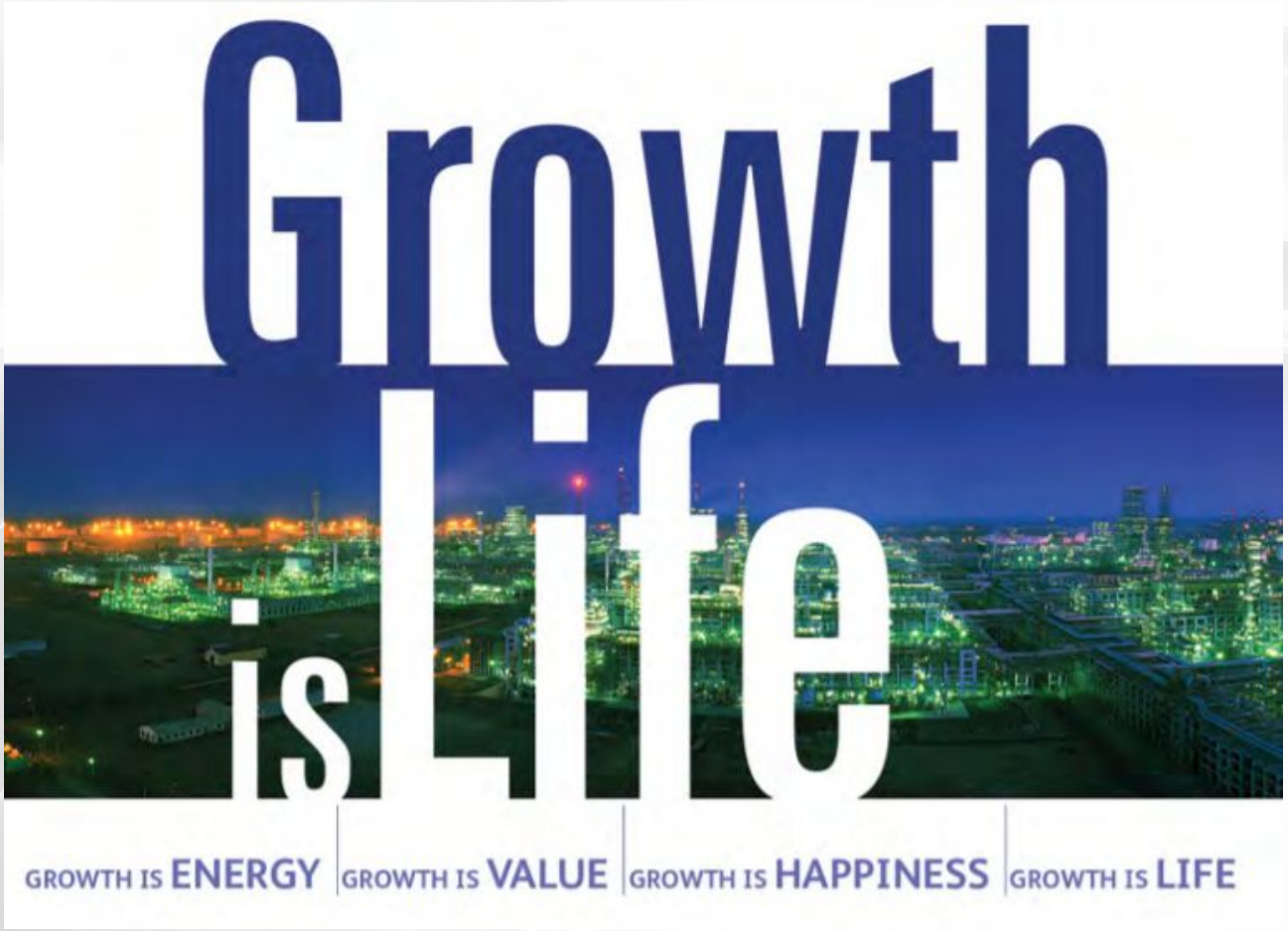
Reliance Jamnagar

a glimpse to largest refinery hub of the world...

Swapnil Keshari **Sahil Chalak** **Adhishree Apte**


Growth
is Life
GROWTH IS ENERGY
GROWTH IS VALUE
GROWTH IS HAPPINESS
GROWTH IS LIFE

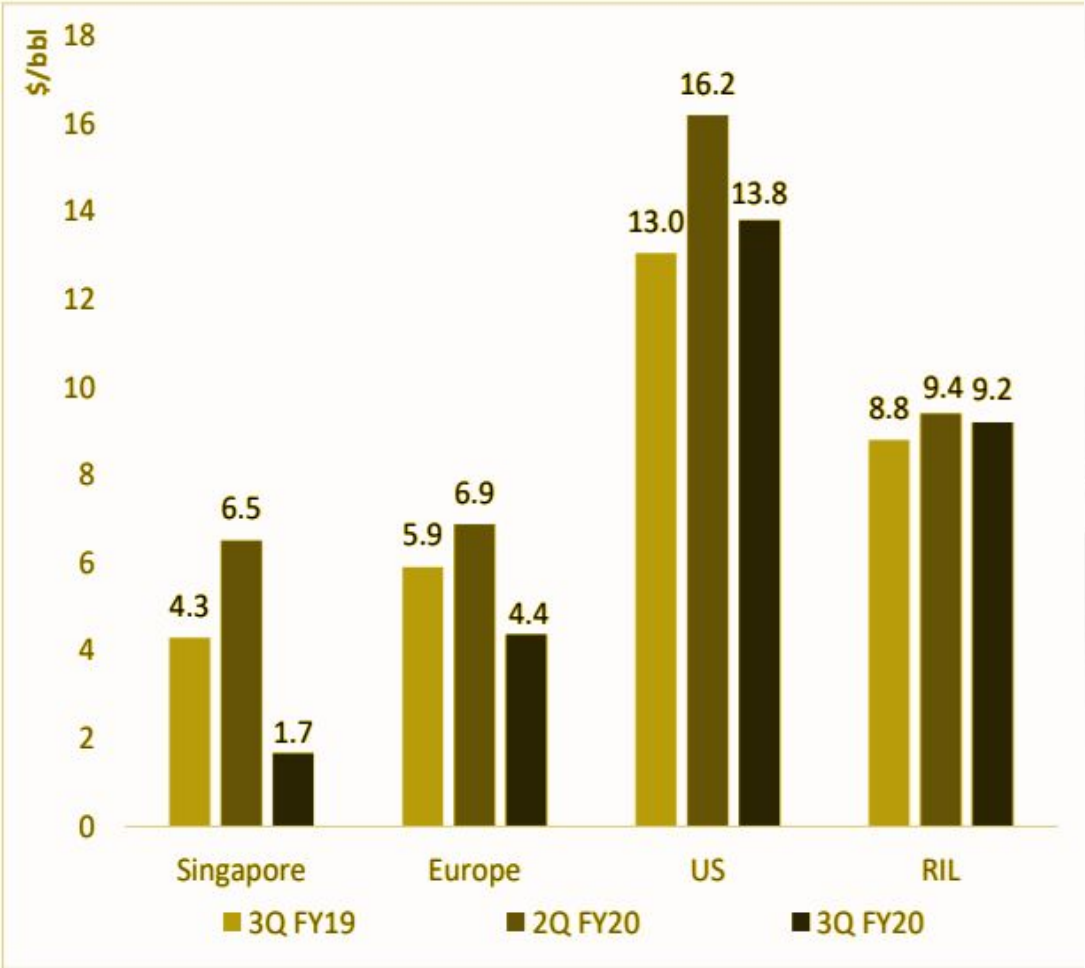
JAMNAGAR SHALL BE THE REFINERY ICON OF THE WORLD WITH BEST-IN-CLASS PERFORMANCE

ENSURE THE JAMNAGAR REFINERY IS FUTURE READY WITH A STRATEGIC TRANSFORMATION TO OPTIMAL OIL-TO-CHEMICALS

Housing World's Largest

- Fluidised Catalytic Cracker (FCC)
- Coker
- Alkylation
- Paraxylene
- Polypropylene
- Refinery offgas (ROG) cracker
- Petcoke gasification plants

Global Refining Margins

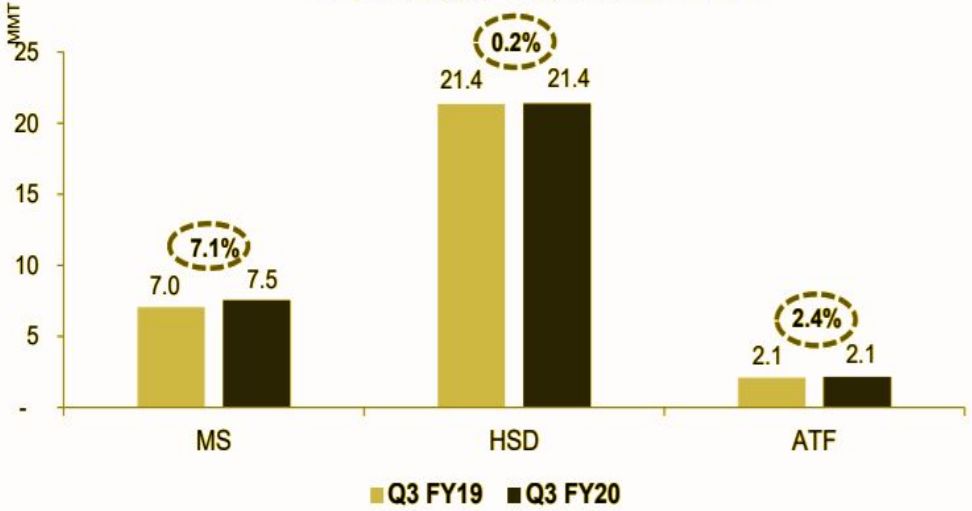


- Average profit around 10$/barrel
- Profit relative to other refineries
- Huge volumes processed
- Overall profits high

Refining and Manufacturing Segment Performance

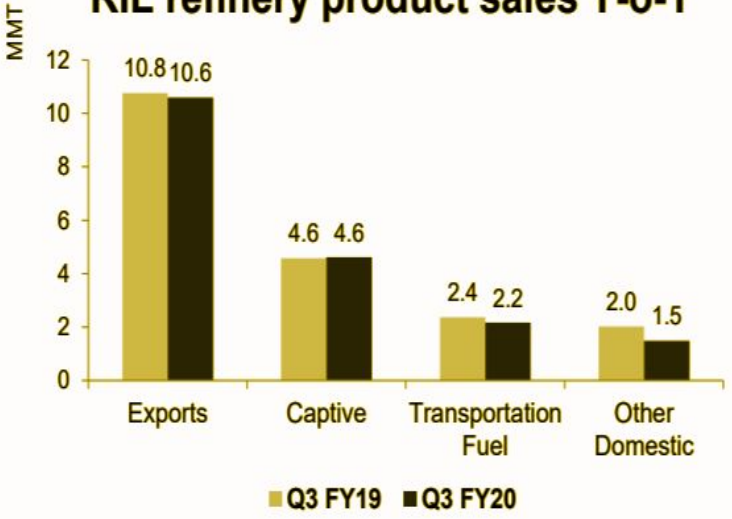
(₹ crore)	3QFY19	2QFY20	3QFY20
Revenue	111,738	97,229	103,718
GRM ($/bbl)	8.8	9.4	9.2
EBITDA	5,849	5,659	6,530
EBITDA Margin (%)	5.2%	5.8%	6.3%
Throughput (MMT)	18.0	16.7	18.1

Domestic Demand Y-o-Y



- India oil product demand grew 3.2% in 3Q FY20
  - Preference for petrol cars, improving road infrastructure and rural connectivity driving MS demand
  - Pickup in tourist movement post festive season provided support to ATF demand

RIL refinery product sales Y-o-Y



- Exports sales remained in line Y-o-Y basis
- Strong traction in retail and bulk fuel sales through RIL network

Source: [Financial Reporting Reliance]

R&M Business Outlook

Reliance Industries Limited

Challenges

- Large capacity additions 1.4 mb/d (2019) and 1.2 mb/d (2020)
- Reduced heavy crude supply due to sanctions
- Growing freight rates on the back of IMO spec change and geopolitical concerns

Macro trends

- Oil demand to grow by 1.0 mb/d (2019) and 1.2 mb/d (2020)
- Continued Middle East Geopolitical tensions
- Uncertainty over future of US China trade deals
- Brexit uncertainties

Refining drivers

- Refined products demand growth from Emerging Market Economies
- Gasoil demand growth as compliant bunker fuel
- Discount on sour crudes and feedstocks
- Tightening Gasoline specifications

Positioning

- RIL is well placed to take advantage of emerging market scenarios by
  - Enhanced coker capacity
  - Versatile and flexible kit in terms of feedstock and products
  - Maximizing distillate yields

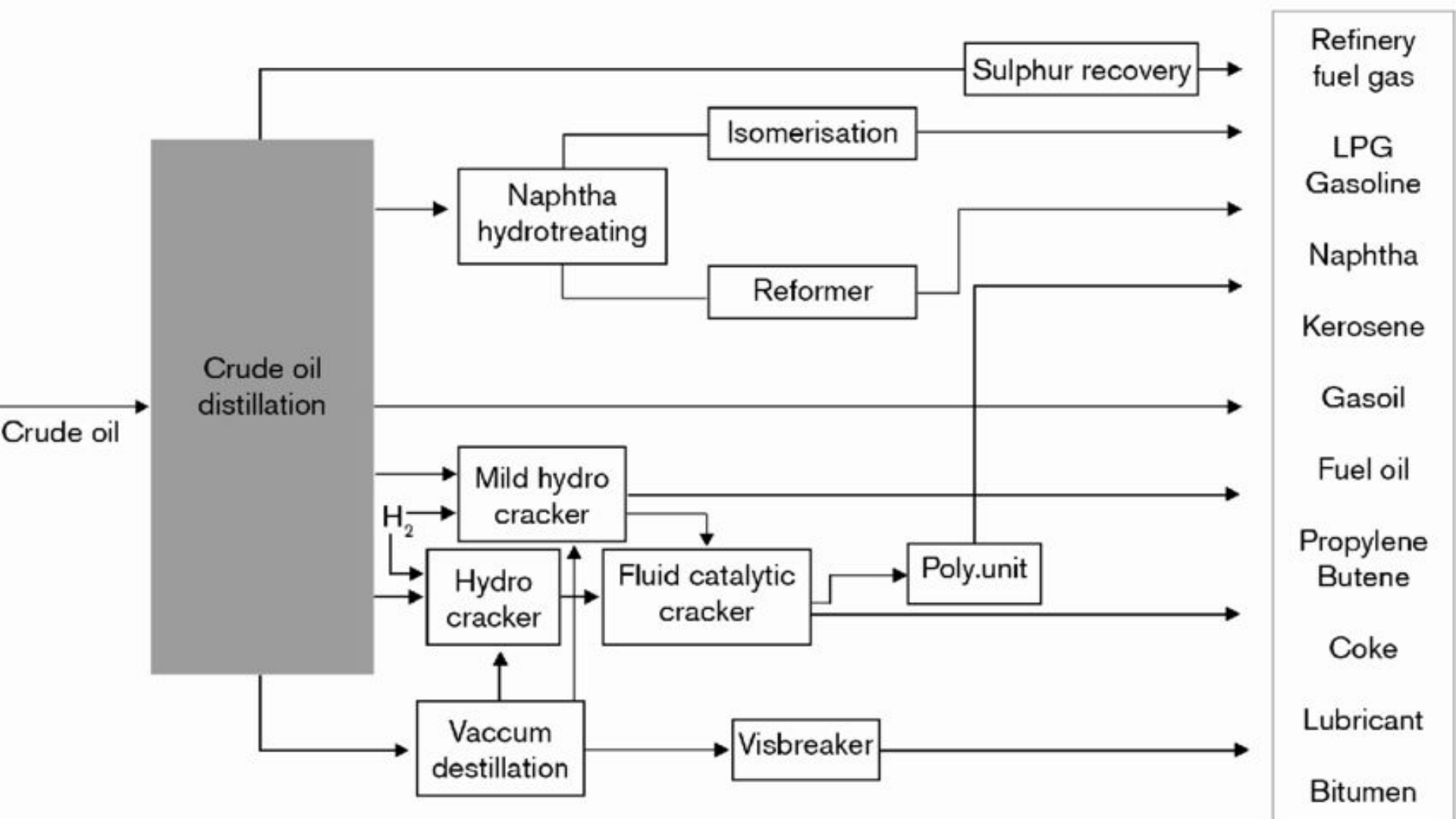
Constructive outlook with IMO spec change and stable demand growth

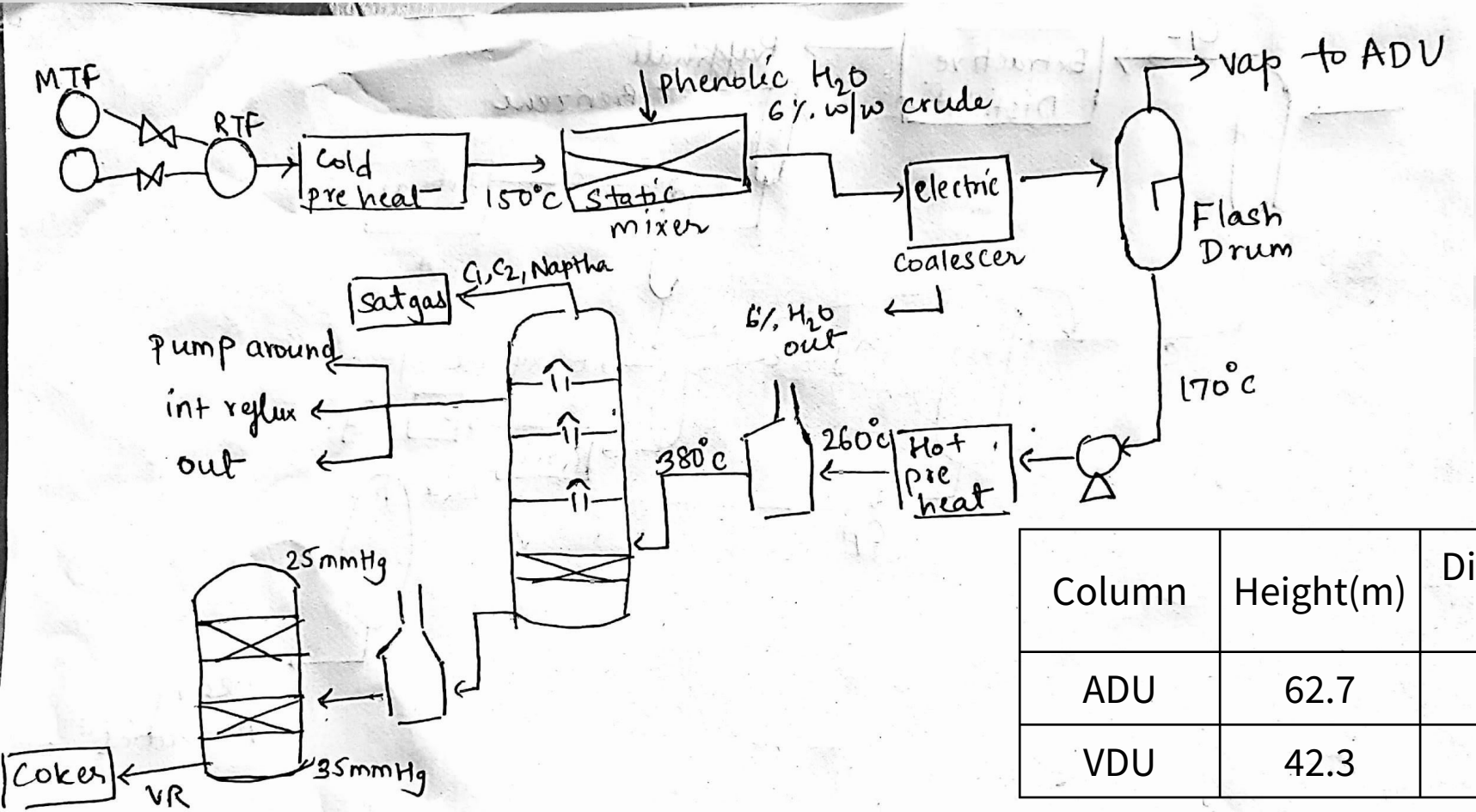
Single Point Moorings

- Deep Sea Floating Anchors
- Subsea Pipelines
- Single Cargo
- ULCC Ships

Berths

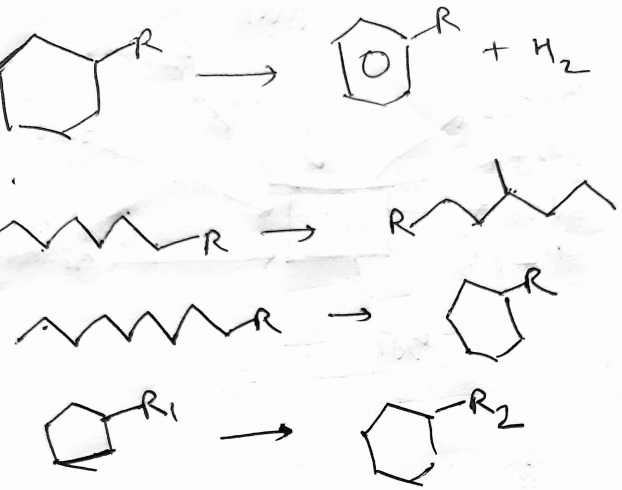
- Closer to Shore
- Above Sea Pipelines
- Different Cargo
- Draft Limitation


Crude oil
Crude oil distillation
Sulphur recovery
Isomerisation
Naphtha hydrotreating
Reformer
Mild hydro cracker
H_2
Hydro cracker
Fluid catalytic cracker
Poly.unit
Vaccum destillation
Visbreaker
Refinery fuel gas
LPG
Gasoline
Naphtha
Kerosene
Gasoil
Fuel oil
Propylene
Butene
Coke
Lubricant
Bitumen



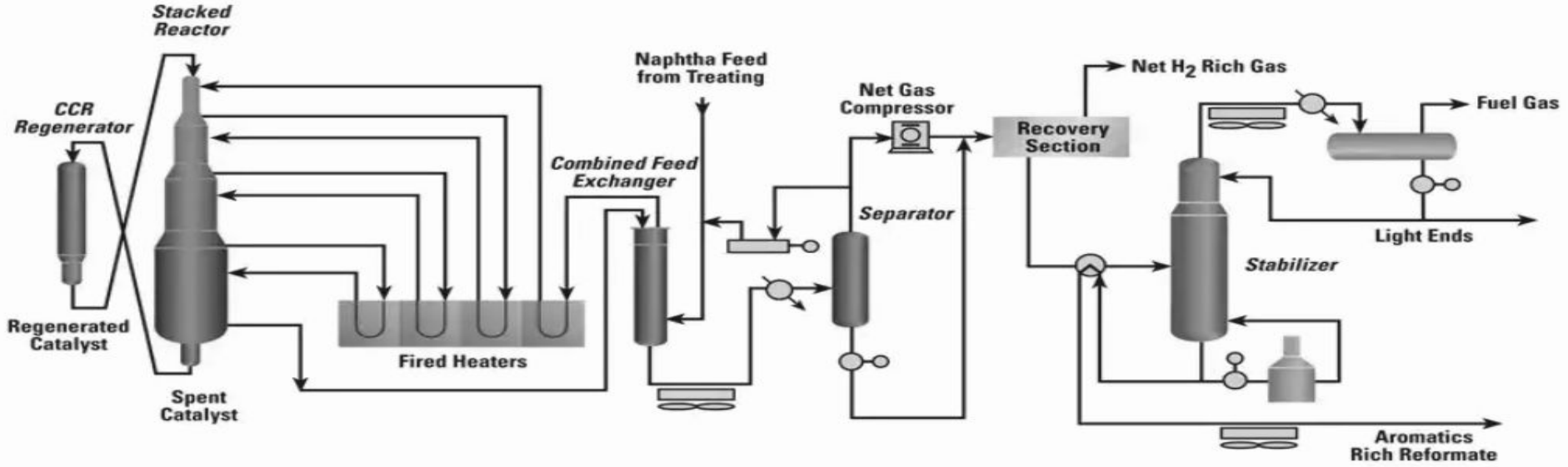
Column	Height(m)	Diameter (m)
ADU	62.7	9.6
VDU	42.3	12.5

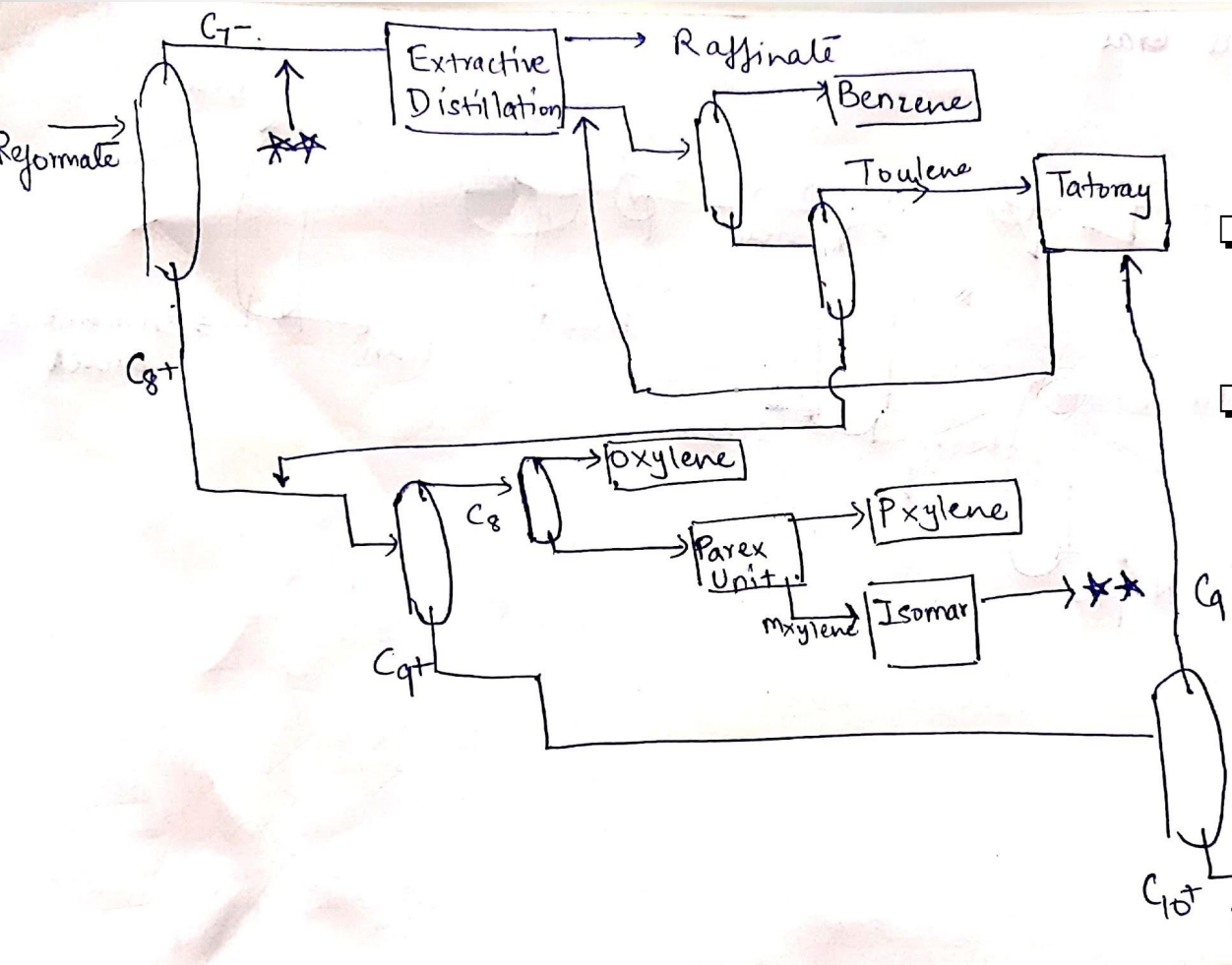
Crude Distillation Unit



Platformer

- Hydrogen generating unit
- Objective is to increase octane number of the feed
- Houses PakiNox - World's Largest Plate Welded Plate Heat Exchanger



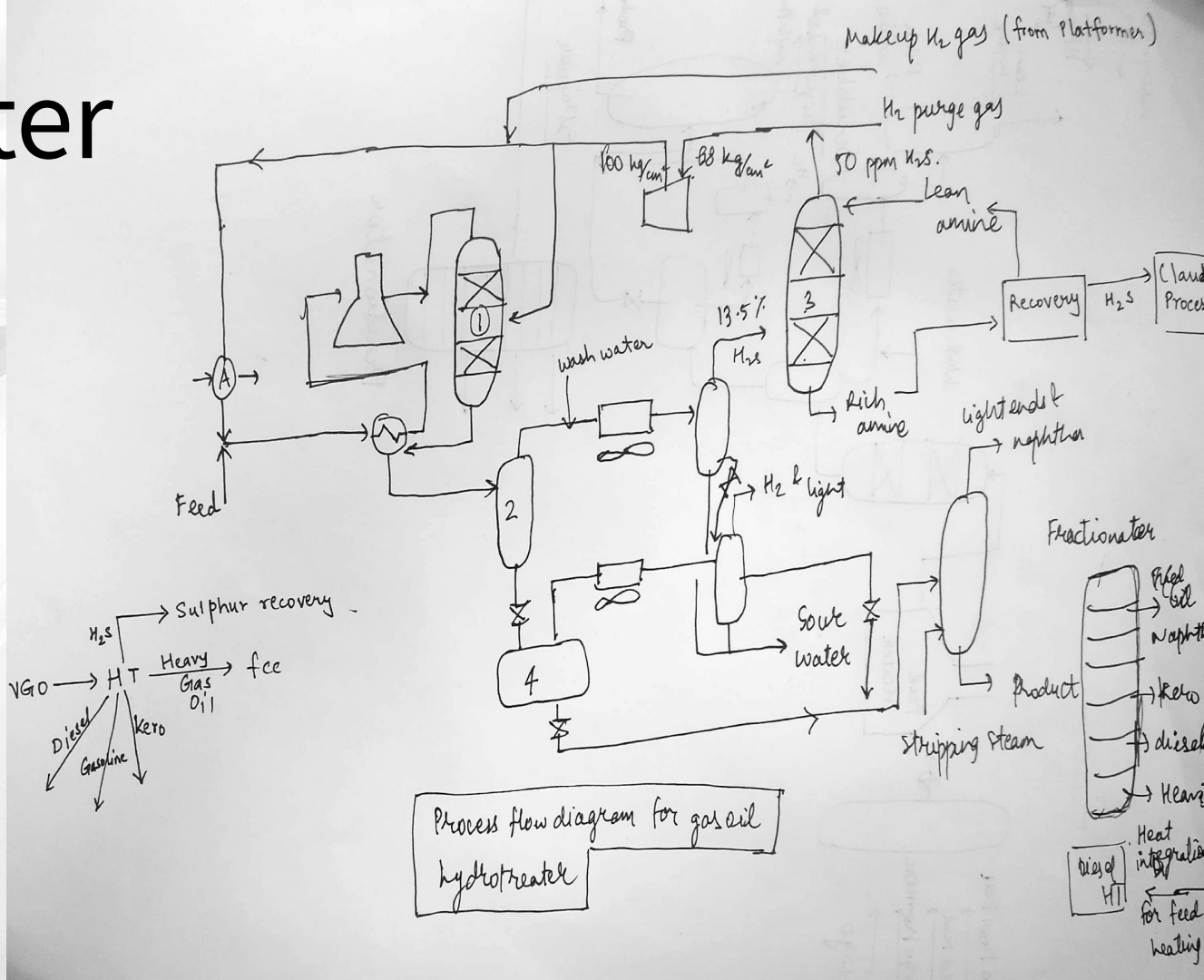


Aromatics

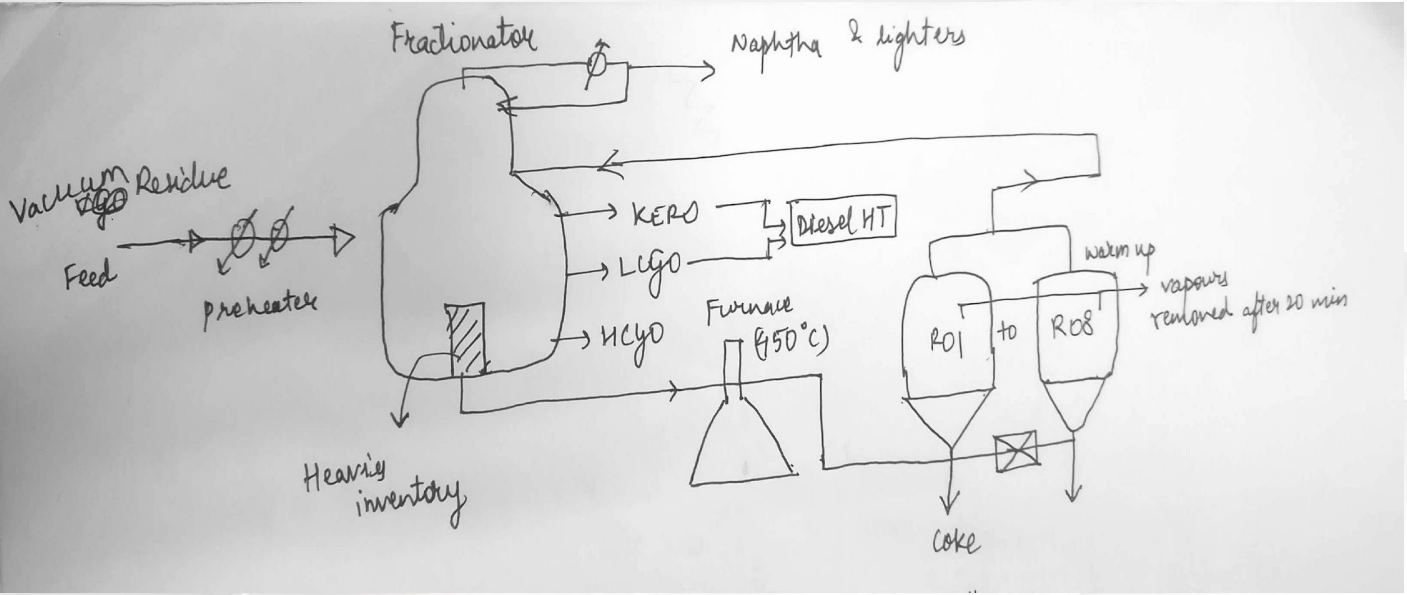
- BTX are the main products
- Unit operations such as:
  1. Extractive Distillation
  2. Swing Adsorption in Parex unit

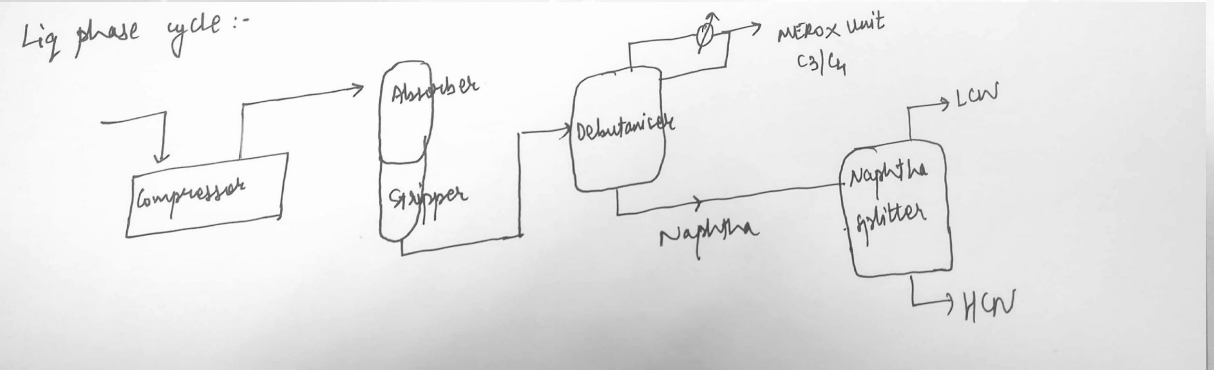
Hydrotreater

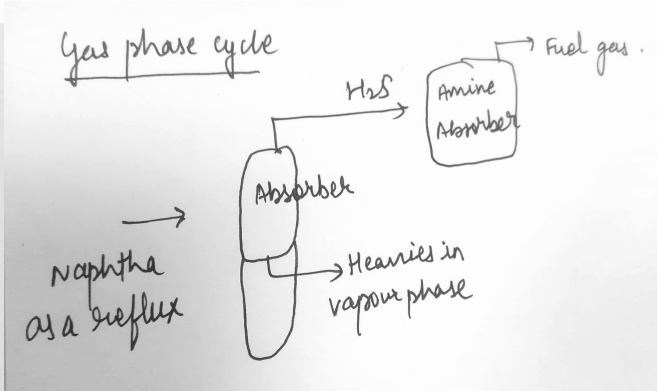
- COMoS is a pyrophoric catalyst, i.e., it ignites when it comes in contact with air.



Coker

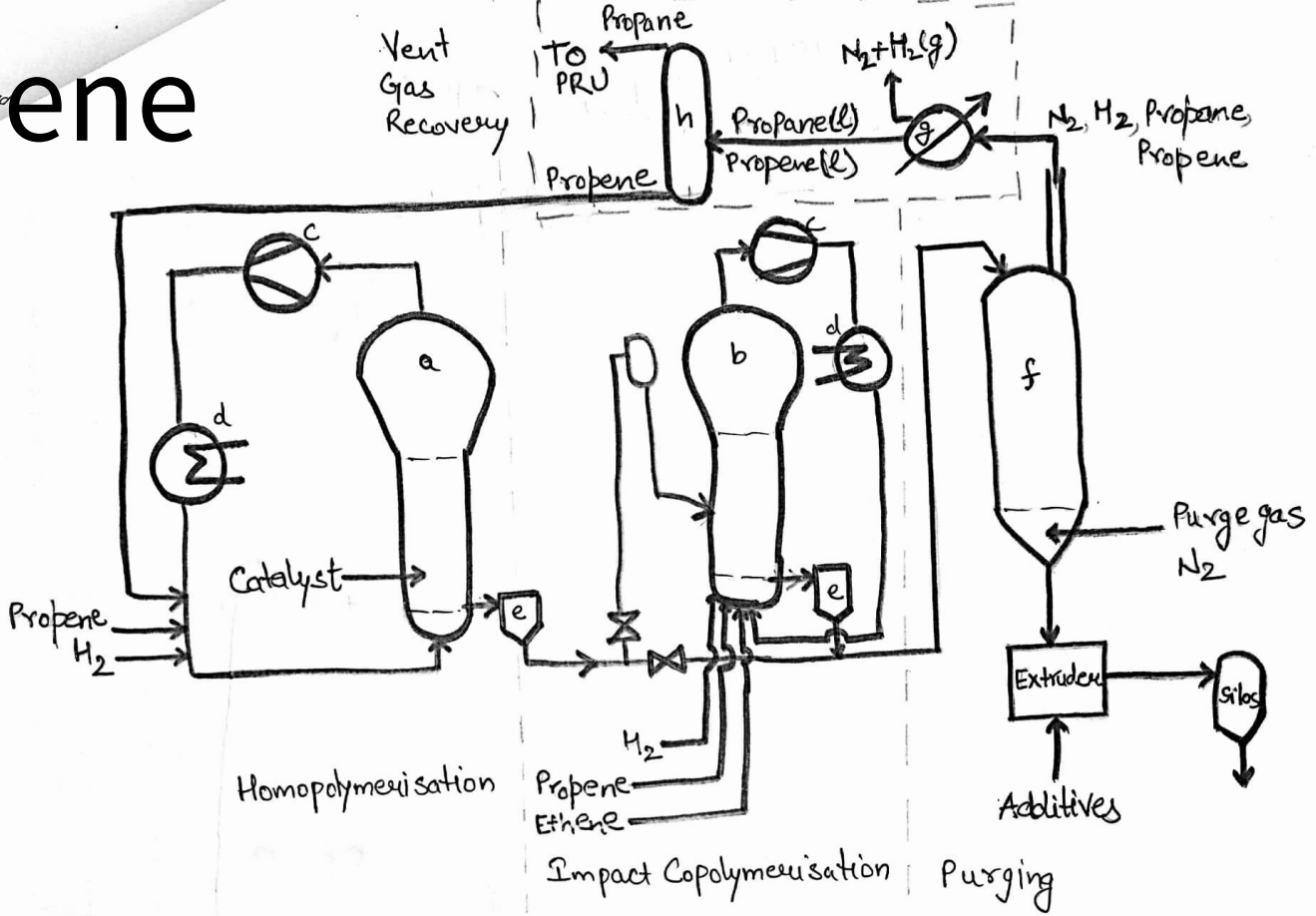

Fractionator
Naphtha & lighters
Vacuum Residue
Feed
preheater
KERO
Diesel HT
LCGO
HCGO
Furnace
(450°C)
R01
to
R08
warm up
vapours removed after 20 min
Heavies inventory
Coke


Liq phase cycle :-
Compressor
Absorber
Stripper
Debutanizer
MEROX unit
C3/C4
LCN
Naphtha
Naphtha Splitter
HCN

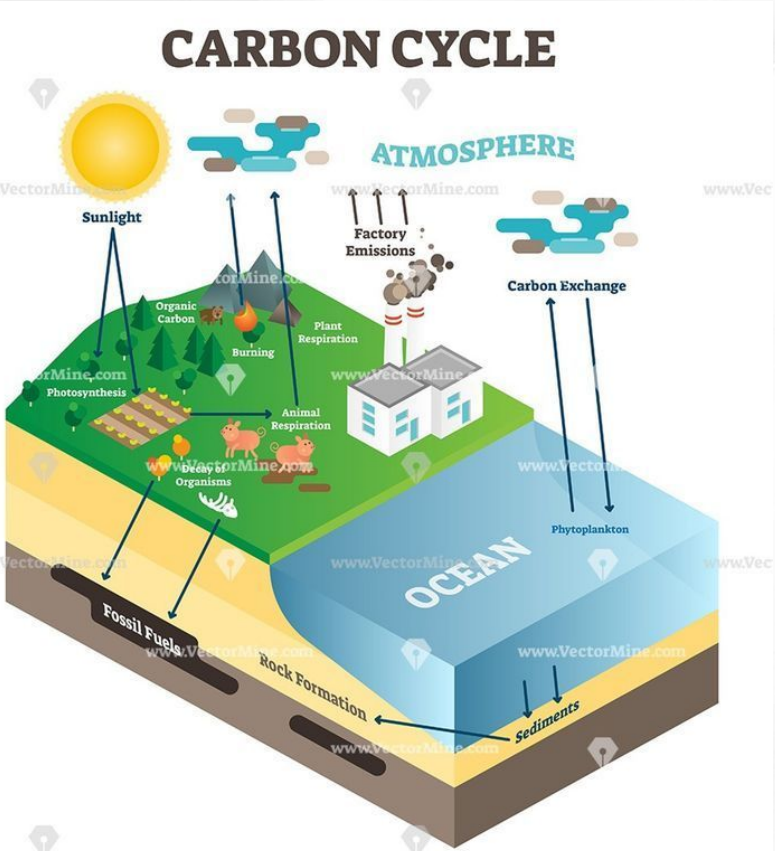

Gas phase cycle
Fuel gas.
H2S
Amine Absorber
Absorber
Naphtha as a reflux
Heavies in vapour phase

Polypropylene

- Catalyst which is developed in house for the process
- Total production is 1170 KTPA



Algae to Oil


CARBON CYCLE
ATMOSPHERE
Sunlight
Factory Emissions
Carbon Exchange
Organic Carbon
Burning
Plant Respiration
Photosynthesis
Animal Respiration
Dead Organisms
Phytoplankton
OCEAN
Fossil Fuels
Rock Formation
Sediments

A2O Plant at RIL

1. Algae culture is viable because it grows 25-30 times faster than normal food crops. Here the photosynthesis efficiency is maintained at good rates and algae is developed through membrane process.
2. The oil formed has nitrogen and oxygen contents which are then to be separated. Also the solid formed from the oil formation which is called biochar is used in fertiliser and cosmetic industries.
3. The pilot plant involves a closed reactant system for Genetic Modification. Algae that contains lipids, proteins and carbohydrates can be grown on marines and hence better plant extraction is possible.
4. The reaction involves algae reacting with water and carbon dioxide in the presence of sunlight to get an increased algae yield.
5. After harvesting, process of Hydrothermal Liquefaction is used to convert algae to oil. The reaction conditions are:- 200-250 bar. Also, a photobioreactor is used to make algae which uses a thin membrane for higher sunlight percolation.

Research and Development at Reliance Jamnagar

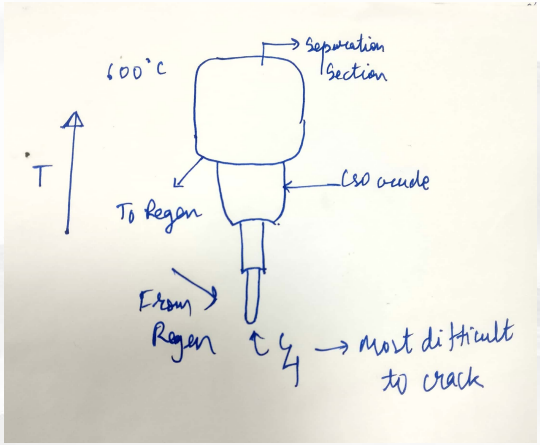
RnD Pilot Lab

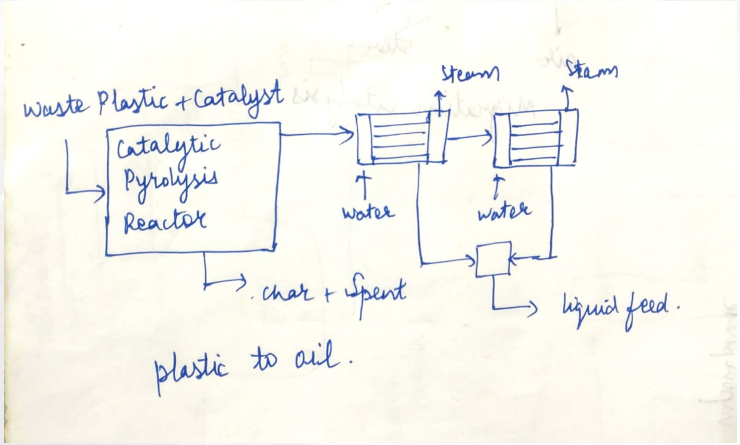
At the RnD lab at Reliance we saw the following apparatus:

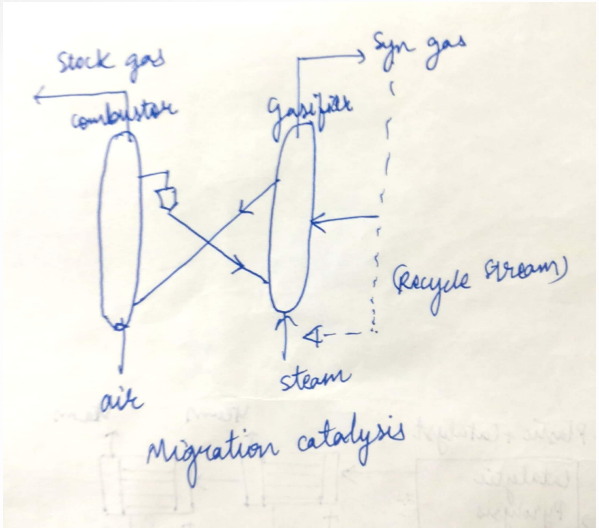
1. ACE: Advanced Cracking Evaluation
   This method was used to study the different yeild patterns in the FCC unit in the presence of different catalysts.
2. BET: Surface Area Analyser
   This apparatus was used to measure the internal surface area and the porosity of the catalysts involved in the FCC Unit
3. Carbon Sulfur Analyser
   This apparatus was used to analyse the sulphur content in petcoke and the equilibrium catalyst deposited in the FCC.
4. SimDisk
   This apparatus was used to analyse the liquid product composition from the FCC based on the boiling point distributions.
5. Gas Analyser
   This apparatus was used to analyse the gaseous phase product composition from the FCC based on their polarities.

RnD projects undertaken at RIL Jamnagar

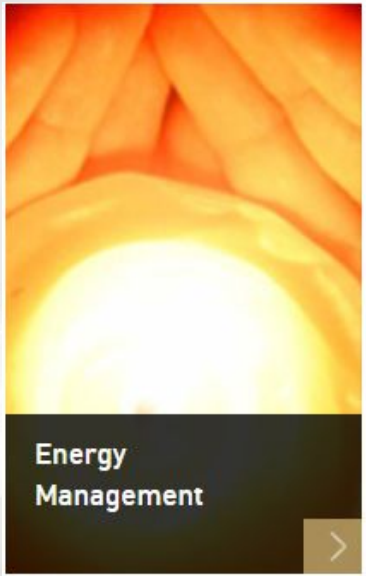
1. Multi-zone Catalytic Cracking (MCC)
2. Low-Temperature Catalytic Gasification
3. Waste Plastic Utilisation
4. Needle Coke Process





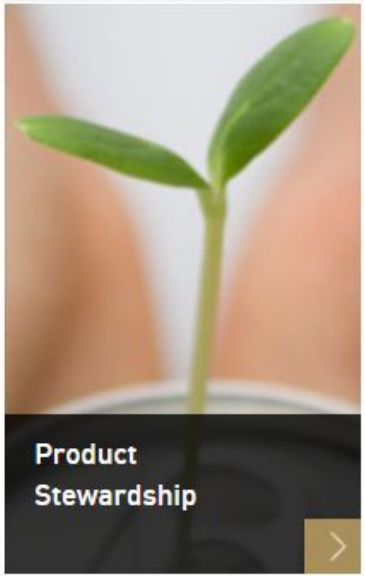



At Reliance, business priorities co-exist
with social commitments and our activities
support inclusive growth.

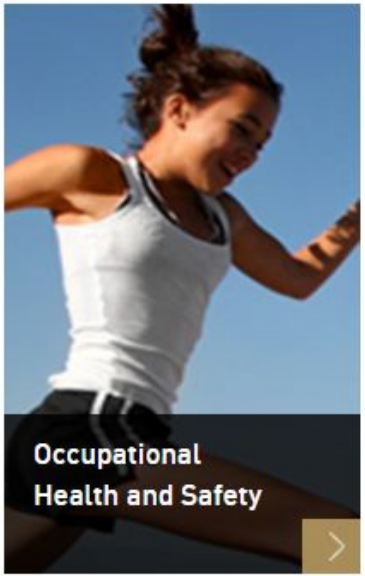


- Revamping air preheaters
- Uprating Gas Turbines
- Install latest Technology Divided Wall Columns

- A2O, Jatropha based biodiesel
- Plastic PET bottle recycle
- Solar panels



- Reducing carbon footprint of textile products



- Health and safety of employees
- Task based hse assessment

- Corporate social responsibilities initiatives

"Our dreams have to be bigger.
Our ambitions higher.
Our commitment deeper.
And our efforts greater."

~Shri. Dhirubhai Ambani