

● Newbuilding Requirements Forecast

31-39.6 Million CGT Annually During the 2016-2035 Period

In the 2017 global supply-demand specialist conference, KOSHIPA presented an outlook that newbuilding requirements will reach an annual average of 39.6 million CGT during the 2016-2030 period CGT. The figure is compared with 35.5 million CGT estimated by SEA Europe and 31.35 by SAJ of Japan.

● Shipbuilding Associations Forecast by Country

(Unit: Million CGT)

Country	Annual Average	2016~2020	2021~2025	2026~2030	2031~2035	2016~2035
Korea (KOSHIPA)		23.3	37	44	53.5	39.6
China (CANSI)		25	15	25	-	-
Japan (SAJ)		17	27.5	34.5	43.5	31
Europe (SEA Europe)		27.4	30.4	44	40.2	35.5

※ Based on Newbuilding Requirements, which was presented at 2017 global shipbuilding supply-demand specialists conference

● Shipbuilding Associations Forecast by Ship Type

(Unit: Million CGT)

Korea (KOSHIPA)	Annual Average	2016~2020	2021~2025	2026~2030	2031~2035	2016~2035
Tanker		4	7.4	8.5	11.4	7.8
Bulk		6.7	5.7	6.3	6.3	6.3
Container		3.3	10.1	13.3	19.5	11.6
LNG		0.8	1.3	1.7	2.1	1.5

China (CANSI)	Annual Average	2016~2020	2021~2025	2026~2030	2031~2035	2016~2035
Tanker		3.4	4.7	7.3	6.9	5.7
Bulk		4.5	3.2	6.6	-	-

Japan (SAJ)	Annual Average	2016~2020	2021~2025	2026~2030	2031~2035	2016~2035
Tanker		1.9	5.2	7.2	8	5.6
Bulk		0.6	4.3	6.1	10.2	5.3
Container		2.3	7.5	9.7	11.4	7.9
LNG		3.3	1.4	1.5	2.1	2.1
LPG		1.1	0.5	0.7	0.8	0.8

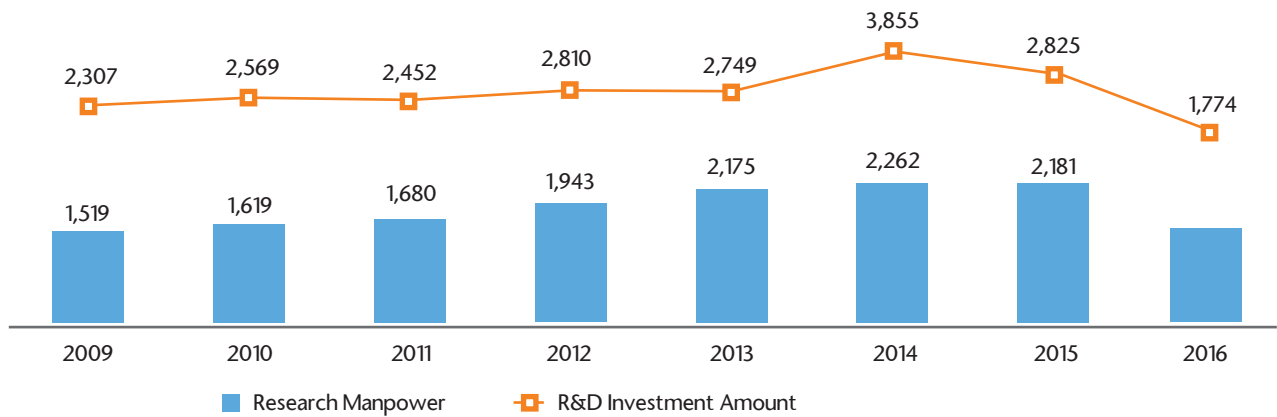
Europe (SEA Europe)	Annual Average	2016~2020	2021~2025	2026~2030	2031~2035	2016~2035
Container		-	-	-	-	9.5
Tanker		-	-	-	-	7.8
LNG		-	-	-	-	0.7
Bulk		-	-	-	-	7.6

● R&D & Investment

R&D Investment Amounts to ₩177.4 Billion in 2016

Korean shipyards' combined R&D investment reached 177.4 billion won in 2016, accounting for 0.06% of total sales. Meanwhile, research manpower numbered 2,068 persons, according to KOSHIPA & KRISO.

(Unit: ₩100 Mil., Person)



(Unit: ₩100 Mil.)

Category	2009	2010	2011	2012	2013	2014	2015	2016
Sales Amount (A)	384,168	329,436	355,810	274,544	266,420	227,464	266,036	294,345
R&D Investment Amount (B)	2,307	2,569	2,452	2,810	2,749	3,855	2,825	1,774
(B)/(A)	0.60%	0.78%	0.69%	1.02%	1.03%	1.69%	1.06%	0.60%

Source: KOSHIPA, KRISO

(Unit: Person)

Category		2009	2010	2011	2012	2013	2014	2015	2016
Shipyards	Doctorate	143	194	209	257	297	324	267	167
	Masters Degree	706	818	848	973	1,073	1,020	913	556
	Others	539	479	495	583	672	783	714	1,078
	Sub-Total	1,388	1,491	1,552	1,813	2,042	2,127	1,894	1,801
Korea Research Institute of Ships & Ocean Engineering (KRISO)	Doctorate	68	71	71	76	79	84	88	93
	Masters Degree	29	28	27	25	25	32	25	22
	Others	34	29	30	29	29	19	174	153
	Sub-Total	131	128	128	130	133	135	287	267
Total		1,519	1,619	1,680	1,943	2,175	2,262	2,181	2,068

Source: KOSHIPA

● Foreign Workforce

Number of Foreign Workers Dwindles to 8,924

The number of foreign workforce at Korean shipyards declined from 10,541 in 2015 to 8,924 in 2016. In a departure from the steady increase during the 2010-2015 period, the decrease reflects shipbuilding industry setbacks throughout the world.

(Unit: Person)

Companies		Category	Year						
			2010	2011	2012	2013	2014	2015	2016
KOSHIPA Members	Hyundai Heavy Industries Co., Ltd.	Direct Management	46	46	49	71	91	110	52
		Subcontractor Companies	419	945	945	1,196	1,956	2,205	1,789
	Daewoo Shipbuilding & Marine Engineering Co., Ltd.	Direct Management	45	38	35	37	37	32	14
		Subcontractor Companies	1,188	1,210	1,277	1,316	1,712	2,300	2,181
	Samsung Heavy Industries Co., Ltd.	Direct Management	170	158	148	214	290	298	196
		Subcontractor Companies	619	630	791	914	1,208	1,615	2,008
	Hyundai Samho Heavy Industries Co., Ltd.	Direct Management					3		
		Subcontractor Companies	421	680	728	630	1,237	1,472	1,232
	Hyundai Mipo Dockyard Co., Ltd.	Direct Management					1		
		Subcontractor Companies	305	590	602	847	1,061	1,026	839
	STX Offshore & Shipbuilding Co., Ltd.	Direct Management							
		Subcontractor Companies	323	457	436	310	416	516	
	Sungdong Shipbuilding & Marine Engineering Co., Ltd.	Direct Management							
		Subcontractor Companies							813
	Hanjin Heavy Industries & Construction Co., Ltd.	Direct Management							
		Subcontractor Companies	42	9				100	56
	Dae Sun Shipbuilding & Engineering Co., Ltd.	Direct Management							
		Subcontractor Companies		10		20	19		
ShinaSB Yard Co., Ltd.	Direct Management	4	4						
	Subcontractor Companies	52	55	20					
Non-Members	Direct Management	2	1	1					
	Subcontractor Companies	859	966	1,498	778	1,096	867	644	
Total			4,495	5,798	6,530	6,334	9,127	10,541	8,924

Source: KOSHIPA

● Eco-Friendly, Energy-Efficient Vessels

Proactively Responding to Post-2020 Regime

Shipbuilding The shipbuilding industry of the ROK still remains the top player in the global market, but is facing new challenges such as the decreasing demand for new vessels from global recession and rise of second movers like China that are increasing market shares based on low-price competitiveness. The ROK planned to overcome this crisis by developing and adopting green shipbuilding technologies.

Relevant technologies include fuel-efficient hull design, environmentally friendly propulsion system, and optimized navigation control using remote supervision and control.



Net Present Value (NPV) Calculation for 7-8% More Fuel-Efficient Vessels

		7,500TEU	180K Bulker	300K VLCC	47K MR
Daily fuel consumption (tons)		178.5	56	90	36
Fuel cost saving per year (US\$)	US\$600	2,099,160	658,560	1,058,400	423,360
	US\$450	1,574,370	493,920	793,800	317,520
NPV calculation (US\$)	US\$600	32,724,146	10,266,399	16,499,569	6,599,828
	US\$450	24,543,109	7,800,274	12,374,677	4,949,871
New shipbuilding price (US\$)	Maximum price	77,000,000	58,000,000	101,000,000	37,250,000
	Minimum price	70,000,000	46,000,000	89,500,000	33,000,000
NPV (Bunker C at US\$600)	Compared with highest price	42.5%	17.7%	16.3%	17.7%
	Compared with lowest price	46.7%	22.3%	18.4%	20.0%
NPV (Bunker C at US\$450)	Compared with highest price	31.9%	13.4%	12.3%	13.3%
	Compared with lowest price	35.1%	17.0%	13.8%	15.0%

Basic Factors & Criteria

- Ship operation: 280 days per year
- Discount rate: 2.5% per year
- Fuel cost: Two scenarios -- US\$600 & US\$450 for CST380 bunker

Source: Korea Exim Bank.

Korea Accelerates Development of LNG Carrier, LNG Bunkering System

The Korean government is accelerating the development of LNG-fuelled vessels and establishment of LNG bunkering systems. The LNG bunkering vessel refuels LNG-powered vessels at sea. LNG-fuelled vessels and LNG bunkering systems are considered Blue Ocean in the marine sector.

The Korea Research Institute of Ships & Ocean Engineering (KRISO) said on May 30 that it has been conducting a study to develop basic design, operational skills and main equipment of floating LNG bunkering terminal (FLBTs) for five years since 2014, backed by the Ministry of Oceans and Fisheries (MOF).

