



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:







••• PHASE ACHIEVEMENTS•••

Phase 1- Achievements (2002-2012)





EMETHANEX





MOPCO

ESTYRENICS



Products:	Products:	Products:	Products:	Products:
100 KTA Linear Alkvl	400 KTA Propylene	1.3 Million	600 KTA Urea	200 KTA
Benzene(LAB)	400 KTA	T/Y Methanol	50 KTA	Poly-Styrene
Location:	Polypropylene	Location:	Ammonia	
Alexandria	Location:	Damietta Port	Location:	Location:
	Port Said		Damietta	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

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.

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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

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Licensor and basic Engineering packages have been settled

•••••EGYPTIAN-PETROCHEMICAL•••• ••••••INDUSTRY : (2002-2015)



Petrochemicals Production in 2009

KTA

Total	1400 KTA	
МОРСО	600 Urea 50 Ammonia 650	
ELAB	100 LAB	
Acrylic Fiber	54 Acrylic Fiber	
OPC	165 PP	
LAB	50	
SIDPEC	230 Ethylene 225 PE	
EPC	80 PVC	

Petrochemicals Capacity in 2012



Expected Petrochemicals Capacity in 2015





WHAT ABOUT FUTURE



Investment / Financing

Competition .

General Feedstocks.



- i. Master Plan
- ii. Value Chain Approach
- iii. Petrochemical / Refinery Integration.
- iv. Liquid Feedstocks "Naphtina 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).

> et of small and intermediate petrochemica industries integrated with each other in utilities and services to produce final



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

Suez







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



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



THANKS

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