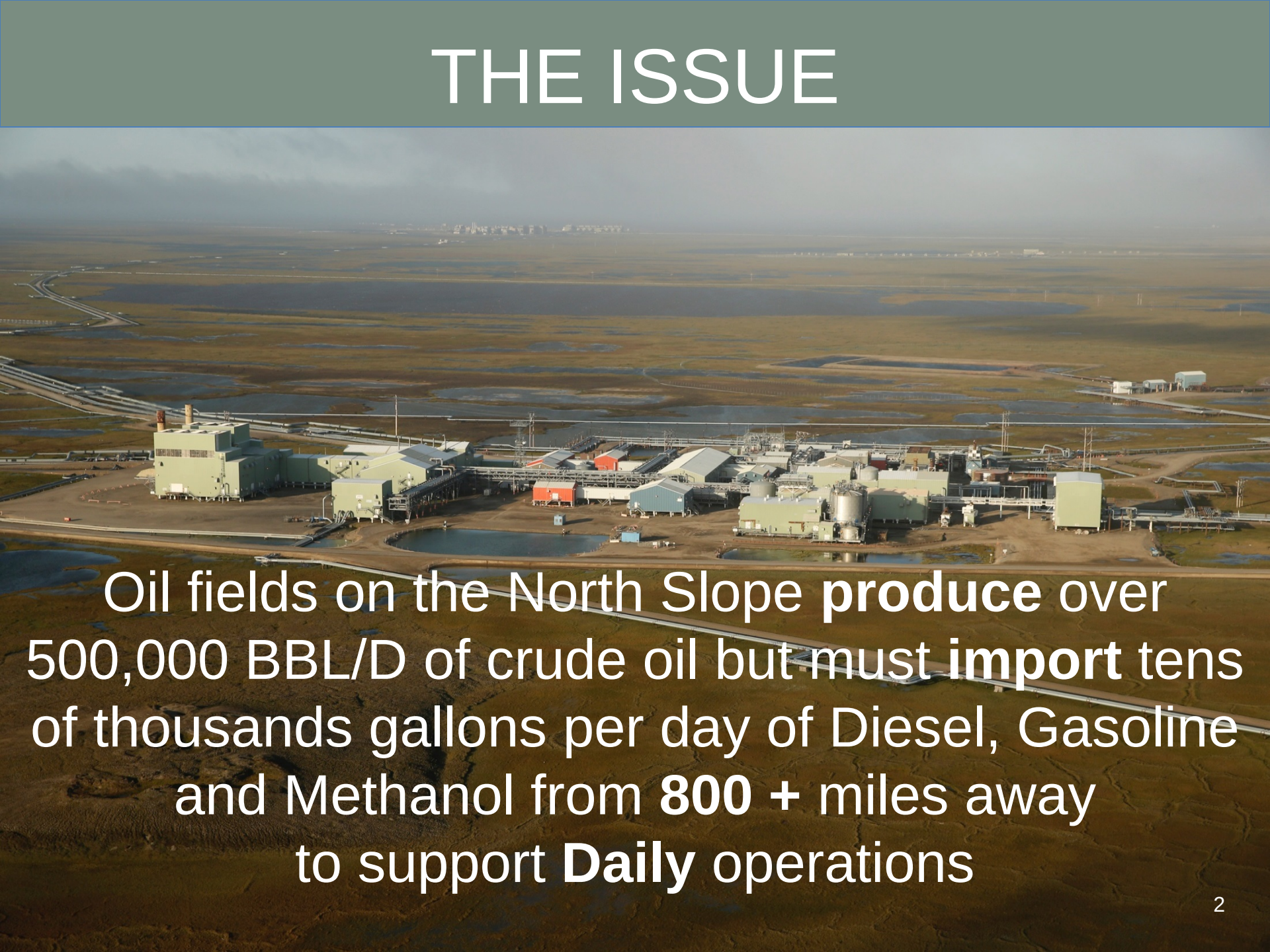


NORTH SLOPE GAS TO LIQUIDS (GTL) PLANT PROPOSAL FINISHED FUELS MADE ON THE NORTH SLOPE – “AGAIN”



May 2017

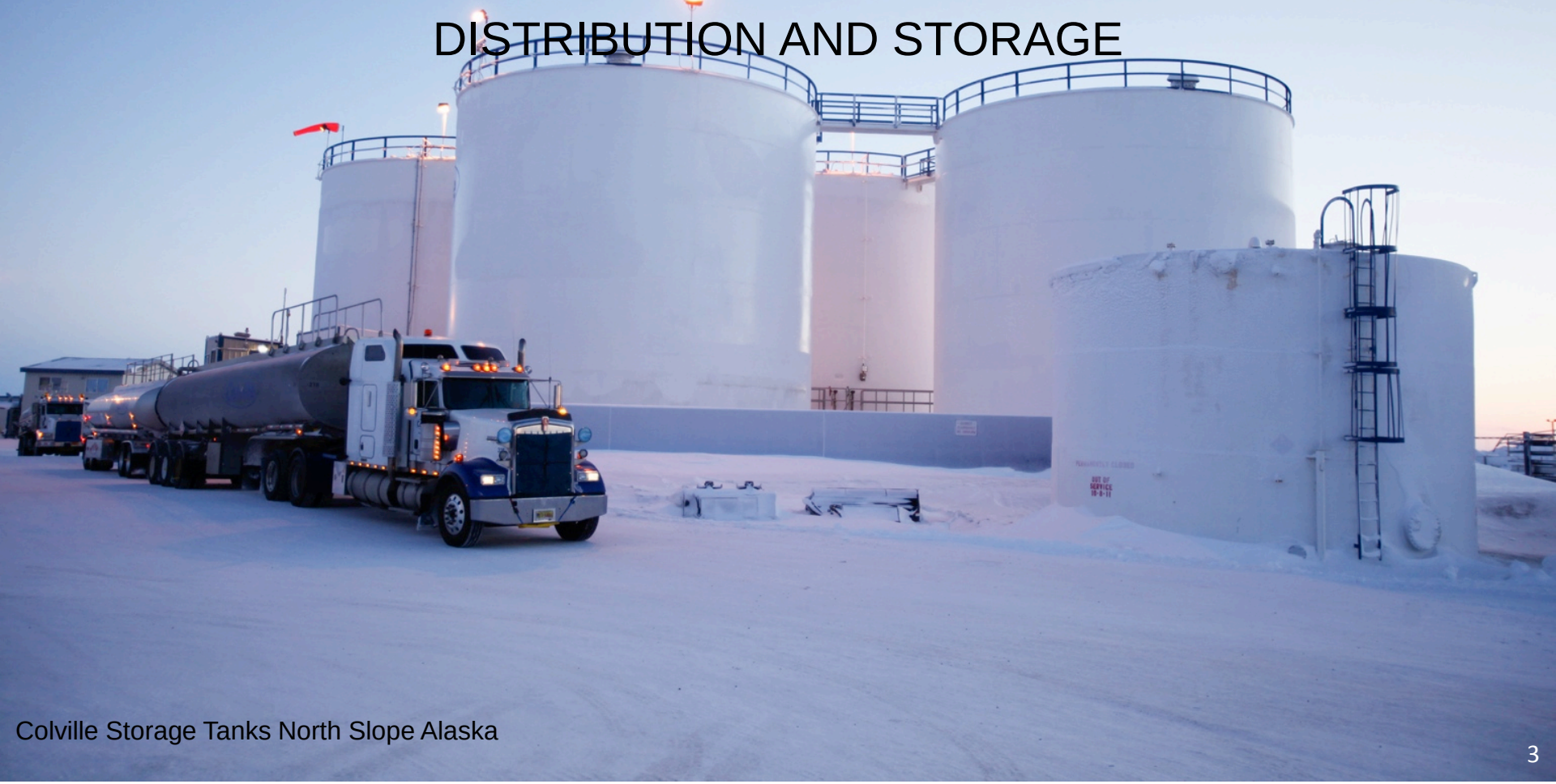
THE ISSUE

An aerial photograph of an industrial facility, likely an oil processing plant, situated on a vast, flat, brownish landscape. The facility consists of several large, light-colored buildings, numerous storage tanks, and a complex network of pipes and walkways. In the background, a body of water is visible under a cloudy sky. The text is overlaid on the lower half of the image.

Oil fields on the North Slope **produce** over 500,000 BBL/D of crude oil but must **import** tens of thousands gallons per day of Diesel, Gasoline and Methanol from **800 +** miles away to support **Daily** operations

ANRTL – WORKING WITH EXISTING NS COMPANIES

CONVERTING NATURAL GAS INTO DIESEL, GASOLINE AND METHANOL FOR THE LOCAL MARKET ELIMINATING OVER 900 MILES OF TRANSPORT (ONE WAY) PLUS MILLIONS OF MILES PER YEAR OF TRANSPORT EMISSIONS WHILE STILL UTILIZING LOCAL DISTRIBUTION AND STORAGE



Colville Storage Tanks North Slope Alaska

Alaska High Cost Fuels

Alaska has some of the **highest wholesale fuel costs** in the world.

Transport can add an **additional** \$1.00 to \$1.50/gallon to the already high fuel cost.

ANRTL proposes to supply ULSD, Gasoline and Methanol to North Slope Operators at a discount to the delivered cost of these products.

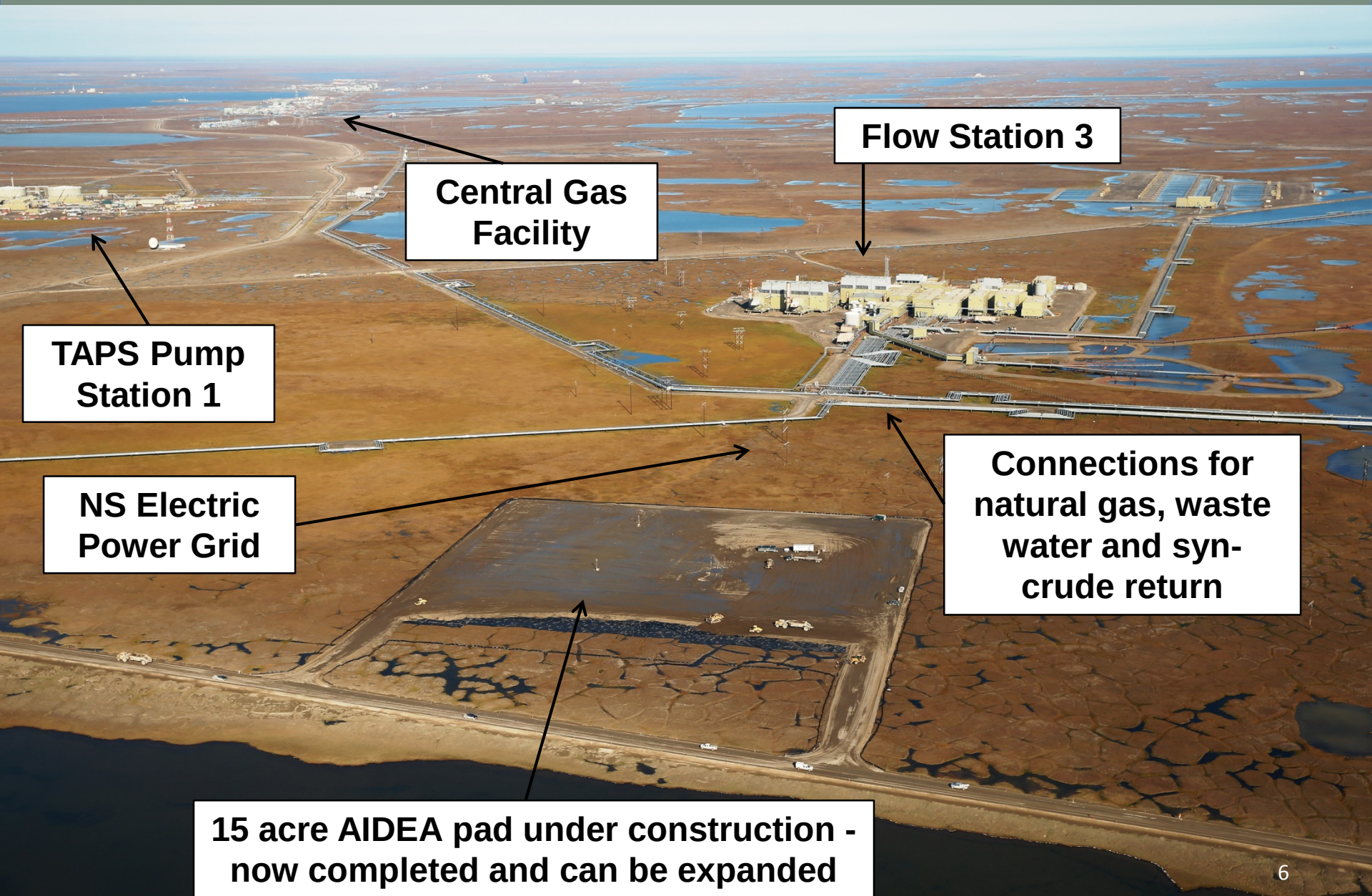
The amount of the discount will vary with the price of crude oil.



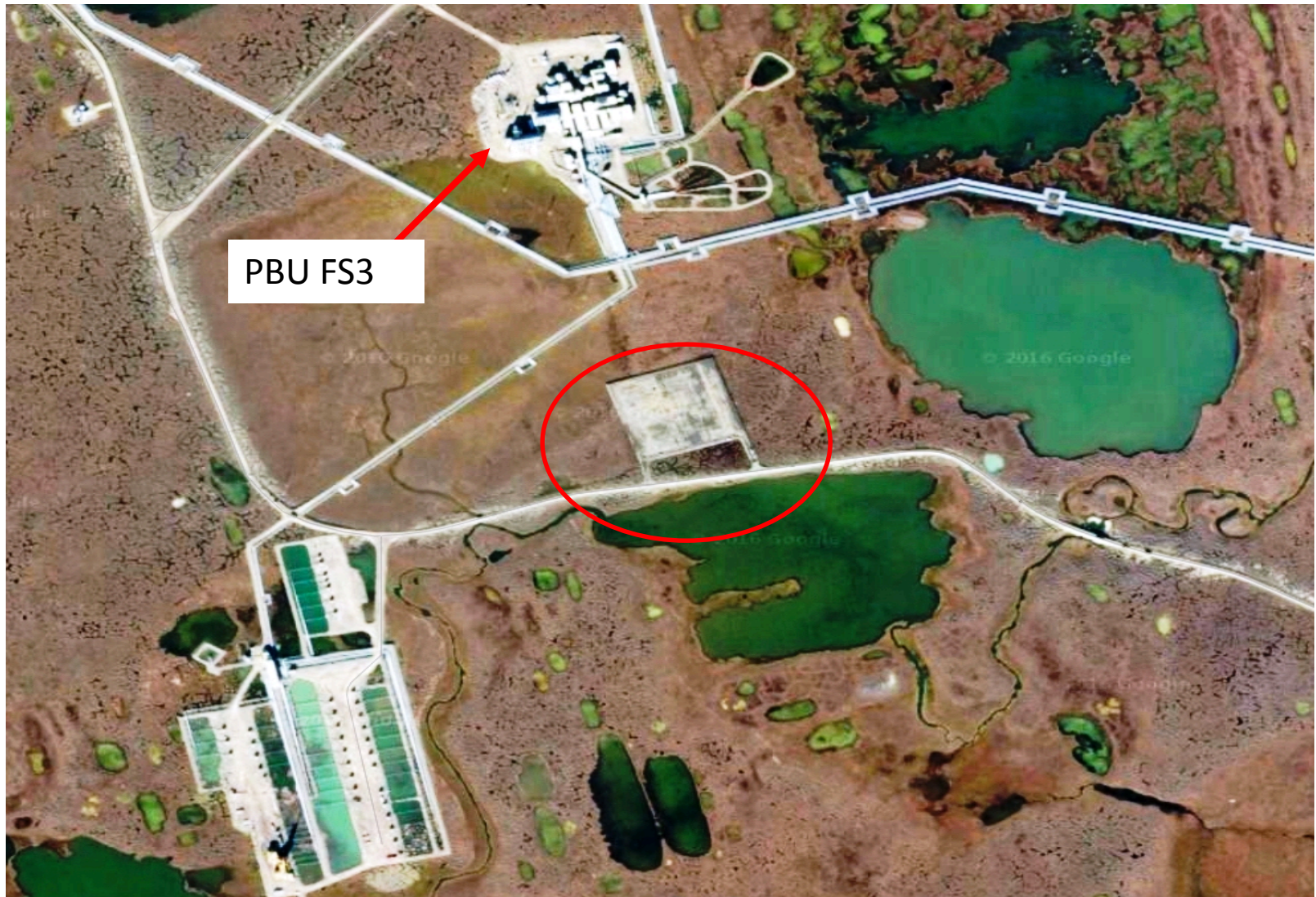
ANRTL GTL PLANT LOCATION LOCATION LOCATION

1. ANRTL's GTL plant will be located on an existing Pad located within the Prudhoe Bay Oil Unit and approved by BP as operator of the PBU.
2. The Pad is within close proximity to the source of natural gas supply, waste water disposal lines, electric power grid, CO₂ injection line and TAPS pump station 1 for delivery of syn-crude if it is marketed off the PBU.
3. The pad is owned by the Alaska Industrial Development and Export Authority (AIDEA) and they will provide the pad to the project as an initial equity investment into ANRTL's GTL project and comes with existing permits; and
4. The Pad is located on the existing North America road system, nearby tidewater docks for mega loads and adjacent to a large commercial airport and the area is serviced by over 6,000 oil and gas skilled workers.

NORTH SLOPE AIDEA PAD



AIDEA PAD – IDEAL LOCATION FOR A GTL PLANT



ARIEL VIEW OF COMPLETED AIDEA PAD

THE MAJOR COMPANIES IN THE WORLD
HAVE FOCUSED ON MEGA GTL PLANTS IN
THE RANGE OF 30,000 TO 140,000 BBL/D

THE SHALE GAS AND SHALE OIL
REVOLUTION HAS CREATED A DEMAND
FOR SMALLER SCALE GTL PLANTS IN THE
RANGE OF 200 TO 5,000 BBL/D

WHILE NEVER SPECIFICALLY DESIGNED
FOR THE NORTH SLOPE THIS SCALE IS
IDEAL FOR THE CURRENT APPLICATION

ANRTL – A GTL DEVELOPER WHO SELECTS
THE BEST TECHNOLOGY FOR EACH PROJECT

GAS TO LIQUIDS (GTL)

THESE LIQUIDS CAN BE

- DIESEL
- NAPHTHA
- GASOLINE
- METHANOL
- SYN-CRUDE

ANRTL – SMALL SCALE COMES OF AGE

**GTL TECHNOLOGY
DIESEL (F-T)
NAPHTHA (F-T)
GASOLINE (FTG)
METHANOL (FTM)**

All commercial for over
50 years and now scalable



THE HAUL ROAD

THE SIZE OF THE
GTL REACTORS
IS DEPENDENT ON
THE WEIGHT TO
BE SHIPPED BY A
STANDARD TRUCK
ON AN EXISTING
ROAD AND LIFTED
BY A COMMONLY
AVAILABLE CRANE



Scale of F-T Reactors

The next 3 charts show the size of a Sasol design 15,000 bbl/d slurry bubble column F-T reactor, a Shell 7,500 bbl/d fixed bed (tube) F-T reactor and a Velocys 125 bbl/d microchannel F-T reactor.

The Sasol 35,000 bbl/d Oryx plant has two F-T reactors costing well over \$150 million each.

The Shell tube reactors in the 140,000 bbl/d Pearl GTL plant are smaller but will have 24 reactors.

The Velocys 1,400 bbl/d GTL Calumet plant has 8 175 bbl/d reactors costing about \$1.3 million each

SASOL F-T Reactor for Oryx

33' Diameter, 196' Tall, 2,200 tons can only be delivered via ship/barge at a tide water location



15,000 BBL/D Sasol F-T Reactor

Shell F-T Reactors at Pearl

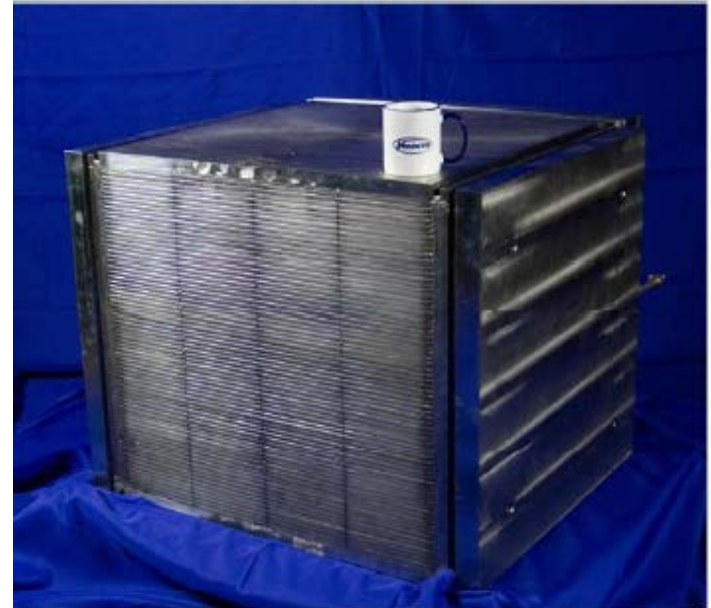


7,500 BBL/D F-T Reactor

VELOCYS PLC



FT Reactor Core



Catalyst fills channels

Microchannels



3 core 125 bbl/d F-T reactor pictured above a 4 core 175 bbl/d is available and a 6 core 250 bbl/d reactor is planned. A - 4 core F-T reactor weighs approximately 23 tons

water cooling channels

VELOCYS 4 CORE F-T REACTOR



Final stages of the build of a commercial four-core FT reactor

ANRTL's NORTH SLOPE GTL PLANT WILL ACCOMPLISH AT LEAST FOUR GOALS

1. DELIVERY OF LOWER COST ULSD, GASOLINE & METHANOL TO THE OIL MAJORS ON THE NORTH SLOPE PLUS THE SOURCE WILL BE 900 MILES CLOSER TO THE MARKET;
2. REDUCE CRUDE OIL PRODUCTION COSTS & INCREASE TAX REVENUES TO THE STATE;
3. ELIMINATE 10 TO 30 TANKER TRUCKS FROM THE HAUL ROAD PER DAY SAVING OVER 3 MILLION MILES/YR OF EMISSIONS PLUS ELIMINATE TRANSPORT CRASHES AND SUBSEQUENT FUEL SPILLS;
4. SERVE AS A BLUEPRINT FOR SMALLER SCALE GTL/CTL/BTL PLANTS FOR RURAL ALASKA; AND
5. NOT BE SUBJECT TO HAUL ROAD CLOSURES

MODULAR FABRICATION

Benefits:

Optimally shorten project schedules, enhanced quality control, fieldwork reduction, elimination of weather delays, improved safety, reduced need for onsite skilled labor and specialized equipment, simplified logistics, and time and cost savings

GTL MODULES UNDER CONSTRUCTION

Module and vessel fabrication - progress
At Ventech, Pasadena, Texas



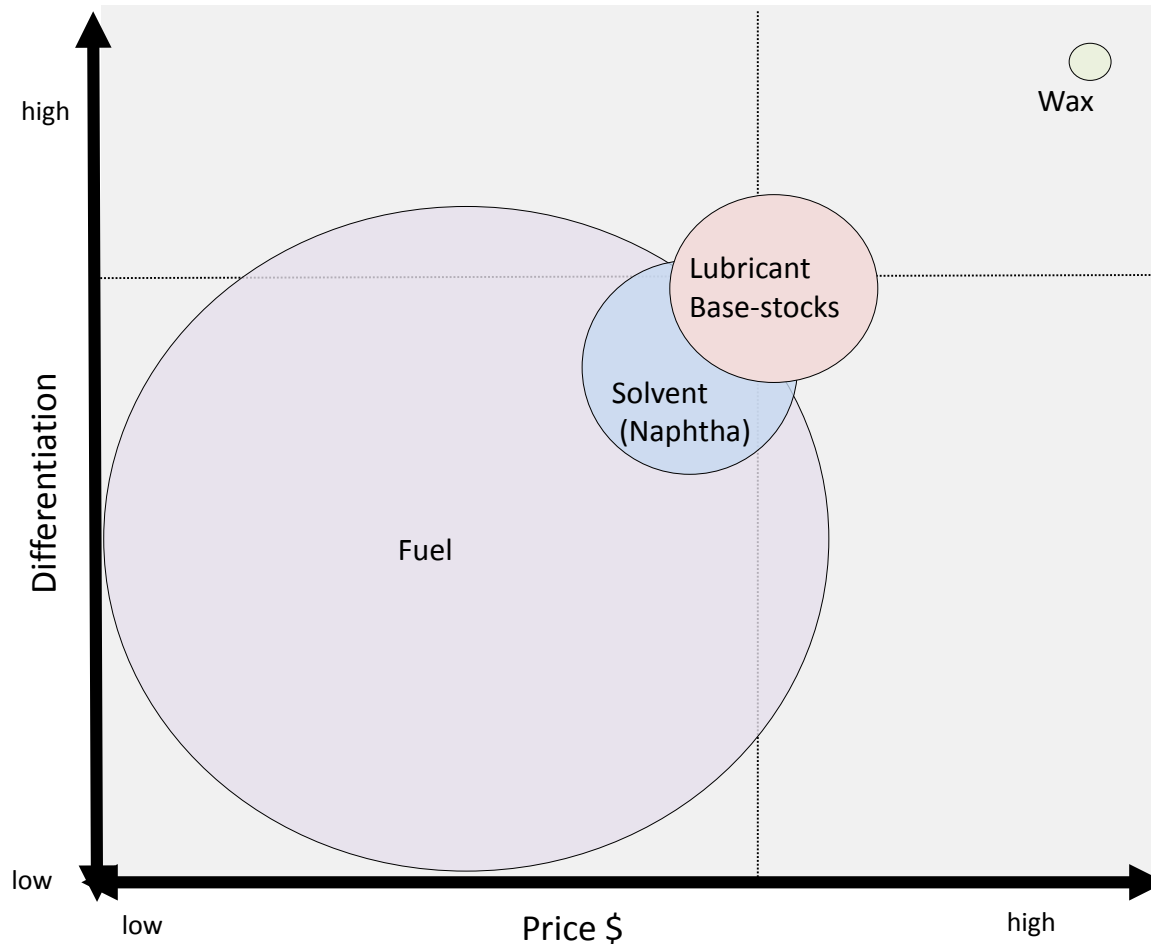
GTL modules under construction for a GTL project in the Oklahoma City area scheduled for startup 4Q 2016.

GOAL – LOWER COST'S TO PRODUCERS

ANRTL'S GOAL IS TO
MAXIMIZE PLANT OUTPUT BY
PRODUCING A RANGE OF
PRODUCTS MOSTLY FOR
CONSUMPTION ON THE
NORTH SLOPE BUT SOME
MAY BE AVAILABLE FOR
BACKHAUL TO OTHER HIGH
VALUE MARKETS

F-T PRODUCTS

opportunity to add value through differentiated products



- FT products are of the highest quality and command premium prices in most applications
- FT syn-crude offers many product options to add value depending on market need
- Specialty products are sold on performance at higher prices
 - E.g. wax pricing is up to 100% higher than diesel
- Specialty products pricing is less volatile and can add sustainable value to the total FT product mix

F-T WAX



BUILDING BLOCK FOR HIGH VALUE SYNTHETIC LUBE OILS

POTENTIAL OF BACK HAULING

PRODUCTS FROM THE ANRTL
NORTH SLOPE GTL PLANT
TRANSPORTED TO FAIRBANKS
OR ANCHORAGE

4,000 LB SACKS FOR HAULING



POTENTIAL OUTPUT

1. THE MARKET IS LIMITING
2. THE MARKET IS THOUSANDS OF MILES AWAY
 - a) COULD BE IN LOWER 48
 - b) COULD BE IN ASIA
3. MAX PLANT OUTPUT SOMEWHERE UNDER 1,000 BBL/D
 - a) 6 BBL OF WAX WEIGHT 2,000 LBS.
 - b) 12 BBL PER SUPER SACK
 - c) 166 TONS PER DAY
 - d) APPROXIMATELY 42 SACKS PER DAY

TRUCK TRAFFIC DEADHORSE SOUTH BOUND

1. DRY BULK PRODUCT

- a) PREFER PRODUCT KEPT DRY

2. FLATBED

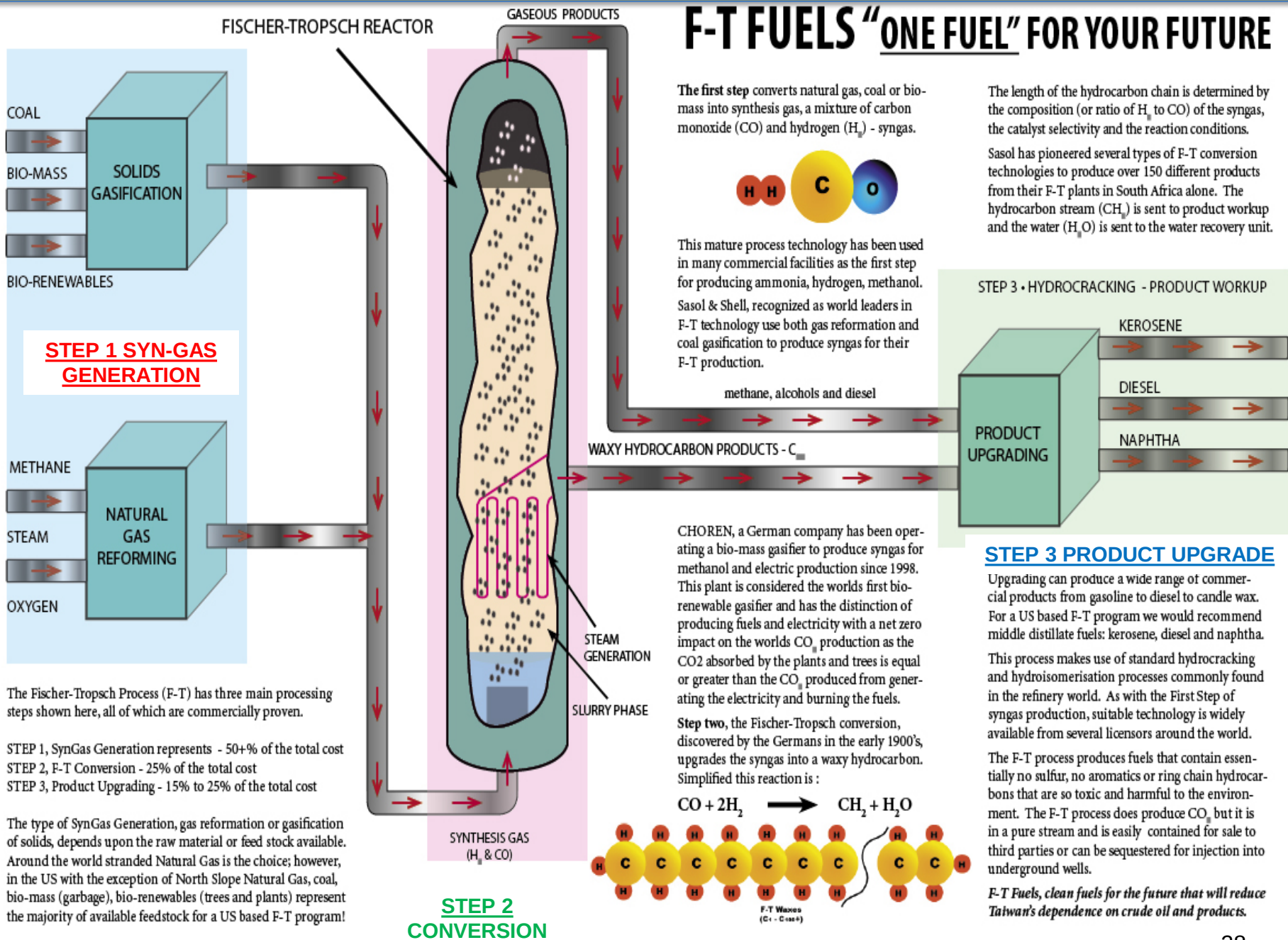
3. ENCLOSED TRAILER

4. COST?

- a) FAIRBANKS
- b) ANCHORAGE

GTL - METHANOL PROCESS

GTL AND METHANOL USE A THREE STEP
PROCESS WITH THE FIRST STEP SYN-GAS
GENERATION IDENTICAL FOR EACH
PROGRAM



STG – Synthesis to Gasoline

STM – Synthesis to Methanol

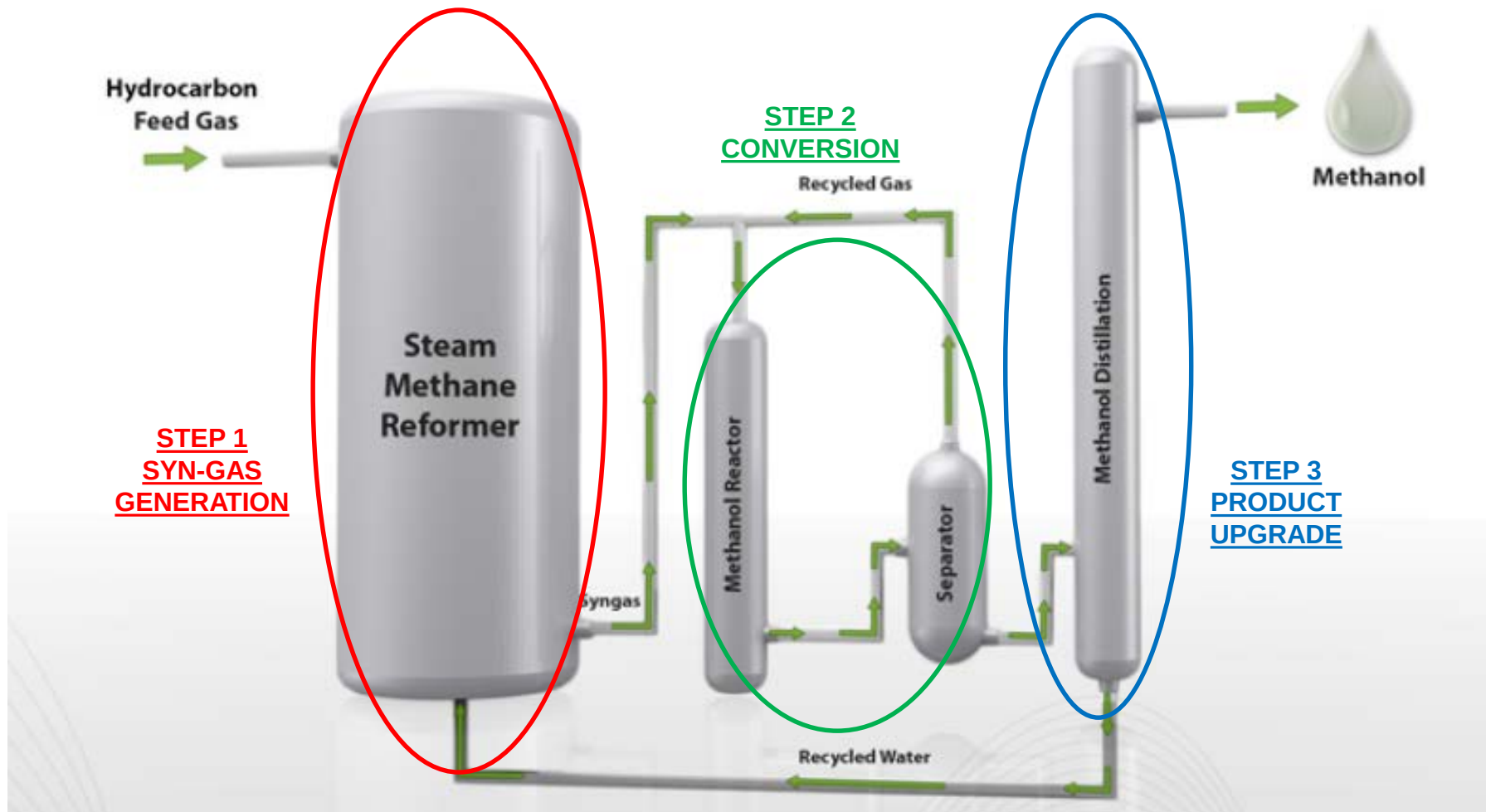
MTG – Methanol to Gasoline

PRIMUS GREEN ENERGY STG, STM and MTG

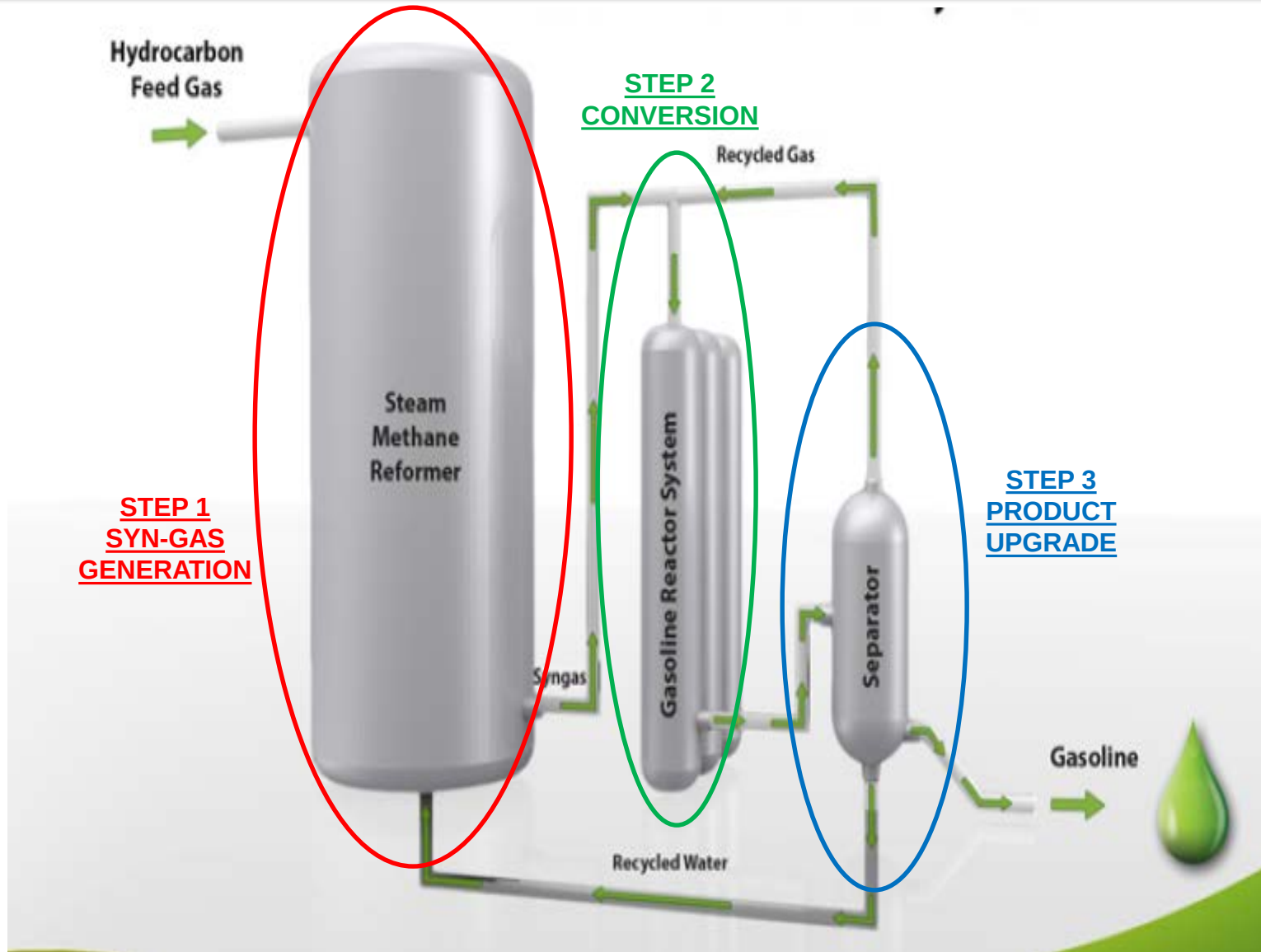


Primus 1,250 bbl/d full scale commercial plant in NJ used as a training center for new operators and for testing new catalysts

STM – METHANOL



STG - GASOLINE



Key Advantages

- Produces a single, finished product; no further refining or multiple product handling necessary
- Accepts wide range of feed gas types
- Simple, continuous, gas-phase process
- Features standard fixed-bed reactor technology
- Modular units allow fast deployment to remote sites
- Standard, long-lifetime catalysts
- Zero wastewater
- Enables profitable compliance with anti-flaring regulations
- Low capital and operating costs compared with alternative GTL options

High Quality Gasoline

Zero Sulfur. Zero Benzene.

The gasoline produced through Primus' process has a unique zero-sulfur and zero-benzene profile and can be blended with refinery gasoline, sold directly into the wholesale market, or mixed with crude oil for simplified logistics at the wellhead. Primus' gasoline meets most specifications globally without the need for additional refining. In the United States, Primus' gasoline exceeds the requirements for RBOB grade gasoline and complies with other national grade specifications.

Factor/Process	Primus STG+™	Haldor Topsoe TIGAS	ExxonMobil MTG
Product Flexibility	Gasoline or methanol or diluent	Gasoline	Gasoline
Durene Reduction	Integrated	Separate	Separate
Number of Major Steps	2 (Syngas, Gasoline Synthesis)	3 (Syngas, TIGAS, durene reduction)	4 (Syngas, methanol, MTG, durene reduction)
Scale Flexibility	Small to large	Small to large	Limited to methanol plant size
Catalyst Sourcing	Multiple sources	In-house	Combined
Integration Economies	Highly integrated	Unknown	Little integration; separate plants
Footprint	Small	Medium	Larger



THANK YOU

FOR ADDITIONAL INFORMATION ON AN ALASKA NORTH SLOPE GTL PROGRAM
CONTACT ANRTL AT (907) 264-6709 OR E-MAIL RPETERSON@ANGTL.COM