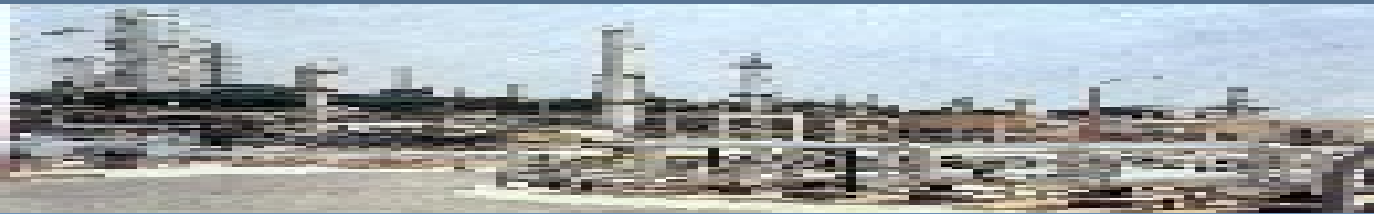




# Azzawiya Refinery Present & Future Development



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



## **HISTORICAL PERSPECTIVE**

- IN 1959, OIL WAS FIRST DISCOVERED IN COMMERCIAL QUANTITIES IN LIBYA .**
- IN 1961, CRUDE OIL EXPORT STARTED .**
- IN 1962, LIBYA BECAME A MEMBER OF OPEC .**
- IN 1963, ESTABLISHMENT OF THE MINISTRY OF PETROLEUM.**

# REFINING OVER VIEW

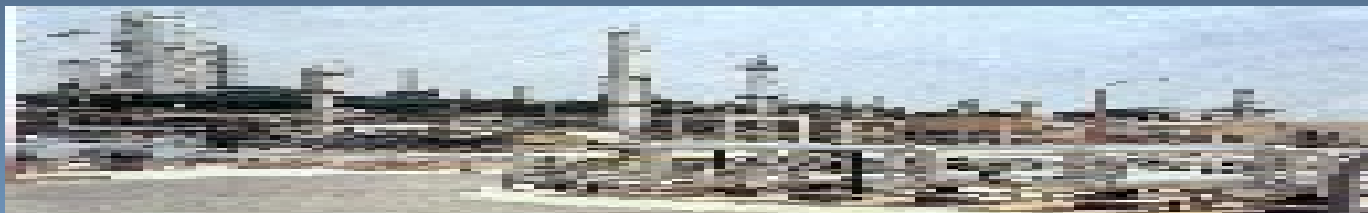
. National Oil Corporation (NOC) Refines (380,000) b/d of -  
. Crude Oil in its (5) Refineries

. Refineries are Located in different parts of Libya and -  
. Operated by (NOC) Subsidiary companies

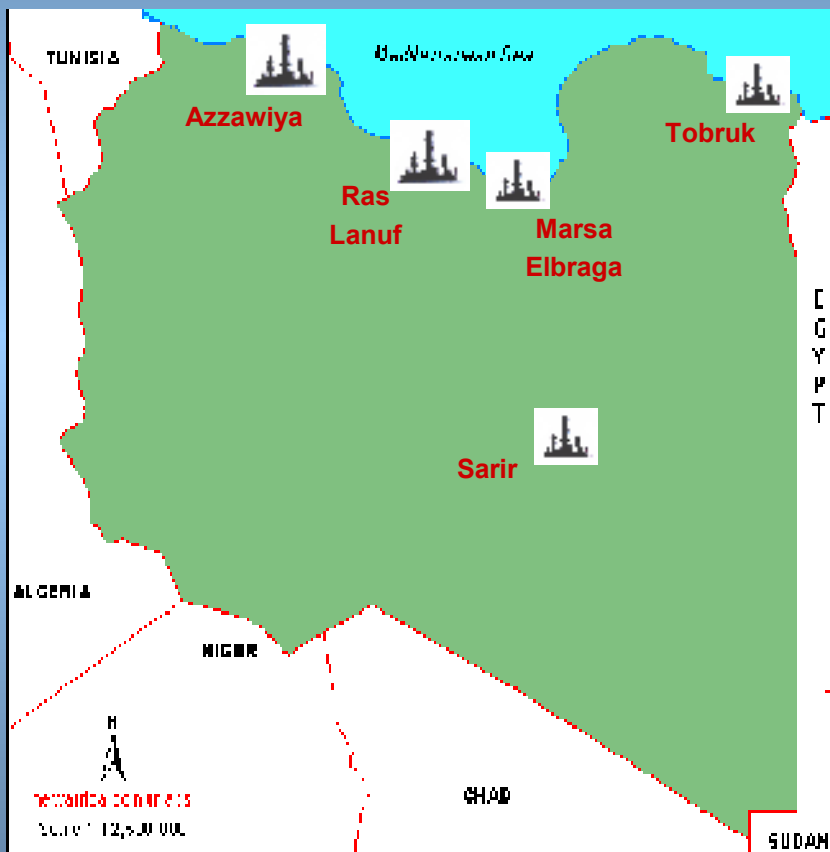
. All the refineries are simple hydro skimming type, and -  
approximately 60% of its products are exported to  
.International markets

. A plan for development of the Refining Industry has been -  
approved to enable the Refineries to become more  
economical and to meet newly implemented specification.

.(( NOC & SRAR – JV



## DOMESTIC REFINING CAPACITY



REFINERY	CAPACITY (b/d)	START UP
MARSA EL-BREGA	10,000	1965
AZZAWIYA	120,000	1974-77
RAS-LANUF	220,000	1984
TOBRUK	20,000	1986
SARIR	10,000	1989
<b>TOTAL</b>	<b>380,000</b>	

# RAS LANUF REFINERY

(Ras Lanuf Oil and Gas Processing Company (RASCO) is a subsidiary Company of National Oil Corporation and is located on the coast of Libya

Refinery commenced its Production in 1984, Plant has a capacity of processing (220,000 b/d) of Crude Oil

The petrochemical Complex is composed of a Refinery plant, an Ethylene plant, a Polyethylene plants, and associated with utilities facilities

The Harbor which is also located inside the complex is used for exporting the products

# Main Products

- .(LPG : Liquefied Petroleum Gas (94,800 mt/y -
- .(Straight Run Naphtha (1,190,000 mt/y -
- .(Kerosene (520,000 mt/y -
  - .(Diesel (2,280,000 mt/y -
  - .(Fuel Oil (5,400,000 mt/y -
- .Ethylene -
- .Propylene -

**SARIR Refinery**  
**MARSA EL-BREGA Refinery**  
**TOBRUK Refinery**

Capacity of all these Refineries are very small and to meet -  
.the area requirements

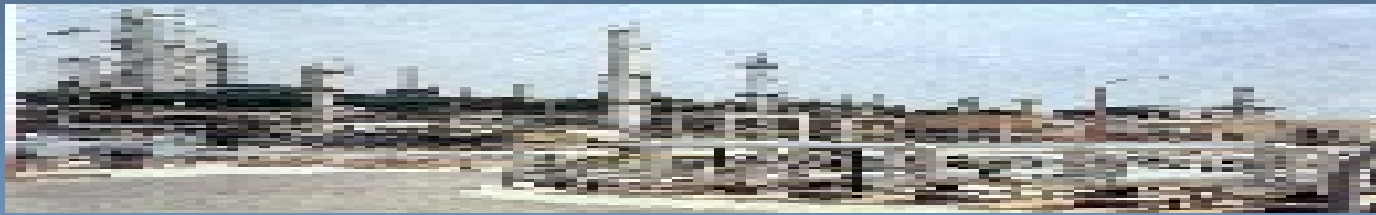
Refining the Libyan Crude Oil to produce St. Run Naphtha, -  
. Kerosene, LPG, Gas Oil, Fuel Oil and Gasoline





# Azzawiya Refinery Present & Future Development





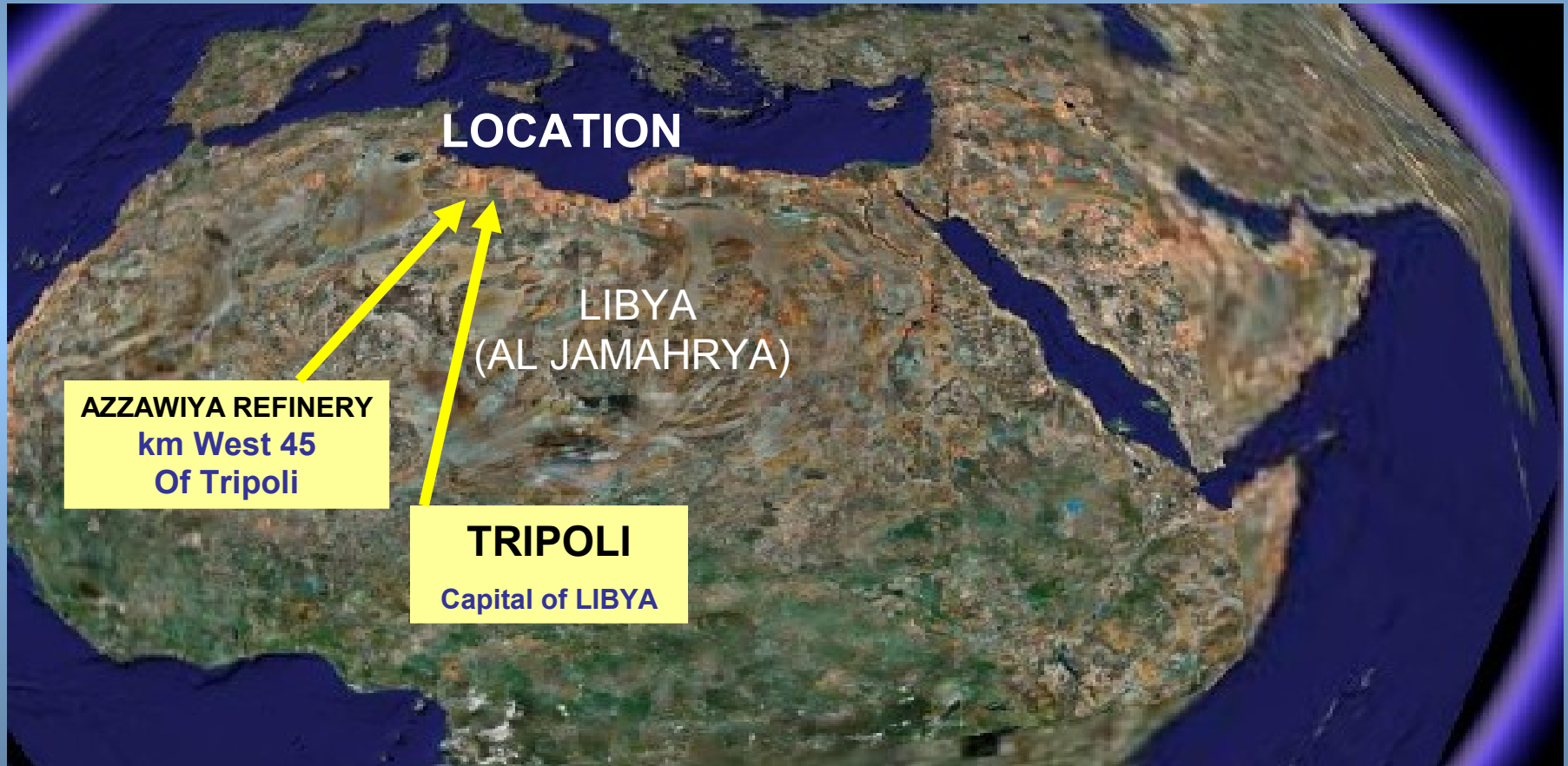
# PREAMBLE

Azzawiya Oil Refinery is the first Refinery was built by National Oil Corporation (NOC). and commenced its production in 1974 as a subsidiary of NOC.





# AZZAWIYA REFINERY





### **Legend of abbreviations used in this brochure**

**GSPLAJ** : Great Socialist People's Libyan Arab Jamahiriya (Libya)

**ARC** : Azzawia Oil Refining Company, Inc.

**NOC** : National Oil Corporation

**BPD** : Barrels per day

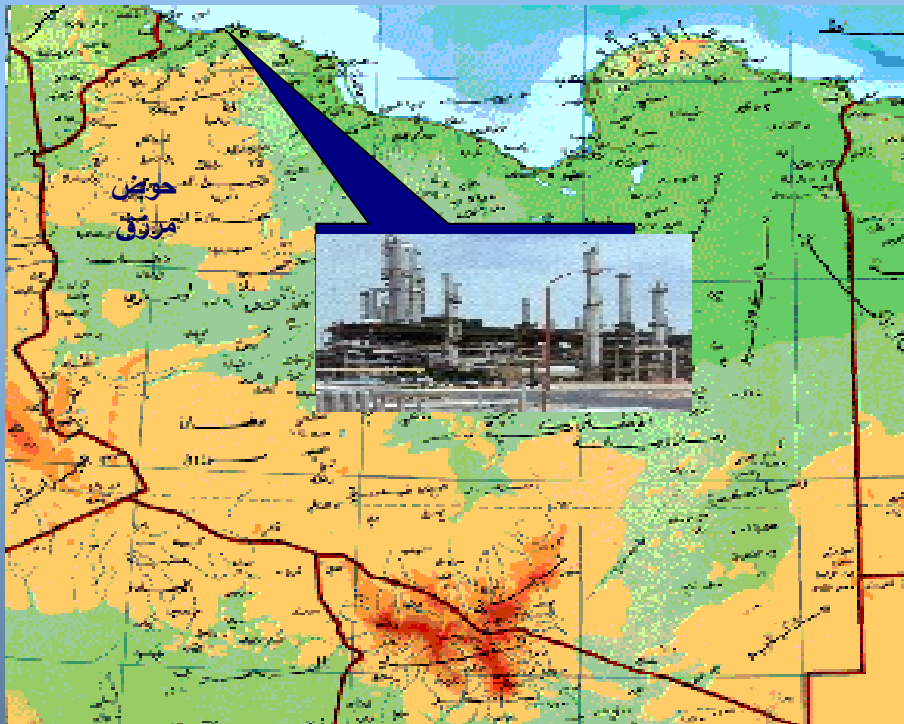
**LPG** : Liquefied petroleum gas

**CDU** : Crude Distillation Unit

**SRN** : Straight Run Naphtha

**LN** : Light Naphtha

**MT** : metric tons



# **ARC**

**Address: Libya, GSPLAJ**

## **Headquarters**

**Azzawiya, where Azzawiya Refinery and Lub. Oil Plant (LOP) are based.**

**Mail Box: 15715, Azzawiya;  
: 6451, Tripoli**

**Phone: + 218 21 3610539 – 42, Tripoli;  
+ 218 23 620125 – 27, Azzawiya**

**Fax: + 218 21 3610538**

**Telex: 20125; 30424; 30535**

**Website: [www.ARC.com.ly](http://www.ARC.com.ly)**

**Benghazi Asphalt Plant:**

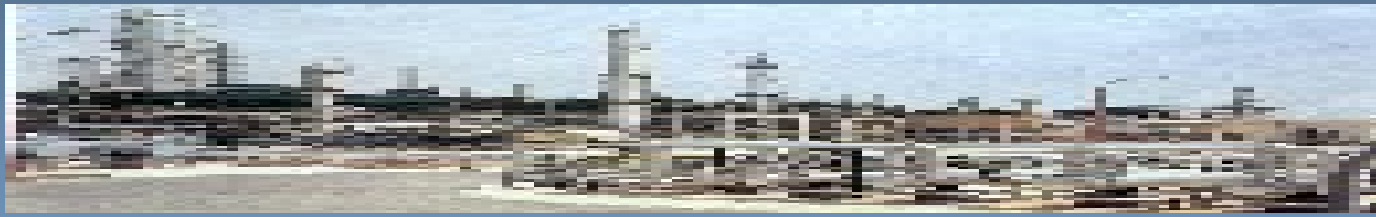
**Phone: + 218 61 2236952**



## Principal Activities

1. Refining of Crude Oil to produce St. Run Naphtha, Gasoline, LPG, Jet Fuel, Kerosene, Gas Oil and Low Sulphur Fuel Oil.
  - Processing of Reduced Crude Oil to produce Asphalt of 60/70 Penetration Grade. Our Benghazi Asphalt Plant also produces Cutback Asphalt of Rapid Curing and Medium Curing Type in addition to Normal 60/70 Penetration Grade Asphalt.
3. Lubricating Oil Blending Plant (including Filling and Canning) to produce different grades of Lubricating Oil.



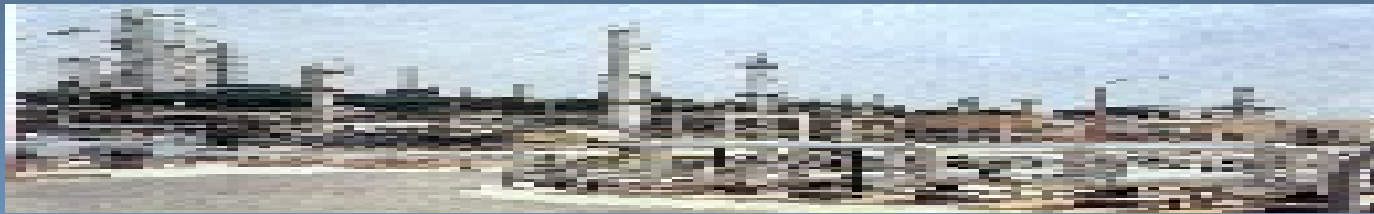


- Plant also had self contained utilities like Power Generating Units, Seawater Intake System, Desalination Plants, Boilers and Tank farm for Crude Oil, and Finished Products.



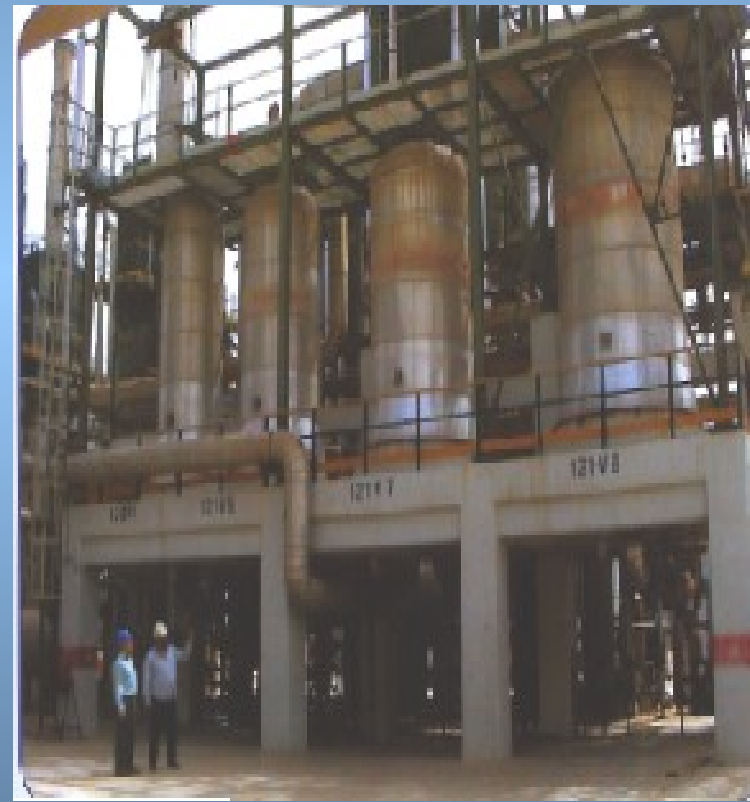
- Refinery has its own Harbor to import/export Crude Oil and Finished Products in addition to transfer finished products to local marketing company for internal distribution and export to international market via our own harbor (SBM & Conventional Berths)





## Refinery Process Units

- **Topping Units (*Atmospheric Pressure Distillation (APD) Towers*)**
- **Naphtha Hydrobon Units**
- **Platforming Units**
- **Kerosene Treatment Units**
- **LPG De-ethanizer Unit**





## PROCESS UNITS

Name of Plant	Capacity of Units	Number of Units	Year of Installation (Start-Up)	Total Capacity BBLs/DAY
Atmospheric Distillation	60,000 BBLs/Day	2	1974 1976	120,000
Naphtha Hydrobon	9,700 11,640	2	1974 1976 1997	19,400
Platforming Units	6,500 7,925	2 2	1974, 1976 1997	Total capacity was increased to 120% (total capacity 15850)
Kerosene	9,600	2	1974 1976	19,200
Vacuum Distillation (Asphalt Unit)	3,775	1*	1980	3,775
LPG Sweetening Plant	5,000 Tons/Year	1	1999	—

\* Another unit is located in Bengehazi

AUXILIARY UNIT (NITROGEN PLANT)

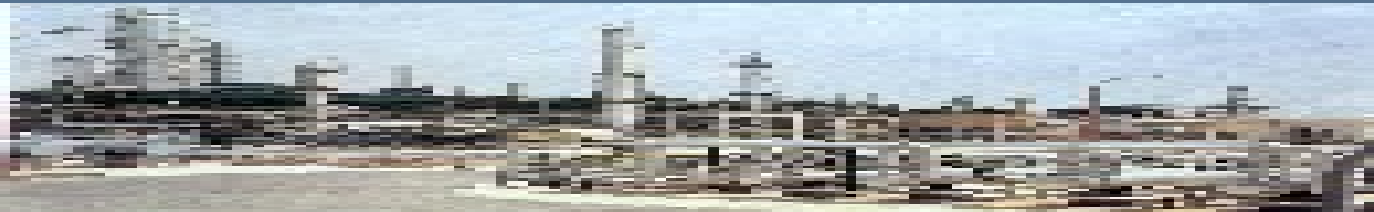




## Topping Units

- Two Topping Units, each with an identical capacity of 60,000 barrels per day, are existing at present. First Unit was established in 1974, second Unit went into stream in 1976.
- Topping units are associated with stabilizers to reduce light gases and to provide LPG, which needs to be sweetened in downstream units.





## Naphtha Hydrobon Units

- Two identical units, with capacity of 9,700 bbl/d, In late nineties, capacity was raised to 11,640 BBLS/Day which is the present capacity.

- Catalyst used now is HR 304.  
Initially, Catalyst was UOP supplied S-9. Purpose of this unit is to split Naphtha into two fractions and to remove Sulphur and other impurities by Hydrogen-rich Recycle Gas from Platforming Units with the help of Catalysts.



**Naphtha Hydrobon Unit**



## Catalytic Reforming Units

- Two identical units, capacity of each unit was 6,500 b/d, In 1997 a capacity increased to 7,925 b/d.
- In Platforming Units, Previously we were using R-22 Catalyst from UOP, we are now using R-56 Catalyst to improve performance to meet higher octane need.
  - Since 2003, we are producing unleaded gasoline for better environmental standard.





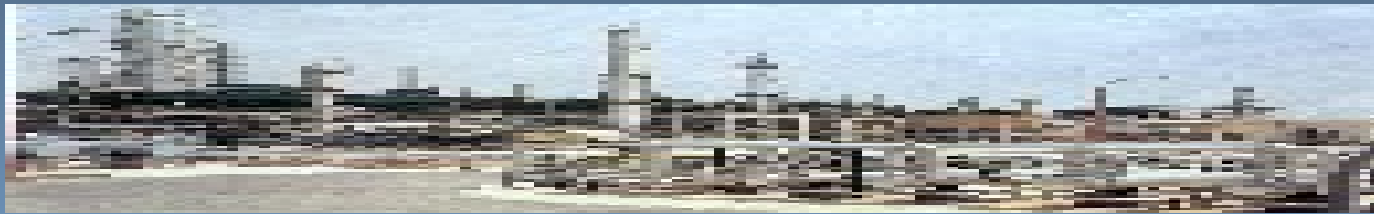
## Kerosene Hydrotreaters•

- Impurities such as Sulphur and Nitrogen Compounds and Heavy Metals are removed from Kerosene of Topping Units to meet the international specification .

- Impurities are removed in Process Reactors in Hydrogen Atmosphere supplied from Platforming Units. Initially, Catalyst was S-9 from UOP. Later on, for better performance Catalyst was replaced with HR 304 from Akzo of Holland.



- Capacity of each Unit is 9,600 BBLS/Day .

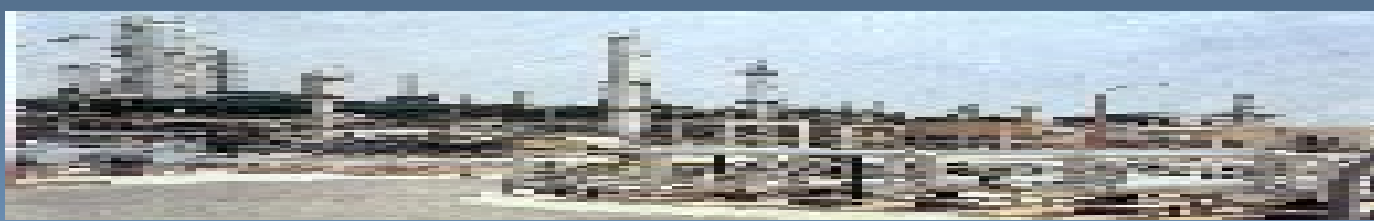


## LPG De-ethanizer Unit

Prior to 1998, LPG was recovered only from Platforming Units. In order to recover more LPG, provisions were made to recover LPG from Topping Unit from Stabilizers, and LPG Sweetening Plant was also installed to meet LPG international Specifications.

With this arrangement, LPG production was increased to over 72,000 tons per year from a previous figure of only 28,000 tons/year.





## Asphalt Plants

- **Azzawiya Asphalt Plant**

Plant has a capacity of processing 210,000 tons of Reduced Crude to produce at least 100,000 tons of Asphalt. Feedstock is imported, as Libyan Crude Oil does not produce Reduced Crude Oil suitable for Asphalt manufacture.

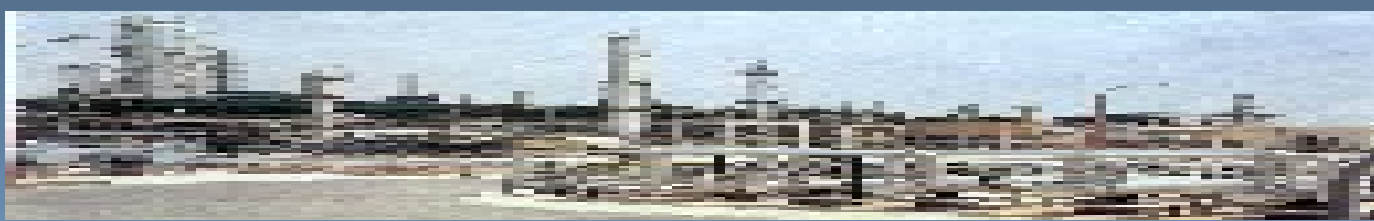
***products*** : 60/70 Pen. + VGO

Commenced Production in 1980.

Azzawia Asphalt Plant



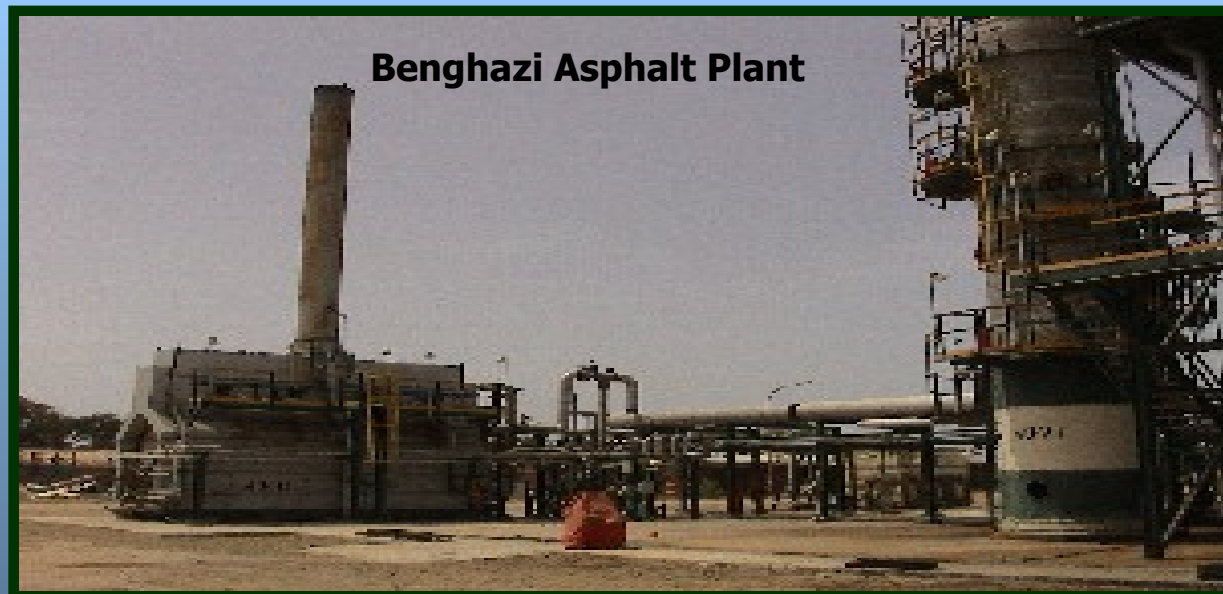
Asphalt Plant

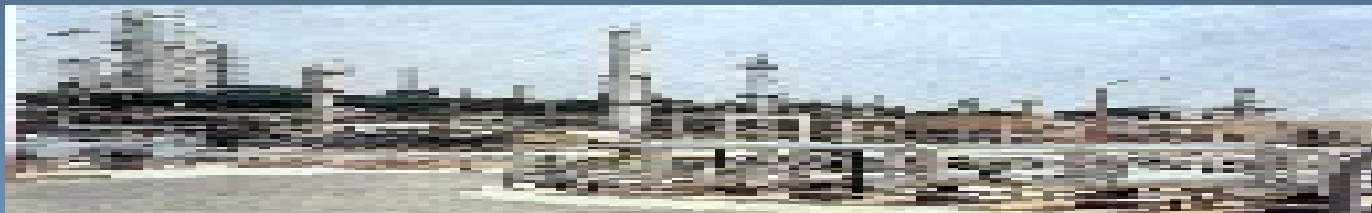


- **Benghazi Asphalt Plant**

In 1984, commenced production of Asphalt in identical plant capacity of 210,000 tons of Reduced Crude to produce at least 100,000 tons of Asphalt.

Plant has the additional provision to produce Cutback Asphalt of both rapid curing and medium curing Asphalts.





## Lubricating Oil Blending Plant

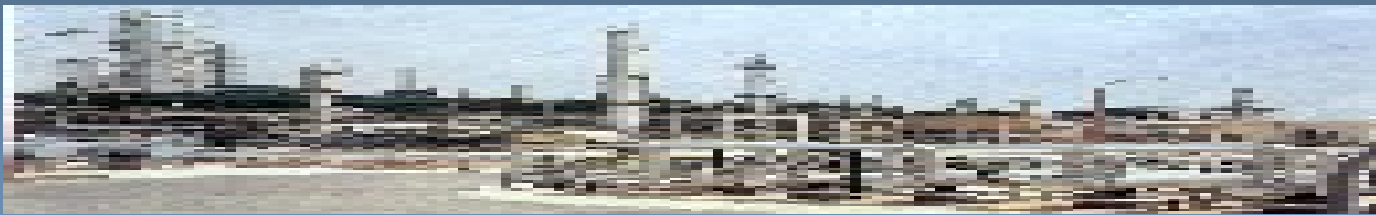
- In 1983, this plant was affiliated with ARC. Production is about 45,000 tons of various grades of Lubricating Oil for Gasoline and Diesel Engines, in addition to hydraulic and various other kinds of Lube Oils.

### Production Lines:

- 1 Liter Can
- 4 Liters Can
- 200 Liters Drums

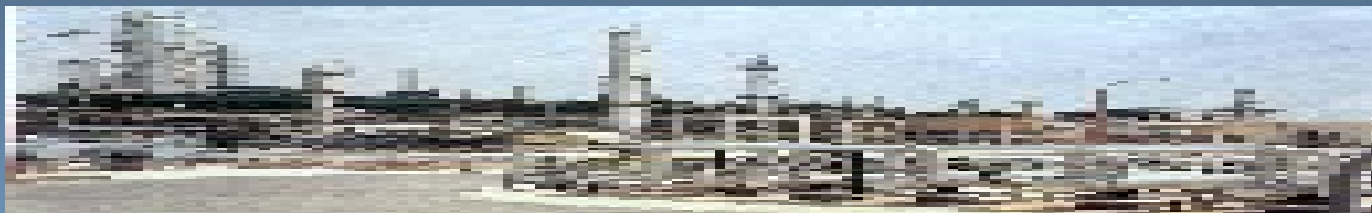






## Supplementary Utilities

Besides the main plants, the ARC is also furnished with all necessary utilities for the generation of power and steam, units for the desalination of brine water, a lab for analysis and quality-control, maintenance workshops of different specialties, and a warehouse that provides the company with all its essential spare-parts in order to maintain the non-stop operation of its plants.



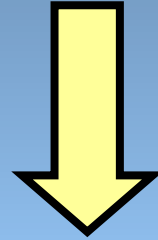
## Marine Operations

These operations are among the company's vital utilities, which insure the continuity of operating marine facilities and it makes it possible for tankers to be received and tied to existing marine berths or docks within the Harbor so as to be shipped with different products for the purpose of exportation abroad or local distribution, or for the exportation of crude oil and the discharging of reduced crude, base oils and gasoline from tankers. They are distributed as follows:

Berth	Capacity (in 1000 tons)	Imports/Exports
1	10 – 100 Tankers	Kerosene & diesel oil
2	5 – 30 Tankers	Light products, base oils, and imported gasoline
3	15 – 140 Tankers	Sharara crude & reduced crude



# Major future Projects in ARC



**Refinery Revamp Project**  
-Phase I  
-Phase II

**Harbor Expansion  
Project**

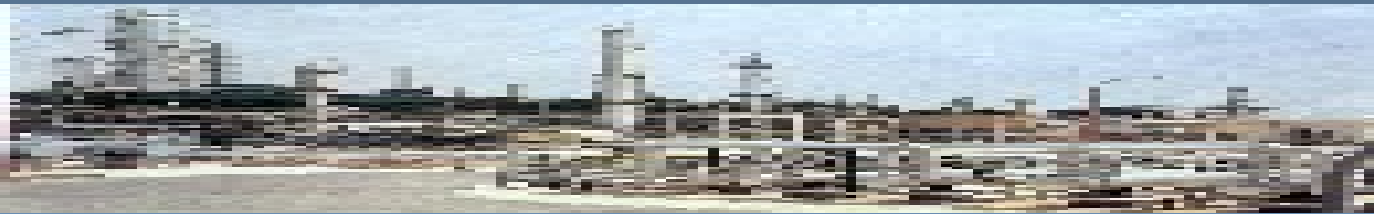
**Lub. Oil Blending Revamp  
Project**



## Refinery Revamp Project

### MAIN OBJECTIVES OF THE REVAMP PROJECT

- ❑ IMPROVING REFINERY ECONOMICS .
- ❑ SECURING THE LOCAL MARKET DEMAND .
- ❑ MODERNIZATION :-
  - ✓ CONTROL AND COMPUTERIZATION .
  - ✓ ENERGY CONSERVATION AND LOSS MINIMIZATION .
  - ✓ ENVIRONMENTAL CONSIDERATIONS .
- ❑ UPGRADING PRODUCTS SPECIFICATIONS .



# Refinery Revamp Project

## Phase I

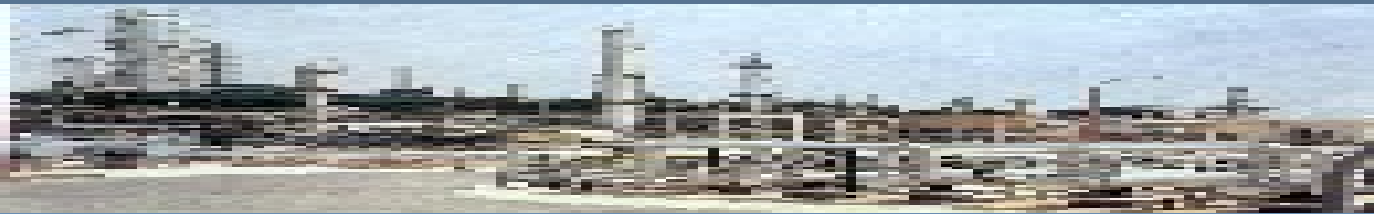
This phase targets:

4. Upgrading the refining capacity and the multiplication of gasoline production.
6. Updating the control and measurement systems.
7. Improving diesel specifications.
8. Contribution to economical growth.



## Phase II

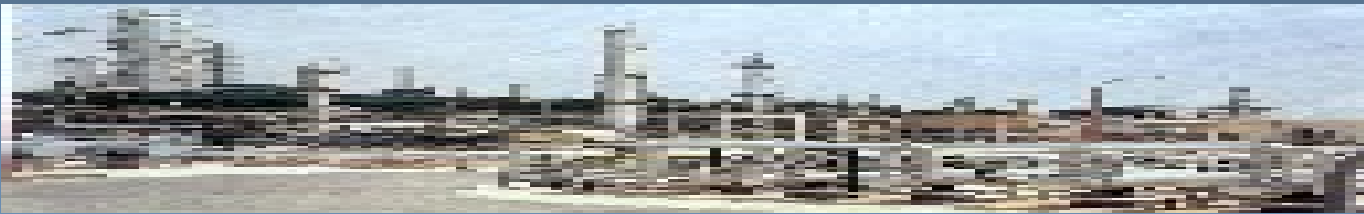
This phase targets the cracking and transforming of heavy fuel oil into highly economical white products, and also increasing the produced gasoline and optimizing the economics of the Refinery in a way that achieves good profitability.



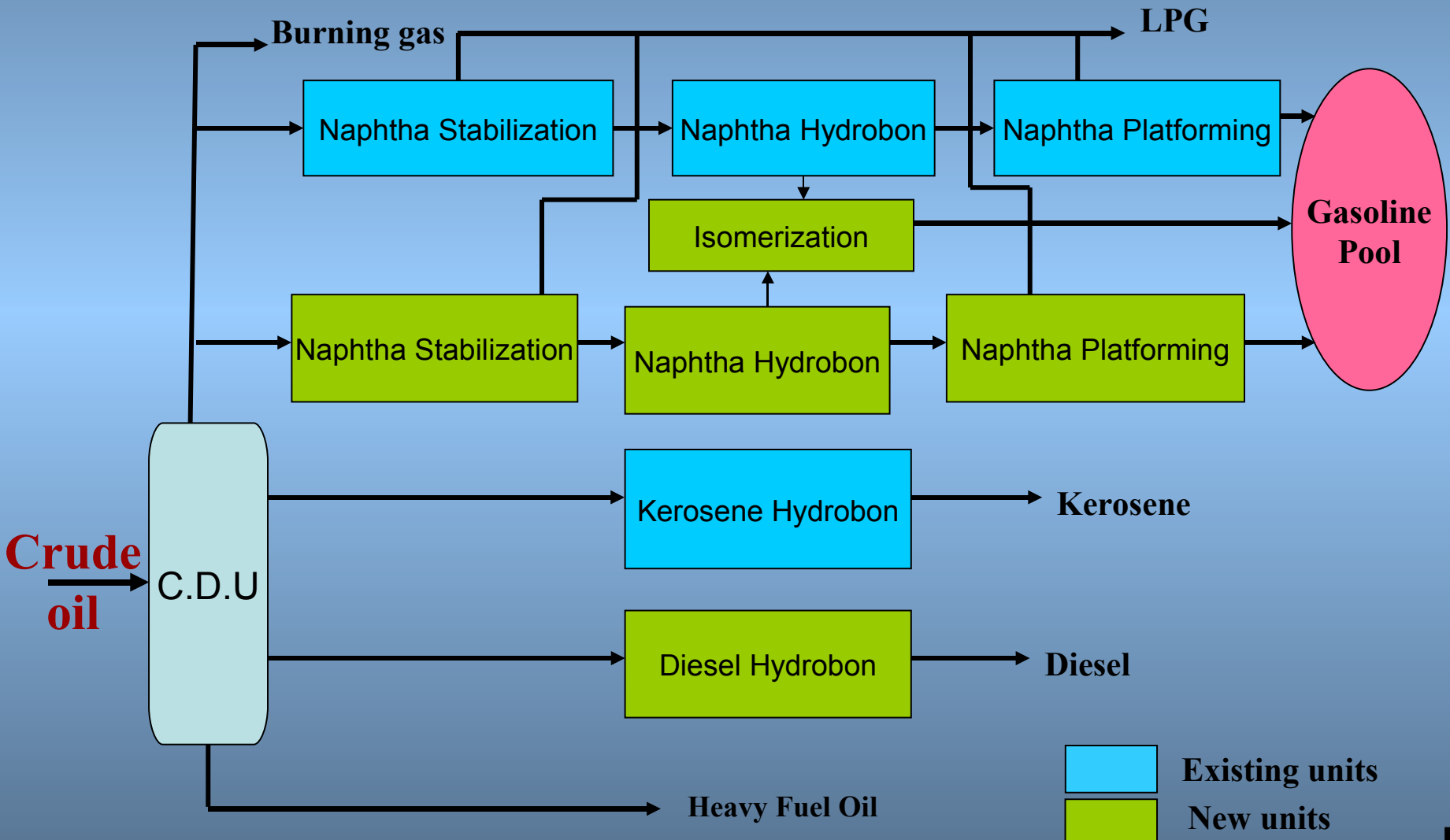
## Phase I Units of the Revamp Project

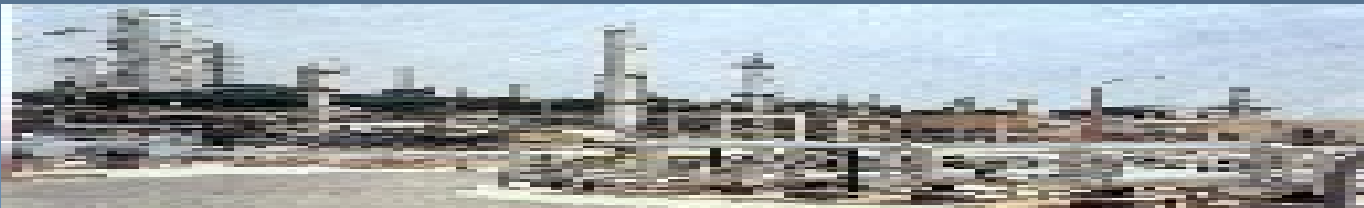
### Hydrobon and Platforming Units

- Necessary modification of the existing units for increasing the refining output.
- Naphtha Stabilizer Unit
- Naphtha Platforming Unit
- Light Naphtha Isomerization Unit
- Diesel Hydrobon Unit
- Sulfur Extraction Unit



# A schematic diagram showing Phase I Units of the Revamp Project





## Production Rates\* at Present Time and after Phase I Revamp

S. No.	Product	Present Production	Post-Revamp Refining cap. 6.14 million tons
1	LPG	71	164
2	Untreated Naphtha	583	-
3	Gasoline	580	1568
4	Kerosene	1,019	776
5	Diesel	1,338	1,704
6	Heavy Fuel Oil	1,254	1,648

\* Rates x 1000 tons



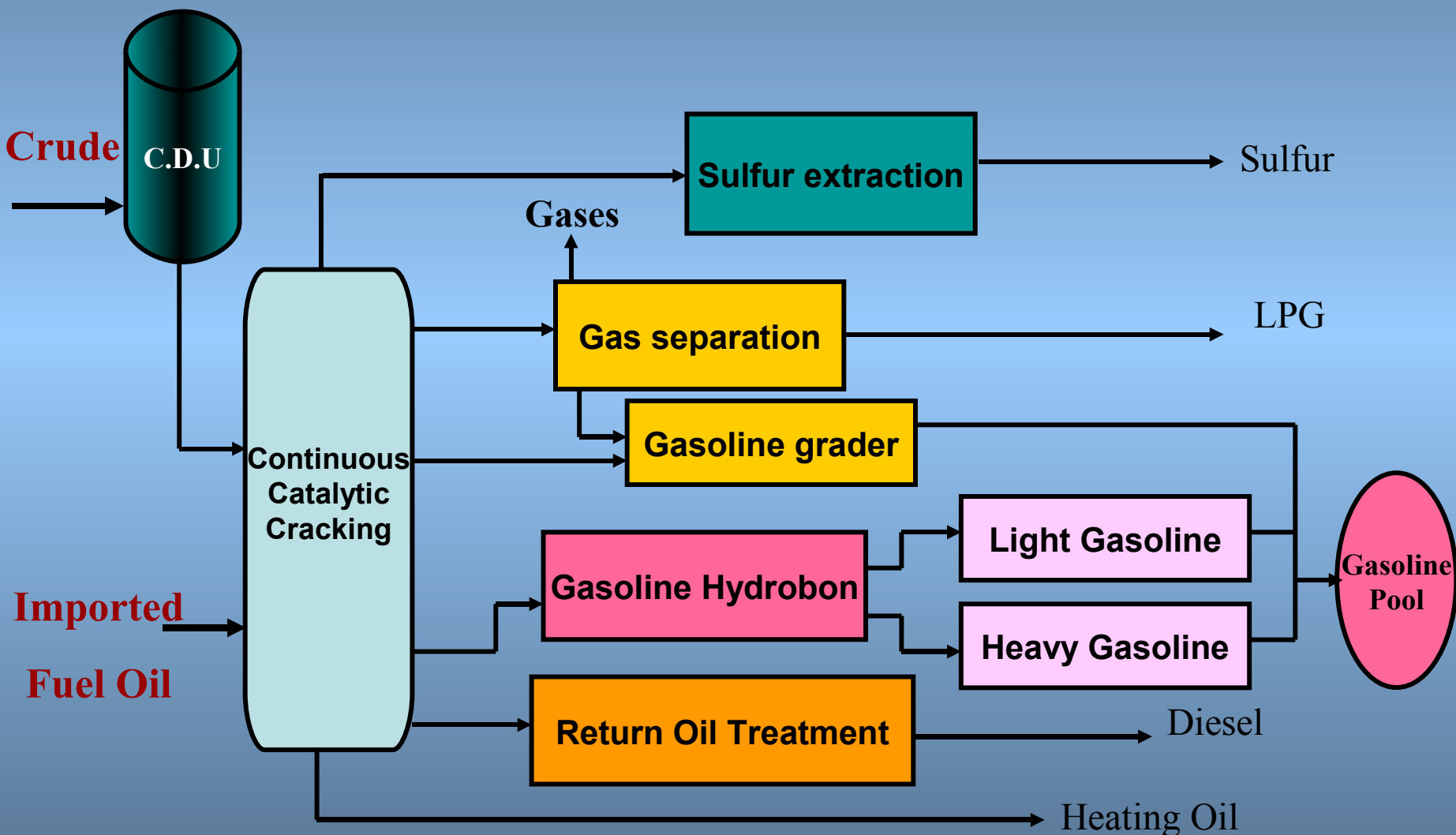


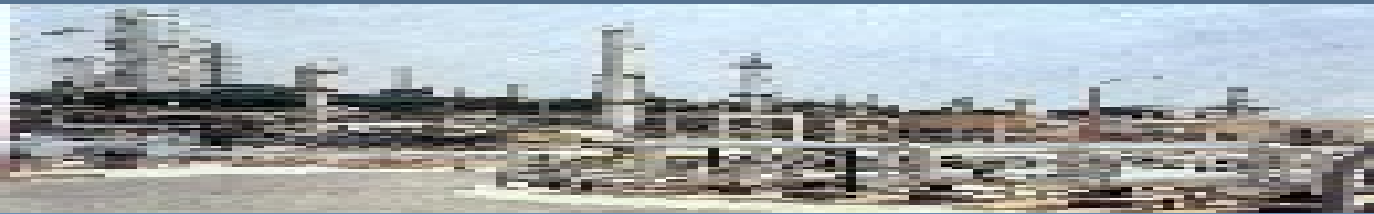
## Phase II of the Revamp Project

- **Heavy Fuel Oil RFCC Unit**
- **Gasoline Hydrobon Unit**
- **Isomerization Unit**
- **Return Oil Treatment Unit**
- **Sulfur Extraction Unit**



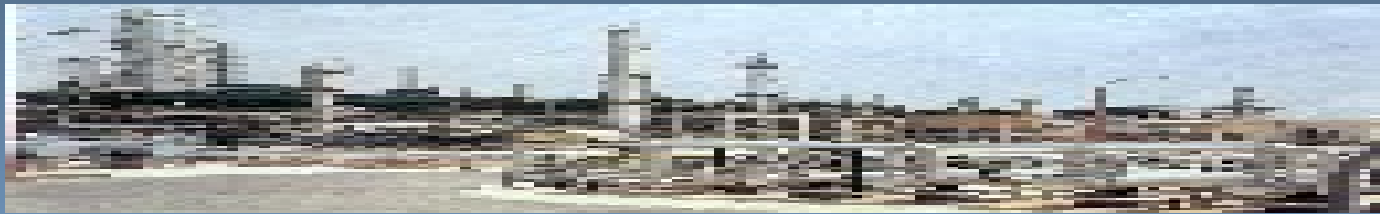
## A schematic diagram showing Phase II Units of the Revamp Project





## Production after **Phase II** of the Revamp Project

S. No.	Product	Present Prod.	Post Phase I	Post Phase II
1	LPG	71	164	245
2	Untreated Naphtha	583	-	-
3	Kerosene	1,019	776	955
4	Gasoline	580	1,568	2,583
5	Diesel I	1,338	1,704	1,750
6	Heavy Fuel Oil	1,254	1,648	0
7	Heating Oil	-	-	213



## Harbor Expansion Project

ARC intends to expand its harbor in a way that permits tankers to dock at open high seas in addition to existing floating buoys, linked to an entirely protected harbor (sea-port), with a capacity for 3 oil tankers.

This will secure ARC's exports of white products, asphalt, LPG, fuel oil, besides its imports of base oils and reduced crude.

Furthermore, the project will avail exports of crude oil, etc. from the south west of Great Jamahiriya.





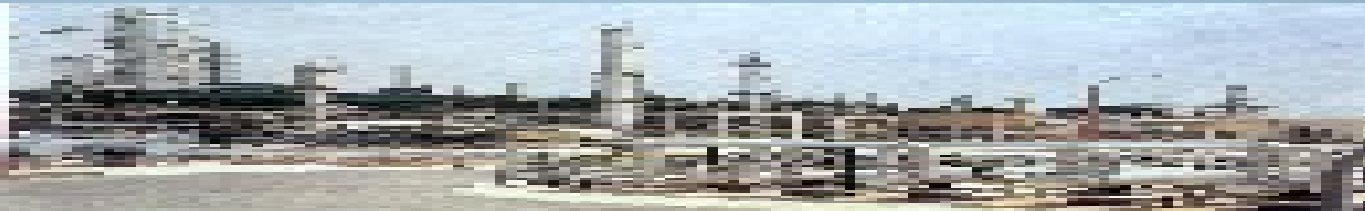
## Lube Oil Blending Revamp Project

Due to equipment deterioration and lack of spare parts required to ensure smooth operation and to meet the rapidly oil demand. ARC approved the project to : revamp the plant with view to achieving the following objects

- Increase the plant capacity from 45,000 tons to 100,000 tons .
- Add the flexibility of blending to produce new kinds of oils as per consumer requirements & global specifications .
- Change the canning from metal to plastic cans .
- Improve the canning to different sizes as per market requirements.

Keeping the above in view , ARC studied many options and approved the best one : from technical & commercial aspects which includes the followings

- New and integral blending systems .
- Install new filling lines for different plastic can sizes .
- Improve the plant existing utilities and add new requirements .



**THANK YOU FOR  
YOUR ATTENTION**