Sustainable Energy Fund – October 26, 2023

Ensyn Corporate Summary

- Ensyn has been in business for over 30 years, producing cellulosic non-food biofuels and specialty chemicals
- Ensyn uses its patented and proprietary Rapid Thermal Processing™(RTP™) technology to convert wood residues or other cellulosic material into a renewable fuel oil, RFO™
- RFO is a refinery feedstock for production of gasoline and diesel, and is also a renewable heating fuel
- Ensyn RTP technology has been deployed in 16 facilities since 1989 and is currently operating in 8 facilities across the USA and Canada. Production to date exceeds 50 million gallons in over 200,000 hours of unit operation
- The company's technology is commercially proven in multiple industries:

- Red Arrow (now Kerry foods), a specialty food products company, has used the Ensyn technology since 1989 to produce food chemicals and heating fuels

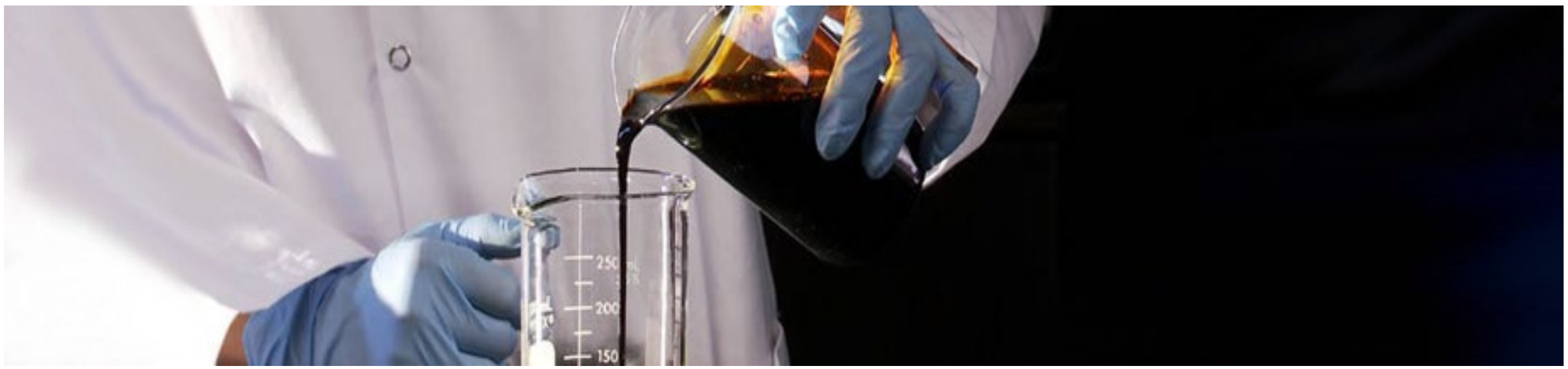
- Ivanhoe Energy Inc (TSX: IE, NSADAQ: IVAN), an oil exploration and production company, acquired the rights for petroleum (heavy oil) upgrading in 2005 at a $100 million valuation

- Ensyn has two production facilities through licensed production. The Ontario facility is a 3 million gallon per year facility located in Renfrew, ON and the Cote Nord production facility is a 10 million gallon per year facility located in Port Cartier, QC.
- Ensyn is now building out capacity in a number of projects to produce significantly more RFO capacity – partially spurred on by RFS – in order to be a major supplier of RFO to the heating oil and refinery markets. There are production facilities which are in some form of development in Minnesota, Maine, Washington and Georgia.

Ensyn's Ontario RFO plant in Renfrew, Ontario

Ensyn's Cote Nord RFO plant in Port Cartier, QC.

What is RFO?



- A homogeneous, organic liquid obtained from the thermal conversion of biomass
- Primarily carbon, hydrogen and oxygen
- Appearance of motor oil
- It is polar in nature and does not readily mix with hydrocarbons
- Tends to contain less metals and sulfur than petroleum liquids
- Pourable at room temperatures
- pH of 3; similar to vinegar or red wine
- Is the only known liquid fuel sourced from woody biomass that can be used for thermal operations in existing boilers

RFO Specifications

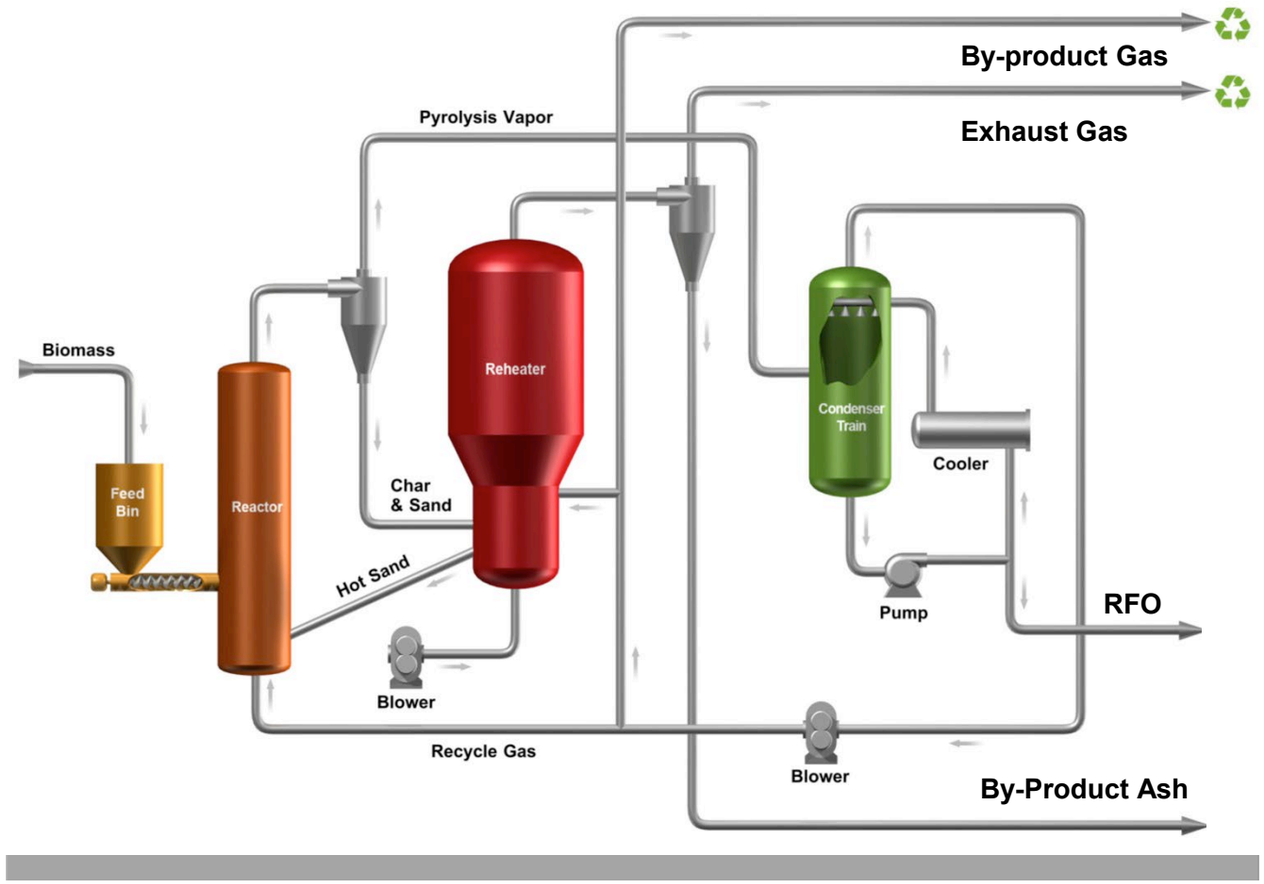
The RFO supplied by Ensyn shall comply with ASTM D7544, Standard Specification for Pyrolysis Liquid Biofuel. For ease of readership, these specifications are reproduced herein, showing both the metric units used in the ASTM standard as well as imperial units.

RFO Specification:

Parameter	Test Method	Metric Units	Imperial Units	
Gross Heat of Combustion	ASTM D240	15 MJ/kg min	6450 BTU/lb min	★
Water Content	ASTM E203	30 wt% max	30 wt% max	★
Pyrolysis Solids Content	ASTM D7579	2.5 wt% max	2.5 wt% max	
Kinematic Viscosity, at 40°C	ASTM D445	125 mm^2/s max	125 cSt max	
Density, at 20°C	ASTM D4052	1.1 to 1.3 kg/dm^3	9.2 to 10.8 lb/US Gallon	★
Sulfur Content	ASTM D4294	0.05 wt% max	0.05 wt% max	
Ash Content	ASTM D482	0.25 wt% max	0.25 wt% max	★
pH	ASTM E70	Report	Report	
Flash Point	ASTM D93, Procedure B	45 °C min	113°F min	
Pour Point	ASTM D97	-9 °C max	16 °F max	★

Rapid Thermal Processing (RTP™) Overview

RTP™ Diagram



RTP™ Technology Summary

- RTP™ technology is a simple scaled down version of a Fluid Catalytic Cracker (FCC)
- Sand and heat are used to thermally crack and convert biomass into renewable crude oil
- The process does not require catalysts, high pressure or hydrogen, preserving a maximum amount of carbon in liquid form
- Gas and char co-products are used as a source of energy to run the facility
- Ensyn has strong IP on its technology and bioenergy applications

ENSYN fuels

Renewable Fuel Standard (RFS2)

- Passed by Congress in 2007 under the Energy Independence and Security Act (EISA).
- Increased the Renewable Fuel mandate from the 12 billion gallons in the original RFS to 36 billion gallons by 2022.
- Obligated parties under RFS2 are petroleum refineries and gasoline importers.
- All biofuels must be produced from “Renewable Biomass”.
- Of the 36 billion gallon mandate, 16 billion must be cellulosic biofuel like RFO.
- RFO must show a 50% reduction in GHGs from the fuel that it is replacing in order to qualify for a RIN (Renewable Identification Number) similar to a REC for electricity.
- Obligated parties must generate RINs to show compliance with RFS2.
- When a gallon of RFO is burned, a RIN is generated. Ensyn Fuels sells RINs to obligated parties so that they can be compliant with RFS2.
- The value of the RIN is established by the legislation. In general terms, as the cost of gasoline goes down, the value of the RIN goes up and vice-versa.
- Current RIN value (as of Oct. 19) is approximately $3.30 or $42.31/MMBtu.

Renewable Fuel Standard Feedstock Requirements

In order to qualify under the EPA's Renewable Fuel Standard, Ensyn Fuels must use "Renewable Biomass" as defined by the RFS. The credits generated as a qualified renewable fuel are critical to Ensyn Fuels' economics so all RFO will be manufactured using feedstock that meets the "Renewable Biomass" definition. "Renewable Biomass" is defined as follows:

- Slash and pre-commercial thinnings from non-federal forest lands.
- Planted trees and tree residue from actively managed tree plantations on non-federal lands.
- Biomass obtained from the immediate vicinity of buildings, public infrastructure and areas regularly occupied by people that are at risk from wildfire.
- Other activities, including planted crops and crop residue from non-forested agricultural land that is either actively managed or fallow.

Before Thinning

After Thinning

ENSYN fuels

GHG Emissions – Wood Feedstock

Fuel	Heating Oil	Natural Gas	PyOil (i.e., RFO)
Feedstock	Crude Oil	Natural Gas	Wood Residues
	g CO_2eq/GJ		
Fuel Dispensing	402	0	874
Fuel Distribution & Storage	698	2,063	361
Fuel Production	8,412	1,376	9,555
Feedstock Transmission	1,401	0	0
Feedstock Recovery	8,081	1,708	0
Land-use Changes, Cultivation	25	0	0
Fertilizer Manufacture	0	0	0
Gas Leaks & Flares	1,900	3,540	0
CO_2, H_2S Removed from NG	0	642	0
Emissions Displaced	-128	0	0
Sub-total Fuel Production	20,790	9,330	10,790
Fuel Combustion	68,718	51,432	301
Grand Total	89,508	60,762	11,091
% Change Compared to RFO	-87.6%	-81.6%	
	208.18 lbs/MMBtu	141.32 lbs/MMBtu	25.8 lbs/MMBtu

(S&T)² Consultants Inc.
11657 Summit Crescent
Delta, BC Canada, V4E 2Z2

ENSYN fuels

Sample GHG Savings Calculation

Annual Consumption: 78,000 MMBtus
Gas Cost: $10/MMBtu
RFO Cost: $8/MMBtu
Annual Fuel Savings: $156,000

Annual GHGs using Gas: 5,000 MTCO2eq
Annual GHGs using RFO: 913 MTCO2eq
GHG Reduction: 4,088 MTCO2eq

If any amount of fuel oil is displaced, both the cost savings and GHG reduction are increased.

For every MTCO2eq reduced, the customer ***SAVES* $38!**

ENSYN fuels

RFO - Combustion

Emission Factors for Combustion of Renewable Fuel Oil (RFO)

Emission Factor lb/MMBtu (HHV)	NG[1]	ULSD[2]	Distillate[3]	No.4[4]	No.5[5]	No.6[6] (low S)	No.6[7] (high S)	RFO[8]
CO2	118	159	159	154	155	167	163	138
CO	0.082	0.036	0.036	0.033	0.033	0.033	0.033	0.005
NOx (Expressed as NO2)	0.098	0.14	0.14	0.13	0.37	0.37	0.37	0.175
SO2	0.0006	0.0015	0.22	1.35	1.97	0.88	4.16	0.001
Total PM	0.0075	0.024	0.024	0.055	0.077	0.083	0.27	0.075
VOC (NMTOC)	0.0054	0.0014	0.0014	0.0013	0.0019	0.0019	0.0019	0.0001

- RFO combustion emissions compare favorably with fossil fuel
- Extent of burner retrofit dependent on the burner design (new fuel gun versus complete burner assembly)
- Commercial burner package has been developed to retrofit boilers for 100% RFO use
- Official emissions test conducted at Memorial Hospital in September 2015 and Youngstown Thermal in 2016.

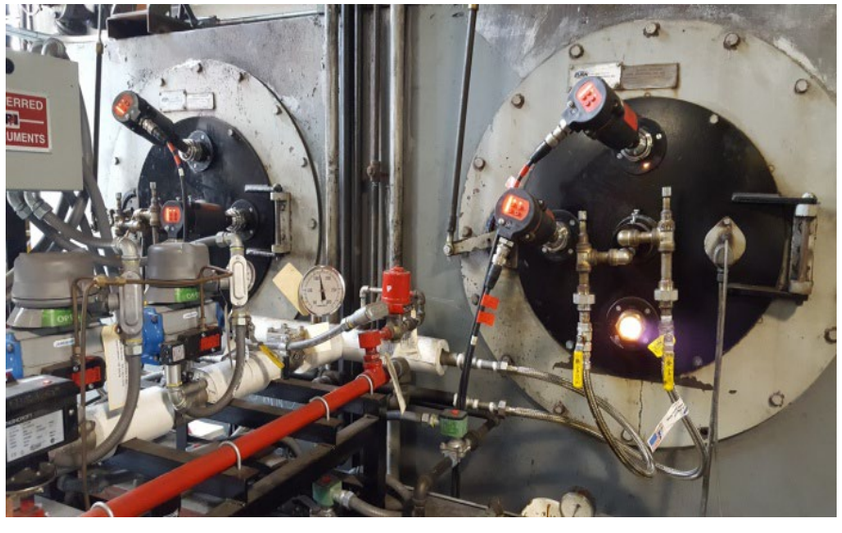
ENSYN fuels

RFO Projects – Memorial Hospital North Conway, NH

- Chose RFO over solid biomass
- 2 Cleaver Brooks 200 HP boilers
- Converted in 2014
- Increased fuel optionality and reliability
- Consumed over 2.3 million gallons since 2014
- RFO has provided over 95% of the steam load

RFO Projects – Youngstown Thermal Youngstown, OH

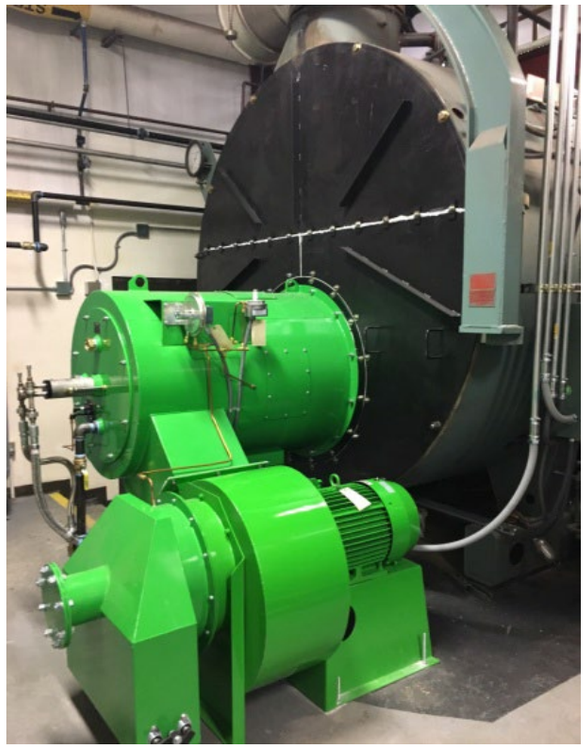
- Converted a 100,000 lb/hr natural gas, water tube boiler to natural gas/RFO in 2016.
- The converted burner can burn gas, RFO or co-fire RFO and gas.
- Increased fuel optionality and reliability.
- YT has burned over 2 million gallons to date.
- Used as a test site to prove use in large boiler and rail logistics.



ENSYN fuels

RFO Projects – Bates College Lewiston, ME

- 3 Cleaver Brooks 700HP boilers.
- Converted 1 boiler to RFO in 2017.
- The RFO boiler carries about 80% of the steam load.
- They have seen a 67% reduction in their scope 1 GHGs.
- In the process of converting a second boiler so that nearly 100% of the steam load will be carried by RFO.
- Project had a less than 2-year payback.



ENSYN fuels

East Millinocket Biorefinery

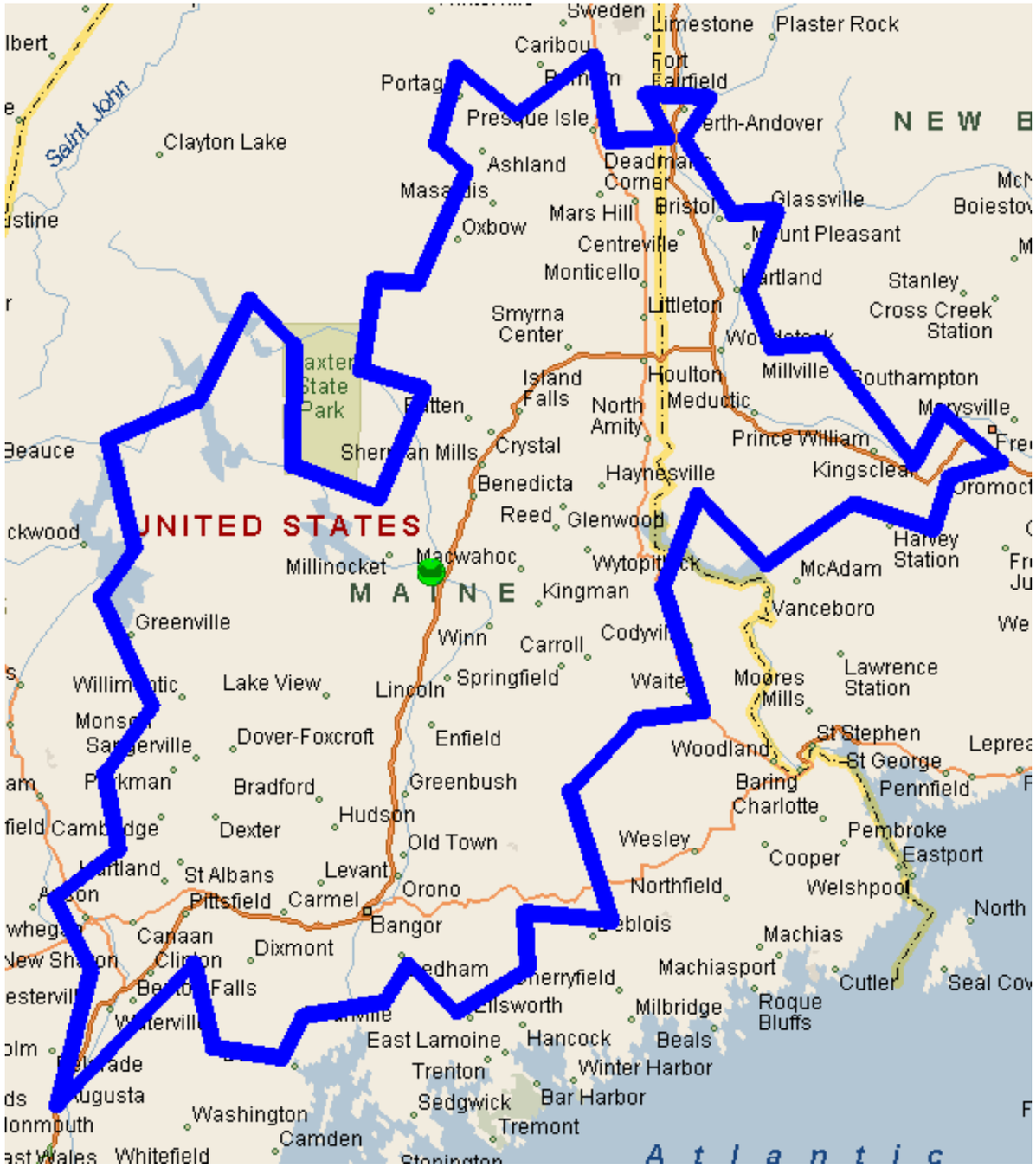
- Total capacity of 21 million gallons per year
- Will consume 400 bone dry tons of biomass per day
- EPA has approved harvest plan
- Total cost of $200 million
- ME DEP Air License has been issued.
- $100 Million in project equity is in final negotiation. Remaining funding to be completed by the end of 2023
- Target Operation date of 2025-26 heating season.
- One of the investors is a Native American Tribe

ENSYN fuels

East Millinocket Bio Refinery

East Millinocket Bio Refinery Feedstock Plan

- The facility requires 300,000+/- green tons of material per year.
- EPA has approved our feedstock plan. The EM project is the first project in the US to have a pre-approved feedstock plan approval.
- Approved feedstock is “slash” which includes tops, branches, butts, dead and damaged trees.
- All feedstock is required to be certified by our forester and a third-party auditor.
- Feedstock supply will be procured within 90 minutes of the plant.
- Current available feedstock is 1.5 million tons of slash.
- We are in the process of finalizing supply agreements with 4-5 landowners in the supply area.



ENSYN fuels

Slash – Burned or Left to Decompose

ENSYN fuels

First project is already in advanced development in Brazil, with start-up in 4Q2025

Location: Aracruz, Espírito Santo, Brazil

Aracruz Pulp Mill
2.3 Million tones per year

Bio Pyrolysis Oil Project

Capacity: 111 kt

Feedstock

(a) 100% residues: tree tops, energy wood and industrial biomass residues

(b) Planted forest: SUZ most competitive model

Transportation

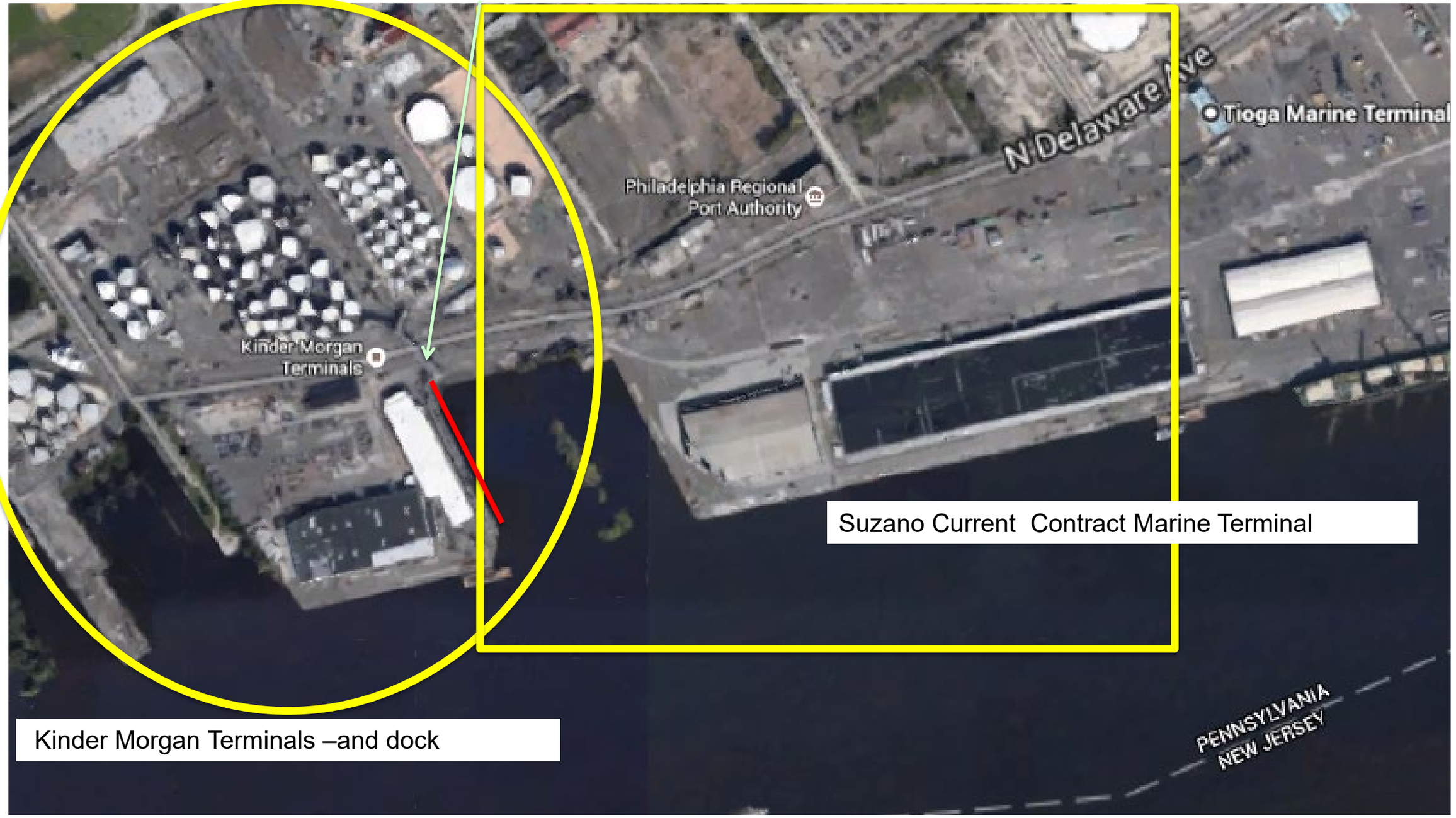
- Transfer from SUZ to terminal by pipeline
- Exports by Petrobras Terminal (TABR): liquid vessels with 10 kton of capacity

Timing

- Approval expected for 4Q23
- Start-up 4Q25

Tioga-Kinder Morgan Marine Termial – N Philadelphia

Proposed SS Pumps and piping



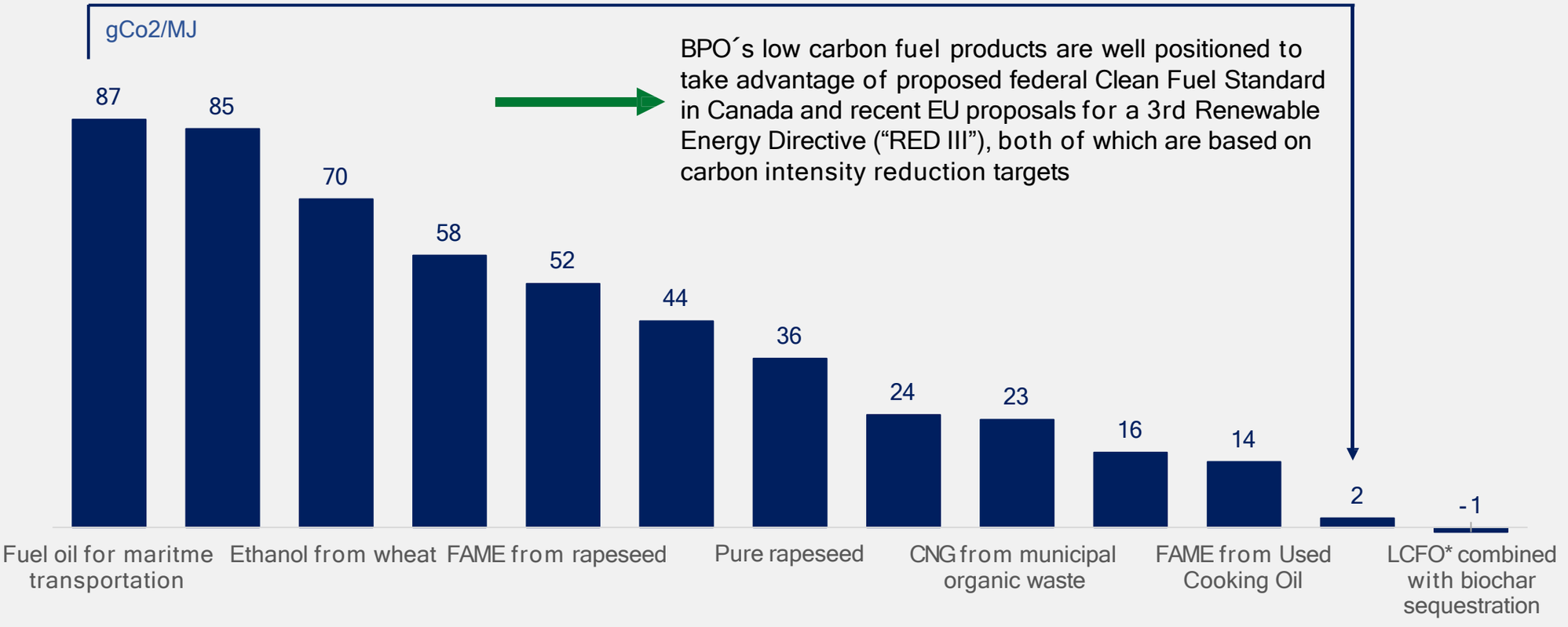
Kinder Morgan Terminals –and dock

Suzano Current Contract Marine Terminal

ENSYN fuels

Carbon intensity turns BPO into a sustainable and attractive product

Low Carbon Fuel Oil can reduce total GHG emissions by up to 98% on a full life cycle basis



BPO´s low carbon fuel products are well positioned to take advantage of proposed federal Clean Fuel Standard in Canada and recent EU proposals for a 3rd Renewable Energy Directive (“RED III”), both of which are based on carbon intensity reduction targets

Source: BioGrace-Harmonised calculations of biofuel Greenhouse Gas Emissions in Europe. HVO: Hydrogenated Vegetable Oil. CNG: Compressed Natural Gas.
* Low Carbon Fuel Oil figures exclude final transportation to customers and are based on existing RTP® facility operating data using wood processing residues.

Retrofit Costs

- A standard retrofit includes storage, pump and heater skid, burner and off-load pump or air compressor.
- Costs will depend on desired storage amount, boiler and existing conditions.
- The costs to retrofit Memorial Hospital, Bates College and Youngstown Thermal were very similar so the more use, the lower the cost per MTCO2eq reduced.
- The hope is that the fuel cost savings will pay for the conversion in 3-5 years.

ENSYN fuels

Challenges of the PA Market

- History of low gas prices making saving over gas more difficult.
- No current state programs incentivizing conversion to RFO. Some northeastern states have a Thermal REC program worth about $6/MMBtu.
- Logistics from Maine or Brazil add cost making it more difficult to deliver a cost competitive alternative.
- More reliant on the price of the RIN to be competitive.

ENSYN fuels

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