# Egyptian Petrochemicals Industry

## A Prospect for the Future

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# Introduction

Petrochemical industry plays a vital role in the economic development and growth.

In recognition of the importance of petrochemicals industry in Egypt's economy, along with the existence of successful drivers, petrochemical development strategy has settled to accelerate the implementation of such industry.

# Egypt's Petrochemical Development Strategy

## Step 1

Assigning an International experienced consultant to set a Master Plan for the Petrochemicals industry.

## Step 2

Establishing a Petrochemical authority to support the implementation of a Master Plan for the Petrochemical projects.

# Way forward : 20 Years Master Plan

- The Petrochemical Master plan presents a vision of the industry which could be established in Egypt over the next 20 years (2002 -2022) taking into consideration:

# KEY FEATURES OF PETROCHEMICAL VISION

## US $ 20 Billion Investment in 20 Years

# Petrochemicals Master Plan (2002 – 2022)

| PHASE (1) (2002 - 2008) US $ 6 billion | PHASE (2) (2009 - 2015) US $ 7 billion | PHASE (3) (2016 - 2022) US $ 7 billion |
|---|---|---|
| • Methanol (I) | • Styrene | • Propylene / Polypropylene (II) |
| • Ammonia / Urea (I) | • Polyester (I) | • 3rd Olefins Complex |
| • Ammonia / Urea (II, III) | • Aromatics Complex | • Styrenic Complex |
| • Polypropylene (I) | • Ethoxylates | • Vinyl's Complex |
| • Polystyrene | • 2nd Olefins Complex | • Butadiene |
| • LAB | • Methanol (II) | • Detergents (II) |
| • Acrylic Fibers | • PTA | • SB Latex (II) |
| • PVC (I) | • SB Latex (I) | |
| • 1st Olefins Complex | | |

In Operation | Under Construction | Under Development | Phase 3

# PHASE 1 ACHIEVEMENTS

# Phase 1- Achievements (2002-2012)

## ELAB

**Products:**

100 KTA Linear Alkyl Benzene(LAB)

**Location:**

Alexandria

## EPP

**Products:**

400 KTA Propylene

400 KTA Polypropylene

**Location:**

Port Said

## EMETHANEX

**Products:**

1.3 Million

T/Y Methanol

**Location:**

Damietta Port

## MOPCO

**Products:**

600 KTA Urea

50 KTA Ammonia

**Location:**

Damietta

## ESTYRENICS

**Products:**

200 KTA

Poly-Styrene

**Location:**

Alexandria

Phase 1 projects assure our commitment and success to achieve a national Petrochemical Master Plan strategy, consequently, five plants were successfully operated, and two projects are currently under construction.

# PROJECTS UNDER EXECUTION

# Misr Fertilizers Production Company (MOPCO Expansion)

The Project aims at producing Urea to replace imports and increase exports.

## Plant Capacity

1380 Million T/Y Urea
100 KTA Excess Ammonia

## Feedstock

Natural Gas

## Total Investment Cost

1800 Million USD

## Location

Damietta

# Egyptian Indian Company for Polyester

Egyptian Indian Polyester Company "EI-PET", an Egyptian Joint Stock Company. This project aims at producing the Polyester used for food and beverage packaging, so as to meet local market's demands as well as fulfilling export surplus.

## Plant Capacity

420 Thousand Tons/Year.

## Feedstock

PTA (Purified Terephthalic Acid)

MEG (Mono Ethylene Glycol)

## Total Investment Cost

253 Million USD.

## Location

Economic Zone – North West Gulf of Suez.

# The Egyptian Ethylene and Derivatives Company- ETHYDCO

As a part of the National Petrochemicals Master Plan, the complex aims at producing Ethylene and Ethylene Derivatives to maximize the value added to Ethane/Propane mixture - produced by The Western Desert Gas Complex in Alexandria. Ethylene is esteemed to be important for many intermediate petrochemical industries, such as PE, Styrene and PVC, etc...

## Plant Capacity

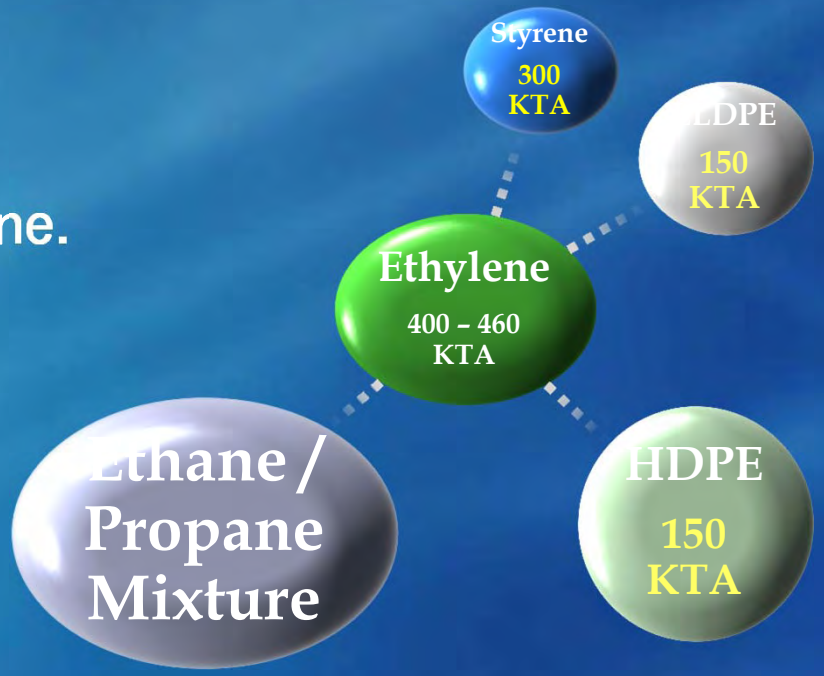
460 Thousand Tons/Year Ethylene.
400 Thousand Tons/Year Poly Ethylene.

## Total Investment Cost

1900 Million USD.

## Location

Al-Amerya - Alexandria



# Egyptian Styrenics Company (E-styrenics)- Styrene Project

The Project aims at producing Styrene in order to satisfy the feed requirements of the Polystyrene plant and export the Styrene surplus.

## Plant Capacity

300 KTA Styrene

## Feedstock

80 KTA Ethylene from Ethydco

## Total Investment Cost

460 Million USD

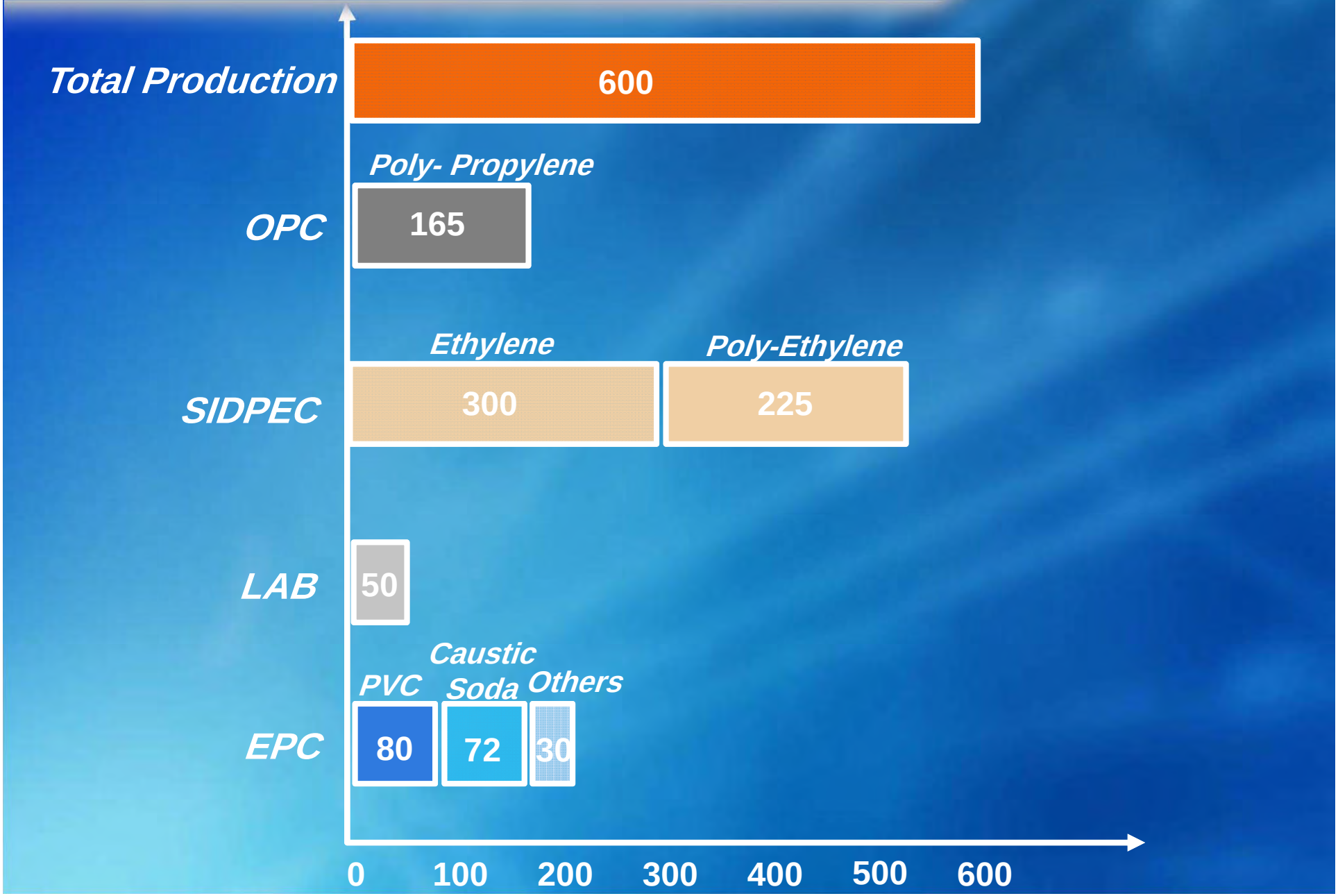
## Location

Al Dekheila Port - Alexandria


Licensor and basic Engineering packages have been settled

# EGYPTIAN PETROCHEMICAL INDUSTRY : (2002- 2015 )

# Production in 2002



# Petrochemicals Production in 2009

# Petrochemicals Capacity in 2012

EPC 80 KTA PVC
SIDPEC 225 KTA PE
LAB Unit 50 KTA LAB
OPC 165 KTA PP


Acrylic Fiber 54 KTA AF
E-LAB 100 KTA LAB
MOPCO: 600 KTA Urea
50 KTA Ammonia

E-Methanex 1150 KTA Methanol
EPP 400 KTA PP
E-Styrenics 200 KTA PS

# Expected Petrochemicals Capacity in 2015

# WHAT ABOUT FUTURE

# Constrains & Challenges

- Investment / Financing .
- Competition .
- **Feedstocks .**

# Outlines of Future Vision

i. Master Plan

ii. Value Chain Approach

iii. Petrochemical / Refinery Integration.

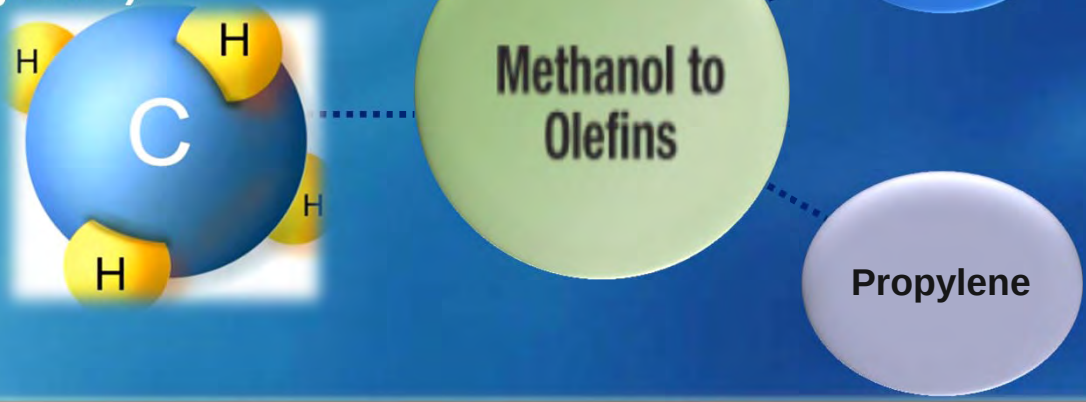
iv. Liquid Feedstocks “Naphtha Cracking”

# 1. Gas to Olefins Complex (GTO)

This project targets optimizing the Egyptian natural gas usage, satisfying the market's needs of Olefins (Ethylene & Propylene) and Poly-olefin (Polyethylene & Polypropylene), and exporting the surplus. The project will use the state-of-the-art technology to convert the lean natural gas (mainly C1) into methanol, thus, convert the latter into olefins (ethylene and/or propylene).

## Plant Capacity

1 million T/Y of olefins ( Ethylene and Propylene)
to produce 1 million T/Y of Poly-olefins
(polyethylene & polypropylene)




## Total Investment Cost

4 Billion USD.

## Location

Not Yet determined

# 2. Petrochemicals Downstream Clusters

Developing world-class industrial downstream clusters based on the basic petrochemical products that are produced from phase one projects.

Feedstock

Petrochemicals products with different grades :
(PVC), Poly propylene (PP), Polyester (PET), Polyethylene (PE), Polystyrene (PS), Acrylonitrile Butadiene Styrene (ABS).

# Selected Clusters

## 1- Plastic Packaging Cluster

**Feedstock**

- HDPE
- LLDPE
- PP
- PS
- PVC
- PET

**Process**

- Blow Film
- Cast Film
- Extrusion
- Form Fill Seal
- Injection Molding
- Blow Molding

**End Use**

- Packaging
- Laminate/Pouches
- Cups/ Bottles
- Food Serving Caps
- Containers/Tanks
- Agriculture film


# 2- Construction Cluster

**Feedstock**

- HDPE
- LLDPE
- PP
- PVC
- ABS

**Process**

- Extrusion
- Roto-molding
- Injection Molding
- Blow Molding

**End Use**

- Tanks /Pipes
- Containers
- Flexible tubing
- Profiles
- Siding shutters
- Decking/Outdoor furniture

# 3- Automotive Cluster

**Feedstock**

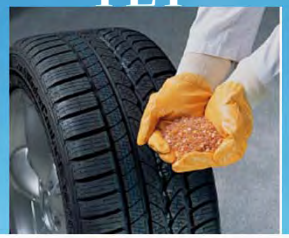
- HDPE
- PS
- SBR, SBL
- PP
- ABS
- Butadiene
- PET

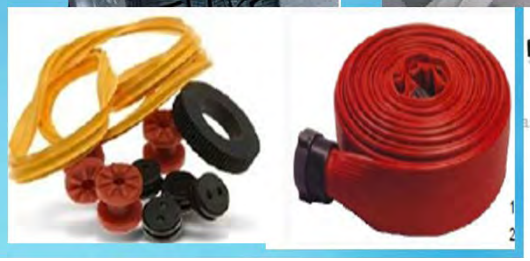
**Process**

- Film
- Extrusion
- Injection molding
- Blow Molding
- Compounding
- Thermoforming
- Fiber

**End Use**

- Car bumper
- Seats
- Interior parts
- Battery cases
- Carpets/ Gaskets
- Tyres/ Hoses






# 3. Aromatics Complex

The Aromatics Complex is one of the main projects in the Egyptian Master Plan. This project aims at producing (PX & Bz) to serve several downstream petrochemical projects (PTA , PET, PS, ...etc) in Egypt, by utilizing Naphtha obtained from existing refineries in Suez. The surplus of this production will be exported.

## Plant Capacity

350 KTA Benzene, 530 KTA Para-Xylene

## Feedstock

1.7 KTA Naphtha

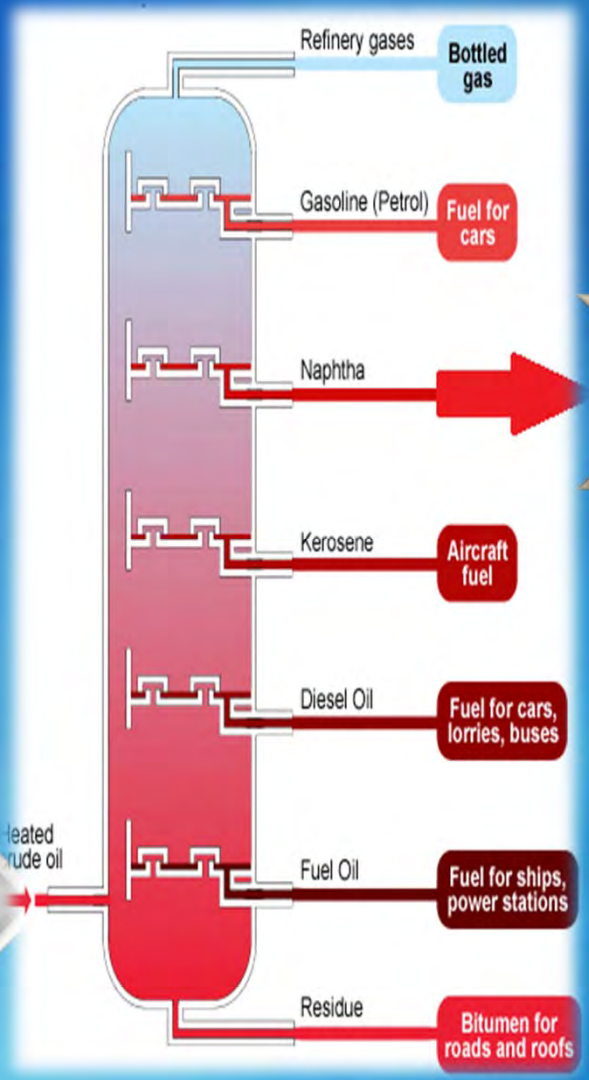
## Total Investment Cost

1750 MMUSD

## Location

Suez

Crude Oil




Naphtha

Para Xylene
Benzene

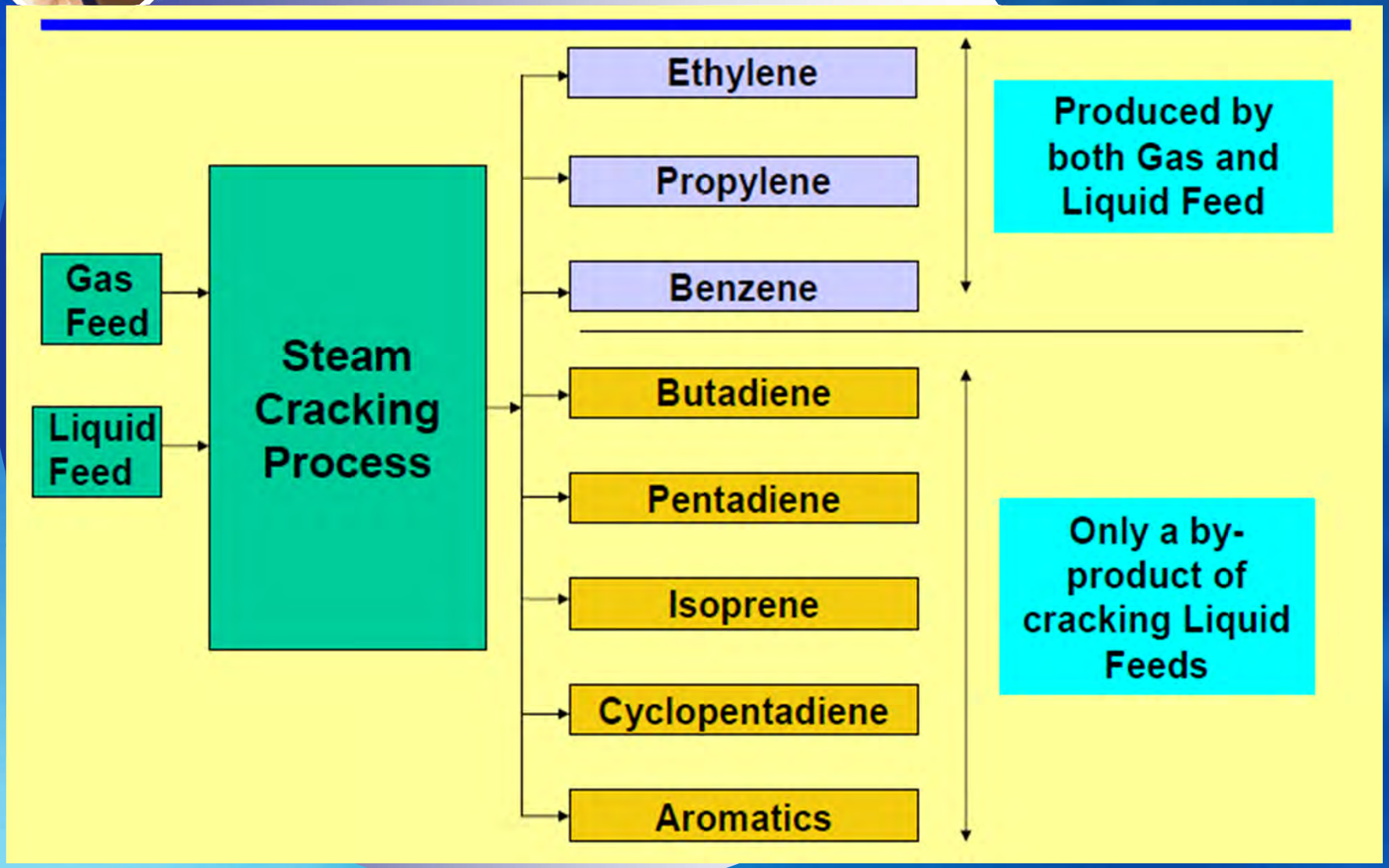
PX 530 KTA
BZ 306 KTA

Light Naphtha
LPG, Hydrogen
Raffinate

LN 305 KTA
LPG 55 KTA
$H_2$ 118 KTA

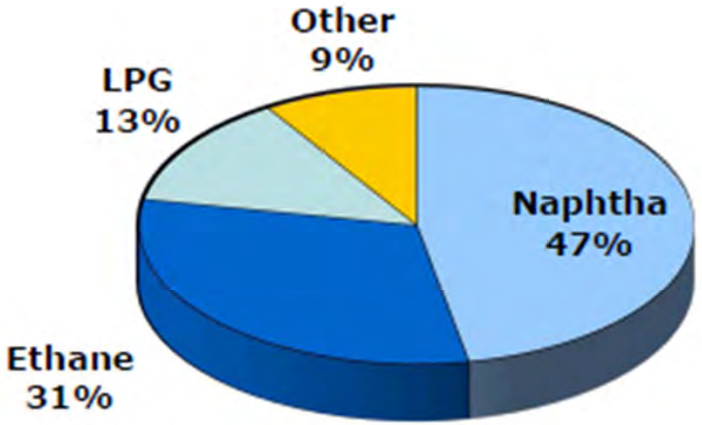
Aromatics Complex

# 4.Steam Cracking



# Other steam cracker feedstocks

- Ethane ⇒ ethylene only (Middle East, USA)
- Propane/LPG ⇒ ethylene and propylene
- Condensates ⇒ more olefins and less aromatics
- Gas oil ⇒ less olefins and more aromatics




World steam cracking feedstock breakdown, 2011
Source: ICIS consulting

# Typical yields in wt% for various steam cracker feedstocks

| | Ethane | Propane | Butane | Naphtha | Gas oil |
|---|---|---|---|---|---|
| **Ethylene** | 79-84 | 42-45 | 30-40 | 28-38 | 23-26 |
| **Propylene** | 1-3 | 14-18 | 16-20 | 13-18 | 13-14 |
| **Butadiene** | 2 | 2 | 2.5-3 | 4-5 | 4.8-5 |
| **Butenes/ Butanes** | 1 | 1 | 6.5-6.8 | 4-5 | 4.5-5.3 |
| **Aromatics** | 0.4 | 3.5 | 3.4 | 7-14 | 10-13 |

Source: G. Margaret Wells, Handbook of Petrochemicals and Processes

# Comparison of Naphtha and Gas crackers

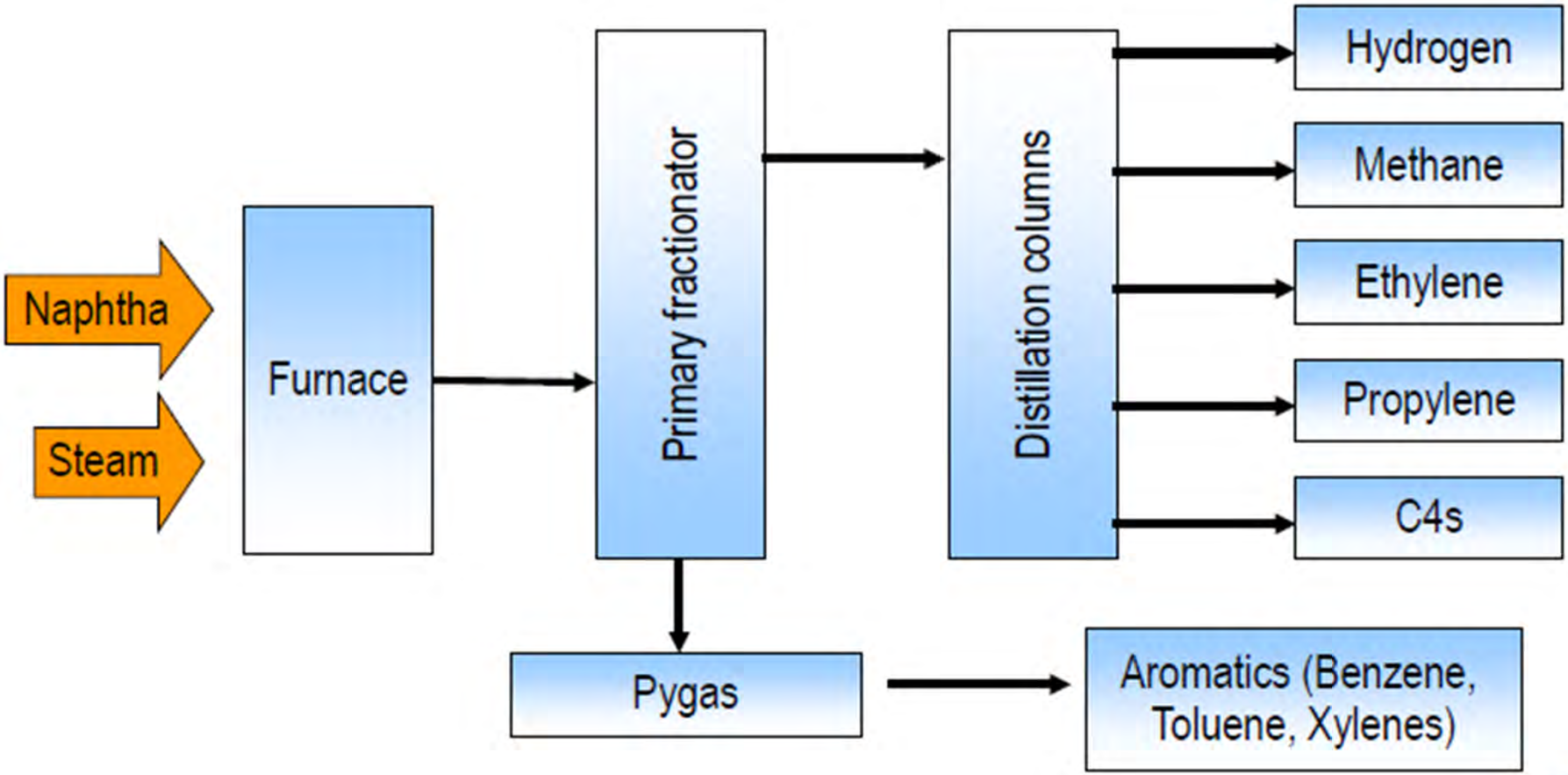
| | Gas Cracker | Naphtha Cracker |
|---|---|---|
| Investment cost | Standard | More than gas cracker due to higher number of equipments and variety of products |
| Product Yield | Ethylene and propylene yield is high | Ethylene and Propylene yield is low and is the reason for more by products |
| Operational difficulties | Easy to operate | Operation is difficult due to handling pour point problems and stripping of Heavy Fuel Oil |
| Integration with refinery | No advantage | Economic if integrated with a refinery |

# Selection Basis of cracking process

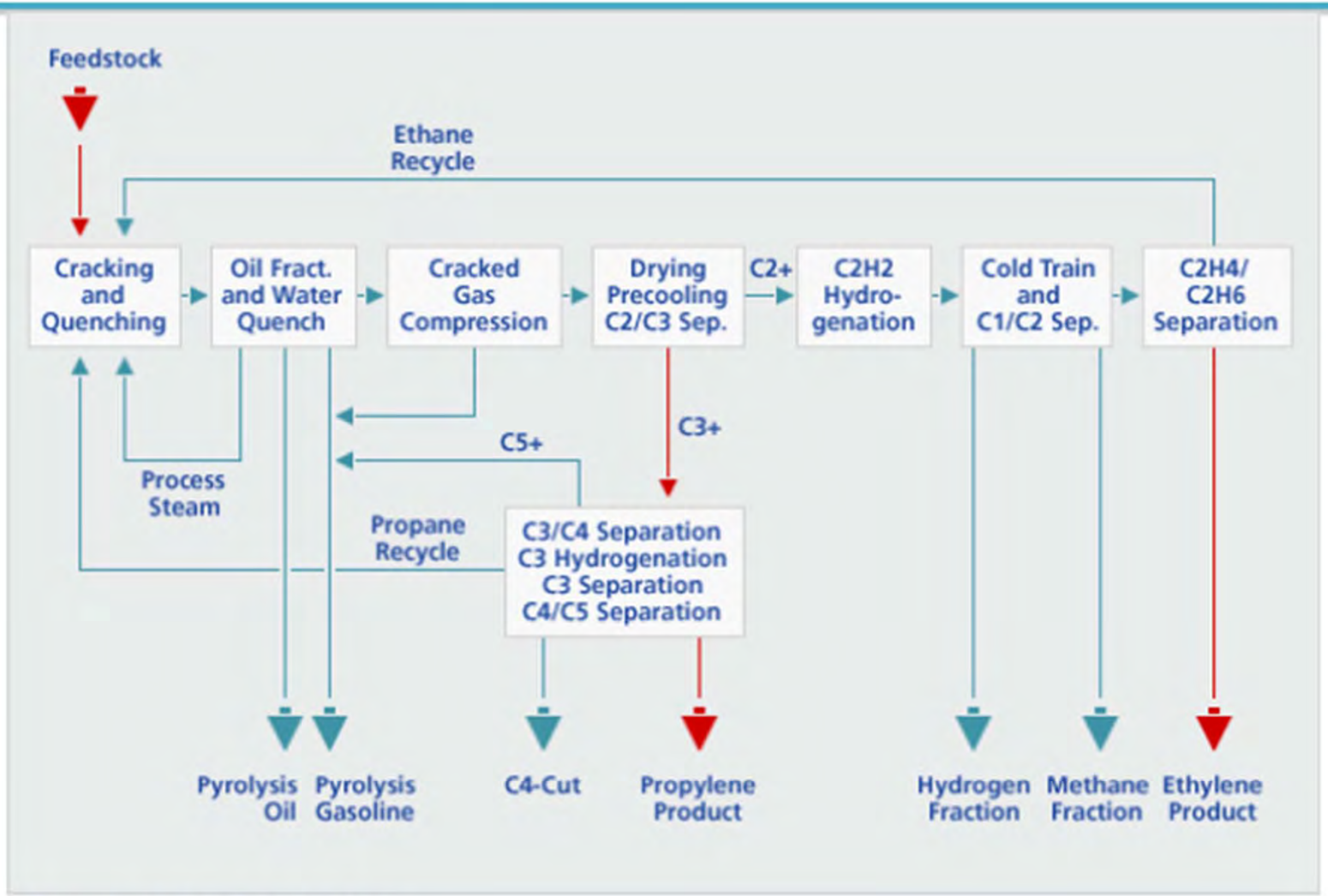
- ✓Feed availability and costs at producer location
- ✓Yield of each feed.
- ✓Demand for each product.
- ✓Alternatives to buy versus manufacture that product
- ✓Economic Model Assessment
- ✓Evaluate netback of all products.

**Most of the Middle East; is gas cracking**
**Most of Asia; is liquid or Naphtha cracking**

# Naphtha steam cracker



# Steam cracking process




Source: Linde Engineering

# Q & A

# THANKS

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