



Synfuels BioFuels

100% Renewable Bio-Jet

- ▶ Jet Fuel (JP-8) that meets or exceeds all specification
- ▶ Made from ethanol – an abundant feed stock
- ▶ Very Low Sulfur
- ▶ Lower Freeze point than standard JP-8 made from crude oil
- ▶ Better thermal stability than JP-8 made from crude oil

Why is **Ours** Better Than Others?

- ▶ Manufacture whatever aromatic content the client desires
- ▶ Very little HEAVY Smoke causing polycyclic aromatics
- ▶ Very little straight chain hydrocarbons that cause fuel freezing
- ▶ Molecular weight distribution nearly identical to standard JP-8 made from crude

The Difference is in the Process

- ▶ In **reactor 1**, we convert ethanol to ethylene
- ▶ In **reactor 2**, we convert ethylene to mostly butene and hexene
- ▶ In **reactor 3**, we convert butene/hexene to jet fuel
- ▶ In **reactor 4**, we add a little hydrogen to stabilize the raw product
- ▶ We separate the jet fuel (80)% from diesel, gasoline and light product (20%). Lights used to make hydrogen (5%)

Basic Process Design

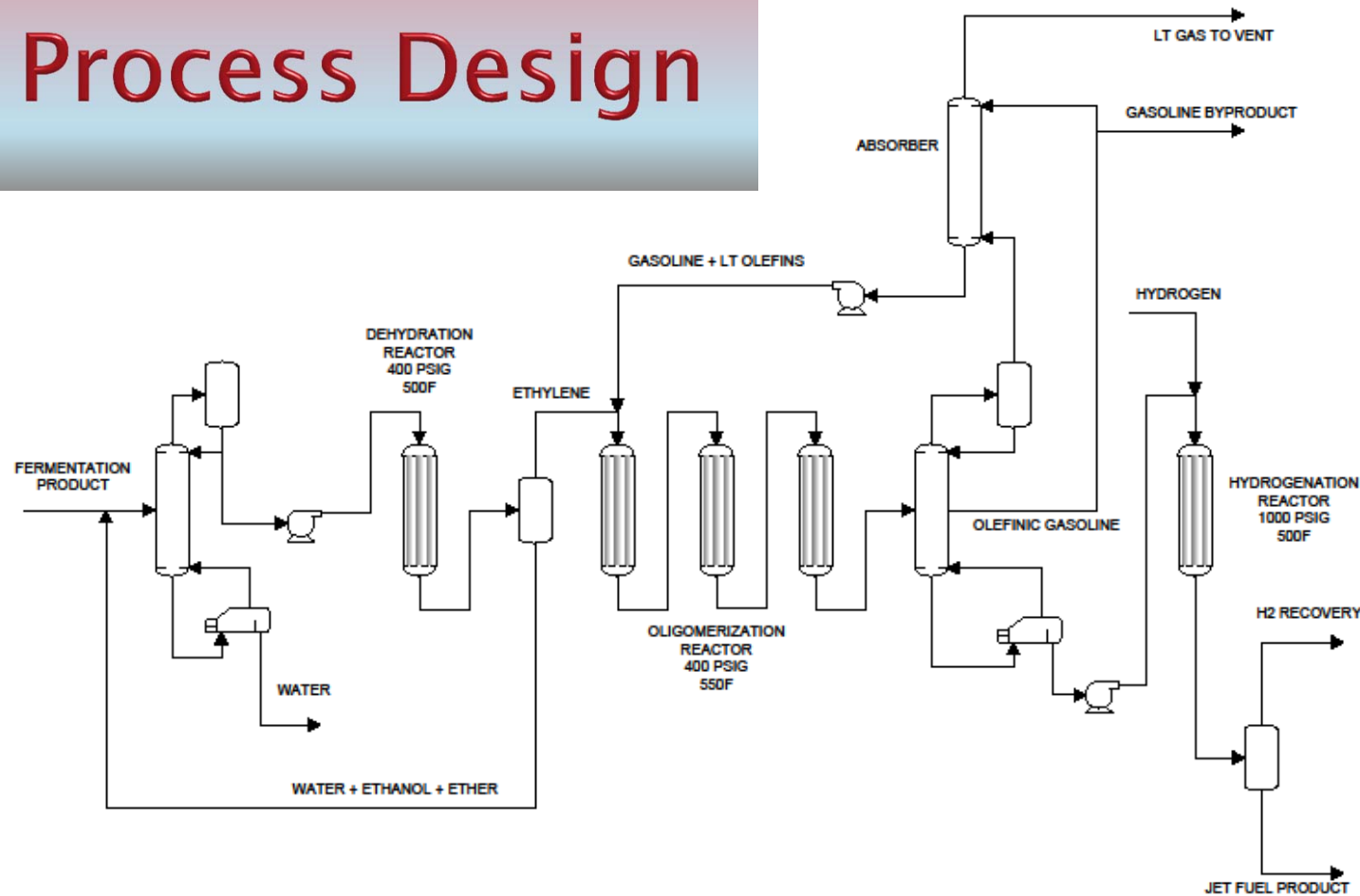
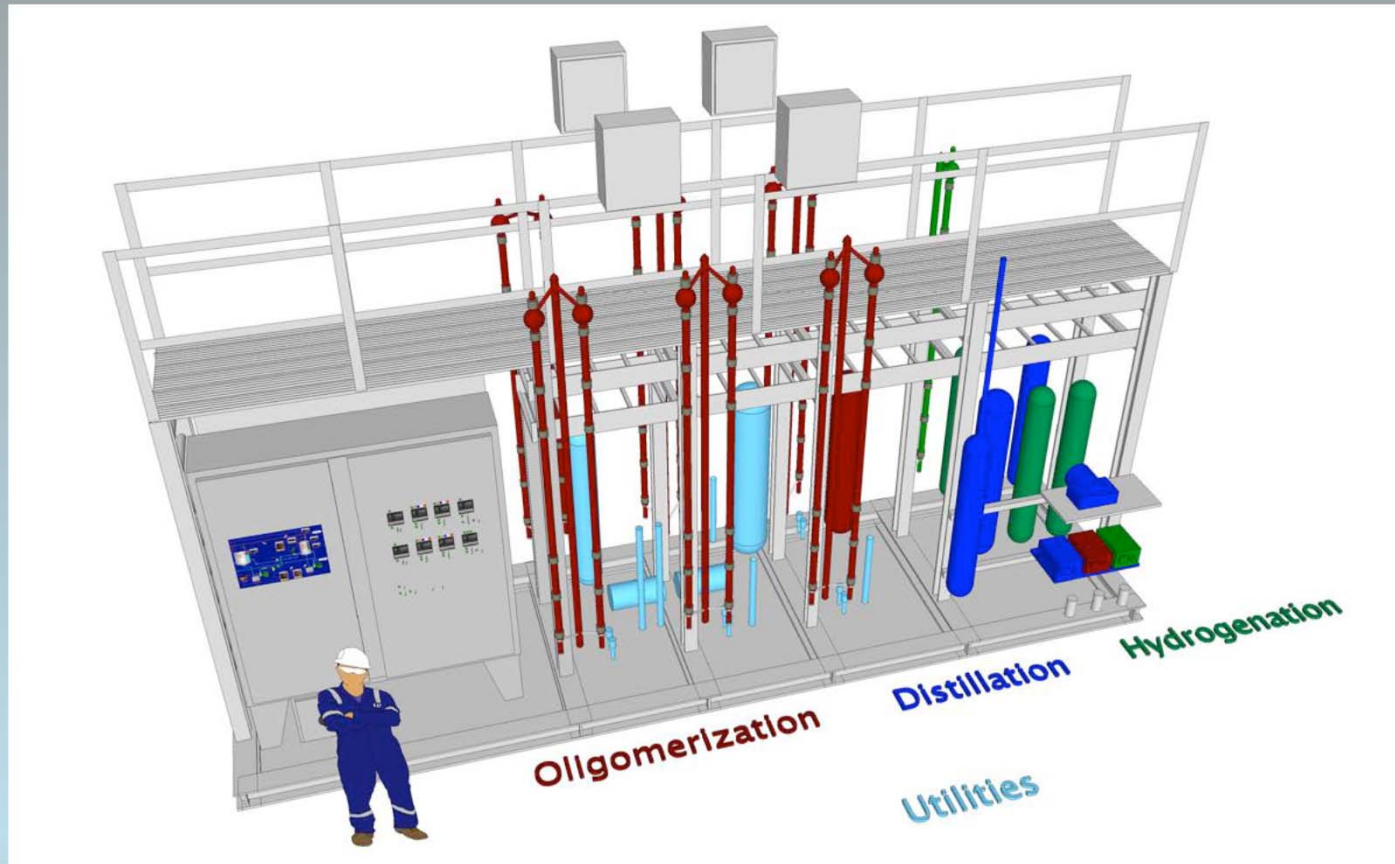


FIGURE 1
PROPOSED PROCESS FLOW DIAGRAM

Where we are in the Approval Process?

- ▶ ASTM has a 4 tier testing program
- ▶ We have passed the first 2 tiers with 1 gallon sized samples
- ▶ Tier 3 and 4 require 100 and 10,000 gallon samples primarily for engine testing
- ▶ We have designed a production rig for making 150 gallons per month

5 Gal/Day Production Rig



Who Needs Renewable Jet?

- ▶ EU is enforcing rules that require jets to use a growing percentage renewable fuel
- ▶ Renewable Jet fuel will earn substantial carbon credits in Europe
- ▶ Airlines that desire to have or retain a good public image will show their environmental stewardship by using renewable jet
- ▶ Military aircraft that require fail-safe cold weather operation