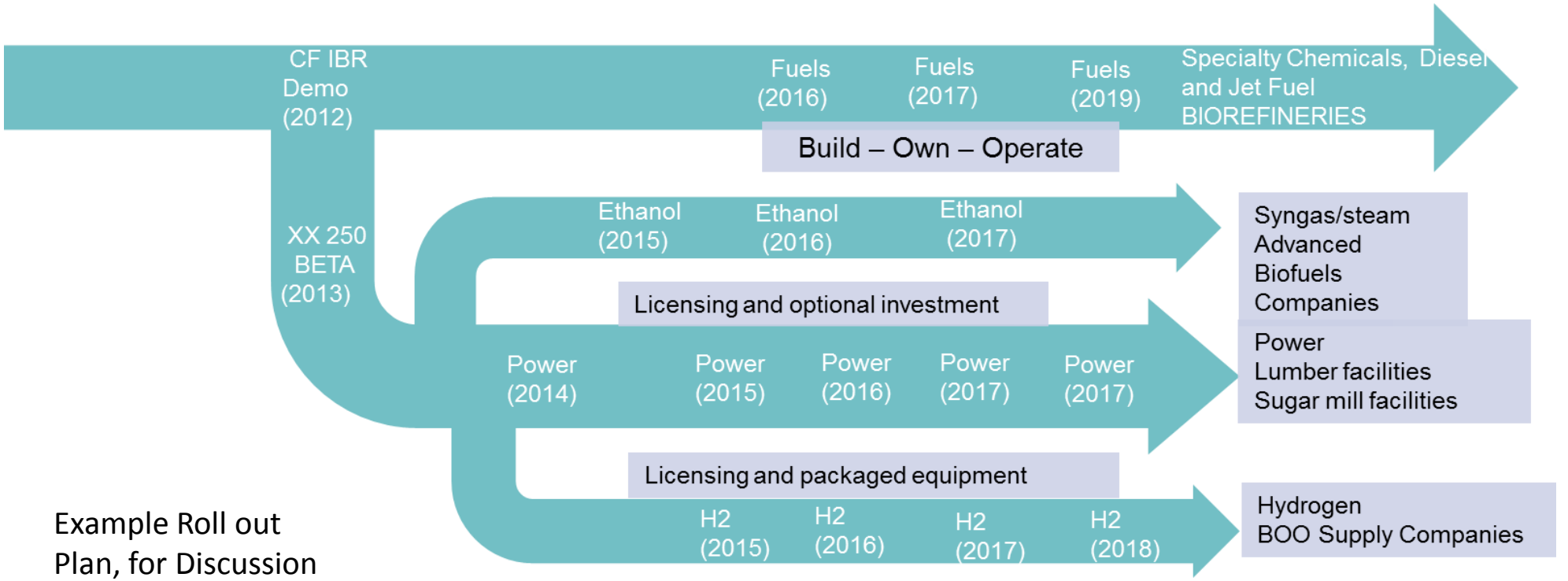
Naphtha

RenChem® Naphtha

Clean Power

Scale, Efficiency, Timing

- Scale defined by feedstock availability
- Co-Location



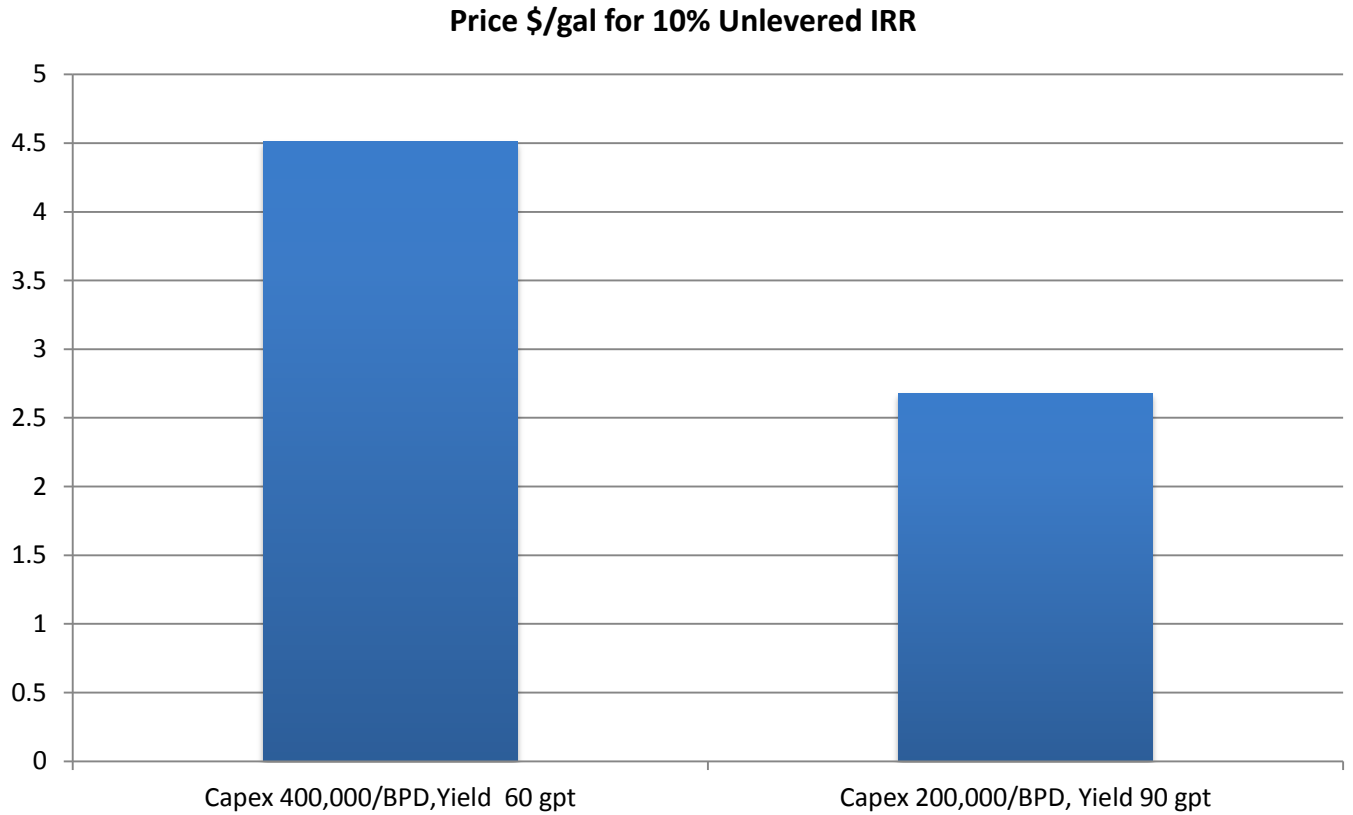
Example Roll out Plan, for Discussion Purposes Only

Economic Challenges – Perception FT is not Affordable

- Drop-In Certified Fuels
  - One of Only Two Approved Routes to Jet Fuel
    - Other Routes are years from certification
  - No Infrastructure Issues; No Integration with Petroleum Refineries needed(possible but not needed)
- No need for imported Hydrogen
  - Many of the other possible processes will require large amounts of H_2 from either gasification of biomass or reforming of natural gas
    - For example, 5000 SCF/BBL needed for pyrolysis oil upgrading, a 40 MGPY facility will require 15 million SCF per day of H2
- All Parts of Biomass Used
  - Large Integration Opportunities with other technologies
    - Syngas Fermentation to Ethanol for example
    - Algae Oil Upgrading

Illustrative Economics

- Renewable FT Diesel can compete with other Renewable Fuel prices
  - See all in price including all RIN's and other credits required for 10% IRR below.
- With improvement in yield and capex with next gen technologies, Renewable FT diesel can even compete with petroleum diesel



Cost Reduction Measures

- Initial BioRefineries
  - Diversify product offerings
    - Specialty Chemicals
    - Be aware of Market Saturation
- Next BioRefineries
  - Reduce Capital Cost
  - Increase Yield

How we manage Capex

- Lower Equipment Count
- Increased Catalyst Efficiency
- Increase Yield
- Global Sourcing
- Project Execution Management
  - EPC Wraps not Feasible for First of a Kind Technologies
- Project Risk Management
  - Watch Overruns
  - Demonstrate First – Fully Integrated Pilots Needed
  - IBR Example
    - Waste Heat Recovery