WHAT IS RENEWABLE DIESEL?

RENEWABLE DIESEL AND BIO-DIESEL are both made from renewable feedstocks BUT ARE DIFFERENT MOLECULES

**RENEWABLE DIESEL**
- Chemically indistinguishable from diesel fuel (Drop-in)
- No blend constraints, same equipment, no pipeline restrictions.
- Same energy density of diesel
- Cetane No >70
- Cloud point: customizable, as low as -50°C
- Renewable Jet-A possible
- #1 and #2 diesel by changing operating conditions

**BIO-DIESEL**
- Fatty Acid Methyl Ester (oxygenated)
- Limited to B20
- Constraints in the use of the petroleum infrastructure
- Cetane ~45-50
- 90% Energy content of diesel
- Cloud point ~ -5°C
- NOx emission may be higher

Δ ~ $1/gal

Typical premium for renewable diesel over biodiesel in the marketplace
SUITABLE FEEDSTOCKS

- Used Cooking Oils (UCO)
- Yellow Greases (waste veg. oils and animal fats)
- Distiller Corn Oil
- Tallow
- Acid Oils
- Algal Oil
- Tall Oil and Tall Oil Fractions
- Any vegetable oil

NO LIMITATION ON FFA%

- Waste and Processing Residues
- Low Carbon Intensity Feedstock
- Qualify for higher compliance value in key jurisdictions (CA LCFS, EU REDII)
THE RENEWABLE DIESEL PROCESS IN A NUTSHELL

1. **Pre-treatment (degumming, etc.)**
   - **Fats & Oils**

2. **Reformer**
   - **Nat Gas**
   - **Hydrogen**

3. **Hydrotreating Reaction**

4. **Isomerization Reaction**

5. **Fractionation**

6. **Fuel Gas**
   - **Mid Pressure Steam**

7. **Renewable Diesel Yield ~85%**

8. **Renewable Naphtha Yield ~8%**

**ISBL**

- **Renewable Diesel** Yield ~85%
... WITH MASSIVE POTENTIAL IN CALIFORNIA ALONE

Total Sales on road diesel and jet fuel in California (includes bio-based)

2018 actual ~ 550,000 barrels per day

Plenty of headspace for Renewable Diesel to grow:
- No blending constraints
- Low CI Renewable Diesel necessary to meet compliance goals

Sales of Bio-Based Diesel in California for LCFS Compliance

2020 estimate\(^1\) ~ 100,000 barrels per day

2018 actual ~ 40,000 barrels per day

OTHER STATES ARE ADOPTING THE CA LCSF OR SIMILAR PROGRAM
RENEWABLE DIESEL: COMPLIANCE VALUE (US)

California LCFS: Mandated Carbon Intensity Reduction (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Cellulosic biofuel (million gallons)</th>
<th>Biomass-based diesel (billion gallons)</th>
<th>Advanced biofuel (billion gallons)</th>
<th>Renewable fuel (billion gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>540</td>
<td>2.43</td>
<td>5.04</td>
<td>20.04</td>
</tr>
</tbody>
</table>

RENEWABLE DIESEL: DELIVERS OUTSTANDING CARBON INTENSITY REDUCTIONS

Carbon Intensity¹ Score (gCO₂/MJ Energy) of Renewable Diesel vs. Other Biofuels and Petroleum Diesel (CARB approved pathways)

Δ Carbon Intensity Petroleum vs Renewable Diesel:
~ 70 CI Score (= -70%)

Average renewable diesel CI is comparable to biodiesel, but RD higher fungibility, higher cetane and lower cloud point make it more attractive.
RENEWABLE DIESEL IS A WELL-ESTABLISHED PRODUCT AND MARKETPLACE …

Geographic spread of HVO plants

<table>
<thead>
<tr>
<th>Company</th>
<th>Capacity p.a. (MT)</th>
<th>Market share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NESTE</td>
<td>~2.510</td>
<td>37%</td>
</tr>
<tr>
<td>Eni</td>
<td>~1.130*</td>
<td>17%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>~800</td>
<td>12%</td>
</tr>
<tr>
<td>EMERALD</td>
<td>~500*</td>
<td>7%</td>
</tr>
<tr>
<td>SB</td>
<td>~400*</td>
<td>6%</td>
</tr>
<tr>
<td>EMERALD</td>
<td>~280*</td>
<td>4%</td>
</tr>
<tr>
<td>REG</td>
<td>~250</td>
<td>4%</td>
</tr>
<tr>
<td>PETROBRAS</td>
<td>~230</td>
<td>3%</td>
</tr>
<tr>
<td>Others</td>
<td>~665</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>~6775</td>
<td>100%</td>
</tr>
</tbody>
</table>

Note: Including industrial plants under construction | Source: Greenecc, Industriell Energi AB
THE MARKETPLACE IS CURRENTLY DOMINATED BY OIL REFINERS

Being that Renewable Diesel is produced with petroleum refining technologies, **conventional wisdom** wants that the production of RD is economically viable only:

- At very large scale (industrial economies of scale are everything)
- Co-located with a petroleum refinery

This **Conventional Wisdom** is convenient for Big Oil
This Conventional Wisdom is convenient for Big Oil

Because the production of RD unlocks the compliance value of the feedstock as a biofuel → such conventional wisdom shifts the economic value downstream, away from the Feedstock Supplier

... BUT it is NOT TRUE
RENEWABLE DIESEL: 3 COMPONENTS CONTRIBUTE TO VALUE

- **Co-products**: Naphta, Co-location synergies
  - Average 2019: $0.15/gal RD

- **Compliance**: LCFS, RFS, BTC
  - LCFS: $1.5/gal RD
  - RFS: $0.85/gal RD

- **Commodity**: Fuel Price
  - Average 2019: $1.5/gal RD
RENEWABLE DIESEL - DISECONOMIES OF SUPPLY MATTER FOR BIO-BASED RESOURCES

- Economies of Scale dominate the economics of fossil resources
- Diseconomies of Supply matter more in the economics of many bio-based resources
  - Aggregating bio-based resources (especially residual resources) is expensive
RENEWABLE DIESEL: INCREASING PROFITABILITY OF CORN ETHANOL DRY MILLING

CRUSH MARGIN ($/GALLON ETHANOL) IMPACT OF RENEWABLE DIESEL

Δ ~ 14 $ cts/gal EtOH

Key Assumptions

- Corn Price: $4.25/bu
- Ethanol Price: $1.3/gal
- Natural Gas Cost: $3.5/MMBtu
- DDGS Price: $140/ton
- Corn Oil Value: $0.25/lb
- External Corn Oil Purchases: 44 Mlbs/yr
- Renewable Diesel Price: $3.75/gal

Without Renewable Diesel

$7 cts/gal EtOH

With Renewable Diesel

$21 cts/gal EtOH

1: 10 MMGPY Renewable Diesel Facility
Have partnered to provide a standard RD solution right sized for feedstock owners
RENEWABLE DIESEL: A PROVEN TECHNOLOGY AT SMALLER SCALE

4.5 MGPY CAPACITY Plant

Feedstock: Distillers Corn Oil

- Ethanol plant in Garnett, KS
  - 40 mgy corn ethanol plant
  - Uses own DCO and source additional from a nearby mill
- Site is operational (September 2020)
- Operational History
  - Original Start-up in 2016
  - Increased capacity by 50% in 2017
  - Hydrocarbon Yield in the 90-92% range
  - Upgraded H2 facility in 2019/2020
  - Seamless integration with the ethanol facility
RENEWABLE DIESEL - DERISKING PROJECT DELIVERY FOR FEEDSTOCK OWNERS

- Pre-Treatment Technology
- Small scale hydrogen reforming
- Refining know-how
- Modularization experience
- Full EPC wrap
- Performance guarantees

Renewable Diesel Project

- Lump sum, turn-key project
- 4 standard modules: 5 -10 - 20 - 30 MMGPY (ISBL pre-engineered)
- Grey field site

- Core process technology
- Experience with DCO
- Knowledge of corn ethanol facilities integration
- Commissioning, start-up and operational support
- Training

14-16 Months

- PROCUREMENT: T=1M
- MODULES MANUFACTURING: T=3M
- DELIVERY TO SITE: T=9-11 M
- SITE ASSEMBLING COMPLETED: T=12-14 M
- Start-Up: T=14-16 M

T=0

MODULES READY: T=8-10 M
## FY 2019 Results

- **Revenues**: $3.75 billion (BLN)
- **EBITDA**: $250 million (MLN)

## Operating Companies

- **Maire Tecnimont**
- **KT (Kinetics Technology)**
- **Stamicarbon**
- **Met Development**
- **NextChem** (Maire Tecnimont for Energy Transition)
- **Neosia Renewables**

## Presence in the World

- **~9,300 Employees & Professionals**
- **50 Operating Companies**
- **45 Countries**

## Hydropnons

- **RENEWABLE RESOURCES**
Thank you for your attention and interest!

QUESTIONS?

Setup I used to test synthesis of RD from DCO in 2009 with a grant from the MN Dept of Agriculture