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**Korea Petrochemical Industry Association(KPIA)**

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# **I . Country Report**



## Current Status and Challenges of Korea's Petrochemical Industry

### 1. Korea's Economic Situation and Prospects

Since global financial crisis, the increase rate in private consumption has consistently fallen short of economic growth rate, leading to widening the gap between growth and consumption, which is due to expansion of the gap between income and growth. In addition, situation in which most of disposable income is spent on consumption has limited room for expanding consumption without increase in income.

Due to slowdown in world economic growth resulting from eurozone financial crisis, increase in exports is expected to slow down to single digit growth rate. In ASEAN and China, high domestic demand is expected in 2012, but exports will be weakened by slowdown in import demand for parts and materials related to sluggish exports due to national elections of these countries.

Since the first quarter of 2012, the employment rate has improved in line with the actual figures, but price instability factors such as rising oil prices have continuously remained, coupled with a recent rebound in key indicators of exports and industrial production as well as economic prospects of individuals and businesses.

<Table 1> Status and prospects of major economic indicators (Unit : %)

	2011	2012					
		First half		Second half		Yearly	
		KIET	LGRI	KIET	LGRI	KIET	LGRI
GDP	3.6	3.4	3.2	3.9	3.6	3.7	3.4
Private consumption	2.2	2.9	2.9	3.1	3.0	3.0	2.9
Construction investment	▼6.5	3.2	4.3	1.2	2.6	2.1	3.4
Equipment investment	3.8	3.5	▼1.9	6.4	6.6	4.9	2.3

Notice : 1. Year-on-year rate, 2.LGRI: LG Economic Research Institute('11.12), 3.KIET: Korea Institute for Industrial Economics & Trade('11.12)

## 2. Current Status and Prospects of Petrochemical Industry

[Status in 2011]

In domestic supply and demand for major petrochemicals (based on 3 sectors), production increased by 0.5% to 21,350,000 tons compared to the previous year, and demand increased by 3.7% to 10,640,000 tons. In case of production, the number of regular maintenance increased during the first half of 2011, and adjustment of utilization rates due to sluggish industry performance has been made since the second half of 2011. Due to the global downturn and sluggish demand in China, a major market, exports decreased in two consecutive years, and slowdown in domestic economic growth caused stagnant domestic growth.

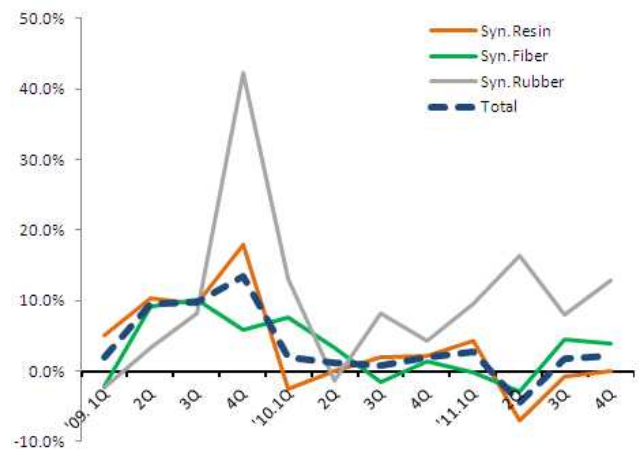
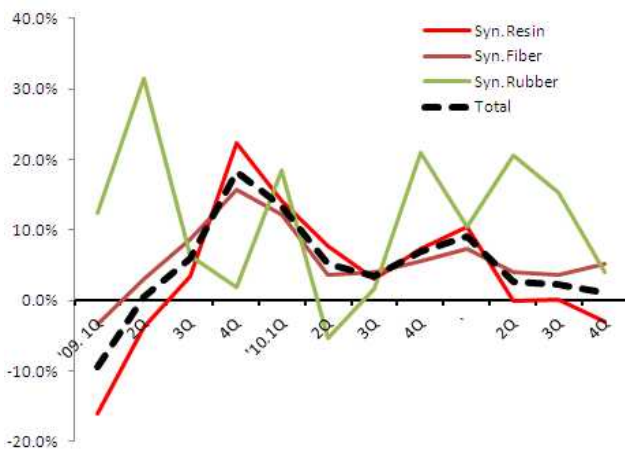
Since the second half of 2011, the realization of global economic uncertainties has led to forming a business cycle of high growth in the first half and low growth in the second half (based on demand). In the first half, the concentration of regular maintenance and China's retrenchment policies resulted in decreased production and exports. In particular, the adjustment of capacity utilization due to the concentration of regular maintenance of ethylene (5 companies from March to May) led to decrease in production. Exports showed a continuous decline due to the rising inflation and tight-financing policy of China. The rise in the capacity utilization of processing industries specializing in synthetic resins (5.2%, year-on-year rate) and synthetic rubber (15.5%, year-on-year rate) led to increase in demand.

In the second half, industry slowdown lasted due to worldwide economic slump and slowdown in exports to China, but base effect from the previous year and signs of year-end recovery in market conditions created a foundation for making a rebound. Production

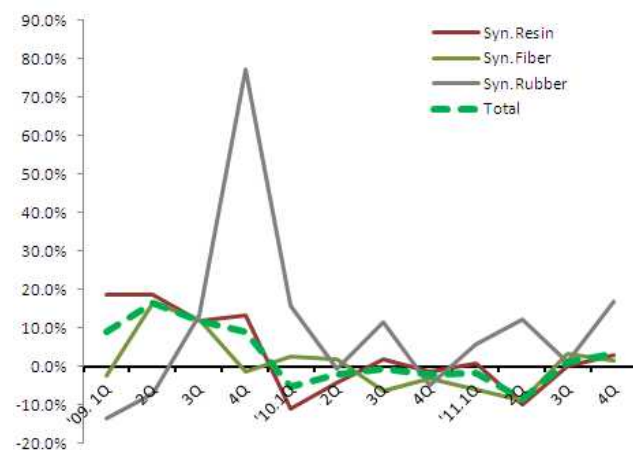
showed a slight increase rate due to downward adjustment of capacity utilization despite the low number of regular maintenance in fall. For reference, HDPE utilization rate decreased from 84.7% in January 2011 to 76.6% in July, and it recorded 79.1% in September, showing 4.1%p decrease from the previous year. Exports returned to growth with expectation of economic recovery due to efforts to stimulate economy from major countries and improvement of various macroeconomic indicators. Demand has decreased with decline in sales of durable goods (automobiles) and nondurables (clothes) due to reduction in personal disposable income (increased debt and rising inflation) since August.

Figure 1\_Changes in supply and demand and capacity utilization trends in 3 sectors

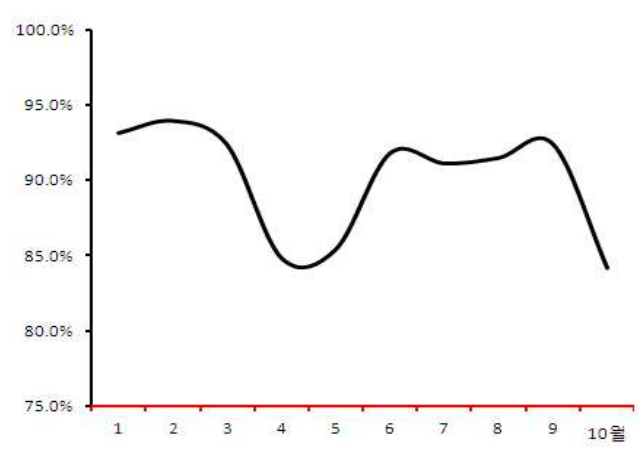
< Changes in demand (year-on-year rate) of 3 sectors > < Changes in production (year-on-year rate) of 3 sectors >



< Changes in exports (year-on-year rate based on quantities) of 3 sectors >



< Utilization trends in 3 sectors >



(Data) Korea Petrochemical Industry Association



### [Prospects for 2012]

In estimation of domestic supply and demand for petrochemistry (based on 3 sectors), production is expected to increase by 3.1% to 21,980,000 tons compared to the previous year, and demand increase by 3.3% to 10,990,000 tons due to reduction in the number of regular maintenance, new establishment and expansion effects from the previous year and expansion of production capacity according to new investment plan. For reference, large number of projects for expansion are to be implemented by Honam Petrochemical Corporation (250,000 tons of ethylene and 60,000 tons of propylene, '12.6) and Kumho Petrochemical Co., Ltd. (80,000 tons of SBR, '12.9).

With uncertainties of worldwide economic conditions, exports are expected to show a downturn trend in the first half, but it is anticipated that expectations for economic recovery and base effect from the previous year will lead to a rebound. In addition, a steady growth in demand is expected in accordance with implementation of domestic-oriented growth policy due to the shrinkage of the overall export.

Table 1\_Current status and prospects of demand and supply in 3 sectors (Unit: 1,000 tons)

		'05	'10	'11(E)	G.R(%)	'12(F)	G.R(%)	AAGR ( '05~'12)
Syn. Resin	Product	10,287	11,759	11,647	-1.0%	<b>11,942</b>	<b>2.5%</b>	<b>2.2%</b>
	Import	142	190	283	49.0%	<b>285</b>	<b>0.7%</b>	<b>10.5%</b>
	Sub-Total	10,429	11,949	11,930	-0.2%	<b>12,227</b>	<b>2.5%</b>	<b>2.3%</b>
	Export	5,828	6,958	6,848	-1.6%	<b>7,026</b>	<b>2.6%</b>	<b>2.7%</b>
	Sub-Total	4,601	4,992	5,082	1.8%	<b>5,201</b>	<b>2.3%</b>	<b>1.8%</b>
	self-suffi. (%)	224	236	229		<b>230</b>		
Syn. Fiber	Product	7,393	8,586	8,698	1.3%	<b>9,026</b>	<b>3.8%</b>	<b>2.9%</b>
	Import	755	591	612	3.5%	<b>636</b>	<b>3.9%</b>	<b>-2.4%</b>
	Sub-Total	8,148	9,176	9,310	1.5%	<b>9,661</b>	<b>3.8%</b>	<b>2.5%</b>
	Export	3,281	4,312	4,201	-2.6%	<b>4,347</b>	<b>3.5%</b>	<b>4.1%</b>
	Sub-Total	4,866	4,864	5,109	5.0%	<b>5,314</b>	<b>4.0%</b>	<b>1.3%</b>
	self-suffi. (%)	152	175	170		<b>168</b>		
Syn. Rubber	Product	474	878	980	11.6%	<b>1,018</b>	<b>3.9%</b>	<b>11.5%</b>
	Import	34	71	66	-6.7%	<b>66</b>	<b>0.4%</b>	<b>10.0%</b>
	Sub-Total	508	949	1,046	10.2%	<b>1,085</b>	<b>3.7%</b>	<b>11.4%</b>
	Export	276	552	599	8.5%	<b>607</b>	<b>1.4%</b>	<b>11.9%</b>
	Sub-Total	232	398	447	12.3%	<b>477</b>	<b>6.8%</b>	<b>10.8%</b>
	self-suffi. (%)	204	221	219		<b>210</b>		
Total	Product	18,154	21,223	21,325	0.5%	<b>21,985</b>	<b>3.1%</b>	<b>2.8%</b>
	Import	931	852	961	12.8%	<b>987</b>	<b>2.7%</b>	<b>0.8%</b>
	Sub-Total	19,085	22,075	22,286	1.0%	<b>22,972</b>	<b>3.1%</b>	<b>2.7%</b>
	Export	9,384	11,821	11,648	-1.5%	<b>11,980</b>	<b>2.9%</b>	<b>3.6%</b>
	Sub-Total	9,700	10,254	10,638	3.7%	<b>10,992</b>	<b>3.3%</b>	<b>1.8%</b>
	self-suffi. (%)	<b>187</b>	<b>207</b>	<b>200</b>		<b>199</b>		

(Data) Korea Petrochemical Industry Association

 Supply and Demand Trends by Sectors

## (1) Synthetic resins

### **[Status in 2011]**

In domestic supply and demand for synthetic resins, production decreased by 1.0% to 11,650,000 tons compared to the previous year, and demand recorded 5,080,000 tons, increased by 1.8% from the previous year. Among 3 sectors, production only showed a decline due to implementation of separate maintenance by products in addition to equipment inspection carried out in the process of NCC maintenance. For reference, the total number of PE·PP maintenance recorded 420 days(accumulated number), increased by 146 days from the previous year.

Due to slowdown in global demand resulting from the recession in North America and Eurozone and sluggish demand by China's tight-financing policies, exports showed a decline. In addition, intense competition with Middle Eastern products and expansion of market share due to RCFA signed between Taiwan and China led to stagnant market share in China.

Despite increase in automobile production, demand recorded a low growth rate due to the downturn in the (housing) construction business and slowdown in the production of white goods. In case of domestic appliances, supplier's capacity utilization rate decreased by 70 to 80% and the same level of decline lasted in the field of a display unit. In construction business, the value of construction completed decreased for the first time in 10 years (due to downturn in the housing market and SOC orders\_Construction Association of Korea). In addition, construction works completed showed a decline by 9.2% over the same month of last year after 11.0% decrease in January 2011.

### **[Prospects for 2012]**

In domestic demand and supply of synthetic resins, production is

expected to increase by 25% to 11,940,000 tons from the previous year, and demand by 2.3% to 5,200,000 tons. It is anticipated that the increase in production will be led by improvement of facilities such as revamping with regular maintenance of major NCC businesses and reduction in the number of regular maintenance, which is due to expectations for demand recovery and a reactionary rise resulting from relatively low utilization rate of 2011. For reference, major expansion plan is to be implemented by Honam Petrochemical Corporation (250,000 tons of HDPE and 200,000 tons of PP, '12.4).

Table 2\_Current status and prospects of supply and demand for synthetic resins (Unit: 1,000 tons)

		2010		2011						2012(F)		
		Total		1H		2H(E)		Total(E)		Total		
			G.R		G.R		G.R		G.R		G.R	
LDPE	Pro	2,060	-1.3%	962	-7.6%	1,100	8.0%	2,062	0.1%	<b>2,101</b>	<b>1.9%</b>	
	EX	1,034	0.2%	470	-9.4%	602	17.0%	1,072	3.7%	<b>1,108</b>	<b>3.3%</b>	
	IM	48	36.5%	47	146.2%	45	56.3%	92	92.0%	<b>102</b>	<b>10.9%</b>	
	Dem	1,074	-1.6%	539	-0.6%	542	1.9%	1,081	0.6%	<b>1,095</b>	<b>1.3%</b>	
HDPE	Pro	1,996	-8.4%	961	-2.5%	1,003	-0.8%	1,964	-1.6%	<b>2,040</b>	<b>3.9%</b>	
	EX	1,119	-16.8%	487	-12.0%	594	5.1%	1,081	-3.3%	<b>1,121</b>	<b>3.7%</b>	
	IM	15	80.4%	21	143.1%	18	171.6%	39	155.6%	<b>30</b>	<b>-23.3%</b>	
	Dem	893	5.8%	495	12.1%	426	-5.6%	921	3.2%	<b>948</b>	<b>3.0%</b>	
PP	Pro	3,805	2.6%	1,804	-3.2%	1,956	0.8%	3,760	-1.2%	<b>3,834</b>	<b>2.0%</b>	
	EX	2,308	-2.9%	1,047	-7.3%	1,207	2.3%	2,253	-2.4%	<b>2,304</b>	<b>2.3%</b>	
	IM	22	4.6%	14	29.0%	14	29.5%	28	29.3%	<b>28</b>	<b>0.4%</b>	
	Dem	1,519	12.2%	771	3.4%	764	-1.2%	1,535	1.0%	<b>1,558</b>	<b>1.5%</b>	
P S	Pro	1,014	7.8%	540	11.2%	530	0.3%	1,070	5.5%	<b>1,077</b>	<b>0.6%</b>	
	EX	607	12.3%	338	15.5%	316	0.5%	654	7.7%	<b>653</b>	<b>-0.1%</b>	
	IM	33	0.3%	10	-42.8%	9	-40.3%	19	-41.7%	<b>19</b>	<b>-4.1%</b>	
	Dem	440	1.6%	212	0.7%	223	-2.6%	436	-1.0%	<b>442</b>	<b>1.5%</b>	
	EPS	Pro	342	3.6%	181	14.7%	199	7.9%	379	11.0%	<b>385</b>	<b>1.4%</b>
		EX	124	11.3%	71	28.3%	74	7.6%	145	16.8%	<b>146</b>	<b>0.7%</b>
		IM	6	19.4%	1	-40.9%	1	-63.0%	3	-53.0%	<b>3</b>	<b>-2.5%</b>
		Dem	223	0.1%	111	6.1%	126	6.3%	237	6.2%	<b>241</b>	<b>1.8%</b>
	PS (GP, HI)	Pro	672	10.1%	359	9.6%	332	-3.8%	691	2.8%	<b>692</b>	<b>0.2%</b>
		EX	483	12.6%	267	12.6%	242	-1.5%	509	5.4%	<b>507</b>	<b>-0.3%</b>
		IM	28	-2.8%	9	-43.1%	8	-34.5%	17	-39.4%	<b>16</b>	<b>-4.3%</b>
		Dem	217	3.2%	101	-4.7%	97	-12.0%	199	-8.5%	<b>201</b>	<b>1.1%</b>
PVC	Pro	1,408	-4.6%	714	2.2%	689	-2.9%	1,402	-0.4%	<b>1,418</b>	<b>1.1%</b>	
	EX	620	-9.2%	305	-0.7%	349	11.7%	654	5.5%	<b>669</b>	<b>2.4%</b>	
	IM	66	107.7%	50	59.4%	49	41.2%	99	49.9%	<b>100</b>	<b>0.9%</b>	
	Dem	854	3.5%	459	8.6%	389	-9.9%	848	-0.8%	<b>849</b>	<b>0.1%</b>	
ABS	Pro	1,476	5.2%	746	0.8%	643	-12.7%	1,389	-5.9%	<b>1,472</b>	<b>6.0%</b>	
	EX	1,271	1.7%	634	-1.3%	500	-20.5%	1,133	-10.8%	<b>1,170</b>	<b>3.2%</b>	
	IM	7	8.3%	3	-22%	4	11.2%	6	-6.1%	<b>7</b>	<b>12.6%</b>	
	Dem	212	32.1%	116	13.8%	146	32.8%	262	23.7%	<b>309</b>	<b>18.0%</b>	
Total	Pro	11,759	-0.3%	5,726	-1.5%	5,921	-0.4%	11,647	-1.0%	<b>11,942</b>	<b>2.5%</b>	
	EX	6,958	-3.7%	3,280	-4.7%	3,568	1.5%	6,848	-1.6%	<b>7,026</b>	<b>2.6%</b>	
	IM	190	41.0%	144	58.2%	139	39.8%	283	48.6%	<b>285</b>	<b>0.8%</b>	
	Dem	4,992	6.0%	2,591	5.2%	2,491	-1.5%	5,082	1.8%	<b>5,201</b>	<b>2.3%</b>	

(Data) Korea Petrochemical Industry Association

With enhanced export competitiveness due to expansion of FTA between major countries and movement of policy changes to economic

stimulus of China, it is expected that exports exceed 7 million tons for the first time ever, and PE products will play a major role in leading overall export growth due to the substitution effect in LDPE products and limited arrivals on the market of low-priced Middle Eastern product quantities.

In addition, limited demand growth is expected with prediction of a downward trend compared to 2011's growth.

## **(2) Synthetic Fiber Raw Materials**

### **[Status in 2011]**

In domestic supply and demand of domestic synthetic fiber raw materials, demand recorded 5,110,000 tons with 5% increase from the previous year. Due to adjustment of capacity utilization, production has shown a limited growth trend since the second half of 2011 without a special expansion except for TPA (an expansion of 200,000 tons in September by Samsung Petrochemical Co., Ltd.).

Exports decreased by the impact of global recession and slowdown in import demand due to the rise of self-sufficiency of China.

In case of demand, clothing consumption was stagnant, but with substitution due to the surge in cotton prices at the beginning of the year, industrial demand for tire code showed a steady increase.

### **[Prospects for 2012]**

In domestic demand and supply of synthetic fiber raw materials for 2012, production is expected to increase by 3.8% to 9,020,000 tons compared to the previous year, and demand by 4.0% to

5,310,000 tons. In production, the effect of increased production capacity due to additional expansion of 2012 and an expansion of TPA (250,000 tons) in the second half of 2011 is reflected.

Meanwhile, it is difficult to expect high export growth in most products except for AN since the growth of China's chemical fiber production has shown a slowdown trend in recent years, and an expansion of major products including TPA is expected within China.

In addition, it is expected that facility expansion and new investments in chemical fiber sector will lead to expansion of demand.

Table 3\_Status and prospects of supply and demand for synthetic materials (Unit: 1,000 tons)

		2010		2011						2012(F)	
		Total		1H		2H(E)		Total(E)		Total	
			G.R		G.R		G.R		G.R		G.R
TPA	Pro	6,535	3.2%	3,230	-1.4%	3,413	4.6%	6,642	1.6%	<b>6,890</b>	<b>3.7%</b>
	EX	3,651	0.9%	1,742	-6.1%	1,832	2.0%	3,574	-2.1%	<b>3,683</b>	<b>3.1%</b>
	IM	0	2.9%	0	-92.1%	0	-99.1%	0	-92.1%	-	-
	Dem	2,885	6.4%	1,488	4.8%	1,580	7.8%	3,069	6.4%	<b>3,207</b>	<b>4.5%</b>
DMT	Pro	75	15.9%	38	2.7%	37	-1.3%	75	0.7%	<b>75</b>	<b>-0.6%</b>
	EX	23	9.0%	12	-1.2%	14	22.2%	25	10.3%	<b>22</b>	<b>-11.0%</b>
	IM	13	451.5%	10	69.1%	0	-94.6%	11	-20.9%	<b>10</b>	<b>-4.9%</b>
	Dem	65	41.8%	37	16.6%	24	-29.3%	61	-7.1%	<b>63</b>	<b>3.0%</b>
EG	Pro	1,150	-2.2%	562	-2.4%	606	5.6%	1,168	1.6%	<b>1,197</b>	<b>2.4%</b>
	EX	440	-16.2%	186	-19.9%	214	2.7%	400	-9.2%	<b>396</b>	<b>-0.9%</b>
	IM	445	-4.5%	230	11.7%	232	-3.0%	462	3.8%	<b>484</b>	<b>4.7%</b>
	Dem	1,155	3.4%	607	10.2%	624	3.2%	1,231	6.5%	<b>1,285</b>	<b>4.4%</b>
AN	Pro	550	0.9%	272	-3.3%	260	-3.0%	533	-3.1%	<b>585</b>	<b>9.9%</b>
	EX	179	3.9%	77	-0.1%	108	5.8%	185	3.3%	<b>232</b>	<b>25.5%</b>
	IM	85	2.8%	46	23.2%	44	-6.0%	91	7.0%	<b>93</b>	<b>2.5%</b>
	Dem	455	0.1%	242	-0.2%	196	-7.9%	438	-3.8%	<b>446</b>	<b>1.8%</b>
CPLM	Pro	275	6.9%	140	0.2%	139	2.4%	279	1.3%	<b>279</b>	<b>-0.2%</b>
	EX	19	-39.9%	8	-26.5%	9	13.1%	17	-10.2%	<b>13</b>	<b>-26.1%</b>
	IM	47	67.5%	26	11.3%	23	-5.2%	48	2.9%	<b>49</b>	<b>0.4%</b>
	Dem	303	19.4%	158	3.9%	152	0.7%	310	2.3%	<b>314</b>	<b>1.3%</b>
Total	Pro	8,586	2.5%	4,243	-1.5%	4,455	4.2%	8,698	1.3%	<b>9,026</b>	<b>3.8%</b>
	EX	4,312	-1.3%	2,024	-7.4%	2,177	2.4%	4,201	-2.6%	<b>4,347</b>	<b>3.5%</b>
	IM	591	1.9%	312	14.4%	300	-5.7%	612	3.6%	<b>636</b>	<b>3.9%</b>
	Dem	4,864	6.1%	2,531	5.7%	2,577	4.4%	5,109	5.0%	<b>5,314</b>	<b>4.0%</b>

(Data) Korea Petrochemical Industry Association

### (3) Synthetic rubber

#### [Status in 2011]

In domestic demand and supply of synthetic rubber, production increased by 11.6% to 980,000 tons compare to the previous year, and demand recorded 450,000 tons with 12.4% increase from the previous year. Production showed an increasing trend with new establishment and expansion of BR (Kumho Petrochemical Co., Ltd. 120,000 tons, '10.12).

Despite the global recession, exports showed continued growth rate and improved market share due to China's steady production of tires. For reference, Korean market share in BR import market within China expanded from 23% in January to 40% in October 2011.

In addition, increased production and expanded domestic sales (effect of new car sales) in tire sector led to an increasing trend in demand.

#### [Prospects for 2012]

In domestic demand and supply of synthetic rubber for 2012, production is expected to increase by 3.9% to 1,020,000 tons compared to the previous year, and demand by 6.8% to approximately 480,000 tons. With enhanced production capacity through new establishment and expansion since 2011, increase in production due to additional expansion of SBR (Kumho Petrochemical Co., Ltd. 80,000 tons in September 2012) is expected in 2012.

Export growth is expected to remain sluggish due to China's continuous establishment and expansion of synthetic rubber.



Meanwhile, it is expected that expansion of production capacity due to continued investments of major tire makers will lead to increase in demand.

Table 4\_Status of supply and demand for synthetic rubber (Unit: 1,000 tons)

		2010		2011						2012(F)	
		Total		1H		2H(E)		Total(E)		Total	
			G.R		G.R		G.R		G.R		G.R
SBR	Pro	560	6.1%	283	2.6%	279	-1.8%	562	0.4%	<b>574</b>	<b>2.2%</b>
	EX	355	9.8%	170	-3.3%	164	-8.4%	334	-5.9%	<b>334</b>	<b>0.1%</b>
	IM	50	25.3%	24	3.5%	19	-27.8%	43	-13.2%	<b>44</b>	<b>1.5%</b>
	Dem	255	4.5%	138	11.2%	134	2.0%	271	6.5%	<b>285</b>	<b>5.0%</b>
BR	Pro	318	5.3%	202	31.5%	216	31.3%	418	31.4%	<b>443</b>	<b>6.0%</b>
	EX	197	-2.0%	124	31.4%	141	37.7%	266	34.7%	<b>274</b>	<b>3.0%</b>
	IM	22	-4.4%	9	-20.5%	13	37.7%	23	5.8%	<b>23</b>	<b>-1.6%</b>
	Dem	143	15.5%	87	22.9%	88	23.0%	175	23.0%	<b>192</b>	<b>9.5%</b>
Total	Pro	878	5.8%	485	12.9%	495	10.4%	980	11.6%	<b>1,018</b>	<b>3.9%</b>
	EX	552	5.2%	294	8.8%	305	8.4%	599	8.6%	<b>607</b>	<b>1.4%</b>
	IM	71	14.5%	33	-4.6%	33	-10.2%	66	-7.5%	<b>66</b>	<b>0.5%</b>
	Dem	398	8.2%	225	15.5%	222	9.4%	447	12.4%	<b>477</b>	<b>6.8%</b>

(Data) Korea Petrochemical Industry Association

#### (4) Basic petrochemical(Ethylene)

[Status in 2011]

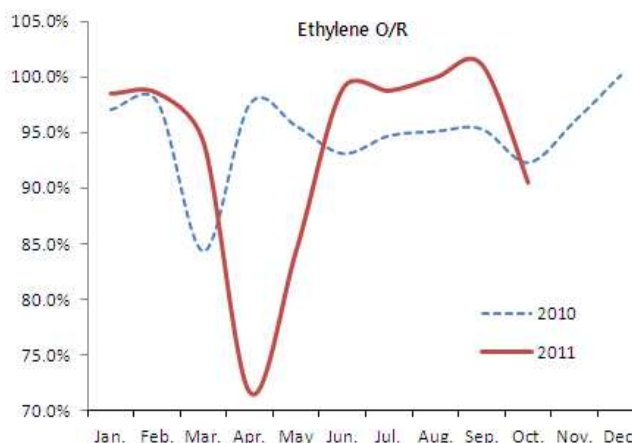
In domestic demand and supply of ethylene, production increased by 1.7% to 7,520,000 tons compared to the previous year, and demand decreased by 1.7% to 6,910,000 tons from the previous year. Despite decrease in the first half due to regular maintenance (5 cases) in spring, the annual production increased by new establishment and expansion (Samsung Total Petrochemical (120,000 tons) and LG Chem (150,000 tons)) carried out in the same period. Due to tight supply and demand caused by supply disruptions, exports increased, but demand decreased by adjustment of utilization capacity in accordance with shrinkage of demand from major downstream industries.

## [Prospects for 2012]

In domestic demand and supply of ethylene for 2012, production is expected to increase by 3.5% to 7,780,000 tons due to new establishment and expansion (Honam Petrochemical (250,000 tons), LG Chem (120,000 tons)), and demand by 4.5% to 7,230,000 tons with increased utilization rates of major downstream industries.

Table 5\_Propects for demand and supply of ethylene (Unit: 1,000 tons) and changes in utilization rate('10vs'11)

	2011(E)		2012(F)	
		G.R(%)		G.R(%)
Prod.	7,518	1.7%	<b>7,781</b>	<b>3.5%</b>
Exp.	750	35.5%	<b>690</b>	<b>▼8.0%</b>
Imp.	144	26.2%	<b>139</b>	<b>▼3.4%</b>
Demd.	6,913	<b>▼1.7%</b>	<b>7,231</b>	<b>4.5%</b>



### 3. Major Current Issues and problems

#### (1) Development of Plans to promote advancement of petrochemical industry and strengthen its competitiveness

With recent large-scale expansion of less developed countries such as Middle East, high oil prices and strengthened greenhouse gas regulations, a foundation for growth of petrochemical industry is rapidly weakening. In this connection, major companies of developed countries are trying to widen a gap based on the advanced technologies, and less developed countries including Middle East and China are striving to narrow the gap through large.

In particular, climate change and environmental regulations pose a burden to continuous growth of petrochemical industry which requires mass consumption of energy and emissions of greenhouse gas. To achieve the fundamental competitiveness and goals to reduce energy and greenhouse gas emissions, support to change petrochemical complex to green zone is required, and based on this, improvement of competitiveness needs to be promoted through national energy savings and energy efficiency of petrochemical industry.

## **(2) Business expansion of a driving force for future growth**

To cope with structural oversupply and maintain a sustainable growth momentum, Korea petrochemical industry needs to develop future growth engines and obtain economies of a certain scale.

In this connection, continuous establishment and expansion has been implemented in terms of nurturing future growth engines and advancing global petrochemical industry. In addition, development of future new businesses related to photovoltaic materials of polysilicon and mono-silane as well as secondary cell is being currently planned and promoted.

## **(3) Countermeasures against climate change**

The International community is discussing the new system to reduce greenhouse gas emissions established after the expiration of the Kyoto Protocol in 2012, and South Korea is expected to take on obligations to reduce greenhouse gas emissions from 2013, the second obligation period.

In this regard, the South Korean government is pursuing a policy against obligations and establishing domestic greenhouse gas reduction

targets through enactment of Framework Act on Low Carbon and Green Growth. In November 2009, it established the goals to reduce national greenhouse gas reduction to 30% compared with BAU in 2020, and plans to set national goals to reduce greenhouse gas emissions by sectors and subordinate businesses in 2012.

In order for Korea's petrochemical industry to maintain the current industrial scale and develop into a future core industry, greenhouse gas policies considering the international competitiveness of the industry need to be promoted, and industry's efforts to compose task force on climate change, prepare for logical response that reflects characteristics of petrochemical industry and promote the corresponding activities are required in consideration of government policies.

【Table 9】 Establishment and expansion trends and prospects

Company name	Item	Production capacity	(new)expansion	location	Opreation period
Honam Petrochemical	Ethylene	1,000	110	Daesan	2012. 4
		750	250	Yeosu	
	Propylene	380	125	Yeosu	
	Benzene	165	35	Yeosu	
	Toluene	78	24	Yeosu	
	Xylene	47	15	Yeosu	
	HDPE	380	250	Yeosu	
	PP	400	200	Yeosu	
LG Chem	Ethylene	930	120	Deasan	2012. 8
	Propylene	465	60	Daesan	
	Butadiene	145	10	Yeosu	2012. 12
	LDPE	170	10	Yeosu	
	Phenol	275	300	Yeosu	2012. 11
	Acetone	170	185	Yeosu	
Samsung Total Petrochemical	Benzene	680	120	Daesan	2012. 9
	PX	600	100	Daesan	
Hyundai Cosmo Petrochemical	Benzene	120	115	Daesan	2013. 2
	PX	380	800	Daesan	
Dongseo Petrochemical	AN	315	245	Ulsan	2012. 12
Kumho Petrochemical	SBR	481	110	Ulsan	2012. 9
Kumho Mitsui Chemicals	MDI	150	50	Yeosu	2012. 6

【Table 10】 M&amp;A status

I Merger	- Dongseo Petrochemical, 100 sale of shares to Asahi Chemical Industry Co., Ltd.	'98. 5
	- hyosung T&C/hyosung Living industry/hyosung Corporation/hyosung Heavy Industries, integrated into hyosung Co., Ltd.	'98.11
	- BASF Urethane Korea/Korea BAST Styrenics/BASF KOREA, integrated into BASE Korea Co., Ltd.	'99.1
	- Gohap Co., Ltd./Gohap Corporation/Goryeo General Chemicals/Goryeo Petochemicals, integrated into Gohap Co., Ltd.	'99.3
	- Jaechul Chemical, merged with Dongyang Chemical	'00. 3
	- Kumho Chemical (PE, EPS, ABS, PPG 생산), merged with Kumho Petrochemical	'01. 1
	- SK Evertec, merged with SKC	'01.11
	- Samsung General Chemical, 50% sales of shares to Atofina	'03.8
	- KP Chemical, merged with Honam Petrochemical	'04.11
	- LG Daesan Petrochemical Corp., merged into LG Chem	'06. 1
	- CCC, merged with Dongyang Chemical Co., Ltd.	'06. 3
	- Kolon Industries, merged into Kolon	'07. 6
	- LG Petrochemical, merged into LG Chem	'07.11
	- Lotte Daesan Chemical, merged into Honam Petrochemical	'09. 1
	- Titan Chemicals, merged with Honam Petrochemical	'10.7
	- Tech Air(company specialized in carbon composites), merged with Honam Petrochemical	'10.8
	- LG Polycarbonate, merged into LG Chem	'11.4
	- H-Plus Hiko, merged into KPX Fine Chemical	'11.6
	- Kumho Petrochemical, took over carbon nanobute business from SEMES	'11.8
- Seohae Power (electricity supplier), Seohae Water, merged with Samsung Total Petrochemical	'12.1	
- KSI (compounding manufacturer), merged with Kolon Plastic	'12.3	
II Business integration	- Daelim industrial/Hanwha L & C, NCC sector integration and co-managment(Yeocheon NCC)	'99.10
	- Daelim Industrial : Transition to a professional company specialized in PP and HDPE - Hanwha L & C : Transition to a professional company specialized in LDPE and LLDPE	'99.10
	- SK Chemical/Samyang Corp., established Huvis (joint venture specializing in polyester) after separating its won polyester business	'00.10
	- LG Chem, divided into LG CI, LG Chemicals, LG Household and Health Care	'00.12
	- Gohap, divided petrochemical business (TPA, PET Chip, PA) sector to KP Chemical, yet synthetic fiber business remained in Gohap	'01.12
	- Hyundai Oilbank, established HC Petrochem for manufacture and sales of BTX(Hyundai Oilbank:Cosmo Oil=50:50)	'09.11
	- SK Global Chemical, separated from SK innovation	'11.1
	- BASF, integrated SM business with INEOS and established Styloution	'11.1

III Sale of business	- Daenong Petrochemical, sale of shares to Yongsan Chemical	'97. 5
	- Jaechul Chemical, sale of shares to Geopyeong Group - Changed their company names to Geopyeong Jaechul Chemical and Geopyeong Chemical	'97. 8
	- Hanyang Chemical, sale of 50% shares to BASF (Germany) - Changed it company name to BASF Urethane Korea	'97.12
	- hyosung, sale of 50% shares to BASF(Germany) - Changed its company name to BASF Stylenics Korea	'98. 3
	- Hanwha L & C, sale its hydrogen peroxide business to Kemira Chemicals, Finland	'98. 7
	- Hanwah L & C, sale its PMMa business to Elf Atochem, France	'98.10
	- LG Chem, sale its carbon black business to Degussa, Germany	'98.11
	- Dongseong Chemical, sale its Polyol business to BASF, Germany	'98.12
	- Hyosung Co., Ltd., sale its Polyacetal, composite PP business (Anyang factory) to Rodia, France	'99.1
	- Kumho Petrochemical, sale its carbon black business to Columbia International Chemical(CICC)	'99.2
	- Hyosung Co., sale its artificial marble business to Dupont	'99.4
	- Daelim Industrial, separated K-Resin business/attracted foreign investment - Established an independent corporation through a joint venture with Phillips, the US (Phillips: 60% shares) - Company name: 'K-Resin Copolymer'	'00.2
	- Daelim Industrial, separated PP business/attracted foreign investment - Established a independent corporation through a joint venture with Montell → Polymirae(Daelim: 50% shares)	'00.9
	- Hyundai Petrochemical, sale its PVC business to LG Chem	'00.11
	- Samsung Total Petrochemical, sale its IPA business to Samsung petrochemical	'00.12
	- SK Evertec, sale its SM equipment #2 to BASF Korea	'01.7
	- Kora PTG, sale of 54.8% shares to Yongsan Chemical	'02.12
	- Hyundai Petrochemical, sale of shares to Honam Petrochemical and LG Chem Consotium	'03.6
	- Incheon Oil Refinery, merged with SK	'05.12
	- SK Chemical, separated petrochemical business and assigned it to SK Petrochemical	'05.12
- OCI, sale of its PA/DOP plant in Yongyeon to Hanwha Chemical	'08.6	
- BASK korea, sale of its SM equipment to SK Energy	'08.8	

## **II . For Committee Meeting**

### **1. General Matters & Raw Materials Committee**



## General Matters & Raw Materials Committee

### 1. Olefins (Ethylene, Propylene, Butadiene)

#### ITEM : Ethylene

##### 1) The 2011 Results

The domestic ethylene production was increased by 0.1% compare to previous year to be 7,477 thousand tons. Total ethylene demand was decreased by 3.7% compare to previous year to be 6,742 thousand tons. The export was increased by 30% compare to previous year to be 722 thousand tons due to new expansion in Korea.

##### 2) The 2012 Forecast

In 2012, total ethylene demand is expected to down around 4% to be 7,165 thousand tons due to weak PE demand . The domestic ethylene production capacity will increase about 5% to be 8,043 thousand tons caused by expansion from Honam PC Chem.

#### ITEM : Propylene

##### 1) The 2011 Results

Korean total supply of propylene was decreased by 3% compare to previous year to be 5,531 thousand tons and total demand of propylene was decreased by 14% compare to previous year to be 4,616 thousand tons. However, Korean exporting volume was increased by 62% compare to previous year to be 904 thousand tons due to good margin by centered T/A in China

## 2) The 2012 Forecast

Korean and Japan maker's annual turnaround will be converged on March and April, so supply/demand balance will be tight temporarily. However, Taiwan CPC RFCC(450thousand tons) will be newly started up in the middle of May then NE Asia balance will be long somewhat.

## ITEM : Butadiene

### 1) The 2011 Results

Even Korean butadiene capacity was expanded by 10.8% to 1,375 thousand tons in 2011, the domestic production rather decreased by 0.7% to 1,016 thousand tons, mainly due to heavy volume of crackers' turnaround loss.

While total domestic demand was grown by 2.4% compare to previous year to be 1,145 thousand tons due to strong demand from synthetic rubber and ABS.

### 2) The 2012 Forecast

There is no capacity expansion for butadiene in Korea, but domestic supply will be increased by 6.5% to 1,082 thousand tons, because butadiene unit operation rate is expected to be higher than last year to cover domestic and export demand.

In 2012, butadiene demand is expected increasing by 1.3% to 1,239 thousand tons.

(Unit : 1,000MT)

			2010	2011	2012 (Prospect)
Ethylene	Supply	Production	7,396	7,477	7,165
		Import	196	136	200
		Total	7,592	7,613	7,365
	Demand	Domestic	7,003	6,742	6,625
		Export	554	722	740
		Total	7,557	7,464	7,365
	Year-end Capacity		7,498	7,633	8,043
Propylene	Supply	Production	5,702	5,531	5,600
		Import	280	264	300
		Total	5,982	5,795	5,900
	Demand	Domestic	5,389	4,616	5,350
		Export	559	904	550
		Total	5,948	5,520	5,900
	Year-end Capacity		5,826	5,956	6,307
Butadiene	Supply	Production	1,023	1,016	1,082
		Import	323	359	157
		Total	1,346	1,375	1,239
	Demand	Domestic	1,145	1,172	1,187
		Export	215	149	52
		Total	1,360	1,321	1,239
	Year-end Capacity		1,168	1,294	1,302

## 2. Aromatics(Benzene, Toluene, Xylene)

### ITEM : Benzene

(Unit : 1,000MT)

	2010	2011	2012 (Prospect)
Production	4,542	4,710	4,886
Demand	3,145	3,145	3,145
Balance	1,397	1,565	1,741

#### 1) The 2011 Results

In 2011 Balance of BZ and its derivative didn't change much compared to last year. However due to the concern of EU's economic outlook, spread reduced significantly. In US due to reinforcement of regulations regarding Gasoline (MSAT2), balance was tighter than expected. The tightness in US cause Asian cargos to move in to US, easing the balance in Asia even with the new start up of S-Oil's new plant.

#### 2) The 2012 Forecast

In 2012, balance not expected to change much even with the new plants running. Spread will maintain at around 150~170 dollars per metric ton, which is similar to 2011. Price in first quarter improved from the previous quarter due to tight balance carrying out since end of 2011. However Asia still remains as a export balance, and arbitrage cargo will continue to be shipped to US throughout the year.

ITEM : Toluene

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	2,744	3,015	2,933
	Import	275	182	150
	Total	3,019	3,197	3,083
Demand	Domestic	2,223	2,296	2,193
	Export	852	901	890
	Total	3,640	3,197	3,083

(NOTE) Sourced by CMAI(2012)

1) The 2011 Results

Beginning of the year, Toluene price increased due to tight balance after the earthquake in Japan. Throughout the year, Toluene prices moved in line with MX, PX. From 20 dollars per metric ton spread toluene spread gradually increased to 200 dollars per metric ton by the end of the year.

2) The 2012 Forecast

The traditional Toluene demand has been solvents and gasoline blending. However, after 2011, toluene has been used as a main feedstock to produce PX, changing the Demand Paradigm. We are expecting a tight PX market in 2012; therefore toluene will be steadily used for PX feedstock. Also, companies, including SK Global Chemical are expected to be scheduled turnarounds in 2012, adding more tightness to the market.

Within Southeast Asia, supply from producers in Thailand is decreasing and India is becoming one of the emerging markets for Toluene. In 2012, Toluene market will be tight, and it is true that we must take into consideration the macro economics. But overall, spread move in line with MX and PX throughout 2012.

ITEM : Mixed Xylene

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	5,732	6,436	6,623
	Import	1,119	1,082	940
	Total	6,851	7,518	7,572
Demand	Domestic	5,980	6,548	6,772
	Export	926	970	850
	Total	6,906	7,518	7,572
Year End Capa.		6,195	6,843	7,172

1) The 2011 Results

In 2011, Production in Korea was 6,000 thousand tons, which was increased by 300 thousand tons from the previous year. The demand of MX, with strong PX demand, was also improved from the previous year. Because of the Earthquake in Japan, export increased from previous year. Import volume was reduced from previous year, due increase in local supply.

2) The 2012 Forecast

MX production in 2012 is expected to increase, due to increase in demand according to strong level of PX. However, export is expected to reduce from 2011, due to increase in demand of MX according to PX revamp of some companies. The amount of total import is projected to reduce especially due to reduction in exports in Japan.

Based on the supply/demand balance, MX prices in 2012 will maintain at a strong level compared to 2011. However MX prices are expected to change, due to PX spread and recovery of MX production in Japan and sharp rise in demand by new PX businesses.

## ITEM : Para Xylene

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	17,880	19,215	21,000
	Import	1,850	1,555	2,000
	Total	19,730	20,770	23,000
Demand	Domestic	19,634	21,035	27,000
	Export	0	45	0
	Total	19,634	21,075	27,000
Year End Capa.		6,195	6,843	7,172

### 1) The 2011 Results

In 2011, due to strong PTA/Polyester Chain, PX price reached 1,750 us dollars per metric ton. Market was volatile owing to macro factors such as the earthquake in Japan as well as the economic issues in Europe. Second half of 2011, PX, PTA Demand was decreased as China, the main market for polyester, announced to control inflation. Market fell down to 1,350 dollars per metric ton by the end of the year.

### 2) The 2012 Forecast

In 2012, we expect the bearish factors to fade away as we expect improvement in the world economics and the shift of the Chinese government will come up with a new pump-priming policy. However, about 12,000 KTA of new PTA plants are in plan to build up in 2012 the tightness in the PX will deepen in 2012.

The Chinese government's ongoing tight fiscal policy will gradually change to stimulative economic policy as they are easing off deposit reserve ratio. Depending on this, the demand of polyester of the textile companies and margin of PX, PTA chain will vary. The PX prices will depend on the operation rates of new PTA plants and as well as the squeezing of the margin.

## ITEM : Raw Material (Naphtha)

(Unit : 1,000MT)

		2010	2011(E)		2012(P)	
				G.R(%)		G.R(%)
Supply	Supply	18,858	19,800	5.0	20,691	4.5
	Import	20,956	21,962	4.8	22,928	4.4
	Total	39,814	41,762	4.9	43,619	4.4
Demand	Crackers	19,939	20,796	4.3	21,794	4.8
	Reformers	16,107	16,944	5.2	17,740	4.6
	Others	200	210	5.0	219	4.2

### 1) The 2011 Results

With normalization of NCC equipment operations due to world economy recovery, production and import of naphtha in Korea increased by 5.0% and 4.8% to 19,800,000 tons and 21,962,000 tons respectively, compared to the previous year. In case of demand, slowdown in demand due to concentration of regular maintenance in NCC sector led to a 1.3%p decrease from the previous year.

### 2) The 2012 Forecast

In 2012, domestic supply of naphtha is expected to show a decreasing trend due to low utilization rate resulting from sluggish global economic growth. In addition, it is expected that the effects of expansion in 2011 and reduction in the number of regular maintenance in 2012 will contribute to recovery in NCC sector with estimated demand for 21,794,000 tons increased by 4.8% from the previous year.

The price of naphtha in 2012 is expected to be maintained at the same level of 2011 or decreased a little bit, and there is little expectation of changes in demand/supply fundamentals since large-scale projects are not expected in terms of supply and demand. However, the US economic



downturn, EU economic crisis solutions and fluctuations in oil prices due to uncertainties of global economy are considered as major risk factors.

## **2. Polyolefins Committee**

## Polyolefins Committee

ITEM : LDPE (including L-LDPE, EVA)

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	2,078	2,097	2,162
	Import	48	93	100
	Total	2,126	2,190	2,262
Demand	Domestic	1,092	1,141	1,187
	Export	1,034	1,049	1,190
	Total	2,126	2,190	2,377
Year-end Capacity		1,909	1,923	2,173

### 1) The 2011 Results

Total LDPE (including LLDPE) production was 2,097KT(Up by 1% compared to 2010) in 2011. Demand of EVA was highly decreased especially for foam application while Solar cell encapsulant was increased. Export quantity was similar to that of 2010. Import quantity for LDPE was increased 94% year on year due to the weak international price.

### 2) The 2012 Forecast

Production of 2012 is expected to be 2,162KT which is up by 65KT compared to year 2011. This is a result from expansion of HPC's 25KT and Samsung Total's 40KT. Domestic demand is expected to increase by 4% which is about 1,187. LLDPE is expected to record the highest growth rate by more than 5%.

The demand for LDPE is gradually slowing down or decreasing. In the case of general products like Film is being replaced with imports and the market demand is also declining. The demand for EVA is expected to show little change.

ITEM : HDPE

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	2,028	1,980	2,100
	Import	15	36	35
	Total	2,188	2,016	2,135
Demand	Domestic	877	892	910
	Export	1,119	1,078	1,150
	Total	1,996	1,970	2,060
Year-end Capacity		2,180	2,245	2,245

1) The 2011 Results

In 2011, The total production of HDPE in Korea was 1,980KT, decreased 2.4% as makers reduced production due to poor profitability caused by the higher olefin prices and LG and Daelim plants have changed to the sepecialty such as m-LLDPE.

Even though total amount of import remains relatively low, it is increasing steadily mainly with commodity product. Demand in Korean domestic market has growth rate of 1%, similar with the previous year. With a close look at primary applications, Pipe and Inj. market has grown 16% and Mono/Tarpaulin market has shrank 11% due to relocation of production site to overseas.

2) The 2012 Forecast

In 2012, we expect that the total production would be 2,277KT, 180KT higher than 2011. This expectation contributed by 250KT of expansion which is scheduled to start up in April by Honam Petrochemical. Also, Honam conducted the turnaround for a month in March(HDPE 380KT).

Market sentiment is expected that Chinese poor demand would be

recovered and exports to South America and Africa, Europe and USA under the FTA is to increase due to the lower cost products from SEA and Middle East in China.

Exports to those regions would be steadily increasing due to better price competitiveness by lower tax and the difference of the cost between Chinese and SEA markets and Americas, Europe which is respectively expensive. Producers in Korea are developing technology in order to keep expanding specialty such as m-LLDPE, CPE, etc. targeting domestic as well as overseas markets.

ITEM : P P

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	3,806	3,736	3,859
	Import	22	27	27
	Total	3,828	3,763	3,886
Demand	Domestic	1,497	1,424	1,460
	Export	2,308	2,225	2,314
	Total	3,805	3,649	3,774
Year-end Capacity		3,818	3,958	4,158

1) The 2011 Results

In 2011, production volume recorded 3,736 thousand tons, decreased 1.8% comparing with 2010's 3,806 thousand tons due to a large number of NCC plant turn-around.

Under the Global economic slowdown brought on by the European Sovereign debt risk, the domestic sales volume and export volume decreased 4.9%, 3.6% respectively.

The capacity recorded 3,958 thousand tons, increased 3.7% by small expansion from LG Chemical and Samsung Total.

## **2) The 2012 Forecast**

In 2012, production volume will increase about 3.3% to be 3,859 thousand tons due to the decreasing of turn-around.

The domestic sales volume and export volume will increase slightly due to the base effect from 2011.

It is expected that Co-polymer and Compounding demands will be increased better than it's prospects as automobile and electronic market recovered.

The capacity will increase about 5.0% to be 4,158 thousand tons by expansion of 200 thousand tons from Honam Petrochemical.



### **3. Styrenics Committee**



## Styrenics Committee

ITEM : P S

(Unit : 1,000 MT)

		2010	2011	2012 (Prospect)
Supply	Production	611	614	617
	Import	19	9	9
	Total	630	623	626
Demand	Domestic	443	415	418
	Export	187	208	208
	Total	630	623	626
Year-end Capacity		779	805	805

\* EPS Included

### 1) The 2011 Results

Demand of PS has been contracted due to decline of main applications including CRT TV, Video, Audio, etc and price competitive pressures from PP, PET in packaging areas. This had caused consolidation and restructure of producers since the mid of 2000, resulting in the balance of supply and demand.

2011 supply and demand of PS in South Korea remained at the similar level of 2010, but operating rate was decreased by 4%p over 2010.

### 2) The 2012 Forecast

Even though a new application has not been forthcoming, it will be possible that PS is substituted for ABS in some areas of electronics and home appliance by the price spread between them.

2012 supply and demand of PS in South Korea is expected to stand at the similar level of 2011, however, it can be increased in case of more exports to China, Middle East Asia, Africa, etc

ITEM : A B S

(Unit : 1,000 MT)

		2010	2011	2012 (Prospect)
Supply	Production	1,463	1,345	1,417
	Import	7	6	7
	Total	1,470	1,351	1,421
Demand	Domestic	199	216	219
	Export	1,271	1,135	1,202
	Total	1,470	1,351	1,421
Year-end Capacity		1,606	1,606	1,606

1) The 2011 Results

Affected by global depression resulting from financial problems in Europe in the second half of 2011, ABS demands in South Korea were decreased by 8%p in comparison with 2010.

In particular, as South Korea, net exporter of ABS, has even larger proportion of export in a total of demands, prolonged retrenchment policy of China, the top export destination, until 2011 caused its export volume to China and Hong Kong to be reduced by 17%p over 2010. Accordingly, production of South Korea was also contracted, resulting in drop of operating rate by 7% over 2010 to 84% in 2011.

2) The 2012 Forecast

Domestic demands in 2012 will be expected in the similar level of 2011, however, the export volume will be increased by 5% over last year due to increased demand of electronics and home appliance, the top consumption of ABS, in China by easing retrenchment policy from the end of 2011.

Because of this, operating rate in South Korea will be improved by 4%p over last year although capacity expansion in China for 2012 may make Chinese market more competitive.

ITEM : S M

(Unit : 1,000 MT)

		2010	2011	2012 (Prospect)
Supply	Production	2,810	2,751	2,861
	Import	858	855	800
	Total	3,668	3,606	3,661
Demand	Domestic	2,348	2,352	2,341
	Export	1,361	1,240	1,320
	Total	3,709	3,592	3,661
Year-end Capacity		2,790	2,835	2,870

1) The 2011 Results

The production of SM in 2011 was reduced by 60 thousand tons compared to the last year due to annual maintenances of main local companies and exports decreased by 120 thousand tons.

In the case of the first half of 2011, the SM market rose due to tight supply and demand resulting from annual maintenance of major local SM companies. However, after September 2011, prices were on the decline until the end of the year in the aftermath of European economic crisis and eroding demand of SM derivatives, especially the demand of ABS.

2) The 2012 Forecast

Local SM production in 2012 is expected to increase compared to previous year since Samsung Total is the only company which plans annual maintenance. On the other hand, local demand of SM throughout the year is projected to be stable. Therefore the export is expected to increase compared to 2011.

SM supply/demand balance in Far East is expected to be tight due to annual maintenances of major companies in Japan. Limited arbitrage cargos from the US to China resulting from high Benzene and Ethylene prices with

rising oil prices also causes the tight supply. However, SM prices will be determined by future demand in line with recovery of SM derivatives in China.

< Appendix >

○ PS exports & imports in South Korea

(Unit : MT)

Region	2010		2011	
	Export	Import	Export	Import
China/Hong Kong	66,422	626	62,996	437
Middle East/ Africa	44,125	-	48,652	10
South America	22,657	1,049	24,185	518
Southeast Asia	21,385	3,190	21,674	1,920
Europe/CIS	18,139	971	34,318	66
Northeast Asia/Oceania	9,063	12,107	10,107	5,651
Southwest Asia (incl. India)	4,164	138	5,789	1
North America	584	1,016	480	639
<b>Total</b>	<b>186,539</b>	<b>19,097</b>	<b>208,201</b>	<b>9,242</b>

○ ABS exports & imports in South Korea

(Unit : MT)

Region	2010		2011	
	Export	Import	Export	Import
China/Hong Kong	742,386	532	615,522	1,339
Southeast Asia	132,827	174	129,042	721
Europe/CIS	125,063	626	118,354	386
South America	84,760	22	85,226	58
Middle East/Africa	73,988	85	81,272	27
Southwest Asia (incl.India)	46,012	11	40,859	11
North America	35,963	1,667	38,334	263
Northeast Asia /Oceania	29,821	3,502	26,400	3,515
<b>Total</b>	<b>1,270,820</b>	<b>6,619</b>	<b>1,135,009</b>	<b>6,320</b>



## **4. PVC Committee**

## PVC Committee

### ITEM : P V C

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	1,388	1,420	1,406
	Import	78	78	80
	Total	1,466	1,498	1,486
Demand	Domestic	927	940	966
	Export	539	558	520
	Total	1,466	1,498	1,486
Year-end Capacity		1,425	1,425	1,425

#### 1) The 2011 Results

The first half of 2011, the international price was reach to U\$1,210/MT CFR China. But from the second half of 2011, the price was dropped consistently due to deepening global economic recession. ('11.Oct U\$895/MT CFR China)

Republic of Korea annual demand was increased year on year although the end of year's demand decreased of Korea.

#### 2) The 2012 Forecast

Economic slowdown is forecasted to continue for the next year. We expect that PVC NEW price weak to lower price of USA material will flow into Asia,

ITEM : V C M

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	1,571	1,583	1,583
	Import	8	6	6
	Total	1,579	1,618	1,580
Demand	Domestic	1,417	1,463	1,471
	Export	162	126	118
	Total	1,579	1,589	1,589
Year-end Capacity		1,610	1,610	1,610

1) The 2011 Results

Overall, total export volume decreased in 2011 as the demand for self – consumption increased. In Korea, domestic demand mostly accounted for self–consumption to produce PVC. The export volume depended on the operating rates of PVC plants overseas.

During the first half of 2011, the supply remained tight due to the planned and unplanned turnarounds in the region. Although the PVC production in Japan improved after the earthquake in March, the pace remained slower than expected. In addition, several major VCM producers also had planned turnarounds in the first half of 2011.

However, the upward momentum in PVC prices diminished from May 2011. The operating rates of PVC plants in China declined in May, and PVC prices in the export market started to decline due to weak demand.

Accordingly, VCM export market continued on a downward trend from July as a result of weak demand. The export price decreased to \$700/MT CFR NEA on 2H of 2011, which was \$300/MT CFR NEA lower than the highest price (i.e. \$1,000/MT) in 2011. The principal cause of the decline in export VCM price was the sluggish demand in the PVC market.



From November, the market balance has shifted to the tighter supply side due to the Tosoh's VCM plant deterioration, which resulted from the fire, leading to a loss of 1.2 million MT/year of VCM production. This supply disruption put the VCM price under immense upward pressure. After that fire, buying idea in December was closer to firm offers at \$800/MT CFR, which was around \$100/MT higher than November fixed price level.

## **2) The 2012 Forecast**

Above all, total Export volume will show a slight decline compared to last year's. This is because Hanwha Chemical Corporation will start their PVC plant expansion (Capa: 42KMT/Y), which will operate in September 2012, and this expansion will require more VCM demand for self-consumption, so export volume of VCM is expected to decrease.

The Asia market balance will be more tight during 1H of 2012. The tight supply situation is likely to be worsened by expected and ongoing plant turnarounds in March and April at several VCM facilities in Northeast Asia.

The outlook in Northeast Asia is expected to remain positive, in view of further increase in the regional PVC price in 2012. Furthermore, both stable VCM demand increase mainly in China and few VCM expansions within the region will make VCM supply/demand balance much shorter.

## **5. Synthetic Rubber Committee**

Synthetic Rubber Committee

(Unit : MT)

		2010	2011	2012 (Prospect)	
SBR	Capa. (Year-end)	616	616	696	
	Supply	Production	559	566	580
		Import	50	43	43
		Total	609	609	623
	Demand	Domestic	255	269	282
		Export	354	340	341
Total		609	609	623	
BR	Capa. (Year-end)	322	512	582	
	Supply	Production	318	422	433
		Import	22	19	20
		Total	340	441	453
	Demand	Domestic	143	168	200
		Export	197	273	253
Total		340	441	453	

1) The 2011 Results

As of global tire industry growth of 4% in 2011, demand for synthetic rubber also grew accordingly. In 2011, Korean tire makers production was increased, but there was no expansion of SBR in Korea. So export of SBR was shrunked 4% in 2011.

In emerging countries including Korea, the BR capacity was expanded(BR 490KT, SBR 290KT), the growth rate was above 8%.Two BR producers added new capacity to 512KT/Y from 322KT, BR export volume was increased 30%.

Global industry recover affected natural rubber supply to be tight, and pulled up the price both NR & SR by 3rd quarter.

The demand of SR was decreased due to the EU zone crisis in the last quarter.

## **2) The 2012 Forecast**

Global rubber demand is forecasted to reach 27.2 million metric tons in 2012, Global synthetic rubber demand is expected to grow by 5.5 percent in 2012.

BD supply will be tight this year. The supply will be limited because the number of naphtha based plants was 25% of new constructed ethylene plants for last 3 years. The demand will be increased by 6%, but BD supply will be increased by 2.5%. Scheduled T/A of BD producers in Korea & USA in the first half of 2012 are risk factor of BD supply.

Uncertainty from European credit issue & Chinese low growth may hold demand of synthetic rubber. In 3rd quarter, Korea will have a new additional supply (BR 60KT, SBR 80KT).

The global market will be more competitive because of a new additional supply (BR 435KT, SBR 400KT).

With EU labeling regulation on November 2012 & demand of UHP Tire, needs for S-SBR will be increased gradually. New supply plans are focused on SSBR and Nd-BR except emerging countries.



## **6. Synthetic Fiber Raw Materials Committee**

## Synthetic Fiber Raw Materials Committee

### ITEM : A N

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	595	564	598
	Import	88	87	116
	Total	683	651	714
Demand	Domestic	490	478	525
	Export	183	185	189
	Total	673	663	714
Year-end Capacity		550	565	565

#### 1) The 2011 Results

Firstly, comparing with 2010, AN total demand in Korea was decreased by 8% and reached to 478KT. Derivative-wide, AN demand from acrylic fibre was 56KT, recording 12% of increase from the last year which was resulting from 100% of the healthy operation rate and high priced cottons.

On the other hand, AN demand from ABS resin sector was 326KT, recording 8% of decrease from 2011 and operation rate was 70% level due to financial crisis from EU and tight monetary policy from China.

In the mean time, AN supply also has fallen to 564KT and by 5%, because of the decreased demand in the 2nd half, reflecting decreased AN operation ratio and domestic AN makers's T/A.

#### 2) The 2012 Forecast

2012 Demand from AF will be expected to reach at 61KT which is increased by 9% from the previous year, mainly thanks to 10KT of capacity increase in 2011 Q4 and start-up of 1.5KT Carbon Fibre in the 2nd quarter of 2012. Turning to ABS, ABS demand will be forecasted to be expanded

by stabilized EU Economy and monetary policy from China. As a result, AN Demand from ABS Sector will be increased by 11% and reached to 362KT. Accordingly, total domestic demand will be reached to 525KT, 10% increase from the last year.

Domestic production will be increased by 6% and reached at 598KT, reflecting turnarounds from both of TK and TSPC in Feb and Oct, respectively. TSPC's new line 245kt will be started from Jan. 2013. To compensate domestic shortfalls, import will be expected to be increased by 33% and touched at 116KT. Accordingly, total supply would be expected to record 714KT in 2012.

## ITEM : Caprolactam

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	275	276	277
	Import	47	49	49
	Total	322	325	326
Demand	Domestic	303	304	300
	Export	19	21	26
	Total	322	325	326
Year-end Capacity		270	270	270

### 1) The 2011 Results

In 2011, stagnation of growth appeared in entire sector except for exports. Production showed an increased rate of only 0.4% compared to the previous year, and domestic demand increased by only 0.9% due to the impact of global recession in the fourth of 2011. In addition, it was analyzed that with increased exports in automobiles, demand for Enpla showed a robust growth .



## 2) The 2012 Forecast

It is expected that supply and demand in 2012 will show a slowdown in growth in general, and production will show a slight increase of about 1%. Domestic demand is expected to decrease by 2% from the previous year. In addition, demand for Enpla is anticipated to be relatively stable, but its growth is expected to be stagnant by the effect of expansion of comprehensive facilities for Nylon in China.

## ITEM : E G

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	1,150	1,156	1,150
	Import	445	458	450
	Total	1,595	1,614	1,600
Demand	Domestic	1,155	1,212	1,200
	Export	440	402	400
	Total	1,595	1,614	1,600
Year-end Capacity		1,340	1,340	1,340

## 1) The 2011 Results

MEG demand in Korea was about 1,212 thousand tons in 2011, slightly increased by 5% compared to previous year's 1,155 thousand tons. The reason is that some polyester plants which had been shut down in the past restarted in 2011. However, their operation rate was not stable.

The existing 3 MEG suppliers produced 1,156 thousand tons in total, similar to last year. Domestic EO derivatives' demand was not good enough so MEG production was more than expectation.

The total MEG import figures were decreased to 458 thousand tons.

To cope with increasing domestic demand, MEG producers have decided to increase domestic supply by reducing export volume. The total MEG export figures were decreased to 402 thousand tons, which was 9% lower than that of previous year.

## **2) The 2012 Forecast**

On the demand side, Korean polyester makers are expected to struggle for severe competition due to increased supply by numerous polyester capacity expansion in China and decreased demand by EU and US's economic slowdown. Moreover, the margin will be also less than previous year.

For these reasons, we expect a slight decrease in domestic demand of MEG in 2012.

On the Production side, MEG production will maintain the level of previous year. The production of HPEO (High Purified Ethylene Oxide) was suspended by stagnant domestic demand, which consistently has been the usual case for the past few years.

As per price outlook, MEG price is expected to trend up as a result of steady demand growth in polyester industry. Moreover, there are no additional expansion plans until 2013. However, considering the fact that demand of polyester has slowed down since 2nd half of 2011 along with EU and US's economic downturn, it may be a bearish factor in terms of price outlook, if the same situation continues.

**ITEM : T P A**

(Unit : 1,000MT)

		<b>2010</b>	<b>2011</b>	<b>2012 (Prospect)</b>
Supply	Production	6,536	6,304	6,059
	Import	-	-	-
	Total	6,536	6,304	6,059
Demand	Domestic	2,816	2,736	2,984
	Export	3,658	3,630	3,060
	Total	6,474	6,366	6,044
Year-end Capacity		6,390	6,840	6,840

**1) The 2011 Results**

- 1st half : 1st quarter: strong, 2nd quarter: weak

In the 1st quarter of 2011, PTA chain prices increased rapidly due to troubles of PTA factories (India and Belgium) and the Japanese earthquake. Korean PTA makers expanded, selling into non-Chinese markets for profitability. PTA market price entered into a downtrend in the 2nd quarter. The operation rate of polymerization decreased to 75% due to the influence of high PTA prices. Also the tight domestic policy of the Chinese government restricted the market's growth

- 2nd half : Deterioration of Profitability

The Chinese operation rate of polymerization was restored to over 80% in the 3rd quarter due to the market entering the peak season of downstream products but profitability sudden decreased due to an extension of Yisheng Petrochemical and bad PX supply. The EU economic crisis and entering the low season of downstream markets caused the collapse of PTA profitability, resulting in margins below production costs.

Weak demand and Chinese expansion concerns made profitability difficult in the PTA market of 2011. The market was kept steady by the preference for Korean PTA in China.

## 2) The 2012 Forecast

Due to the China–ASEAN FTA, exporting from ASEAN countries to China will increase, therefore supply chain reorganization in Asia is expected. An expansion of Chinese PTA factories from 2nd half 2011 will continue in 2012. This will limit profit improvements of PTA manufacturers. Despite these issues, the forecasted appeal of Korean PTA will remain consistent in 2012.



## **7. Chemicals Committee**

## Chemicals Committee

### ITEM : Phenol

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	645	693	717
	Import	96	98	146
	Total	741	791	863
Demand	Domestic	595	616	713
	Export	132	168	135
	Total	727	784	848
Year-end Capacity		645	680	980

### 1) The 2011 Results

#### ① Global trend

	1Q	2Q	3Q	4Q
Outlook	Positive	Very positive	Less positive	Very negative
Price (ICIS CMP Avg.)	USD1,790/MT	USD1,972/MT	USD1,671/MT	USD1,248/MT

#### ② Analysis by each factors

- 1~2Q : Cumene shortage of USA make export to Asia decrease and moreover Japan earthquake raise the market price.
- 3Q : Tight monetary policy of Chinese government make demand shrink and Taiwan maker's surplus due to trouble of BPA plant.
- 4Q : Chinese strict tight monetary policy and EU economy recession make consumption very very shrink.

#### ③ Korea demand & supply

- Anti-oxidant and Phenolic resin demand was decreased than 2010 due to weak polymer products.

- BPA demand is increased than 2010 due to epoxy expansion(70KT).

## 2) The 2011 Forecast

### ① Global trend

	1Q	2Q	3Q	4Q
Outlook	Positive	More positive	Positive	Less Positive

### ② Forecast by each factors

- 1Q : Strong raw material price push the market price and downstream makers operating ratio increased .
- 2Q : Eventhough Kingboard(200KT) in China start but new downstream makers operate at normal , so expansion impact can be offset.
  - \*Samyang Inochem (BPA 150KT, Korea), CPDC( Cyclohexanon 100KT,Taiwan)

Import volume from EU & USA will be decreased due to maintenance & high cost.
- 3~4Q : Global economy index will be improved due to political issues(President election).New downstream makers keep the demand stably.

### ③ Korea demand & supply

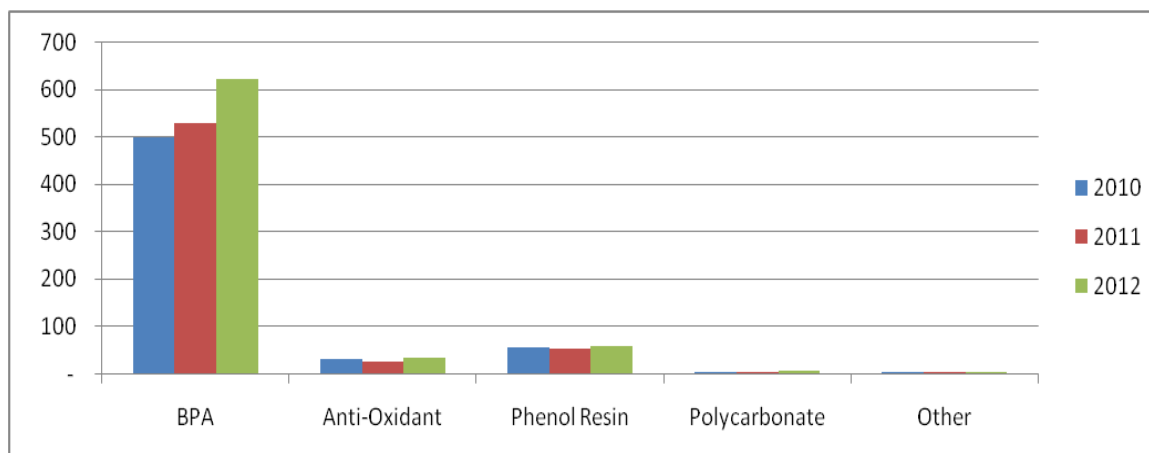
- There is no any expansion plan in Anti-oxidant and Phenolic resin factors. But expectation of economy recovery make consumption recover to 2010 level.
- BPA demand is more than 2011 because of expansion of Samyang Inochem and LG Chem (150KT, Dec.)

#### < Korea new expansion plan >

	Phenol			BPA		
2011	Kumho	35KT	Jun.			
2012	LG Chem	300KT	Dec.	Samyang Inochem LG Chem	150KT 150KT	Mar. Dec.



< Korea demand trend of each application >



## ITEM : 2-Ethyl Hexanol

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	398	424	419
	Import	13	18	9
	Total	411	442	428
Demand	Domestic	312	357	348
	Export	99	85	80
	Total	411	442	428
Year-end Capacity		400	400	400

### 1) The 2011 Results

Due to increased production of PVC, domestic demand increased by 14.4% compared to the previous year, and exports increased by 38.4% from the previous year. On the other hand, imports decreased by 14.1% compared to the previous year due to effects of meeting domestic demand.

### 2) The 2012 Forecast

In 2012, production is expected to decrease by 1.1% from the previous year due to adjustment of production capacity resulting from slowdown in domestic demand, and exports by 5.8% due to the global economic recession.

## ITEM : Phthalic Anhydride

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	397	388	385
	Import	1	1	1
	Total	398	389	386
Demand	Domestic	192	189	187
	Export	206	200	199
	Total	398	389	386
Year-end Capacity		340	340	340

### 1) The 2011 Results

In domestic demand and supply of PA, demand decreased by 1.5% from the previous year due to economic slump, and production by 2.2%. In addition, exports decreased by 3.0% compared to the previous year.

### 2) The 2012 Forecast

In 2012, slowdown of growth in production and demand is expected by the effect of the overall economic downturn.

ITEM : Acetic Acid

(Unit : 1,000MT)

		2010	2011	2012 (Prospect)
Supply	Production	455	486	493
	Import	48	84	42
	Total	503	540	535
Demand	Domestic	503	540	535
	Export	52	30	80
	Total	555	570	615
Year-end Capacity		507	486	573

1) The 2011 Results

Since end 2010, production trouble from key producers in all over the world, made deep fluctuation of A.Acid price in 2011. Due to lack of supply volume (SSBP D/B, Sep.~Oct), A.Acid imported more than any year. (38kt) Domestic demand from PTA maintained full operation and high margin.

2) The 2012 Forecast

Stable operation and weak demand made poor margin In 1H of 2012 Key producers in S.E./N.E.Asia, China and M.E.Asia adjusted their operation rate to low or earlier TAR than expectation. Due to extremely poor margin of PTA producers, supply volume would be decreased appx. 5kt until May. In 2H of 2012, No favorable factor. Under stable A.Acid supply, demand side could be only key factor to push up market condition.