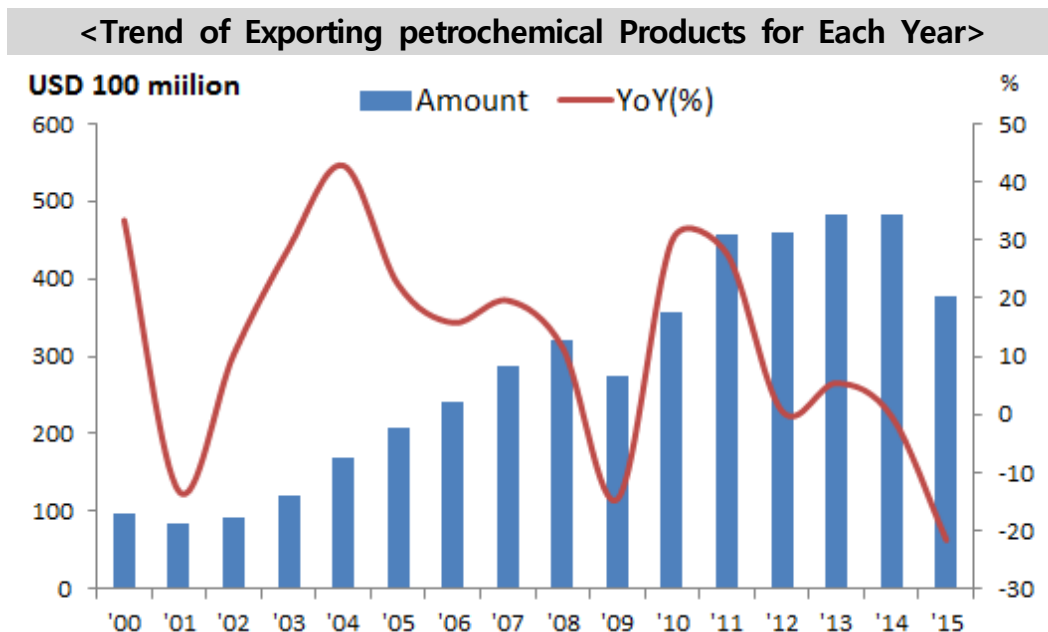


- **Demands** are expected to increase by 1.1% compared to the previous year, reaching 433 KT favored by increased domestic demands following the expected increases in tire production (3.1% YoY increase) in 2016.

(4) Export

[Status of 2015]

- In 2015, the petrochemical industry's total exports were 37.8 billion dollars, marking a 21.4% YoY decrease directly affected by declines in export prices following oil price cuts.
- The volume increased by 5.1% following the major equipment expansion in 2014, but the export price decreased by 25.4% due to the sudden drop of oil prices.
 - * Export volume (KT, YoY change %): (2014) 32,130 (4.5) → (2015) 33,770 (5.1)
 - * Export price (\$/ton, YoY change %): (2014) 1,501 (Δ4.6) → (2015) 1,119 (Δ25.4)
 - * oil price (\$/bbl, Dubai): (2014) 96 (Δ8.8) → (2015) 51 (Δ46.8)



Data: KOTIS

[Prospect of 2016]

- Exports are expected to decrease to 36 billion dollars, a 4.8% YoY decrease, due to prices coming down following declines in oil and raw material (naphtha) prices.

- **The export volume** is expected to be 33,840 thousand tons, a 0.2% YoY increase, owing to increases in export capabilities led by equipment expansion despite the increasing self-reliance trend in China that is the biggest export market.

II. Olefins & Aromatics

Olefins & Aromatics

1. Olefins (Ethylene, Propylene, Butadiene)

ITEM : Ethylene

(Unit: KTA)

		2014	2015	2016(E)
Supply	Production	8,279	8,279	8,495
	Import	232	201	190
	Total	8,511	8,480	8,685
Demand	Domestic	7,722	7,842	7,985
	Export	757	634	700
	Total	8,479	8,476	8,685
Year-end Capacity		8,500	8,640	8,640

1) The 2015 Results

Ethylene market in Asia had been turned to strong due to the increase of T/A of NCC compared to previous year and a few operation trouble of Europe in 2Q, 2015. But, production was slightly decreased compared to previous year due to the turn around. Domestic demand was increased by 1.6% due to the production increase of main downstream, such as PE, EG and so forth.

2) The 2016 Forecast

While Ethylene balance will keep short in Asia and bullish ethylene prices continuously due to the strong demand in downstream such as SM, HDPE and so forth. Also, There will be capacity reduction following the T/A of crackers and Asahi Kasei NCC plant scrap in February. But production will be increased slightly. The reason is that less turn-around are scheduled compared to previous year. (YNCC, SKGC, Lotte Chemical etc)

ITEM : Propylene

(Unit: KTA)

		2014	2015	2016(E)
Supply	Production	6,284	6,150	6,580
	Import	435	449	450
	Total	6,719	6,599	7,030
Demand	Domestic	5,530	5,295	5,730
	Export	1,296	1,258	1,300
	Total	6,826	6,553	7,330
Year-end Capacity		6,760	7,604	8,204

1) The 2015 Results

In the second half, as anticipated propylene market turned to over supply following the increased facility of Hyosung P.D.H (300KTA), YNCC OCU (140KTA). Due to the stoppage of operation for O.C.U caused by profitability decline and with the influence of NCC T/A, propylene production has decreased 2.1% compared to previous year. While the new facility of China's on purpose propylene supply the market has sustained its declining trend. The export demand has decreased 2.9% compared to 2014

2) The 2016 Forecast

NCC operation rate will be high for the competitive ethylene margin, So propylene market is expected to be over supply situation. But, Propylene operation rate will be low continuously due to weak demand in downstream, such as AN, AA etc. Nevertheless, production will be increased about 7.0% to be 6,580 thousand tons caused by SK Advanced P.D.H(600KMT) start up in the first half

ITEM : Butadiene

(Unit: KTA)

		2014	2015	2016(E)
Supply	Production	1,223	1,202	1,238
	Import	449	426	430
	Total	1,672	1,628	1,668
Demand	Domestic	1,476	1,458	1,508
	Export	204	155	160
	Total	1,680	1,613	1,668
Year-end Capacity		1,322	1,322	1,322

1) The 2015 Results

Although T/A of NCC crackers, such as, LG Chemical (1,000KTA), Hanwha Total (1,000KTA), Lotte Chemical (1,000KTA) and so forth, the market was bearish due to the weak demand in synthetic rubber. Domestic and export demand also was decreased compared to previous year.

2) The 2016 Forecast

Under the low oil prices environment, butadiene demand will be slightly increased in accordance with the increase of tire industry. Also, from 2016, supply tightness could be occurred while very few additional NCC capacity will be increased

2. Aromatics (Benzene, Toluene, Xylene)

ITEM : Benzene

(Unit: KTA)

		2014	2015	2016(E)
Supply	Production	5,397	5,725	5,729
	Import	84	27	75
	Total	5,481	5,752	5,804
Demand	Domestic	3,627	3,445	3,690
	Export	1,784	2,307	2,114
	Total	5,411	5,752	5,804
Year-end Capacity		6,438	6,443	6,443

1) The 2015 Results

The benzene production capacity significantly increased in 2014 following major PX expansion projects by Hanwha TOTAL, SK Incheon Petrochem, UAC, etc. In 2015, the domestic production volume increased by 328 KT compared to 2014, 5,725 KT. As the demands were primarily satisfied by local production, imports were sharply reduced to 27 KT.

In 2015, Hanwha TOTAL's SM #1 plant revamp made a 120 KTA increase in its SM capacity, but most SM makers including Hanwha TOTAL, LG Chem, Lotte Chemical, and YNCC underwent T/A in the first half of the year, leading to a 182 KT reduction in the domestic demands, 3,445 KT. Increased capacity and reduced local demands resulted in a surge of exports compared to 2014, 2,307 KT.

2) The 2016 Forecast

Local crackers and reformers have T/A plans scheduled in the first (YNCC, Lotte Yeosu, Hanwha TOTAL, GS Caltex, and SKGC) or second

half (SK Incheon Petrochem and UAC) of the year, but a new facility of the Hyundai-Lotte joint venture is coming up during the second half of 2016. Overall, domestic productions in 2016 are expected to be similar to that in 2015, estimated to be 5,729 KT.

Although LG Chem (Daesan), Hanwha TOTAL, SKGC's SM plant, and Kumho P&B have T/A plans, the scale of T/A has been reduced compared to that in 2015, and the Kumho P&B Phenol will have increased capacity (415 KTA) during the first half of 2016. Taken together, domestic demands are expected to increase by 7% compared to 2015, 3,690 KT. Export volumes can vary depending on gasoline market conditions (China and the USA) and Chinese refineries' operation rates.

ITEM : Toluene

(Unit: KTA)

		2014	2015	2016(E)
Supply	Production	3,149	3,050	3,036
	Import	601	662	700
	Total	3,750	3,712	3,736
Demand	Domestic	3,060	3,128	2,926
	Export	820	648	810
	Total	3,880	3,776	3,736
Year-end Capacity		4,482	4,799	4,893

1) The 2015 Results

After the major PX expansion in 2014, a majority of TOL productions were supplied to TDP, resulting in reduced external sales. Accordingly, exports decreased to 52% compared to the previous year, whereas imports increased by 26% due to new UAC operations, reaching 760

KT, with a marked increase in imports from Japan. TDP's economic feasibility became worsened in the course of the year, which led to a decline in the operation rate and an increase in TOL productions, which was offset by increases in demands for gasoline in China. Productions were reduced during the second half due to T/A works by YNCC, SKGC and Lotte, keeping the tight supply-demand.

2) The 2016 Forecast

Toluene productions are likely to decline due to reformers' and crackers' T/A works, for example SKGC, GS Caltex, Lotte, and Hanwha TOTAL in the first half and SK Incheon Petrochem in the second half. But such reductions can be offset by the operation of Hyundai Chemical (350 KTA) in the second half, holding the annual production level slightly lower than that of the previous year.

Toluene demands are likely to experience declines during SKGC's and GS Caltex's T/A works, resulting in a 6% decrease in domestic demands from 3,128 KT in 2015 to 2,926 KT in 2016.

Strong demands for gasoline and PX in China will lead to increases in exports to the Chinese market, raising the annual export volume to 810KT, a 162 KT increase compared to the previous year.

ITEM : Mixed Xylene

(Unit: KTA)

		2014	2015	2016(E)
Supply	Production	8,455	9,977	9,813
	Import	1,397	1,567	1,334
	Total	9,852	11,544	11,147
Demand	Domestic	9,073	10,845	10,547
	Export	779	699	600
	Total	9,852	11,544	11,147
Year-end Capacity		8,836	10,163	10,417

1) The 2015 Results

MX productions and imports increased following the major expansion of the nation's PX facilities in 2014. The total supply volume in 2015 was 11,544 KT, a 15% YoY increase. MX supplies increased during the S-Oil PX plant T/A in the first half, but such excess was offset by increased demands for gasoline in China in the second half.

MX supply reductions due to T/A works by SKGC and GS Caltex in the second half held the tight supply-demand overall, which led to a 11% decrease in exports and a 11% increase in imports.

2) The 2016 Forecast

Korean crackers and reformers have increased T/A plans compared to the previous year, which is likely to result in slight YoY decreases in productions and domestic demands. MX supplies are expected to remain tight. PX demands and prices have been rising since the beginning of the year, and the resulting better profitability will contribute to keeping solid demands for MX for PX productions.

Intra-regional supplies are likely to increase following the operation of new facilities in Japan, but this is unlikely to have significant influence on the markets due to increased demands during the gasoline season. The supply-demand conditions can be somewhat relieved when the Hyundai-Lotte joint venture (MX, 1,200 KTA) goes into operation in the fourth quarter.

ITEM : Para Xylene

(Unit: KTA)

		2014	2015	2016(E)
Supply	Production	7,200	8,825	8,458
	Import	244	86	—
	Total	7,444	8,911	8,458
Demand	Domestic	3,442	3,219	3,008
	Export	3,951	5,680	5,450
	Total	7,393	8,899	8,458
Year-end Capacity		9,970	10,080	10,080

1) The 2015 Results

In 2015, the domestic PX equipment capacity was greatly increased following the major PX expansion projects in 2014 by Hanwha TOTAL, SK Incheon Petrochem, UAC, etc. As a result, productions in 2015 increased by 23% compared to 2014, 8,825 KT, and imports were greatly down to 86 KT.

Meanwhile, China continued constructing major PTA facilities and the Indian Reliance PTA (2,300 KTA) went into operation, leading to increases in exports by Chinese and Indian PTA makers. Increased self-reliance of China and Europe meant reduced exports and worsened profitability to Korean PTA companies. Accordingly, part of the facilities of Samnam and Hanwha General Chemical stopped operating, resulting in a 14% decrease in the nation's effective PTA capacity. Due to the reduced capacity and operation, the domestic PX demands decreased by 6% compared to the previous year, 3,219 KT. The increased PX capacity and decreased domestic demands together resulted in a marked increase (+44%) in PX exports, 5,680 KT.

2) The 2016 Forecast

China's downstream demands recovered after the Chinese Spring Festival and the operation of new PX facilities in the region has been delayed, which together ensured the economic feasibility of PX operations, and PX facilities are marking high operation rates except for those under T/A. There are scheduled T/A works by Hanwha TOTAL, GS Caltex and SKGC in the first half and SK Incheon Petrochem and UAC in the second half of 2016. Taken together, the domestic productions are expected to mark a 4% YoY decrease, 8,485 KT.

PTA facilities are likely to continue experiencing S/D and operation rate adjustments due to China's major expansion of PTA facilities continued since 2015 and Korean PTA makers' reduced economic feasibility and exports. In addition, Samnam, Taekwang, and Lotte PTA Plant have T/A plans in the second half. Taken together, the domestic PX demands are expected to mark a 7% YoY decrease, 3008 KT. Exports are also expected to slightly decline compared to the previous year due to reduced PX productions.

III . Polyolefins