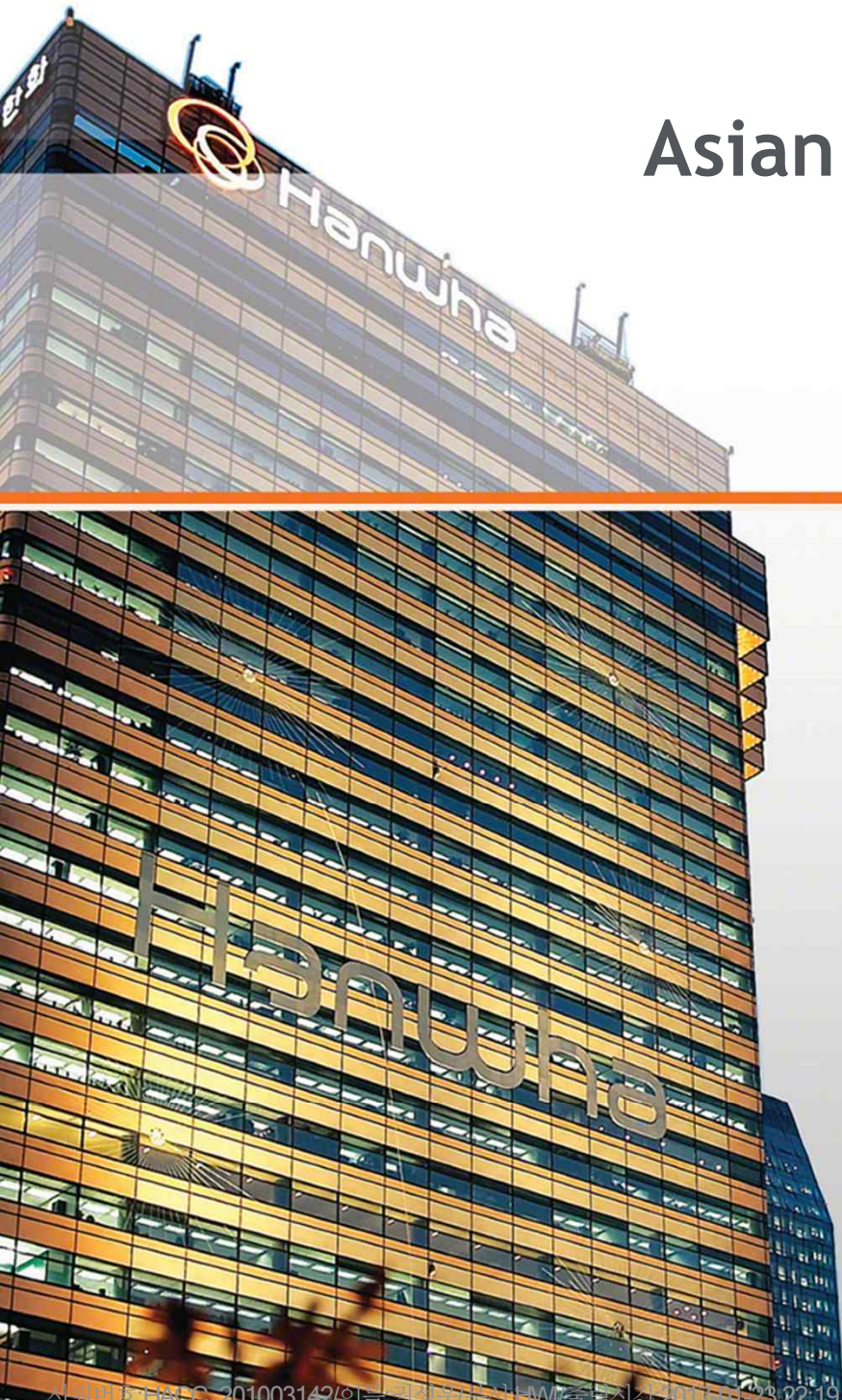


# Asian Polyolefin Market Trends and Strategic Moves

Sungwoo Kwon  
Hanwha International





## ➤ Asian Polyolefin Market Trends

- Market Trends in Asia
- How to Capture the Opportunities in Asian Chemical Industry
- Key Challenges & Uncertainties

## ➤ Strategic Moves of Hanwha Group in Chemical Industry

- Hanwha Group Overview
- Chemical Business of Hanwha
- Hanwha's Strategic Moves

## ➤ Message: How to Move as a Game Changer





# Asian Polyolefin Market Trends



## Korea

- Government/market driven business restructuring
- High competition with NCC expansion project
- Development of specialty products for enhancing competitiveness



## Japan

- Lower competitiveness of chemical industry
- Noticeable decline of C2/C3 exports to China
- Japan emerges as a new ethylene importer as cracking capacity falls



## China

- One Belt, One Road (一帶一路)  
: Policies for infrastructure, trading, and investment
- 13th Five-Year(16~20) Plan  
: C2/C3/PP/PVC Self-sufficiency ↑, remaining deficit in PE
- Focus on coal to chemical
- Surge in imports of NGLs for cracking and PDH
- Reduction in Refinery/Petrochemicals investment
- Still, China is dominant importer



## ASEAN

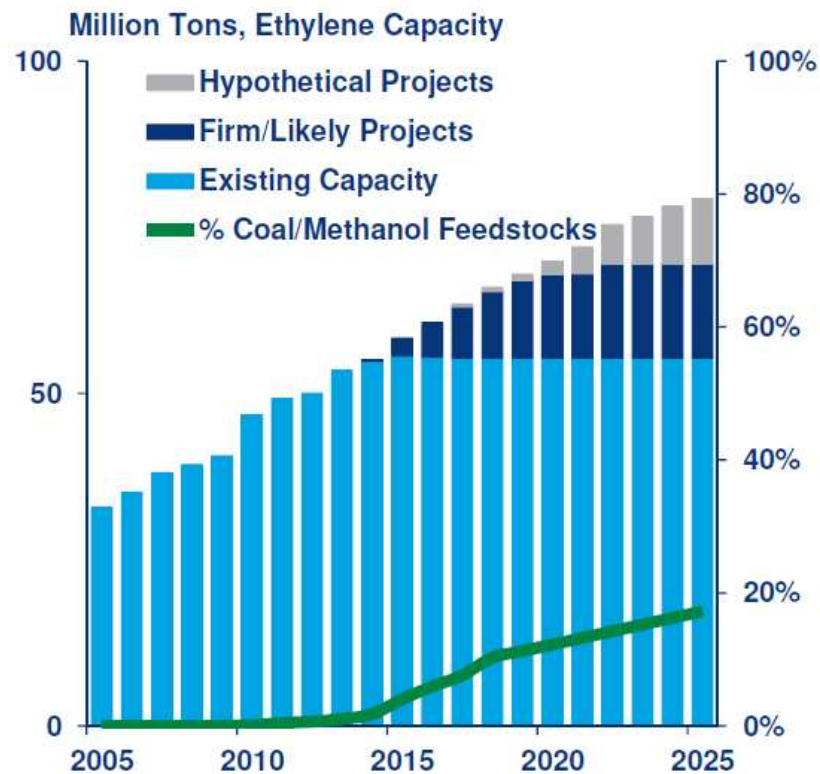
- Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei, Vietnam, Laos, Myanmar, Cambodia
- 8.6% of total world population
- 3% of global GDP with 5% CAGR
- One of the world's fastest-growing markets  
& One of the least well known markets
- Demand driven by production and consumer trends, varying by country maturity



# Asia Ethylene & PE

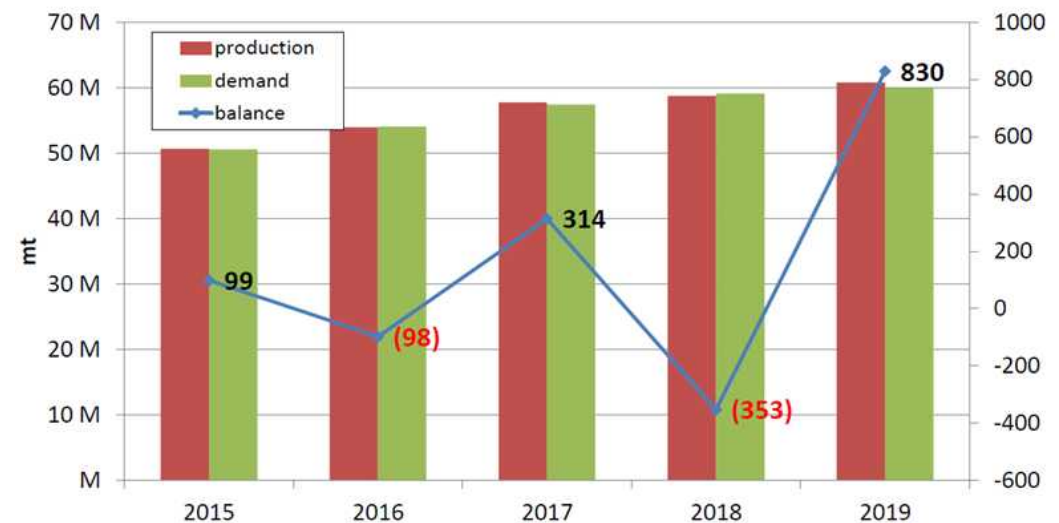
- Ethylene supply expected to increase, but supply & demand balance is still tight.
- Tight supply of ethylene will drive Asian ethylene market.
- Fresh C2/PE demand would be coming from Japan and ASEAN countries.

## Asia Ethylene Capacity



(Source: ICIS)

## Asia Ethylene Balance



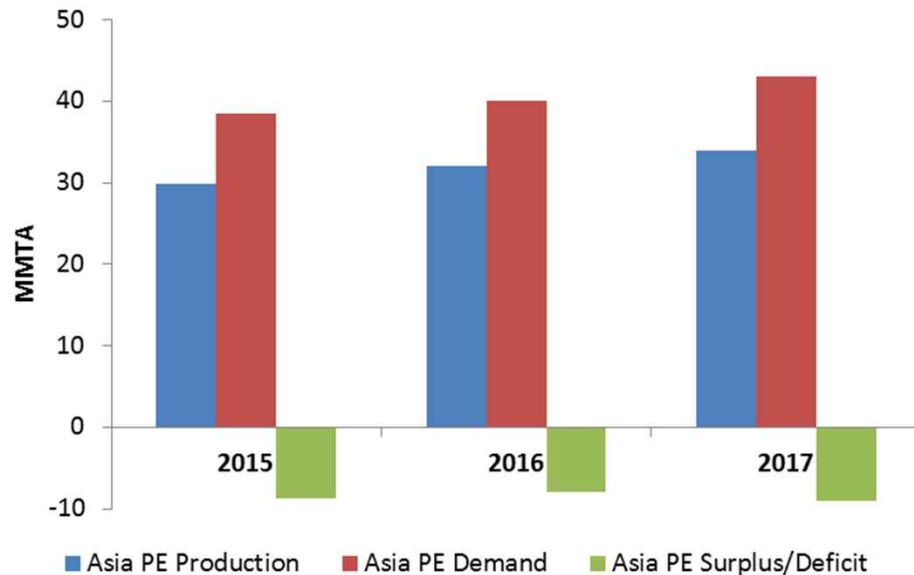
(Source: Platts, Japan's METI)



# Asia Ethylene & PE

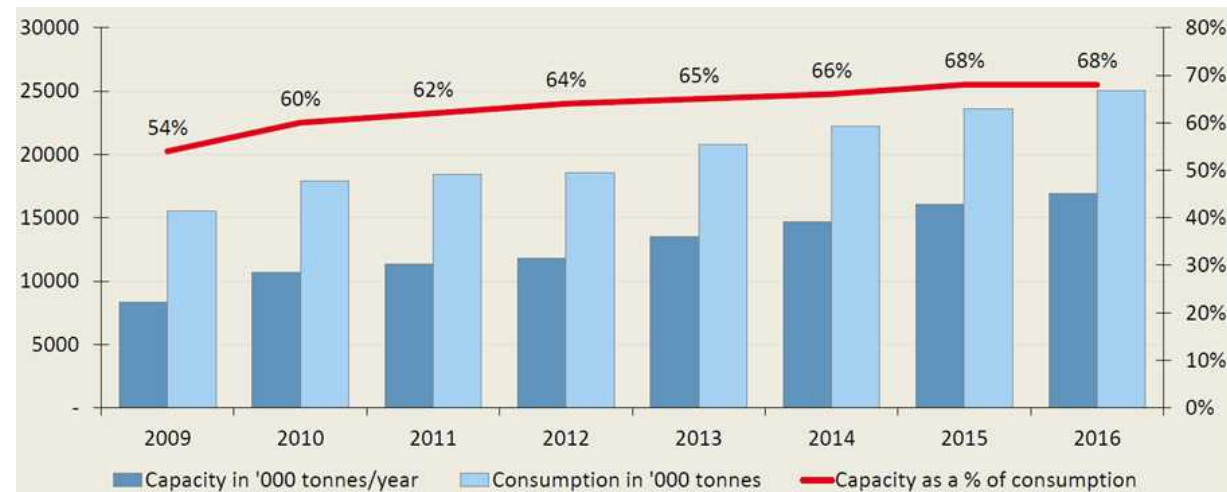
- Despite increasing in PE capacity, Asian market is still deficient in PE.
- Demand growth in China keeps China's PE self-sufficiency flat.
- PE trade flow from Middle East and North America would be expected.

## Asia PE Supply & Demand



(Source: Platts)

## China PE Supply & Demand

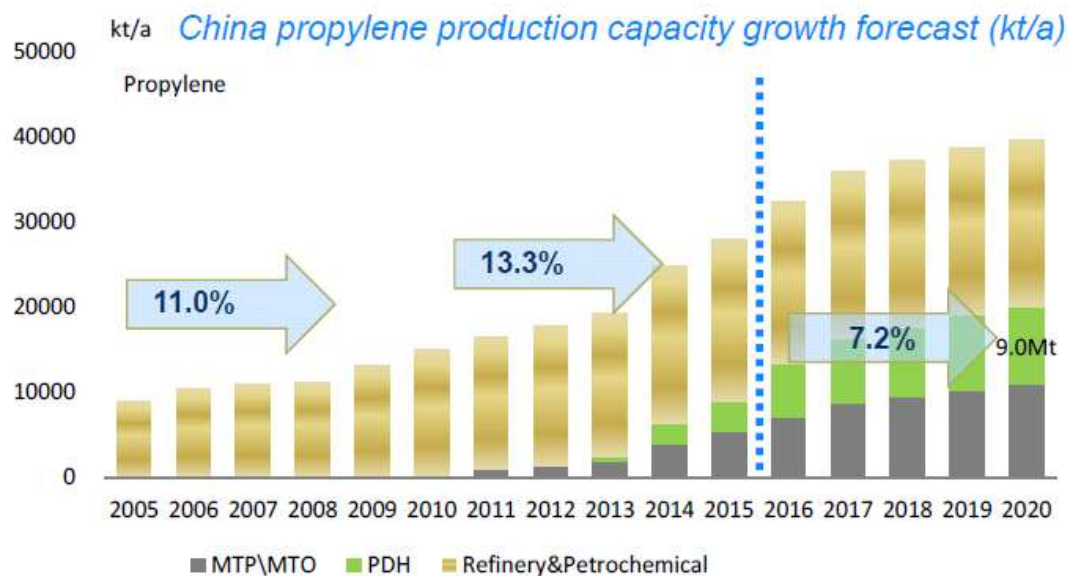


(Source: ICIS)

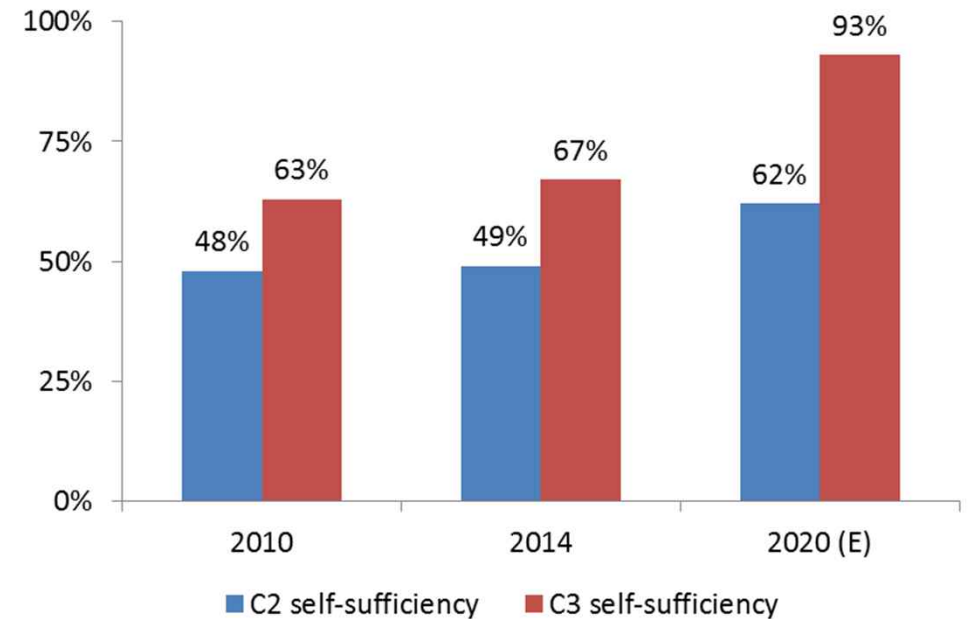


# Asia Propylene & PP

- Because PDH has been profitable, fresh supplies from PDH units may drive China's capacity growth in propylene.
- Propylene from coal-based MTP/MTO would be delayed due to high coal price.
- China's Propylene self-sufficiency would be increasing unlike Ethylene.



(Source: Petrochina)

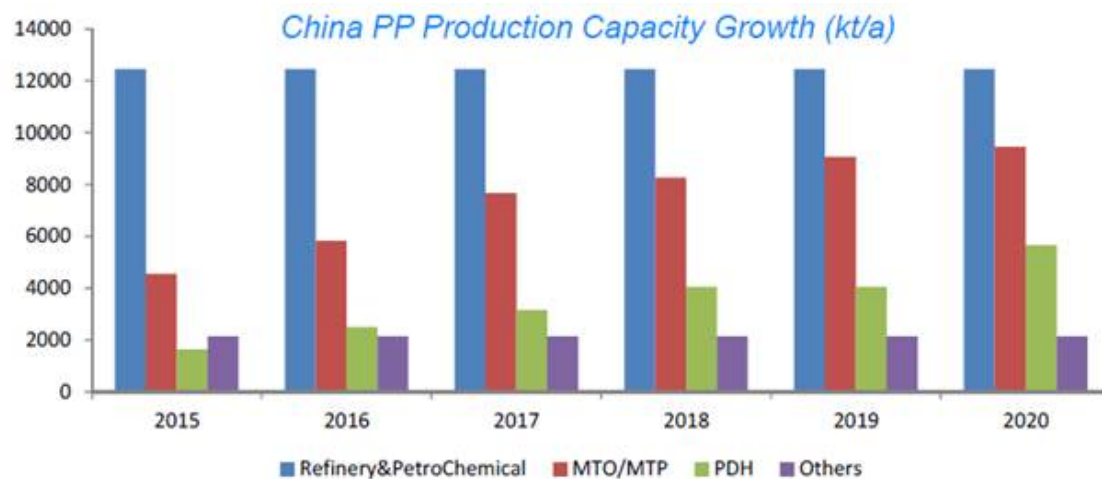


(Source: pH Report, CCCCC)

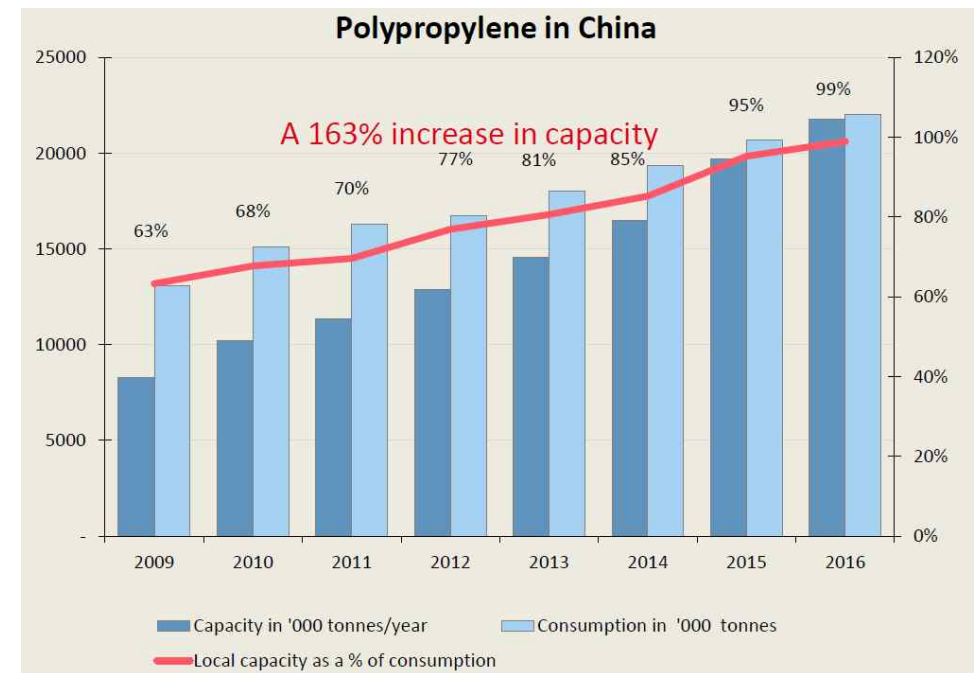


# Asia Propylene & PP

- Expected PP capacity growth would exceed demand growth in Asia market.
- China has a key role in PP market regarding Supply & Demand and self-sufficiency.



(Source: Petrochina)



(Source: ICIS)



# How to Capture the Opportunities in Asian Chemical Industry



**C2 > C3**

- Tight supplies of ethylene market
- Fresh C2/PE demand from Japan and ASEAN countries
- Positive margin on C2/PE, opportunities for integrated C2 maker
- Expected C3/PP capacity growth exceeds demand growth

**Expanding to  
the New Growth Market**

- New business, JV, Sales & Marketing offices for the new growth market
- especially in ASEAN region
- Improving pricing management for creating untapped value
- Increasing feed flexibility for low cost feedstocks
- Market opportunity in various sectors e.g. packaging, agriculture, etc.

**Product Portfolio  
Realignment**

- Portfolio expansion to differentiated commodities and specialties
- Finding & promoting new growth engine with organic or inorganic growth

**Business  
Rationalization**

- Sustaining core business
- Streamlining business by spin-offs, carve-outs and divestitures
- Optimizing Capex & Opex



# Key Challenges & Uncertainties

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## Volatility of Feedstock Sources & Price

- Questions over low Oil & Gas prices depending on OPEC & US
- Trade flow changes of commodities and specialty products
- US
  - Increased O&G production, especially ethane and other NGLs
  - USGC LLDPE/HDPE producers benefit from low ethane prices
- Middle East
  - Growth restricted by shortage of additional advantaged NGLs
  - Focus on integrated complex with mixed feeds and higher value products to offset competitive position
- China
  - High cost of ethylene due to high coal price and production chain (Gasification, Methanol synthesis, MTO)

## Geopolitical risk & Financial Conditions

- Isolationism vs. Internationalism: US Trumponomics, Brexit
- Interest rate, Strong Dollar, Volatility of Global GDP growth rate, especially China

## Environment Issues

- Worldwide regulations for CO2 Emission Reduction

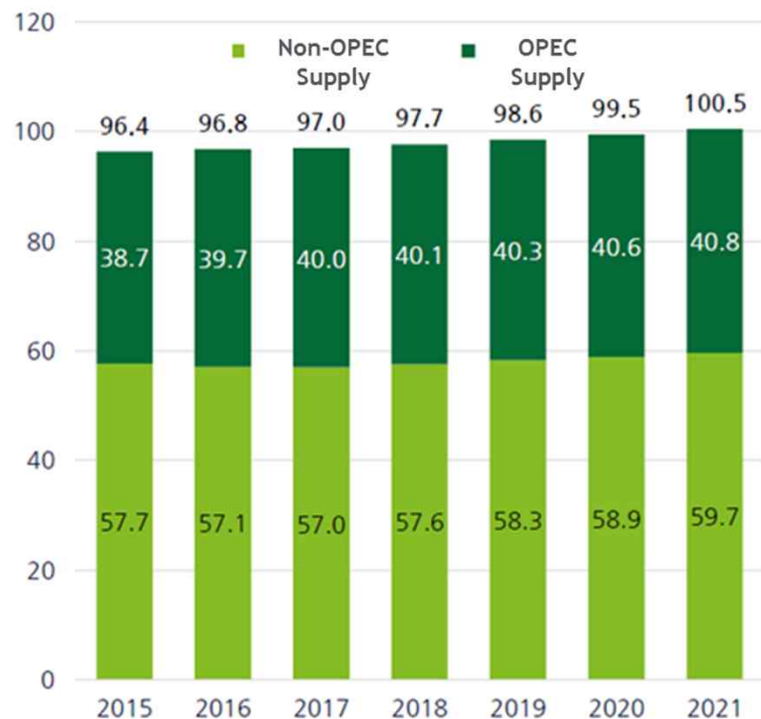


# Crude Oil Supply & Demand

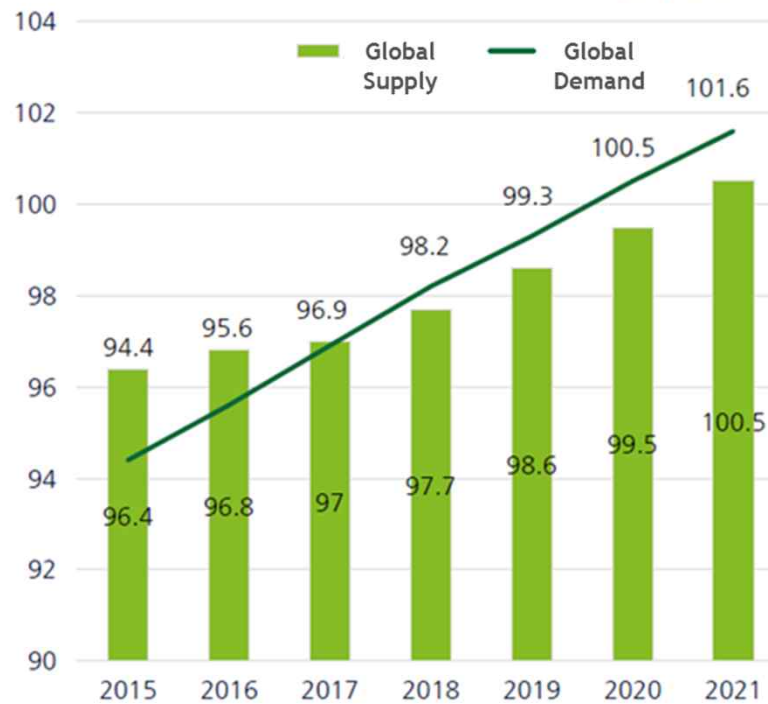
- Surplus crude oil production is expected to be reduced by increasing demand.
- Significant consumption growth from Non-OECD countries such as China and India is expected to be the largest contributor for increasing demand.
- Crude oil production would be increasing in response to rising oil prices and increase in productivity.
- Technology developments (e.g. electric cars, renewable energy etc.) in the coming years would be the potential to push oil prices lower.

## Global Crude Oil Supply & Demand

Unit: Mil. BPD

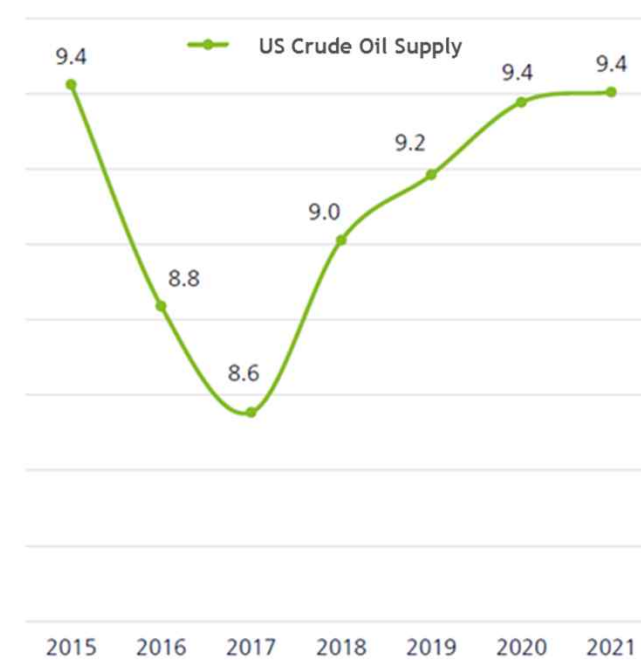


Unit: Mil. BPD



## US Crude Oil Supply

Unit: Mil. BPD



(Source: EIA/OPEC/Deloitte)



# Crude Oil Price

- Crude oil price would be affected by global economics, OPEC production policy, US unconventional resources etc.
- Price volatility would be the key feature of crude oil market.

## Upside Support

- Increase in global demand
- OPEC production policy
- Delay of E&P project for unconventional resources
- Decrease productivity
- Global inventory decreasing
- Increased focus on geopolitical issue
- Upstream spending cuts

## Downside Risk

- Lower demand growth, especially in China
- Increase in OPEC production
- Increase in US tight oil
- Global economic slowdown
- Increase in upstream investment
- Technology development
- High productivity

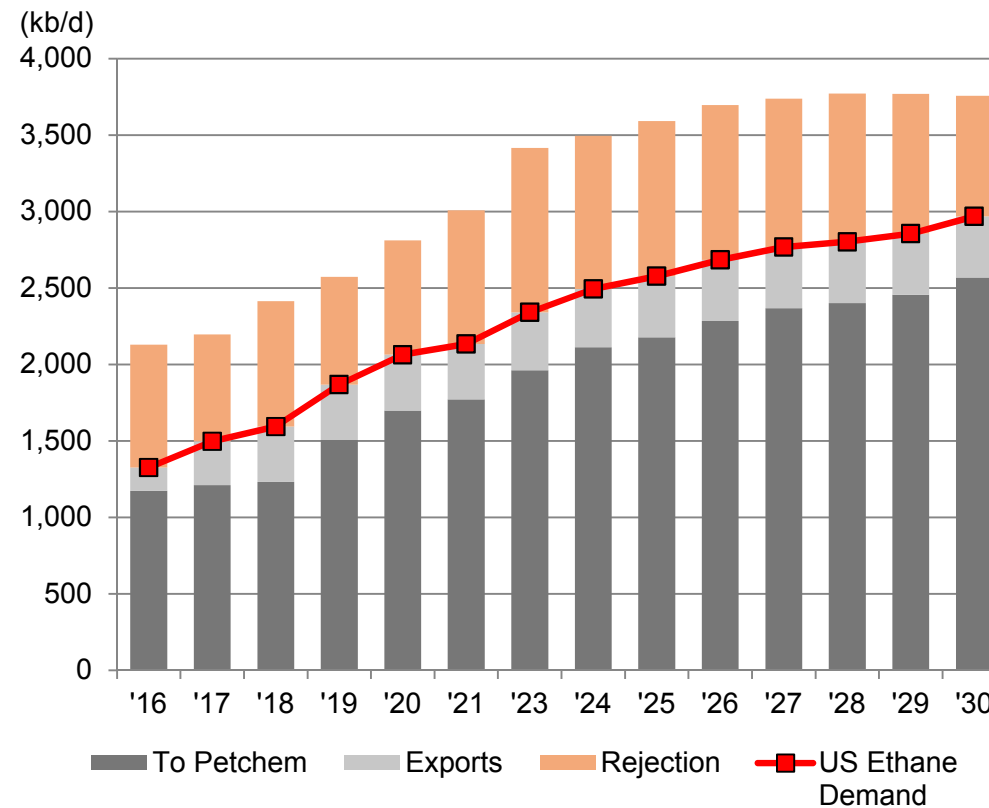




# US Ethane

- Cost-competitiveness of ECC would drive Ethane demand in the US.
- Increase in US Ethane supply may cause Ethane surplus.

US Ethane Supply & Demand

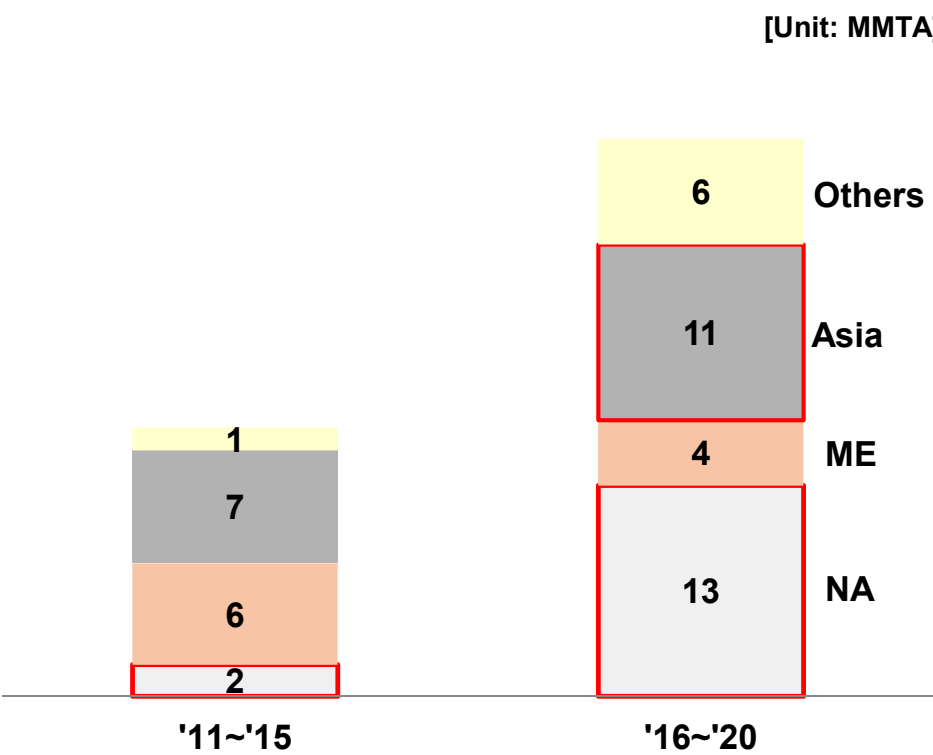


(Source: Wood Mackenzie)

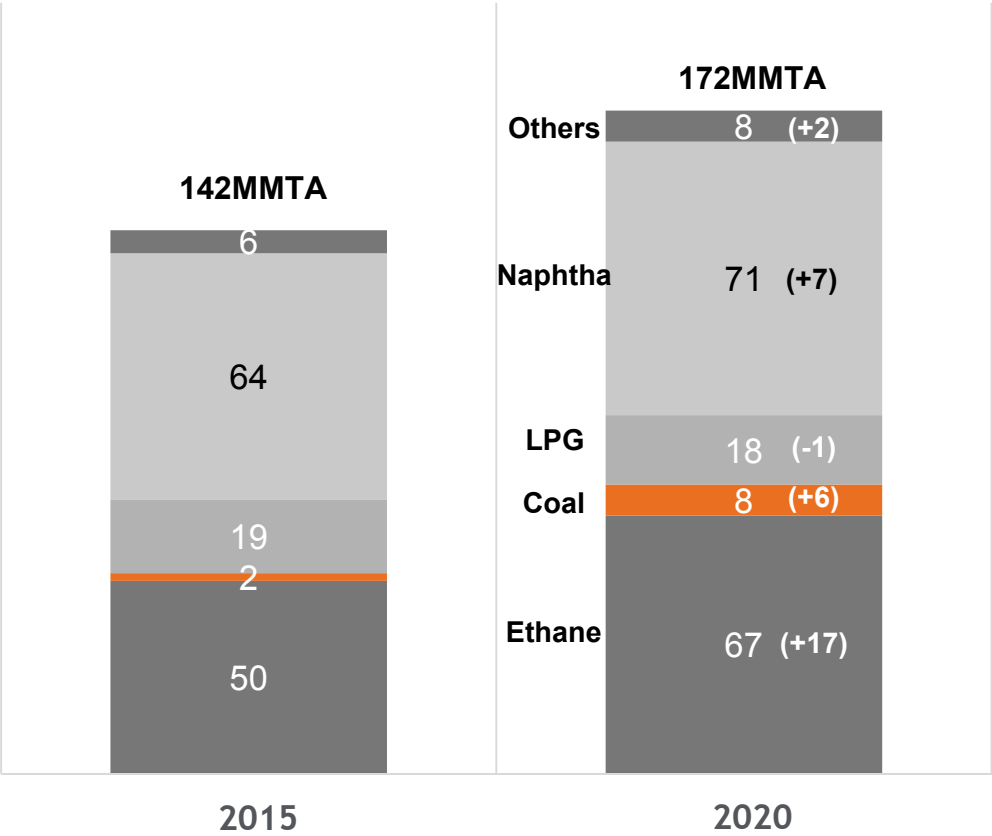


- US, Middle East and China are leading the global expansion of Ethylene.
- Ethane would be in charge of 57% of feedstocks for additional ethylene because of cost-competitiveness.

Global Capacity Expansion of Ethylene by Region



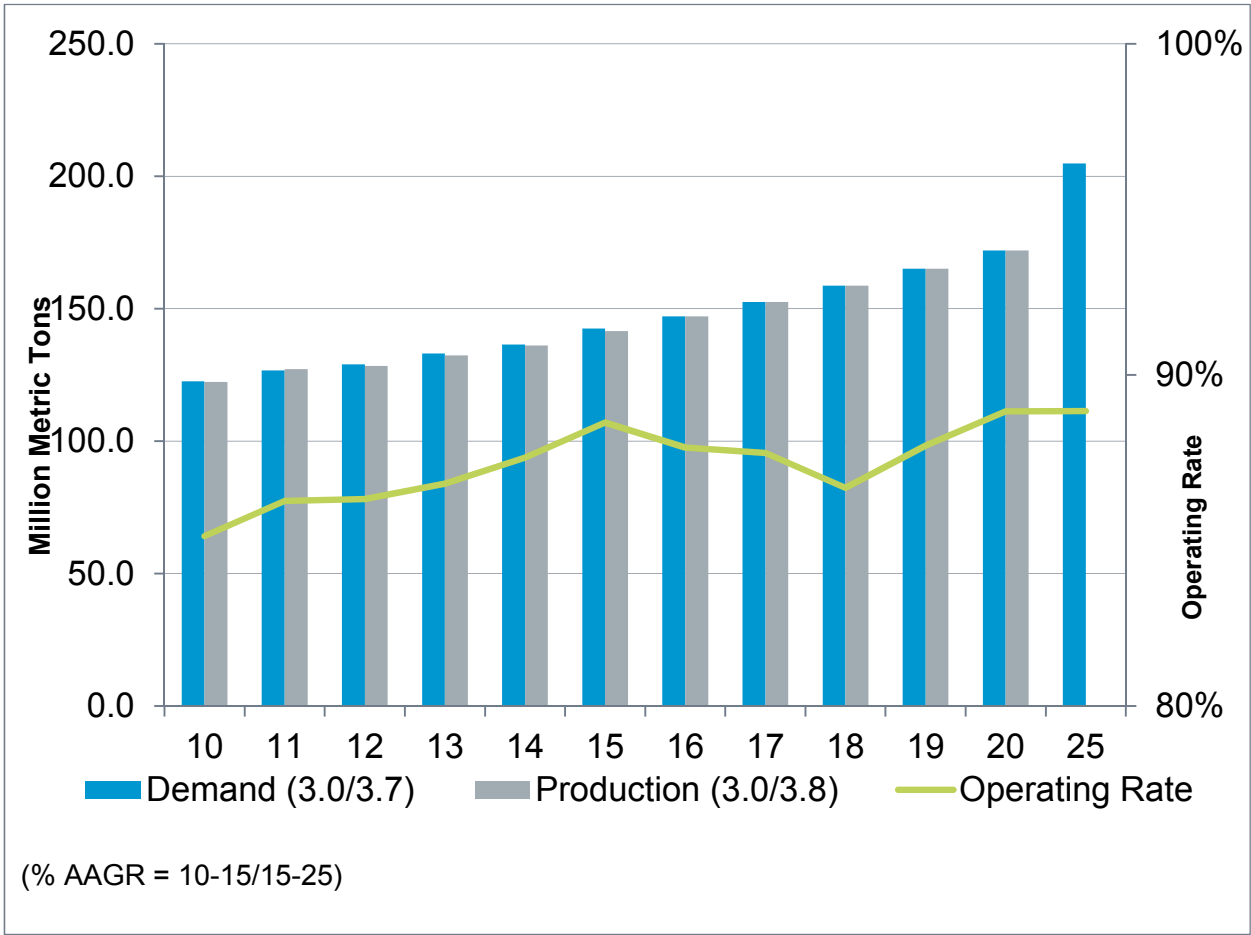
Ethylene Production by Feedstocks



(Source: IHS)



- Operating rate of Global ethylene is expected to increase from 2018.



(Source: IHS)



# Strategic Moves of Hanwha Group in Chemical Industry



# Hanwha Group Overview



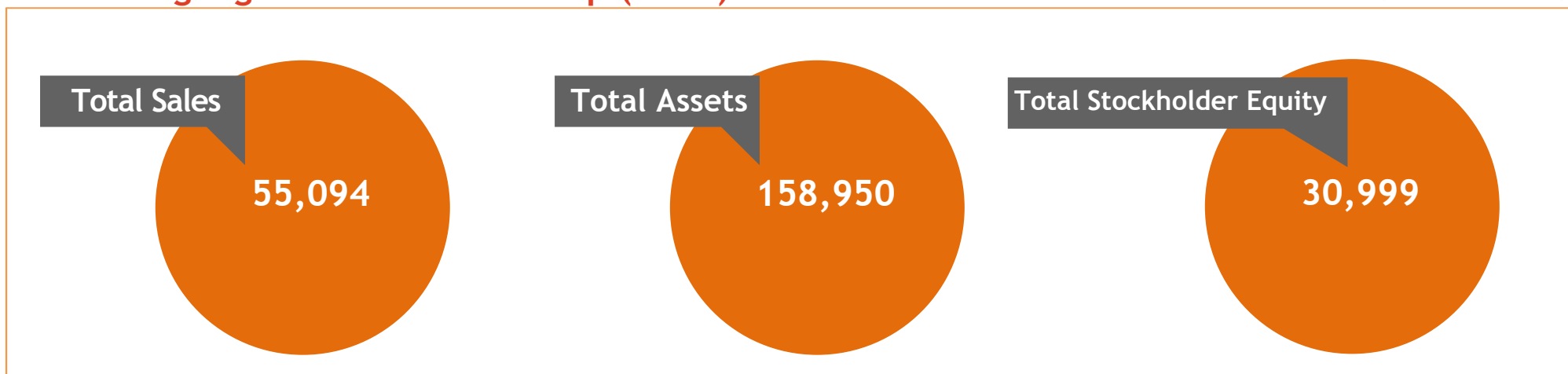
*Hanwha Group is the 8<sup>th</sup> largest conglomerate in Korea with 56 affiliates and sales of \$55 billion in 2016.*

## Hanwha Group At a glance

- More than 60 years history (established in 1952)
- 8<sup>th</sup> largest conglomerate in Korea (2015)
- Balanced business portfolio in 3 key areas (Manufacturing & Construction, Finance, Leisure & Services)
- 56 affiliates and over 90 networks worldwide (2016)

## Financial Highlights of Hanwha Group (2016)

(Unit : USD Millions)



# Chemical Business of Hanwha

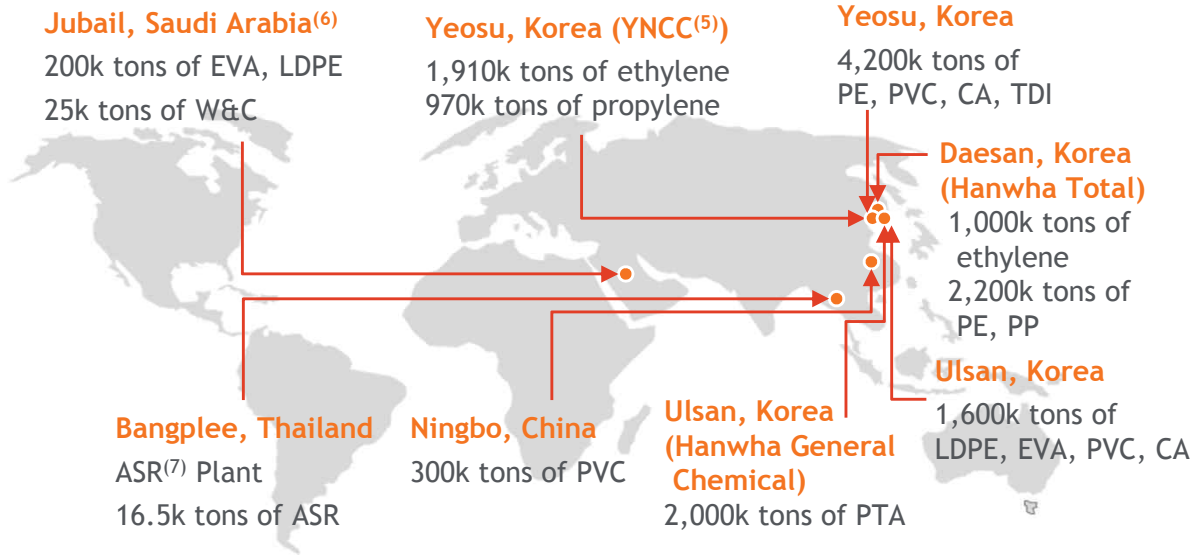


As a domestic leader in Ethylene, PE, PP, PTA, and PVC/CA, Hanwha has successfully established its global footprint.

## Product Overview

Company	Products	End-Products	Market Position
YNCC	Ethylene (2,910kta)	Ethylene	#1 in Korea
Hanwha Total			
Hanwha Chemical	PE (1,770kta)	LDPE/LLDPE	#1 in Korea <sup>(2)</sup>
Hanwha Total		EVA	#1 in Global
		W&C	#1 in Korea
Hanwha Total	PP (700kta)	PP	#1 In Korea
Hanwha Chemical	PVC/Caustic Soda (602kta /906kta)	PVC	#2 in Korea
		CA	#1 in Korea, #3 in Asia
Hanwha General Chemical	PTA (2,000kta)	PTA	#1 in Korea

## Overview of Production Facilities



Note: (1) Hanwha group acquire 58% of Samsung General Chemical(SGC) and Samsung Total (Samsung Total) and officially renamed as Hanwha General Chemical(HGC) and Hanwha Total(HT) on Apr 30. 2015  
(2) On LDPE and LLDPE combined basis;(3) Excluding Hanwha Total and Hanwha General Chemical  
(4) Segment sales based on pre-consolidation adjustment;  
(5) HGC owns 50% shares in YNCC (6) HGC holds 25% stake in the JV; (7) Alkali Soluble Resin



# Hanwha's Strategic Moves

*Hanwha sets a goal to become Korea's No.1 and one of the world's top five through full commitment and intensive investment.*

## Acquired Hanwha Total & Hanwha General Chemicals

*Enhancing competitiveness in the petrochemical industry through cost competitiveness and product diversification*



- Hanwha Group acquired Hanwha Total (former Samsung Total) & Hanwha General Chemical (former Samsung General Chemicals) in April 2015.
- Achieved \$17.5billion of sales and 2.91MMTA of Ethylene capacity (Global Top 9)
- World class competitiveness in the petrochemical industry

## Started EVA production at International Polymers Co. (IPC) of Saudi Arabia

*\$800 million joint venture with a 25:75 share between Hanwha Chemical and Saudi International Petrochemical Co. (Sipchem)*

- Hanwha Ranks 1st in Global Ethylene Vinyl Acetate Production
- First joint venture by Korean petrochemical company in the Middle East
- Ethane-gas process enables material cost reduction over previous naphtha ethylene process



# Hanwha's Strategic Moves

## Merged Hanwha Fine Chemical, a company manufacturing TDI

*merger for stabilization of financial structure by saving cost and strengthening of competitiveness with raising efficiency*



- Hanwha Chemical acquired Hanwha Fine Chemical from KPX Holdings Co. in 2014
- Positioning itself as a leading TDI manufacturer by diversifying its business portfolio and developing specialized products for specific fields
- Strategically merged Hanwha Fine Chemical to maximize the synergy in production processing of CA (chlor-alkali) and vinyl chloride monomer (VCM) while enhancing production efficiencies with toluene diisocyanate (TDI)

## Divested uncompetitive part of CA Business

*streamlining business by divestitures to enhance business competitiveness*

- Strategic divestitures to boost profitability and competitiveness
- Pre-emptive movement for the one of the country's overcapacity products in need of restructuring.
- Win-win for the buyer and seller





# Message: How to Move as a Game Changer



*Appropriate strategies and strategic moves are required for the sustainable growth and enhancement of competitive advantages.*

## How to Take a Position

### Understanding market

- Market trend, Supply/Demand, M&A trend, Monitoring other players' movement
- e.g. Current Look at Asian Polyolefin Market, Megadeals including Bayer-Monsanto, Dow-Dupont Merge etc.

### Game theory

- One player's decision affects other players' movement
- e.g. Impact of Hanwha Group's moves on Asian Polyolefin markets

## Strategic Moves

### Changing payoff matrix

- First mover advantage or Second mover advantage
- Movement depending on strategy

### Corresponding to amid volatile global market situation

- Leadership in technology, application and cost competitiveness
- Scenario analysis for mitigating uncertainties: Survival in any situation

### Enhancing competitive advantage

- Optimize competitive position
- Focus on cost competitiveness, feedstock availability, production economics, and access to markets

