Current PE market situation and production capacity outlook

20 April 2017
PTT Group Value Chain
The biggest integrated petrochemical and refining complex in Thailand

**Upstream**
- Exploration & Production
- Crude Oil Procurement

**Intermediate**
- Pipeline
- Gas Separation Plants
- Logistics
- Refineries

**Downstream**
- Power Plants
- Industry
- NGV
- Oil
- Lube Base Plant
- Plastic Resins

**End customers**
- Electricity
- District Cooling System
- Transportation
- Lubricant
- Household
- End Product
- Export Market
- Gasohol (E10/E20/E85) Biodiesel

**PTTGE**
**PTTGC**
**Thai Oil**
**BCP**
PTT Group Value Chain
Fully Integrated Polymer Business Chain

Manufacturing Unit

Sales & Marketing Arm
VISION
To be a global polymer solution provider and trading company

Logistics Provider

Proprietary information of PTT Polymer Marketing Co., Ltd.
PTTPM Product Portfolio
Continuously Grow to service more customers
LLDPE 400KT
LDPE 300KT
HDPE 800KT

Proprietary information of PTT-Polymer Marketing Co., Ltd.
AGENDA

- Market review and global outlook for PE
- New supply and the influence on market and trading dynamics
- Consumer trends affecting the polymer sector
- Key Takeaways
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Proprietary information of PTT Polymer Marketing Co., Ltd.
World Polymer Demand
PE accounts nearly for 40% of total polymer demand

2016 World Demand by Major Polymers
243 Million Metric Tons

- HDPE 17%
- LLDPE 12%
- LDPE 9%
- PP 26%
- PC 2%
- PET 8%
- PVC 17%
- ABS 3%
- EPS 2%
- PS 4%
- PS 2%

Source: WA 2016
World Polymer Demand
PE mostly consumed in Film and Sheet application

World PE Demand by Application

2016 Total World PE Demand 92 Million Metric Tons

- Film & Sheet 53%
- Blow Molding 12%
- Injection Molding 13%
- Extrusion Coating 2%
- Pipe & Profile 7%
- Rotomolding 2%
- Wire & Cable 2%
- Fiber 1%
- Raffia 1%
- Other 7%

Film & Sheet, representing over 50% of total global PE consumption

Source: WA 2016

Proprietary information of PTT Polymer Marketing Co., Ltd.
World PE Demand
Mostly consumed in Indian sub, NEA, showing strong demand growth

Y2017 = 95 Million MT  +4% CAGR  Y2022 = 117 Million MT

Million MT

<table>
<thead>
<tr>
<th>Region</th>
<th>Sum of 2017</th>
<th>Sum of 2022</th>
<th>%CAGR</th>
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<tbody>
<tr>
<td>NEA</td>
<td>33</td>
<td>43</td>
<td>5%</td>
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<tr>
<td>N. America</td>
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<td>18</td>
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<td>Europe</td>
<td>14</td>
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<td>10</td>
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<tr>
<td>Indian Sub.</td>
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<td>9</td>
<td>4%</td>
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<tr>
<td>Middle East</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Africa</td>
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<td>5</td>
<td>3%</td>
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<tr>
<td>CIS &amp; Baltic States</td>
<td>4</td>
<td>5</td>
<td>3%</td>
</tr>
</tbody>
</table>

Source: WPC 2015

Proprietary information of PTT Polymer Marketing Co., Ltd.
World PE Capacity
Mostly located in 3 regions: N. America, NEA and Middle east

Y2017 = 113 Million MT +3% CAGR Y2022 = 133 Million MT

Majority of new PE capacity additions in the next 5 years will be concentrate in 2 regions, **North America and North East Asia**

Source: WA 2016
North America & the Middle East are the two significant net exporting regions

Source: WPC 2015
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China Economics
Concerned of slow down

Hard Landing? 4-5% GDP Growth

China GDP Growth (Quarterly Growth, %)

2016 GDP Composition

Source: Global Economic Outlook (Mar 2016), Bureau of Labor Statistics (Mar 2016)
Proprietary information of PTT Polymer Marketing Co., Ltd.
China Economics
Demand still Grow Continuously with some changes

NEW KEY
To CHINESE GROWTH

➢ Services

➢ Technology

➢ Domestic Consumptions

Proprietary information of PTT Polymer Marketing Co., Ltd.
Although new local CTO-based plants started, China’s import volume almost hit 10 Million tons due to increasing local demand.

Source: National Bureau of Statistics of China

Proprietary information of PTT Polymer Marketing Co., Ltd.
PLASTIC in EVERYDAY
Global Megatrends
Cause PE Demand to rise

Global Megatrends

Market-Driven
- Health & Wellness
- Aging Population
- Safety
- Convenient Time

Environmentalism & Sustainability Driven
- Environmental Concerns

Plastic Key Advantages
- Cost & Volume Reduction
- Energy & Water Efficiency
- Recyclability

Source: Townsend, PTTPM

Proprietary information of PTT Polymer Marketing Co., Ltd.
Health & Wellness Trend
Lead to lifestyle and consumption changes

Eat Healthy
Reduce Stress
Exercise Regularly
Drink plenty of Water

Proprietary information of PTT Polymer Marketing Co., Ltd.
Health & Wellness Trend
Lead to lifestyle and consumption changes

Produced from InnoPlus HD2200JP, high quality with excellent organoleptic property. Listed in well known beverage brand owner.

Shrink film produced from InnoPlus LD2420D and LL7910A/7903A/7905A

Source: Euromonitor International Ltd 2015: GLOBAL PACKAGING LANDSCAPE: GROWTH, TRENDS & INNOVATIONS
Health & Wellness Trend
Greater consumer awareness of health and wellness

Exercise Regularly
Reduce Stress

Exercise Regularly

Healthy Life
Reduce Stress

Eat Healthy

Drink plenty of Water

Sport equipment

Source: Euromonitor International Ltd 2015: GLOBAL PACKAGING LANDSCAPE: GROWTH, TRENDS & INNOVATIONS
Proprietary information of PTT Polymer Marketing Co., Ltd.
Cost & Volume Effectiveness with Performance
Result in changes of packaging design, creating more opportunity for plastics.

Source: Euromonitor International Ltd 2015: GLOBAL PACKAGING LANDSCAPE: GROWTH, TRENDS & INNOVATIONS
Proprietary information of PTT Polymer Marketing Co., Ltd.
Cost & Volume Effectiveness with Performance

Result in changes of packaging design, creating more opportunity for plastics

Stretch film produced from InnoPlus LL7835A / LL8420A

Proprietary information of PTT Polymer Marketing Co., Ltd.
The comparatively low cost, lighter weight and ease of installation of plastic material provides more advantages.

Source: Euromonitor International Ltd 2015: GLOBAL PACKAGING LANDSCAPE: GROWTH, TRENDS & INNOVATIONS
Proprietary information of PTT Polymer Marketing Co., Ltd.
Cost & Volume Effectiveness
Light-weight product trend in automotive industry

AUTOMOTIVE

Weight Reduction via various metal-to-plastic conversion
projects for powertrain and exterior/interior components

Performance & Fuel Efficiency
Every 10% reduction in vehicle weight results in 5% to 7% fuel saving

Reduce Carbon Emission
Every kilogram of vehicle weight reduction, there is the potential to reduce carbon dioxide emissions by 20kg

Light-weight materials are common needs

Produced from InnoPlus LL8420A
Convenient Time & Safety
Thanks to More middle class, aging population & urbanization

Packaging

Polyolefin laminated container

Water saving plastic

Retort Pouch

High performance down-gauging film

Multi-layered

- Food & Beverage
- Pharmaceuticals

Easy Handling

Shelf-life indicator packaging

Required High Quality and Strict Hygiene!!

Source: IHS (2016)

Proprietary information of PTT Polymer Marketing Co., Ltd.
Environmentalism & Sustainability Driven

Lead to Green-related production

- 36% sugarcane-based PE bag for organic bread
- Green PE packaging
- Bio-Based plastic
- Bio-composability plastic
- Bioplastic coated cup and laminated packaging pouch

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Proprietary information of PTT Polymer Marketing Co., Ltd.
Global PE demand still healthy and continuously growth, especially driven by Packaging Industry.

PE Capacities to accelerate in the next 5 years, mainly from USA and China.

China PE market demand moderately grow along with the steadily economic growth.

There are lots of opportunities from new market trends and robust additional capacities. Developing and adopting quickly are the key to seizing benefits from dynamic business world.
Opportunities
don’t just happen, you create them

Chinese Proverbs via Gecko & Fly
Thank You

CONTACT US

Pakpoom.p@pttpm.com
www.pttpm.com
www.facebook.com/PTTPM
www.youtube.com/user/PTTPolymer
@pmsolution

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