



PT TRI WAHANA UNIVERSAL

Oil Refinery



Head Office

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Site Office

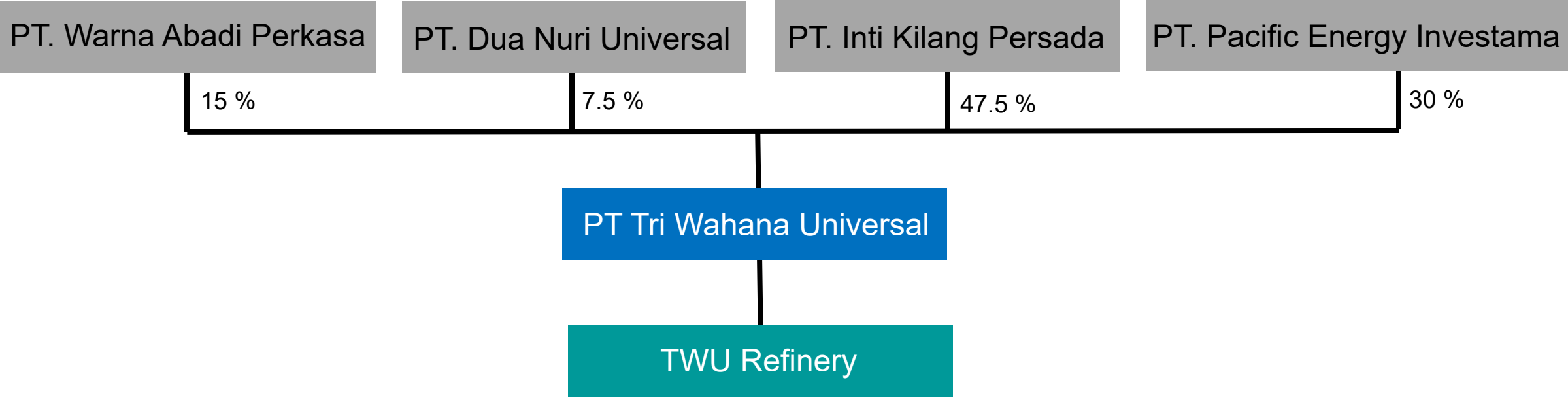
Kilang TWU Desa Gayam
Bojonegoro, Jawa Timur

TWU Oil Refinery



- PT Tri Wahana Universal is the first private oil refinery company operating in Indonesia.
- Tri Wahana Universal (TWU) Oil Refinery is located in Sumengko Village, Kalitidu District, Bojonegoro Regency, East Java Province, Indonesia.
- This refinery was built with new process components based on skid mounted for oil and gas as well as refining.
- TWU Refinery's supply of Crude Oil during its operating period is obtained from the Banyu Urip field, which is 7 km from the refinery.
- The refinery started commercial operations in 2010 with a capacity of 6000 bopd for Train-1, and Train-2 commercial production in 2013 with a capacity of 12,000 bopd.

Ownership Structure



TWU Refinery Location

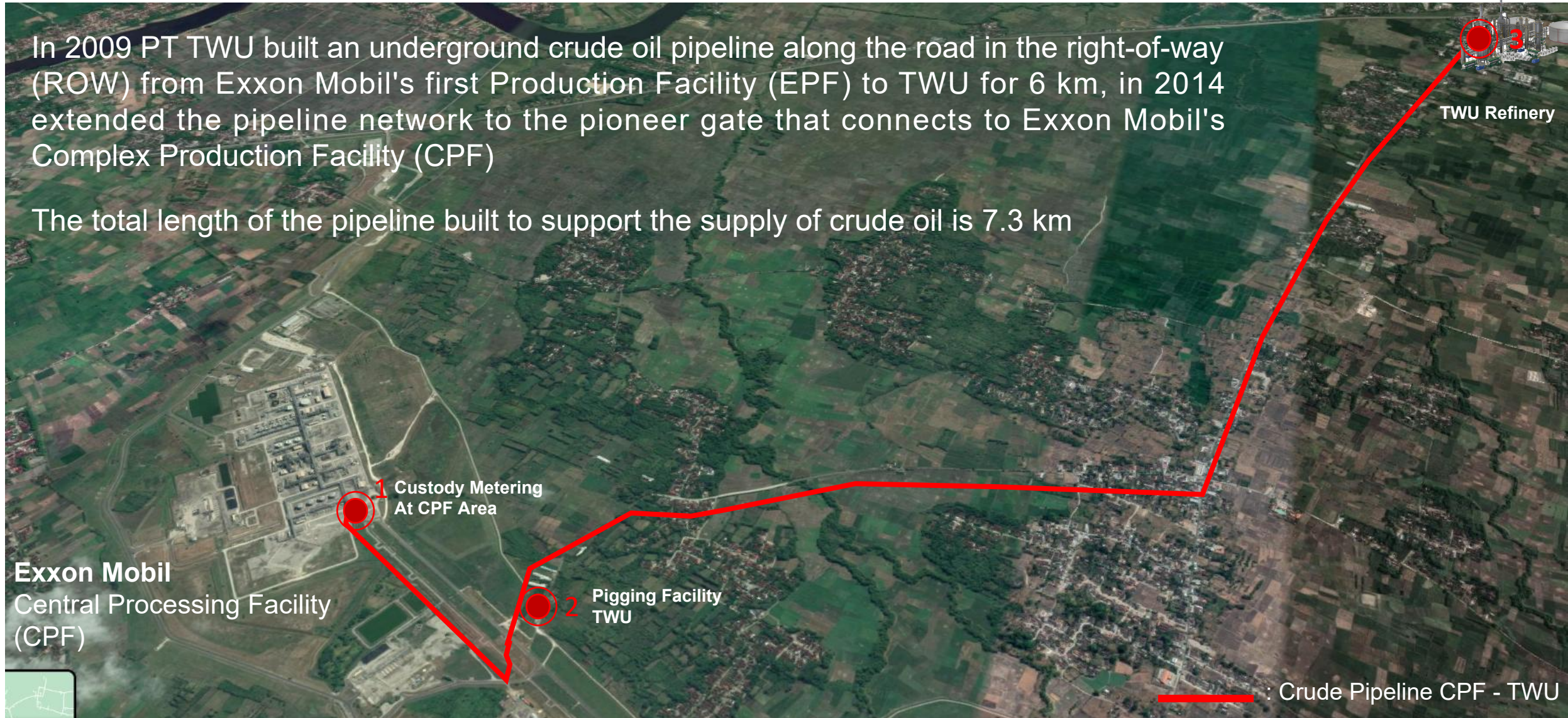


TWU refinery is the only private oil refinery operating in Indonesia

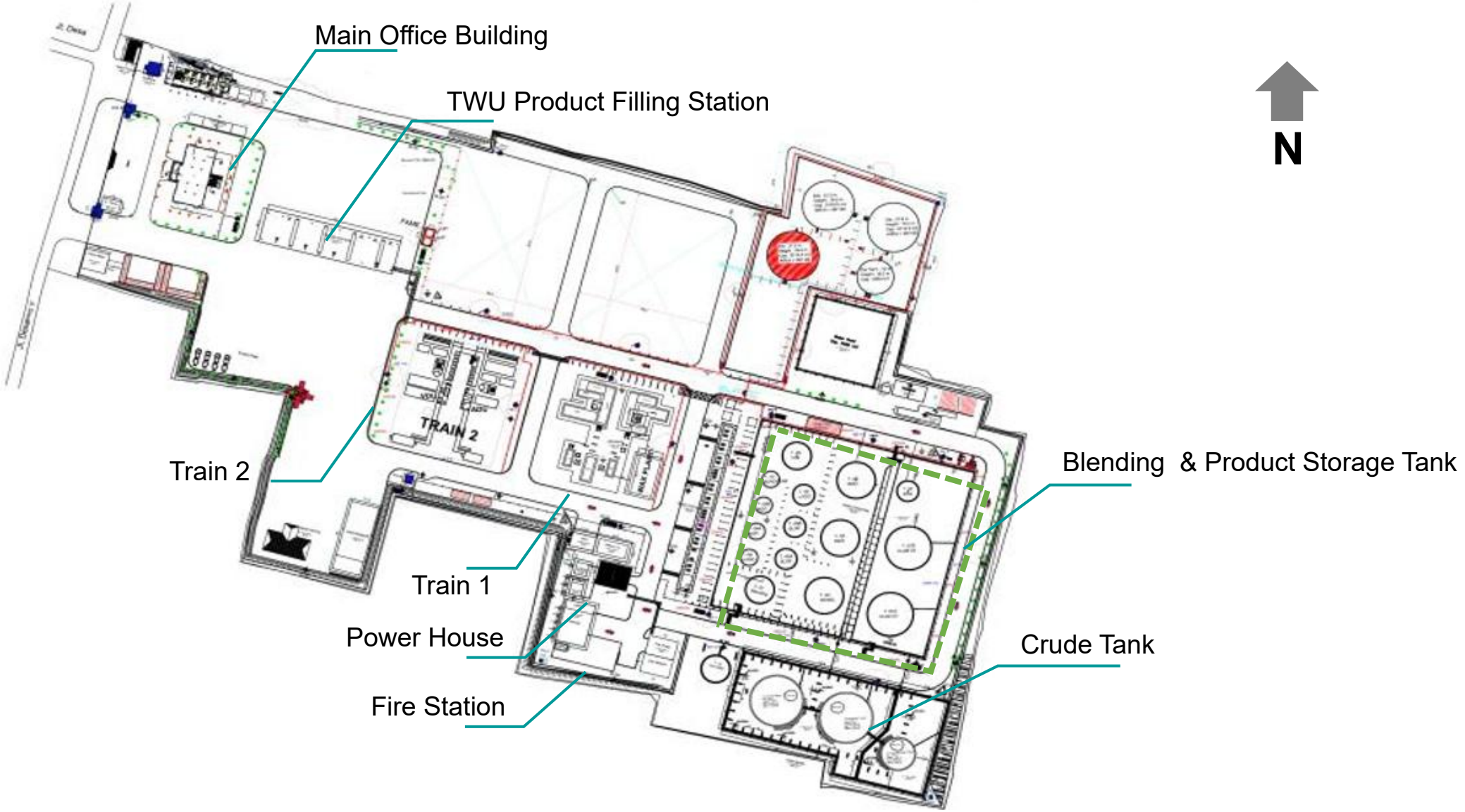
TWU Pipeline and Refinery Layout

In 2009 PT TWU built an underground crude oil pipeline along the road in the right-of-way (ROW) from Exxon Mobil's first Production Facility (EPF) to TWU for 6 km, in 2014 extended the pipeline network to the pioneer gate that connects to Exxon Mobil's Complex Production Facility (CPF)

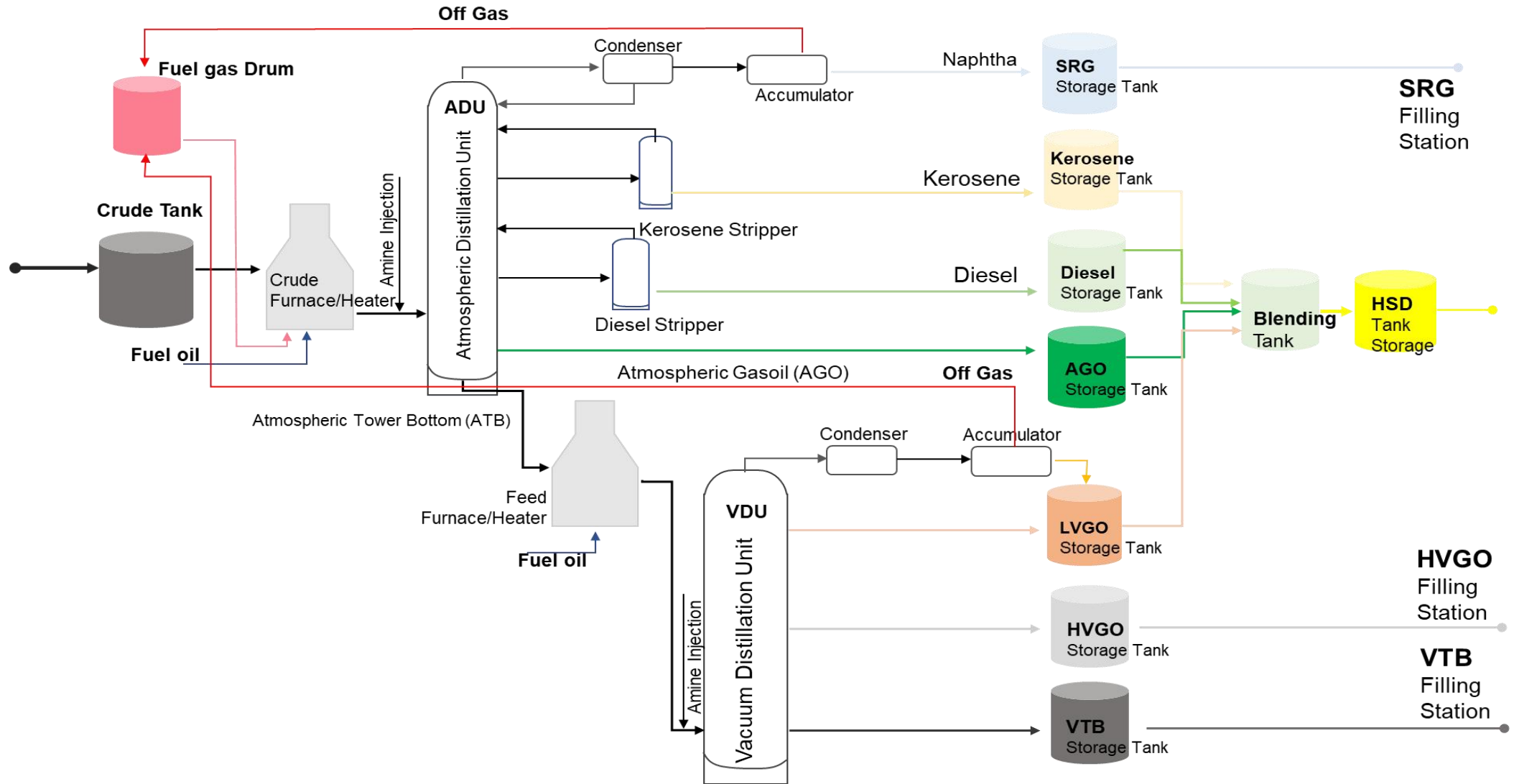
The total length of the pipeline built to support the supply of crude oil is 7.3 km



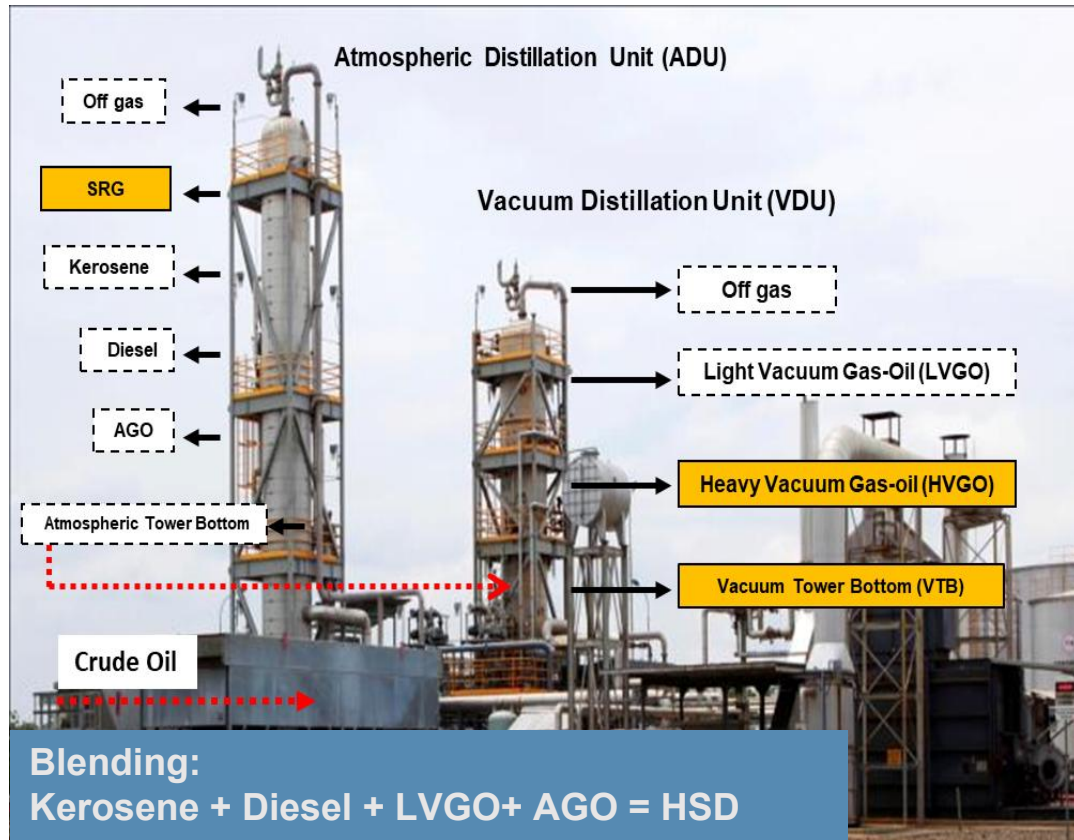
TWU Refinery Layout



Refinery Production Process



Refinery Production Process



| FACILITY | | DESIGN CAPACITY | PRODUCT TYPE | PRODUCTION CAPACITY |
|---|-------------------------------|-----------------|---------------------------------|---------------------|
| CRUDE DISTILLING UNIT (Train 1) - operational since 2010 | | | | |
| ADU | Atmospheric Distillation Unit | 6,000 bopd | SRG (Straight Run Gasoline) | 150 bopd |
| | | | HSD (High Speed Diesel) | 4,140 bopd |
| VDU | Vacuum Distillation Unit | 3,000 bopd | HVGO (Heavy Vacuum Gas Oil) | 600 bopd |
| | | | VTB (Vacuum Tower Bottom) | 1,110 bopd |
| | | | LSWR (Low Sulphur) | |
| CRUDE DISTILLING UNIT (Train 2) - operational since 2014 | | | | |
| ADU | Atmospheric Distillation Unit | 12,000 bopd | SRG (Straight Run Gasoline) | 240 bopd |
| | | | HSD (High Speed Diesel) | 8,160 bopd |
| VDU | Vacuum Distillation Unit | 5,500 bopd | HVGO (Heavy Vacuum Gas Oil) | 1,440 bopd |
| | | | VTB (Vacuum Tower Bottom) | 2,160 bopd |
| | | | LSWR (Low Sulphur) | |
| STORAGE | | | | |
| Lamongan Shore Base | | 10,400 kL | HSD, VTB and HVGO | |
| Facility Site | | 50,950 kL | Crude Oil and Finished Products | |

Crude Oil



TWU REFINERY



TWU Product

| | |
|-----------------------------|------|
| HSD (High Speed Diesel) | 67 % |
| VTB (Vacuum Tower Bottom) | 20 % |
| HVGO (Heavy Vacuum Gasoil) | 10 % |
| SRG (Straight Run Gasoline) | 2 % |

TWU Refinery Products

1. HSD (High Speed Diesel)

Advantages of TWU-HSD :

- Cetane figures are high, perfect combustion and clean.
- Low moisture and sulfur content, reducing the risk of corrosion.
- HSD TWU color is yellow and Clear.

Uses of TWU :

- For high-rev diesel engines (> 1.000 rpm).
(Generators, Ship Engines, Heavy Equipment and Diesel Cars).

| No. | Spesifikasi | Unit | Euro-3 | SOLAR 48 | | HSD-TWU |
|-----|-----------------------------------|-------------------|---------|----------|------|---------|
| | | | | Min | Max | |
| 1 | Density @ 15°C | kg/m ³ | 845 | 815 | 870 | 849,3 |
| 2 | Sulphur Content | % m/m | 0,35 | | 0,30 | 0,24 |
| 3 | Cetane Number | | 51 | 48 | | 52,3 |
| 4 | Distillation, T90°C, max | °C | 360 | | 370 | 356,5 |
| 5 | Flash Point, min | °C | 55 | 52 | | 59 |
| 6 | Water Content, max | % wt. | 0,05 | | 0,05 | 0 |
| 7 | Ash Content, max | % wt. | 0,05 | | 0,01 | 0,005 |
| 8 | Copper corrosion, max | | Class 1 | | | Class 1 |
| 9 | Colour | ASTM-No. | | | 3 | 0 |
| 10 | Conradson carbon residue (10% DR) | % wt. | 0,2 | | | 0 |



2. HVGO (Heavy Vacuum Gasoil)

Processed products through the distillation process.

Advantages of TWU-HVGO :

- Has a high flash point, making it easy and safe in handling.
- Lighter color than other residual products.

Uses of TWU-HVGO :

- Can be processed into wax
- Can be processed into cosmetic ingredients
- Can be processed into lubricants
- Can be processed into “malam” (wax for batik)

| No. | Types of Testing | Unit | HVGO Specification | | Test Methods |
|-----|--------------------------|--------------------|--------------------|------|--------------|
| | | | min | max | |
| 1 | Density at 15°C | kg/m ³ | 860 | 880 | ASTM D1298 |
| 2 | Viscosity Kinematic 60°C | mm ² /s | 9 | 16 | ASTM D445 |
| 3 | Pour Point | °C | 39 | 48 | ASTM D97 |
| 4 | Flash Point | °C | 60 | 190 | ASTM D93 |
| 5 | Water Content | mg/kg | 4,5 | 8 | ASTM D95 |
| 6 | Sulphur Content | %m/m | 0,32 | 0,35 | ASTM D4294 |



3. VTB (Vacuum Tower Bottom)

The processed results go through a distillation process that has a heavier texture, viscous (concentrated) and dark in color.

Advantages of TWU-VTB :

- High flash point, easy and safe handling.
- High calorific value so it is good for fuel.

Uses of TWU-VTB :

- For direct combustion process (Furnace, Boiler and Dryer).
- For steam generators and room heaters.

| No. | Types of Testing | Unit | VTB Specification | | Test Methods |
|-----|--------------------------|--------------------|-------------------|------|--------------|
| | | | min | max | |
| 1 | Density at 15°C | kg/m ³ | | 922 | ASTM D1298 |
| 2 | Viscosity Kinematic 60°C | mm ² /s | 20 | 80 | ASTM D86 |
| 3 | Pour Point | °C | 48 | 54 | ASTM D97 |
| 4 | Flash Point | °C | 60 | | ASTM D93 |
| 5 | Water Content | mg/kg | | 0,5 | ASTM D95 |
| 6 | Sulphur Content | %m/m | | 0,60 | ASTM D4294 |



TWU Refinery Products

4. SRG (Straight Run Gasoline)

It is a light fraction product through the distillation process.

Advantages of TWU-SRG :

- Has a low flashpoint.
- Easy to burn and use as solvent.
- White and clear color.

Uses of TWU-SRG :

- As solvents and diluents (paints, thinners and glues).
- Can be processed into olefin compounds.

| No. | Types of Testing | Unit | SRG Specification | | Test Methods |
|-----|------------------------|--------------------|-------------------|------|--------------|
| | | | min | max | |
| 1 | Density at 15°C | kg/m ³ | | 785 | ASTM D1298 |
| 2 | Distilasi | mm ² /s | | | ASTM D86 |
| | a. IBP | °C | | 60 | |
| | b. 10% vol recovery at | °C | | 74 | |
| | c. 50% vol recovery at | °C | | 125 | |
| | d. 90% vol recovery at | No.ASTM | | 140 | |
| | e. FBP | mg/kg | | 180 | |
| 3 | Sulphur Content | %m/m | | 0,05 | ASTM D4294 |



Crude Supply Pipeline of TWU Refinery

1



Re-installed metering and Pigging at Pioneer gate area of Exxon Mobil's CPF

Cathodic corrosion control is applied to crude oil pipelines. Corridor pipelines are inspected daily for potential leaks and/or damage.

Measurement System

There are 3 custody meter points :

- Custody meter at EMCL for the purchase of crude oil. A proving test is carried out once a month witnessed by the parties.
- Custody meter at TWU filling station for product sales. Calibration carried out by the Government Metrology Service.
- Custody meter at Lamongan Shore Base for product sales. Calibration carried out by the Government Metrology Service.

2



Other Supporting Facilities



Storage Tanks



Pump House



Fire Water Pond



Power House



Fuel Tank For Power House



Fire Protection System

Other Supporting Facilities



Blending Facilities



FAME Tank



VTB and HVGO Tank Storage at LSB Port



Filling Station



LSB Pump Stations



HSD Tank Storage at LSB Port

Health Safety and Environment



ISO 9001:2008



ISO 14001:2004



OHSAS 18001:2007

PT TWU implements ISO 9001, 14001 and OHSAS 18001, TWU Refinery has also received the Patra Nirbhaya Karya Pratama environmental award from Indonesian Government in 2015 & 2017.

Terima Kasih
うもありがとうございます

THANK YOU

謝謝

Merci

شكرًا لك

Grazie

Спасибо

