HSD Engine Co., Ltd. (formerly, Doosan Engine Co., Ltd.) and its subsidiaries

Consolidated financial statements
for the years ended December 31, 2019 and 2018
with the independent auditor's report

HSD Engine Co., Ltd. (formerly, Doosan Engine Co., Ltd.)
and its subsidiaries

Table of contents

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Independent auditor's report

The Shareholders and Board of Directors
HSD Engine Co., Ltd.

Opinion

We have audited the consolidated financial statements of HSD Engine Co., Ltd. (the "Company" and formerly referred to as Doosan Engine Co., Ltd.) and its subsidiaries (collectively referred to as the "Group"), which comprise the consolidated statements of financial position as of December 31, 2019 and 2018, and the consolidated statements of income (loss), consolidated statements of comprehensive income (loss), consolidated statements of changes in equity and consolidated statements of cash flows for the years then ended, and notes to the consolidated financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Group as of December 31, 2019 and 2018 and its consolidated financial performance and its consolidated cash flows for the years then ended in accordance with Korean International Financial Reporting Standards (KIFRS).

Basis for opinion

We conducted our audits in accordance with Korean Auditing Standards (KGAAS). Our responsibilities under those standards are further described in the Auditor's responsibilities for the audit of the consolidated financial statements section of our report. We are independent of the Group in accordance with the ethical requirements that are relevant to our audits of the consolidated financial statements in the Republic of Korea, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Material uncertainty related to going concern

Without qualifying our opinion, we draw attention to Note 35 to the consolidated financial statements, which indicates that the Group recognized operating loss of ₩21,838 million and a net loss of ₩41,444 million during the year ended December 31, 2019.
As of December 31, 2019, the Group's current liabilities exceeded its current assets by ₩240,541 million. These conditions, along with other matters as set forth in Note 35, indicate the existence of a material uncertainty that may cast significant doubt on the Group's ability to continue as a going concern. Our opinion is not modified in respect of this matter.

Key Audit Matters

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements of the current period. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters. For each matter below, our description of how our audit addressed the matter is provided in that context.

(A). Valuation allowance for work-in-process

As described in Note 7, the loss on valuation of work-in-process recognized in the consolidated financial statements in 2019 was ₩21,835 million, and the total amount of work-in-process at the end of 2019 was ₩138,667 million, which is equivalent to 16.7% of the total assets. In order to assess the valuation allowance, the Group's management estimated the losses caused by delays in delivery schedules due to prospective costs and a financial crisis of the client. As there exists uncertainty in the management's assessment and thereby has significant impact on the Group's consolidated financial statements, the adequacy of the evaluation of work-in-process has been identified as key audit matter.

The major audit procedures we performed in relation to the key audit matter are as follows:

- Evaluate the appropriateness of the Group's accounting policies and measurement methods for valuation provisions of work-in-process based on the understanding of the nature of business
- Conduct retrospective review by sampling work-in-process sold during the current year and comparing the actual costs incurred during the current year and the expected costs of the previous year
- Analyze the delivery date of the contract and the expected delivery date as of December 31, 2019, and inquire for the contracts of which the contractual delivery date has passed and examine relevant documents
- Visit and inspect the site of major work-in-process where the production has stopped due to the fiscal deterioration of the client

(B). Impairment of operating assets

In order to calculate the recoverable amounts of operating assets, the Group used the value-in-use model based on the estimated cash flows of future business plan. Accordingly, the recoverable amounts are determined by management's judgment on the estimated future cash flows and discount rates and thereby has significant impact on the consolidated financial statements. Therefore, we determined that the auditor's significant attention is required, and thus we identified the estimation of the recoverable amounts of operating assets as key audit matter.

The major audit procedures we performed in relation to the key audit matter are as follows:

- Assess for the independence and competence of external experts engaged by the management for its self-evaluation
- Assess for the adequacy of discount rates applied by comparing them with the discount rates that have been recalculated by the valuation experts, engaged by the auditor, based on observable information
- Assess the rationality of key assumptions such as estimated sales, operating costs and growth rate used to calculate the value in use by reviewing the internally-approved business plan and comparing with external market information
- Assess for the adequacy of the estimated cash flows used by the management for its self-evaluation by comparing the actual results and the estimation from the previous year
- Assess for the accuracy of recoverable amounts by recalculating independently

Responsibilities of management and those charged with governance for the consolidated financial statements

Management is responsible for the preparation and fair presentation of these consolidated financial statements in accordance with KIFRS, and for such internal control as management determines is necessary to enable the preparation of the consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, management is responsible for assessing the Group's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Group or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Group's financial reporting process.

Auditor's responsibilities for the audit of the consolidated financial statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with KGAAS will always detect a material misstatement when it exists.

Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

As part of an audit in accordance with KGAAS, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Group's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our audit opinion.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report unless law or regulation precludes public disclosure about the matter or when, in extremely rare circumstances, we determine that a matter should not be communicated in our report because the adverse consequences of doing so would reasonably be expected to outweigh the public interest benefits of such communication.

The engagement partner on the audit resulting in this independent auditor's report is Bae, Sang Il.

Ernst & Young Han Young

March 17, 2020

This audit report is effective as of March 17, 2020, the independent auditor's report date. Accordingly, certain material subsequent events or circumstances may have occurred during the period from the independent auditor's report date to the time this report is used. Such events and circumstances could significantly affect the accompanying consolidated financial statements and may result in modifications to this report.

HSD Engine Co., Ltd. (formerly, Doosan Engine Co., Ltd.) and its subsidiaries

Consolidated financial statements
for the years ended December 31, 2019 and 2018

"The accompanying consolidated financial statements, including all footnotes and disclosures, have been prepared by, and are the responsibility of, the Group."

Koh, Young Youl
Chief Executive Officer
HSD Engine Co., Ltd.

HSD Engine Co., Ltd. (formerly, Doosan Engine Co., Ltd.) and its subsidiaries
Consolidated statements of financial position
as of December 31, 2019 and 2018
(Korean won)

	Notes		2019		2018
Assets					
Current assets					
Cash and cash equivalents	4,10	₩	21,128,920,528	₩	59,806,016,853
Short-term financial instruments	4,5,10		20,316,129,965		26,657,599,156
Short-term loans	4,10		255,158,401		380,400,882
Trade and other receivables. net	4,6,10,22,33		77,168,132,324		20,163,273,092
Contract assets	22,24		12,605,297		1,151,004,882
Current tax assets	29		186,223,933		137,836,172
Derivatives assets	4,9,10		4,126,031,811		1,367,726,454
Firm commitment assets	9		11,089,296,827		11,602,647,863
Inventories, net	7,32		230,728,305,263		152,154,072,887
Other current assets			15,173,528,431		8,421,452,073
Total current assets		₩	380,184,332,780	₩	281,842,030,314
Non-current assets					
Long-term financial instruments	4.5,10	₩	1,606,000,000	₩	406,000,000
Long-term investment securities	8,10		1,112,887,907		72,048,000
Investment in subsidiaries and associates	11,32		2,586,763,641		2,557,166,907
Long-term loans	4,10		344,276,623		547,612,608
Long-term other receivables	4.6,10		547,743,465		2,013,318,650
Property, plant and equipment, net	12,32		422,386,139,807		436,526,103,430
Right-of-use assets	13		2,065,838,751		-
Intangible assets	14		4,945,322,545		6,063,367,299
Derivatives assets	4,9,10		196,791,795		154,967,366
Firm commitment assets	9		1,165,170,543		3,488,302,252
Deferred tax assets	29		9,132,801,054		4,425,722,320
Other non current assets			3,865,070,438		5,309,847,035
Total non-current assets			449,954,806,569		461,564,455,867
Total assets		₩	**830,139,139,349**	₩	**743,406,486,181**
Liabilities					
Current liabilities					
Trade payables and other payables	10,33	₩	146,500,635,390	₩	79,435,724,615
Contract liabilities	22,24		2,456,488,802		4,629,840,318
Short-term borrowings	4,10,15,31,32,33		80,674,964,931		42,680,930,637
Current portion of long-term borrowings	4,10,15		43,352,423,584		-
Current portion of bonds	4,10,15,32		84,501,855,057		135,685,364,724
Current portion of convertible bond	4,15,32		47,166,581,137		45,271,346,572
Advances from customers	22,32		173,270,234,183		148,267,040,482
Derivatives liabilities	9,10		10,314,593,670		11,624,650,168
Firm commitment liabilities	9		3,692,822,944		2,645,878,629
Current portion of provisions	17		12,268,430,707		5,896,373,865
Other current liabilities	14,33		16,525,956,757		14,120,660,538
Total current liabilities		₩	620,724,987,162	₩	490,257,810,548
Non-current liabilities					
Long-term other payables	10,33		2,808,094,811		4,012,035,676
Defined benefit plan liabilities	16		8,735,449,954		5,772,857,161
Derivatives liabilities	9,10		-		3,134,353,991
Firm commitment liabilities	9		735,857,235		1,200,484,866
Provisions	17		4,914,643,595		5,085,425,706
Other non-current liabilities	14		3,699,818,445		2,914,557,581
Total non-current liabilities			20,893,864,040		22,119,714,981
Total liabilities		₩	**641,618,851,202**	₩	**512,377,525,529**
Equity					
Issued capital	1,18	₩	32,947,142,000	₩	32,947,142,000
Capital surplus	18		174,628,267,422		174,628,267,422
Other components of equity	19		(54,788,960,036)		(54,788,960,036)
Other accumulated comprehensive income	12,20		71,614,610,924		72,182,918,348
Retained earnings (accumulated deficits)	21		(35,880,772,163)		6,059,592,918
Non-controlling interests			-		-
Total equity		₩	**188,520,288,147**	₩	**231,028,960,652**
Total liabilities and equity		₩	**830,139,139,349**	₩	**743,406,486,181**

The accompanying notes are an integral part of the consolidated financial statements.

HSD Engine Co., Ltd. (formerly, Doosan Engine Co., Ltd.) and its subsidiaries
Consolidated statements of income(loss)
for the years ended December 31, 2019 and 2018
(Korean won)

	Notes		2019		2018
Sales	22,23,24,33	₩	674,278,133,124	₩	511,302,114,055
Cost of sales	25,33		663,569,005,391		509,442,436,452
Selling and administrative expenses	25,26		32,546,938,708		37,186,677,407
Operating profit (loss)			**(21,837,810,975)**		**(35,326,999,804)**
Finance income	10,27		68,679,583,941		57,611,869,131
Finance costs	10,27		86,258,672,560		64,398,299,171
Other income	28,33		330,050,530		13,271,697,621
Other expenses	28,33		6,642,141,134		433,013,297
Gain or loss from equity method investees			(17,517,980)		(314,969,395)
Net loss for the year before tax			**(45,746,508,178)**		**(29,589,714,915)**
Income tax benefit (expense)	29		4,302,150,275		10,909,499,153
Net loss			**(41,444,357,903)**		**(18,680,215,762)**
Equity attributable to owners of the parent	21		(41,444,357,903)		(18,680,215,762)
Non-controlling interests			-		-
Loss per share:					
Basic loss per share	30	₩	(1,258)	₩	(385)
Diluted loss per share	30		(1,258)		(385)

The accompanying notes are an integral part of the financial statements.

HSD Engine Co., Ltd. (formerly, Doosan Engine Co., Ltd.) and its subsidiaries
Consolidated financial statements of comprehensive income(loss)
for the years ended December 31, 2019 and 2018

(Korean won in thousands)

	Notes	2019	2018
Consolidated net loss		₩ (41,444,357,903)	₩ (18,680,215,762)
Consolidated other comprehensive income(loss)	20	(1,064,314,602)	(8,911,022,859)
Items that are not reclassified to profit or loss in the subsequent period			
-Remeasurement of net defined benefit liability	16	(593,457,813)	(399,990,555)
-Revaluation of land	12, 20	(674,871,827)	-
-Valuation loss on equity instruments designated at fair value through OCI		-	(8,459,652,176)
Items that are reclassified to profit or loss in the subsequent period			
-Loss on overseas operations translation		156,900,324	(40,153,753)
-Negative changes in equity from equity method investments		47,114,714	(11,226,375)
-Loss on valuation of available for sale financial assets	8	-	-
Total consolidated comprehensive income(loss)		₩ (42,508,672,505)	₩ - 27,591,238,621
Equity attributable to owners of the parent		(42,508,672,505)	(27,591,238,621)
Non-controlling interests		-	-

The accompanying notes are an integral part of the consolidated financial statements.

HSD Engine Co., Ltd. (formerly, Doosan Engine Co., Ltd.) and its subsidiaries
Consolidated statements of changes in equity
for the years ended December 31, 2019 and 2018
(Korean won)

	Issued capital	Capital surplus	Other components of equity	Other accumulated comprehensive income	Retained earnings (accumulated deficits)	Non-controlling interests	Total
as of Jan 1, 2018	₩ **69,500,000,000**	₩ **367,214,701,425**	₩ **621,477,800**	₩ **115,754,975,376**	₩ **(9,921,225,489)**	₩ **-**	**543,169,929,112**
Cumulative effect of accounting policy changes	**-**	-	**-**	(233,437,065,157)	233,437,065,157	**-**	-
as of Jan 1, 2018 (adjusted)	**69,500,000,000**	**367,214,701,425**	**621,477,800**	**(117,682,089,781)**	**223,515,839,668**	**-**	**543,169,929,112**
Changes due to spin-off	(36,552,858,000)	(193,133,046,753)	(55,380,204,776)	198,376,040,433	(198,376,040,433)	**-**	(285,066,109,529)
Issuance of convertible bonds	-	546,612,750	-	-	-	**-**	546,612,750
Acquisition of treasury stock	-		(30,233,060)	-	-	**-**	(30,233,060)
Total comprehensive income:		-					
-Consolidated net loss	-	-	-	-	(18,680,215,762)	**-**	(18,680,215,762)
-Remeasurement of net defined benefit liability	-	-	-	-	(399,990,555)	**-**	(399,990,555)
-Gain (loss) of fair value instruments at FVOCI	-	-	-	(8,459,652,176)	-	-	(8,459,652,176)
-Gain (loss) on overseas operations translation	-	-	-	(40,153,753)	-	-	(40,153,753)
-Negative changes in equity from equity method investments	-	-	-	(11,226,375)	-	-	(11,226,375)
as of Dec 31, 2018	₩ **32,947,142,000**	₩ **174,628,267,422**	₩ **(54,788,960,036)**	₩ **72,182,918,348**	₩ **6,059,592,918**	₩ **-**	₩ **231,028,960,652**
as of Jan 1, 2019	₩ **32,947,142,000**	₩ **174,628,267,422**	₩ **(54,788,960,036)**	₩ **72,182,918,348**	₩ **6,059,592,918**	₩ **-**	₩ **231,028,960,652**
Total comprehensive income:							
-Consolidated net loss	-	-	-	-	(41,444,357,903)	-	(41,444,357,903)
-Remeasurement of net defined benefit liability	-	-	-	-	(593,457,813)	-	(593,457,813)
-Reevaluation of land	-	-	-	(674,871,827)	-	-	(674,871,827)
-Disposal of re-valued land	-	-	-	(97,450,635)	97,450,635	-	-
-Gain (loss) on overseas operations translation	-	-	-	156,900,324	-	-	156,900,324
-Negative changes in equity from equity method investments	-	-	-	47,114,714	-	-	47,114,714
as of Dec 31, 2019	₩ **32,947,142,000**	₩ **174,628,267,422**	₩ **(54,788,960,036)**	₩ **71,614,610,924**	₩ **(35,880,772,163)**	₩ **-**	₩ **188,520,288,147**

The accompanying notes are an integral part of the consolidated financial statements.

HSD Engine Co., Ltd. (formerly, Doosan Engine Co., Ltd.) and its subsidiaries
Consolidated statements of cash flows
for the years ended December 31, 2019 and 2018
(Korean won)

	2019	2018
Ⅰ. Net cash provided by (used in) operating activities:	**₩ (64,742,927,585)**	**₩ 18,438,513,226**
1. Cash flows from operating activities:	25,262,264,431	(62,449,313,763)
(1) Consolidated Net loss	(18,680,215,762)	(10,343,239,654)
(2) Adjustments	16,111,900,509	63,842,405,442
(3) Changes in operating assets and liabilities	27,830,579,684	(115,948,479,551)
2. Interest received:	697,459,368	1,485,246,452
3. Interest paid:	(16,160,282,671)	(15,567,076,481)
4. Dividends received:	8,462,456,000	7,404,649,000
5. Income tax refunded (paid):	176,616,098	(258,156,660)
Ⅱ. Net cash provided by (used in) investing activities:	**(704,475,764)**	**(14,754,521,147)**
1.Cash flows from investing activities:	9,772,364,747	5,503,156,656
(1) Decrease in short-term financial instruments	6,341,469,191	-
(2) Decrease in short-term loans	341,942,481	653,062,420
(3) Decrease in long-term loans	74,800,000	-
(4) Disposal of property, plant equipment	2,421,607,621	21,548,783
(5) Disposal of intangible assets	592,545,454	1,374,545,453
(6) Disposal of investment in associates	-	3,454,000,000
2.Cash out-flows from investing activities:	(10,476,840,511)	(20,257,677,803)
(1) Increase in short-term financial instruments	-	15,200,021,156
(2) Increase in long-term financial instruments	2,200,000,000	400,000,000
(3) Increase in long-term loans	70,000,000	90,000,000
(4) Acqusition of property, plant and equipment	7,942,140,511	2,452,013,585
(5) Acqusition of intangible assets	264,700,000	2,115,643,062
Ⅲ. Net cash provided by (used in) financing activities:	**26,971,226,980**	**(16,112,715,803)**
1.Cash flows from financing activities:	261,433,721,912	107,339,649,262
(1) Proceeds from short-term borrowings	124,300,000,000	56,540,887,552
(2) Issuance of current portion of bonds	87,133,721,912	5,984,880,000
(3) Issuance of convertible bonds	-	44,813,881,710
(4) Issuance of liquid long-term liabilities	50,000,000,000	-
2.Cash out-flows from financing activities:	(234,462,494,932)	(123,452,365,065)
(1) Repayments of short-term borrowings	96,000,000,000	3,428,865,024
(2) Repayments of current portion of long-term borrowings	6,400,000,000	30,000,000,000
(3) Repayments of current portion of bonds	130,000,000,000	89,993,266,981
(4) Acquisition of treasury stock	-	30,233,060
(5) Repayments of lease liabilities	2,062,494,932	-
Ⅳ. Changes in cash and cash equivalents from net foreign exchange difference	(200,919,956)	(1,095,835)
Ⅴ. Net decrease in cash and cash equivalents	**(38,677,096,325)**	**(12,429,819,559)**
Ⅵ. Cash and cash equivalents at January 1	**59,806,016,853**	**72,235,836,412**
Ⅶ. Cash and cash equivalents at December 31	**₩ 21,128,920,528**	**₩ 59,806,016,853**

The accompanying notes are an integral part of the consolidated financial statements

1. General

(1) Corporate information

HSD Engine Co., Ltd. (the “Company”) was incorporated on December 30, 1999 and since January 4, 2011, the Company has listed its shares in the securities market established by the Korea Exchange. The Company’s headquarters and factories are located in the Changwon City, the Republic of Korea. The Company primarily engages in the manufacture and sale of marine diesel engines, diesel power plants, engine parts and eco-friendly system.

On June 5, 2018, the Company became the surviving company from the split off of its investment business division, which merged with Doosan Heavy Industries & Construction Co., Ltd. (the “Acquired Company”). In addition, the Acquired Company disposed of its previously held shares in the Company to Socius Well To Sea Investment's No. 1 Recovery Private Equity Fund (the “Socius Well To Sea”). In accordance with a resolution at the 2018-2nd annual shareholders’ meeting held on June 8, 2018, the Company changed its corporate name from Doosan Engine Co., Ltd. to HSD Engine Co., Ltd.

The Company’s shares as of December 31, 2019, are owned as follows:

Name of stockholders		Number of shares owned	Ownership percentage (%)
Socius Well To Sea	₩	14,055,867	42.66
Employee stock ownership association		72,389	0.22
Ko, Young Youl (CEO)		10,000	0.03
Treasury stock		7,502	0.02
Others		18,801,384	57.07
	₩	32,947,142	100.00

(2) Consolidated subsidiaries

1) The details of consolidated subsidiaries of the Company and its subsidiaries (collectively, the “Group”) as of December 31, 2019 and 2018, are as follows:

Subsidiary	Type of business	Location	Ownership ratio of the Group (%)		Ownership ratio of non-controlling interests (%)		Financial closing date
			2019	2018	2019	2018	
HSD Marine Industry (Dalian) Co., Ltd ("HSDMI")	Manufacturing of marine engine parts	China	100.00	100.00	-	-	December 31
Doosan Engine PNG Co., Ltd. (“DEPNG”)	Diesel power plant	Papua New Guinea	100.00	100.00	-	-	December 31
New Star HS Arc 1st Co., Ltd. (“SPC”)(*1)	Asset-backed industries	Domestic	-	-	-	-	December 31

(*1) Although the Company does not own a significant stake in the SPC, considering the terms of the arrangement in which the structured entity was established, it decided that it had control over the activities of the structured entity as it exercised significant impact on and substantially gained the SPC's earnings.

2) Condensed financial information of the Group’s consolidated subsidiaries as of December 31, 2019, is as follows (Korean won in thousands):

Subsidiary		Assets		Liabilities		Equity		Sales		Net income (loss)		Total comprehensive income (loss)
HSDMI	₩	18,036,610	₩	11,399,848	₩	6,636,762	₩	4,448,835	₩	(1,127,784)	₩	(969,520)
DEPNG	₩	37,746	₩	6,797	₩	30,949	₩	330,170	₩	58,816	₩	57,452
New Star HS Arc 1st Co., Ltd.	₩	43,600,012	₩	43,637,212	₩	(37,200)	₩	2,236,933	₩	(37,201)	₩	(37,201)

1. General (cont'd)

(3) Changes in the scope of consolidation

The scope of consolidation has changed due to the new incorporation of consolidated structured companies.

Subsidiary	Reason
New Star HS Arc 1st Co., Ltd.	New borrowings

2. Statement of compliance and significant accounting policies

2.1 Statement of compliance

The consolidated financial statements have been prepared in accordance with Korean International Financial Reporting Standards ("KIFRS"), as prescribed in the *Act on External Audits of Stock Companies* in the Republic of Korea.
The Group's consolidated financial statements are based on the historical cost except for land, derivative financial instruments and available-for-sale financial assets which are valued at fair value. The carrying amount of an asset or a liability designated as items of fair value hedge accounting is not be recorded in an amortized cost but is recorded to reflect changes in the fair value corresponding to the hedged risk in an effective hedging relationship. These financial statements are presented in Korean won and are expressed in thousands of Korean won unless otherwise stated.

2.2 Basis of consolidation

The consolidated financial statements comprise the financial statements of the Company and its subsidiaries as of December 31, 2019. Control is achieved when the Group is exposed, or has rights, to variable returns from its involvement with the investee and has the ability to affect those returns through its power over the investee. Specifically, the Group controls an investee if, and only if, the Group has:

- Power over the investee (i.e., existing rights that give it the current ability to direct the relevant activities of the investee)
- Exposure, or rights, to variable returns from its involvement with the investee
- The ability to use its power over the investee to affect its returns

Generally, there is a presumption that a majority of voting rights results in control. To support this presumption and when the Group has less than a majority of the voting or similar rights of an investee, the Group considers all relevant facts and circumstances in assessing whether it has power over an investee, including:

- The contractual arrangement(s) with the other vote holders of the investee
- Rights arising from other contractual arrangements
- The Group's voting rights and potential voting rights

The Group re-assesses whether or not it controls an investee if facts and circumstances indicate that there are changes to one or more of the three elements of control. Consolidation of a subsidiary begins when the Group obtains control over the subsidiary and ceases when the Group loses control of the subsidiary. Assets, liabilities, income and expenses of a subsidiary acquired or disposed of during the year are included in the statement of comprehensive income from the date the Group gains control until the date the Group ceases to control the subsidiary.

Profit or loss and each component of other comprehensive income (OCI) are attributed to the equity holders of the parent of the Group and to the non-controlling interests, even if this results in the non-controlling interests having a deficit balance. When necessary, adjustments are made to the financial statements of subsidiaries to bring their accounting policies into line with the Group's accounting policies. All intra-group assets and liabilities, equity, income, expenses and cash flows relating to transactions between members of the Group are eliminated in full on consolidation.

2.2 Basis of consolidation (cont'd)

A change in the ownership interest of a subsidiary, without a loss of control, is accounted for as an equity transaction.

If the Group loses control over a subsidiary, it derecognizes the related assets (including goodwill), liabilities, non-controlling interest and other components of equity, while any resultant gain or loss is recognized in profit or loss. Any investment retained is recognized at fair value.

2.3 Significant accounting policies

2.3.1 Current versus non-current classification

The Group presents assets and liabilities in the statement of financial position based on current/non-current classification.

An asset is current when it is:

- Expected to be realized or intended to be sold or consumed in the normal operating cycle
- Held primarily for the purpose of trading
- Expected to be realized within twelve months after the reporting period, or
- Cash or cash equivalent unless restricted from being exchanged or used to settle a liability for at least twelve months after the reporting period

All other assets are classified as non-current.

A liability is current when:

- It is expected to be settled in the normal operating cycle
- It is held primarily for the purpose of trading
- It is due to be settled within twelve months after the reporting period, or
- There is no unconditional right to defer the settlement of the liability for at least twelve months after the reporting period

The Group classifies all other liabilities as non-current.

The Group classifies deferred income tax assets (liabilities) as non-current assets (liabilities

2.3.2 Fair value measurement

The Group measures financial instruments such as derivatives and non-financial assets such as investment property at fair value as of the end of the reporting period. Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. The fair value measurement is based on the presumption that the transaction to sell the asset or transfer the liability takes place either:

- In the principal market for the asset or liability, or
- In the absence of a principal market, in the most advantageous market for the asset or liability

The principal or the most advantageous market must be accessible by the Group.

The fair value of an asset or a liability is measured using the assumptions that market participants would use when pricing the asset or liability, assuming that market participants act in their economic best interest.

A fair value measurement of a non-financial asset takes into account a market participant's ability to generate economic benefits by using the asset in its highest and best use or by selling it to another market participant that would use the asset in its highest and best use.

2.3.2 Fair value measurement (cont'd)

The Group uses valuation techniques that are appropriate in the circumstances and for which sufficient data are available to measure fair value, maximizing the use of relevant observable inputs and minimizing the use of unobservable inputs.

All assets and liabilities for which fair value is measured or disclosed in the financial statements are categorized within the fair value hierarchy, described as follows, based on the lowest level input that is significant to the fair value measurement as a whole:

- Level 1 — Quoted (unadjusted) market prices in active markets for identical assets or liabilities
- Level 2 — Valuation techniques for which the lowest level input that is significant to the fair value measurement is directly or indirectly observable
- Level 3 — Valuation techniques for which the lowest level input that is significant to the fair value measurement is unobservable

For assets and liabilities that are recognized in the financial statements at fair value on a recurring basis, The Group determines whether transfers have occurred between levels in the hierarchy by re-assessing categorization (based on the lowest level input that is significant to the fair value measurement as a whole) at the end of each reporting period.

External valuers are involved for valuation of significant assets and significant liabilities, such as properties and AFS financial assets. Selection criteria include market knowledge, reputation, independence and whether professional standards are maintained.

For the purpose of fair value disclosures, the Group has determined classes of assets and liabilities on the basis of the nature, characteristics and risks of the asset or liability and the level of the fair value hierarchy, as explained above.

Fair-value related disclosures for financial instruments and non-financial assets that are measured at fair value or where fair values are disclosed, are summarized in the following notes:

	Notes
Disclosures for valuation methods, significant estimates and assumptions	3, 12, 19
Quantitative disclosures of fair value measurement hierarchy	10
Property, plant and equipment under revaluation model	12
Financial instruments (including those carried at amortized cost)	10
Share-based payment	19

2.3.3 Foreign currencies

The Group's consolidated financial statements are presented in Korean won, which is also the controlling company's functional currency.
For each entity, the Group determines the functional currency and items included in the financial statements of each entity are measured using that functional currency. The Group uses the direct method of consolidation and on disposal of a foreign operation, the gain or loss that is reclassified to profit or loss reflects the amount that arises from using this method.

(1) Transactions and balances

In preparing the financial statements, the Group records transactions made in currencies other than the functional currency by applying the exchange rate of the transaction date.

Monetary assets and liabilities denominated in foreign currencies are retranslated at the functional currency spot rates of exchange at the reporting date.

2.3.3 Foreign currencies (cont'd)

Differences arising on settlement or translation of monetary items are recognized in profit or loss. However, conversion differences arising from items for net investment hedges of foreign operations are reflected directly in equity up to the point of disposal of the net investment and in profit or loss at the time of disposal. The related corporate tax effects are treated equally as capital items.

Non-monetary items that are measured in terms of historical cost in a foreign currency are translated using the exchange rates at the dates of the initial transactions. Non-monetary items measured at fair value in a foreign currency are translated using the exchange rates at the date when the fair value is determined. The gain or loss arising on translation of non-monetary items measured at fair value is treated in line with the recognition of the gain or loss on the change in fair value of the item

(2) Conversion of foreign operation

On consolidation, the assets and liabilities of foreign operations are translated into Korean won at the rate of exchange rate prevailing at the reporting date and their statements of income (loss) are translated at exchange rates prevailing at the dates of the transactions. The exchange differences arising on translation for consolidation are recognized in OCI. On disposal of a foreign operation, the component of OCI relating to that particular foreign operation is recognized in profit or loss.

Any goodwill arising on the acquisition of a foreign operation and any fair value adjustments to the carrying amounts of assets and liabilities arising on the acquisition are treated as assets and liabilities of the foreign operation and translated at the spot rate of exchange at the reporting date.

2.3.4 Property, plant and equipment

Construction-in-progress is stated at cost, net of accumulated impairment losses, and property, plant and equipment are stated at cost, net of accumulated depreciation and accumulated impairment losses, if any. Such cost includes the cost of replacing part of the property, plant and equipment and borrowing costs for long-term construction projects if the recognition criteria are met. When significant parts of property, plant and equipment are required to be replaced at intervals, the Group depreciates them separately based on their specific useful lives. Likewise, when a major inspection is performed, its cost is recognized in the carrying amount of the plant and equipment as a replacement if the recognition criteria are satisfied. All other repair and maintenance costs are recognized in profit or loss as incurred. The present value of the expected cost for the decommissioning of an asset after its use is included in the cost of the respective asset if the recognition criteria for a provision are met.

Property, plant and equipment transferred from customers are initially measured at fair value at the date on which control is obtained.

Land is stated at fair value, net of accumulated impairment losses recognized after revaluation. The revaluation is performed periodically to ensure that the carrying amount of the asset does not differ materially from its fair value at the end of the reporting period.

A revaluation surplus is recorded in OCI and credited to the asset revaluation surplus in equity. However, to the extent that it reverses a revaluation deficit of the same asset previously recognized in profit or loss, the increase is recognized in profit and loss. A revaluation deficit is recognized in the statement of comprehensive income (loss), except to the extent that it offsets an existing surplus on the same asset recognized in the asset revaluation reserve.

2.3.4 Property, plant and equipment (cont'd)

Depreciation is calculated on a straight-line basis over the estimated useful lives of the assets, as follows:

	Useful lives (years)
Buildings	20 ~ 40
Structures	10 ~ 20
Machinery	5 ~ 20
Others	3 ~ 10

An item of property, plant and equipment and any significant part initially recognized is derecognized upon disposal or when no future economic benefits are expected from its use or disposal. Any gain or loss arising on derecognition of the asset (calculated as the difference between the net disposal proceeds and the carrying amount of the asset) is included in the consolidated statement of income (loss) when the asset is derecognized.

The residual values, useful lives and methods of depreciation of property, plant and equipment are reviewed at each financial year end and adjusted prospectively, if appropriate.

2.3.5 Leases

At inception of a contract, the Group assesses whether the contract is or contains, a lease. A contract is, or contains, a lease if the contract conveys the right to control the use of an identified asset for a period of time in exchange for consideration.

The Group applies a single recognition and measurement approach for all leases, except for short-term leases and leases of low-value assets. The Group recognizes lease liabilities to make lease payments and right-of-use assets representing the right to use the underlying assets.

(1) Right-of-use assets

The Group recognises right-of-use assets at the commencement date of the lease (i.e., the date the underlying asset is available for use). Right-of-use assets are measured at cost, less any accumulated depreciation and impairment losses, and adjusted for any remeasurement of lease liabilities. The cost of right-of-use assets includes the amount of lease liabilities recognised, initial direct costs incurred, and lease payments made at or before the commencement date less any lease incentives received. Right-of-use assets are depreciated on a straight-line basis over the shorter of the lease term and the estimated useful lives of the assets as follows:

	Useful lives (years)
Buildings	1 ~ 4
Vehicles	1 ~ 3

If ownership of the leased asset transfers to the Group at the end of the lease term or the cost reflects the exercise of a purchase option, depreciation is calculated using the estimated useful life of the asset. The right-of-use assets are also subject to impairment. Refer to the accounting policies in section 2.3.8 Impairment of non-financial assets.

2.3.5 Leases (cont'd)

(2) Lease liabilities

At the commencement date of the lease, the Group recognises lease liabilities measured at the present value of lease payments to be made over the lease term. The lease payments include fixed payments (including in-substance fixed payments) less any lease incentives receivable, variable lease payments that depend on an index or a rate, and amounts expected to be paid under residual value guarantees. The lease payments also include the exercise price of a purchase option reasonably certain to be exercised by the Group and payments of penalties for terminating the lease, if the lease term reflects the Group exercising the option to terminate. Variable lease payments that do not depend on an index or a rate are recognised as expenses (unless they are incurred to produce inventories) in the period in which the event or condition that triggers the payment occurs.

In calculating the present value of lease payments, the Group uses its incremental borrowing rate at the lease commencement date because the interest rate implicit in the lease is not readily determinable. After the commencement date, the amount of lease liabilities is increased to reflect the accretion of interest and reduced for the lease payments made. In addition, the carrying amount of lease liabilities is remeasured if there is a modification, a change in the lease term, a change in the lease payments (e.g., changes to future payments resulting from a change in an index or rate used to determine such lease payments) or a change in the assessment of an option to purchase the underlying asset.

The Group's lease liabilities are included in Interest-bearing loans and borrowings (see Note 13(2).
(3) Short-term leases and leases of low-value assets

The Group applies the short-term lease recognition exemption to its short-term leases of machinery and equipment (i.e., those leases that have a lease term of 12 months or less from the commencement date and do not contain a purchase option). It also applies the lease of low-value assets recognition exemption to leases of office equipment that are considered to be low value. Lease payments on short-term leases and leases of low value assets are recognised as expense on a straight-line basis over the lease term.

Group as a lessor
Leases in which the Group does not transfer substantially all the risks and rewards incidental to ownership of an asset are classified as operating leases. Rental income arising is accounted for on a straight-line basis over the lease terms and is included in revenue in the statement of income (loss) due to its operating nature. Initial direct costs incurred in negotiating and arranging an operating lease are added to the carrying amount of the leased asset and recognised over the lease term on the same basis as rental income. Contingent rents are recognized as revenue in the period in which they are earned.

2.3.6 Intangible assets

Intangible assets acquired separately are measured on initial recognition at cost. The cost of intangible assets acquired in a business combination is their fair value at the date of acquisition. Following initial recognition, intangible assets are carried at cost less any accumulated amortization and accumulated impairment losses.

The useful lives of intangible assets are assessed as either finite or indefinite. Intangible assets with finite lives are amortized over the useful economic life and assessed for impairment whenever there is an indication that the intangible asset may be impaired. The amortization period and the amortization method for an intangible asset with a finite useful life are reviewed at least at the end of each reporting period. Changes in the expected useful life or the expected pattern of consumption of future economic benefits embodied in the asset are considered to modify the amortization period or method, as appropriate, and are treated as changes in accounting estimates. The amortization expense on intangible assets with finite lives is recognized in the consolidated statement of comprehensive income (loss) in the expense category that is consistent with the function of the intangible assets.

Intangible assets with indefinite useful lives are not amortized, but are tested for impairment annually, either individually or at the CGU level. The assessment of indefinite life is reviewed annually to determine whether the indefinite life continues to be supportable. If not, the change in useful life from indefinite to finite is made on a prospective basis.

Gains or losses arising from derecognition of an intangible asset are measured as the difference between the net disposal proceeds and the carrying amount of the asset and are recognized in the consolidated statement of comprehensive income (loss) when the asset is derecognized.

Research and development costs
Research costs are expensed as incurred. Development expenditures on an individual project are recognized as an intangible asset when the Group can demonstrate:

- The technical feasibility of completing the intangible asset so that the asset will be available for use or sale
- Its intention to complete and its ability to use or sell the asset
- How the asset will generate future economic benefits
- The availability of resources to complete the asset
- The ability to measure reliably the expenditure during development

Following initial recognition of the development expenditure as an asset, the asset is carried at cost less any accumulated amortization and accumulated impairment losses. Amortization of the asset begins when development is complete and the asset is available for use. It is amortized over the period of expected future benefit. Amortization is recorded in cost of sales. During the period of development, the asset is tested for impairment annually.

Amortization is calculated on a straight-line basis over the estimated useful lives of the assets, as follows

	Useful lives (years)
Development costs	5
Software	5
Other intangible assets	5 ~ 10

2.3.7 Inventories

Inventories are valued at the lower of cost and net realizable value. The cost of inventories includes expenditures for acquiring the inventories, production or conversion costs and other costs incurred in bringing them to their existing location and condition. Net realizable value is the estimated selling price in the ordinary course of business, less the costs of completion and selling expenses.

2.3.8 Impairment of non-financial assets

The Group assesses, at each reporting date, whether there is an indication that an asset may be impaired. If any indication exists, or when annual impairment testing for an asset is required, The Group estimates the asset's recoverable amount. An asset's recoverable amount is the higher of an asset's or CGU's fair value less costs of disposal and its value in use. The recoverable amount is determined for an individual asset, unless the asset does not generate cash inflows that are largely independent of those from other assets or groups of assets. When the carrying amount of an asset or CGU exceeds its recoverable amount, the asset is considered impaired and is written down to its recoverable amount.

In assessing value in use, the estimated future cash flows are discounted to their present value using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset. In determining fair value less costs of disposal, recent market transactions are taken into account. If no such transactions can be identified, an appropriate valuation model is used. These calculations are corroborated by valuation multiples, quoted share prices for publicly traded companies or other available fair value indicators.

The Group bases its impairment calculation on detailed budgets and forecast calculations, which are prepared separately for each of The Group's CGUs to which the individual assets are allocated. These budgets and forecast calculations generally cover a period of five years. A long-term growth rate is calculated and applied to project future cash flows after the fifth year.

Impairment losses of continuing operations, including impairment on inventories, are recognized in the consolidated statement of comprehensive income (loss) in expense categories consistent with the function of the impaired asset, except for properties previously revalued with the revaluation taken to OCI. For such properties, the impairment is recognized in OCI up to the amount of any previous revaluation.

For assets excluding goodwill, an assessment is made at each reporting date to determine whether there is an indication that previously recognized impairment losses no longer exist or have decreased. If such indication exists, the Group estimates the asset's or CGU's recoverable amount. A previously recognized impairment loss is reversed only if there has been a change in the assumptions used to determine the asset's recoverable amount since the last impairment loss was recognized. The reversal is limited so that the carrying amount of the asset does not exceed its recoverable amount, nor exceed the carrying amount that would have been determined, net of depreciation, had no impairment loss been recognized for the asset in prior years. Such reversal is recognized in the consolidated statement of comprehensive income (loss) unless the asset is carried at a revalued amount, in which case, the reversal is treated as a revaluation increase.

The following assets have specific characteristics for impairment testing:

Tangible assets
The Group conducts impairment tests on tangible assets by individual assets or by cash-generating units on December 31 of each year and when circumstances indicate that the tangible assets may be impaired.

Intangible assets
Intangible assets with indefinite useful lives are tested for impairment annually as of December 31 at the CGU level, as appropriate, and when circumstances indicate that the carrying value may be impaired.

2.3.9 Cash and cash equivalents

Cash and cash equivalents comprise cash balances and demand deposits with maturities of three months or less from the acquisition date that are subject to an insignificant risk of changes in their fair value.

Cash and cash equivalents in the consolidated statements of cash flows represent the amounts of these cash and cash equivalents, net of any overdrafts.

2.3.10 Financial instruments – initial recognition and subsequent measurement

A financial instrument is any contract that gives rise to a financial asset of one entity and a financial liability or equity instrument of another entity.

(1) Financial assets

Initial recognition and measurement
Financial assets are classified, at initial recognition, as subsequently measured at amortized cost, fair value through other comprehensive income (OCI), and fair value through profit or loss.

The classification of financial assets at initial recognition depends on the financial asset's contractual cash flow characteristics and the Group's business model for managing them. With the exception of trade receivables that do not contain a significant financing component or for which the Group has applied the practical expedient, the Group initially measures a financial asset at its fair value plus, in the case of a financial asset not at fair value through profit or loss, transaction costs. Trade receivables that do not contain a significant financing component or for which the Group has applied the practical expedient are measured at the transaction price determined under KIFRS 1115. Refer to the accounting policies in section (e) Revenue from contracts with customers.

In order for a financial asset to be classified and measured at amortized cost or fair value through OCI, it needs to give rise to cash flows that are 'solely payments of principal and interest (SPPI)' on the principal amount outstanding. This assessment is referred to as the SPPI test and is performed at an instrument level.

The Group's business model for managing financial assets refers to how it manages its financial assets in order to generate cash flows. The business model determines whether cash flows will result from collecting contractual cash flows, selling the financial assets, or both.

Purchases or sales of financial assets that require delivery of assets within a time frame established by regulation or convention in the market place (regular way trades) are recognized on the trade date, i.e., the date that the Group commits to purchase or sell the asset.

Subsequent measurement
For purposes of subsequent measurement, financial assets are classified in four categories:

- *Financial assets at amortized cost (debt instruments)*
- *Financial assets at fair value through OCI with recycling of cumulative gains and losses (debt instruments)*
- *Financial assets designated at fair value through OCI with no recycling of cumulative gains and losses upon derecognition (equity instruments)*
- Financial assets at fair value through profit or loss

Financial assets at amortized cost (debt instruments)
This category is the most relevant to the Group. The Group measures financial assets at amortized cost if both of the following conditions are met:

- ➢ The financial asset is held within a business model with the objective to hold financial assets in order to collect contractual cash flows, and
- ➢ The contractual terms of the financial asset give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding

Financial assets at amortized cost are subsequently measured using the effective interest (EIR) method and are subject to impairment. Gains and losses are recognized in profit or loss when the asset is derecognized, modified or impaired.

2.3.10 Financial instruments – initial recognition and subsequent measurement (cont'd)

Financial assets at fair value through OCI (debt instruments)
The Group measures debt instruments at fair value through OCI if both of the following conditions are met:

- The financial asset is held within a business model with the objective of both holding to collect contractual cash flows and selling, and
- The contractual terms of the financial asset give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding

For debt instruments at fair value through OCI, interest income, foreign exchange revaluation and impairment losses or reversals are recognized in the consolidated statement of income (loss) and computed in the same manner as for financial assets measured at amortized cost. The remaining fair value changes are recognized in OCI. Upon derecognition, the cumulative fair value change recognized in OCI is recycled to profit or loss.

The Group's debt instruments at fair value through OCI includes investments in quoted debt instruments included under other non-current financial assets.

Financial assets designated at fair value through OCI (equity instruments)
Upon initial recognition, the Group can elect to classify irrevocably its equity investments as equity instruments designated at fair value through OCI when they meet the definition of equity under KIFRS 1032 Financial Instruments: Presentation and are not held for trading. The classification is determined on an instrument-by-instrument basis.

Gains and losses on these financial assets are never recycled to profit or loss. Dividends are recognized as other income in the consolidated statement of income (loss) when the right of payment has been established, except when the Group benefits from such proceeds as a recovery of part of the cost of the financial asset, in which case, such gains are recorded in OCI. Equity instruments designated at fair value through OCI are not subject to impairment assessment.

The Group can elect to classify irrevocably its non-listed equity investments under this category.

Financial assets at fair value through profit or loss
Financial assets at fair value through profit or loss include financial assets held for trading and financial assets designated upon initial recognition at fair value through profit or loss. Financial assets are classified as held for trading if they are acquired for the purpose of selling or repurchasing in the near term. Derivatives, including separated embedded derivatives, are also classified as held for trading unless they are designated as effective hedging instruments. Financial assets with cash flows that are not solely payments of principal and interest are classified and measured at fair value through profit or loss, irrespective of the business model. Notwithstanding the criteria for debt instruments to be classified at amortized cost or at fair value through OCI, as described above, debt instruments may be designated at fair value through profit or loss on initial recognition if doing so eliminates, or significantly reduces, an accounting mismatch.

Financial assets at fair value through profit or loss are carried in the consolidated statement of financial position at fair value with net changes in fair value recognized in the consolidated statement of income (loss).

This category includes derivative instruments and listed equity investments which the Group had not irrevocably elected to classify at fair value through OCI. Dividends on listed equity investments are also recognized in profit or loss when the right of payment has been established.

2.3.10 Financial instruments – initial recognition and subsequent measurement (cont'd)

Financial assets at fair value through profit or loss (cont'd)
A derivative embedded in a hybrid contract, with a financial liability or non-financial host, is separated from the host and accounted for as a separate derivative if: the economic characteristics and risks are not closely related to the host; a separate instrument with the same terms as the embedded derivative would meet the definition of a derivative; and the hybrid contract is not measured at fair value through profit or loss. Embedded derivatives are measured at fair value with changes in fair value recognized in profit or loss. Reassessment only occurs if there is either a change in the terms of the contract that significantly modifies the cash flows that would otherwise be required or a reclassification of a financial asset out of the fair value through profit or loss category.
A derivative embedded within a hybrid contract containing a financial asset host is not accounted for separately. The financial asset host together with the embedded derivative is required to be classified in its entirety as a financial asset at fair value through profit or loss.

Derecognition
A financial asset (or, where applicable, a part of a financial asset or part of a group of similar financial assets) is primarily derecognized (i.e., removed from the Group's consolidated statement of financial position) when:
The rights to receive cash flows from the asset have expired, or

The Group has transferred its rights to receive cash flows from the asset or has assumed an obligation to pay the received cash flows in full without material delay to a third party under a 'pass-through' arrangement; and either (a) the Group has transferred substantially all the risks and rewards of the asset, or (b) the Group has neither transferred nor retained substantially all the risks and rewards of the asset, but has transferred control of the asset

When the Group has transferred its rights to receive cash flows from an asset or has entered into a pass-through arrangement, it evaluates if, and to what extent, it has retained the risks and rewards of ownership. When it has neither transferred nor retained substantially all of the risks and rewards of the asset, nor transferred control of the asset, the Group continues to recognize the transferred asset to the extent of its continuing involvement. In that case, the Group also recognizes an associated liability. The transferred asset and the associated liability are measured on a basis that reflects the rights and obligations that the Group has retained.

Continuing involvement that takes the form of a guarantee over the transferred asset is measured at the lower of the original carrying amount of the asset and the maximum amount of consideration that the Group could be required to repay.

Impairment of financial assets
Further disclosures relating to impairment of financial assets are also provided in the following Items:

Disclosures for significant assumptions
Debt instruments at fair value through OCI
Trade receivables, including contract assets

The Group recognizes an allowance for expected credit losses (ECLs) for all debt instruments not held at fair value through profit or loss. ECLs are based on the difference between the contractual cash flows due in accordance with the contract and all the cash flows that the Group expects to receive, discounted at an approximation of the original effective interest rate. The expected cash flows will include cash flows from the sale of collateral held or other credit enhancements that are integral to the contractual terms

ECLs are recognized in two stages. For credit exposures for which there has not been a significant increase in credit risk since initial recognition, ECLs are provided for credit losses that result from default events that are possible within the next 12-months (a 12-month ECL). For those credit exposures for which there has been a significant increase in credit risk since initial recognition, a loss allowance is required for credit losses expected over the remaining life of the exposure, irrespective of the timing of the default (a lifetime ECL).

2.3.10 Financial instruments – initial recognition and subsequent measurement (cont'd)

For trade receivables and contract assets, the Group applies a simplified approach in calculating ECLs. Therefore, the Group does not track changes in credit risk, but instead recognizes a loss allowance based on lifetime ECLs at each reporting date. The Group has established a provision matrix that is based on its historical credit loss experience, adjusted for forward-looking factors specific to the debtors and the economic environment.

For debt instruments at fair value through OCI, the Group applies the low credit risk simplification. At every reporting date, the Group evaluates whether the debt instrument is considered to have low credit risk using all reasonable and supportable information that is available without undue cost or effort. In making that evaluation, the Group reassesses the internal credit rating of the debt instrument. In addition, the Group considers that there has been a significant increase in credit risk when contractual payments are more than 30 days past due. The Group's debt instruments at fair value through OCI comprise solely of quoted bonds that are graded in the top investment category and, therefore, are considered to be low credit risk investments. It is the Group's policy to measure ECLs on such instruments on a 12-month basis. However, when there has been a significant increase in credit risk since origination, the allowance will be based on the lifetime ECL. The Group uses the ratings from a credit rating agency both to determine whether the debt instrument has significantly increased in credit risk and to estimate ECLs.

The Group considers a financial asset in default when contractual payments are 90 days past due. However, in certain cases, the Group may also consider a financial asset to be in default when internal or external information indicates that the Group is unlikely to receive the outstanding contractual amounts in full before taking into account any credit enhancements held by the Group A financial asset is written off when there is no reasonable expectation of recovering the contractual cash flows.

(2) Financial liabilities

Initial recognition and measurement
Financial liabilities are classified, at initial recognition, as financial liabilities at fair value through profit or loss, loans and borrowings, payables, or as derivatives designated as hedging instruments in an effective hedge, as appropriate.

All financial liabilities are recognized initially at fair value and, in the case of loans and borrowings and payables, net of directly attributable transaction costs.

The Group's financial liabilities include trade and other payables, loans and borrowings including bank overdrafts, financial guarantee contracts and derivative financial instruments.

Subsequent measurement
The measurement of financial liabilities depends on their classification, as described below:

Financial liabilities at fair value through profit or loss
Financial liabilities at fair value through profit or loss include financial liabilities held for trading and financial liabilities designated upon initial recognition as of fair value through profit or loss.
Financial liabilities are classified as held for trading if they are incurred for the purpose of repurchasing in the near term. This category also includes derivative financial instruments entered into by the Group that are not designated as hedging instruments in hedge relationships as defined by KIFRS 1109. Separated embedded derivatives are also classified as held for trading unless they are designated as effective hedging instruments. Gains or losses on liabilities held for trading are recognized in the consolidated statement of income (loss).
Financial liabilities designated upon initial recognition at fair value through profit or loss are designated at the initial date of recognition, and only if the criteria in KIFRS 1109 are satisfied. The Group has not designated any financial liability as of fair value through profit or loss.

2.3.10 Financial instruments – initial recognition and subsequent measurement (cont'd)

Loans and borrowings

This is the category most relevant to the Group. After initial recognition, interest-bearing loans and borrowings are subsequently measured at amortized cost using the EIR method. Gains and losses are recognized in profit or loss when the liabilities are derecognized as well as through the EIR amortization process.

Amortized cost is calculated by taking into account any discount or premium on acquisition and fees or costs that are an integral part of the EIR. The EIR amortization is included as finance costs in the consolidated statement of income (loss).

This category generally applies to interest-bearing loans and borrowings. For more information, refer to Note 15.

Derecognition

A financial liability is derecognized when the obligation under the liability is discharged or cancelled or expires. When an existing financial liability is replaced by another from the same lender on substantially different terms, or the terms of an existing liability are substantially modified, such an exchange or modification is treated as the derecognition of the original liability and the recognition of a new liability. The difference in the respective carrying amounts is recognized in the consolidated statement of income (loss).

(3) Offsetting of financial instruments

Financial assets and financial liabilities are offset and the net amount is reported in the consolidated statement of financial position if there is a currently enforceable legal right to offset the recognized amounts and there is an intention to settle on a net basis, to realize the assets and settle the liabilities simultaneously.

2.3.11 Derivative financial instruments and hedge accounting

Initial recognition and subsequent measurement

The Group uses derivative financial instruments, such as forward currency contracts, interest rate swaps and forward commodity contracts, to hedge its foreign currency risks, interest rate risks and commodity price risks, respectively. Such derivative financial instruments are initially recognized at fair value on the date on which a derivative contract is entered into and are subsequently remeasured at fair value. Derivatives are carried as financial assets when the fair value is positive and as financial liabilities when the fair value is negative.

For the purpose of hedge accounting, hedges are classified as:

- Fair value hedges when hedging the exposure to changes in the fair value of a recognized asset or liability or an unrecognized firm commitment
- Cash flow hedges when hedging the exposure to variability in cash flows that is either attributable to a particular risk associated with a recognized asset or liability or a highly probable forecast transaction or the foreign currency risk in an unrecognized firm commitment
- Hedges of a net investment in a foreign operation

At the inception of a hedge relationship, the Group formally designates and documents the hedge relationship to which the Group wishes to apply hedge accounting and the risk management objective and strategy for undertaking the hedge. The documentation includes identification of the hedging instrument, the hedged item or transaction, the nature of the risk being hedged and how the entity will assess the effectiveness of changes in the hedging instrument's fair value in offsetting the exposure to changes in the hedged item's fair value or cash flows attributable to the hedged risk. Such hedges are expected to be highly effective in achieving offsetting changes in fair value or cash flows and are assessed on an ongoing basis to determine that they actually have been highly effective throughout the financial reporting periods for which they were designated.

Hedges that meet the strict criteria for hedge accounting are accounted for, as described below:

2.3.11 Derivative financial instruments and hedge accounting (cont'd)

Fair value hedges

The change in the fair value of a hedging derivative is recognized in the consolidated statement of comprehensive income (loss) as finance costs. The change in the fair value of the hedged item attributable to the risk hedged is recorded as part of the carrying value of the hedged item and is also recognized in the consolidated statement of comprehensive income (loss) as finance costs.

For fair value hedges relating to items carried at amortized cost, any adjustment to carrying value is amortized through profit or loss over the remaining term of the hedge using the EIR method. EIR amortization may begin as soon as an adjustment exists and no later than when the hedged item ceases to be adjusted for changes in its fair value attributable to the risk being hedged.

If the hedged item is derecognized, the unamortized fair value is recognized immediately in profit or loss. When an unrecognized firm commitment is designated as a hedged item, the subsequent cumulative change in the fair value of the firm commitment attributable to the hedged risk is recognized as an asset or liability with a corresponding gain or loss recognized in profit and loss.

Cash flow hedges

The effective portion of the gain or loss on the hedging instrument is recognized in OCI in the cash flow hedge reserve, while any ineffective portion is recognized immediately in the consolidated statement of comprehensive income (loss).

Amounts recognized as OCI are transferred to profit or loss when the hedged transaction affects profit or loss, such as when the hedged financial income or financial expense is recognized or when a forecast sale occurs. When the hedged item is the cost of a non-financial asset or non-financial liability, the amounts recognized as OCI are transferred to the initial carrying amount of the non-financial asset or liability.

If the hedging instrument expires or is sold, terminated or exercised without replacement or rollover (as part of the hedging strategy), or if its designation as a hedge is revoked, or when the hedge no longer meets the criteria for hedge accounting, any cumulative gain or loss previously recognized in OCI remains separately in equity until the forecast transaction occurs or the foreign currency firm commitment is met.

Hedges of a net investment

Hedges of a net investment in a foreign operation, including a hedge of a monetary item that is accounted for as part of the net investment, are accounted for in a way similar to cash flow hedges. Gains or losses on the hedging instrument relating to the effective portion of the hedge are recognized as OCI while any gains or losses relating to the ineffective portion are recognized in the consolidated statement of comprehensive income (loss). On disposal of the foreign operation, the cumulative value of any such gains or losses recorded in equity is transferred to the consolidated statement of comprehensive income (loss)

Initial recognition and subsequent measurement

The Group uses derivative financial instruments, such as forward currency contracts, interest rate swaps and forward commodity contracts, to hedge its foreign currency risks, interest rate risks and commodity price risks, respectively. Such derivative financial instruments are initially recognized at fair value on the date on which a derivative contract is entered into and are subsequently remeasured at fair value. Derivatives are carried as financial assets when the fair value is positive and as financial liabilities when the fair value is negative.

For the purpose of hedge accounting, hedges are classified as:

- Fair value hedges when hedging the exposure to changes in the fair value of a recognized asset or liability or an unrecognized firm commitment
- Cash flow hedges when hedging the exposure to variability in cash flows that is either attributable to a particular risk associated with a recognized asset or liability or a highly probable forecast transaction or the foreign currency risk in an unrecognized firm commitment
- Hedges of a net investment in a foreign operation

2.3.11 Derivative financial instruments and hedge accounting (cont'd)

At the inception of a hedge relationship, the Group formally designates and documents the hedge relationship to which the Group wishes to apply hedge accounting and the risk management objective and strategy for undertaking the hedge. The documentation includes identification of the hedging instrument, the hedged item or transaction, the nature of the risk being hedged and how the entity will assess the effectiveness of changes in the hedging instrument's fair value in offsetting the exposure to changes in the hedged item's fair value or cash flows attributable to the hedged risk. Such hedges are expected to be highly effective in achieving offsetting changes in fair value or cash flows and are assessed on an ongoing basis to determine that they actually have been highly effective throughout the financial reporting periods for which they were designated.

Hedges that meet the strict criteria for hedge accounting are accounted for, as described below:

Fair value hedges
The change in the fair value of a hedging derivative is recognized in the consolidated statement of comprehensive income (loss) as finance costs. The change in the fair value of the hedged item attributable to the risk hedged is recorded as part of the carrying value of the hedged item and is also recognized in the consolidated statement of comprehensive income (loss) as finance costs.

For fair value hedges relating to items carried at amortized cost, any adjustment to carrying value is amortized through profit or loss over the remaining term of the hedge using the EIR method. EIR amortization may begin as soon as an adjustment exists and no later than when the hedged item ceases to be adjusted for changes in its fair value attributable to the risk being hedged.

If the hedged item is derecognized, the unamortized fair value is recognized immediately in profit or loss.
When an unrecognized firm commitment is designated as a hedged item, the subsequent cumulative change in the fair value of the firm commitment attributable to the hedged risk is recognized as an asset or liability with a corresponding gain or loss recognized in profit and loss.

Cash flow hedges
The effective portion of the gain or loss on the hedging instrument is recognized in OCI in the cash flow hedge reserve, while any ineffective portion is recognized immediately in the consolidated statement of comprehensive income (loss).

Amounts recognized as OCI are transferred to profit or loss when the hedged transaction affects profit or loss, such as when the hedged financial income or financial expense is recognized or when a forecast sale occurs. When the hedged item is the cost of a non-financial asset or non-financial liability, the amounts recognized as OCI are transferred to the initial carrying amount of the non-financial asset or liability.

If the hedging instrument expires or is sold, terminated or exercised without replacement or rollover (as part of the hedging strategy), or if its designation as a hedge is revoked, or when the hedge no longer meets the criteria for hedge accounting, any cumulative gain or loss previously recognized in OCI remains separately in equity until the forecast transaction occurs or the foreign currency firm commitment is met.

Hedges of a net investment
Hedges of a net investment in a foreign operation, including a hedge of a monetary item that is accounted for as part of the net investment, are accounted for in a way similar to cash flow hedges. Gains or losses on the hedging instrument relating to the effective portion of the hedge are recognized as OCI while any gains or losses relating to the ineffective portion are recognized in the consolidated statement of comprehensive income (loss). On disposal of the foreign operation, the cumulative value of any such gains or losses recorded in equity is transferred to the consolidated statement of comprehensive income (loss).

2.3.12 Convertible preference shares

Convertible preference shares are separated into liability and equity components based on the terms of the contract.

On issuance of the convertible preference shares, the fair value of the liability component is determined using a market rate for an equivalent non-convertible instrument. This amount is classified as a financial liability measured at amortized cost (net of transaction costs) until it is extinguished on conversion or redemption.

The remainder of the proceeds is allocated to the conversion option that is recognized and included in equity. Transaction costs are deducted from equity, net of associated income tax. The carrying amount of the conversion option is not remeasured in subsequent years.

Transaction costs are apportioned between the liability and equity components of the convertible preference shares, based on the allocation of proceeds to the liability and equity components when the instruments are initially recognized.

The composite financial instruments issued by the Group are convertible bonds that can be converted into equity instruments at the option of the holder.

The liability component of the compound financial instrument is initially recognized at the fair value of the financial liability with no conversion rights under the same conditions and the equity component is initially recognized as the difference between the fair value of the combined financial instrument and the fair value of the liability component. Transaction costs directly related to the issuance of a compound financial instrument are allocated proportionally to the liability component and the initial recognition amount of the component of equity.

The Group recognized the consideration for conversion rights as capital in accordance with the replies to the Financial Supervisory Service's "Question-00094". The accounting treatment is based on the "Act on External Audit of Stock Companies" as defined in Article 13, Paragraph 1.

2.3.13 Treasury shares

Own equity instruments that are reacquired (treasury shares) are recognized at cost and deducted from equity. No gain or loss is recognized in profit or loss on the purchase, sale, issue or cancellation of the Group’s own equity instruments. Any difference between the carrying amount and the consideration, if reissued, is recognized in the share premium. Share options exercised during the reporting period are satisfied with treasury shares.

2.3.14 Non-current assets held for sale or distribution to equity holders of the parent and discontinued operations

The Group classifies non-current assets or disposal group as held for sale if their carrying amounts will be recovered principally through a sale or distribution rather than through continuing use. Such non-current assets and disposal groups classified as held for sale or as held for distribution are measured at the lower of their carrying amount and fair value less costs to sell or to distribute. Costs to distribute are the incremental costs directly attributable to the disposal of an asset (disposal group), excluding the finance costs and income tax expense.

The criteria for held for distribution classification is regarded as met only when the distribution is highly probable and the asset or disposal group is available for immediate distribution in its present condition. Actions required to complete the distribution should indicate that it is unlikely that significant changes to the distribution will be made or that the decision to distribute will be withdrawn. Management must be committed to the distribution expected within one year from the date of the classification.

Property, plant and equipment and intangible assets are not depreciated or amortized once classified as held for sale or as held for distribution.

Assets and liabilities classified as held for sale or for distribution are presented separately as current items in the consolidated statement of financial position.

2.3.14 Non-current assets held for sale or distribution to equity holders of the parent and discontinued operations (cont'd)

A disposal group qualifies as discontinued operation if it is a component of an entity that either has been disposed of, or is classified as held for sale, and:

- Represents a separate major line of business or geographical area of operations
- Is part of a single coordinated plan to dispose of a separate major line of business or geographical area of operations, or
- Is a subsidiary acquired exclusively for the purpose of resale

Discontinued operations are excluded from the results of continuing operations and are presented as a single amount as profit or loss after tax from discontinued operations in the consolidated statement of comprehensive income (loss).

2.3.15 Pension benefits

The Group operates a defined benefit pension plan, which requires contributions to be made to a separately administered fund
The cost of providing benefits under the defined benefit plan is determined using the projected unit credit method. Remeasurements, comprising of actuarial gains and losses, the effect of the asset ceiling, excluding amounts included in net interest on the net defined benefit liability and the return on plan assets (excluding amounts included in net interest on the net defined benefit liability), are recognized immediately in the consolidated statement of financial position with a corresponding debit or credit to retained earnings through OCI in the period in which they occur. Remeasurements are not reclassified to profit or loss in subsequent periods.
Past service costs are recognized in profit or loss on the earlier of:

- The date of the plan amendment or curtailment, and
- The date that the Group recognizes restructuring-related costs

Net interest is calculated by applying the discount rate to the net defined benefit liability or asset. The Group recognizes the following changes in the net defined benefit obligation under 'cost of sales' and 'selling and administrative expenses' in the consolidated statement of comprehensive income (loss).

2.3.16 Share-based payments

The Group provides share-based compensation for employees' work services. The Group provides share-based payment options (stock-based settlement-based compensation transactions) to its employees and cash settlement type share price compensation (Cash-settled share-based payment transactions) to employees of New Business Development.

(1) Equity-settled transactions

The cost of equity-settled transactions is determined by the fair value at the date when the grant is made using an appropriate valuation model (See Note 19). That cost is recognized in employee benefits expense, together with a corresponding increase in equity (other capital reserves), over the period in which the service and, where applicable, the performance conditions are fulfilled (the vesting period). The cumulative expense recognized for equity-settled transactions at each reporting date until the vesting date reflects the extent to which the vesting period has expired and the Group's best estimate of the number of equity instruments that will ultimately vest. The expense or credit in the consolidated statement of comprehensive income (loss) for a period represents the movement in cumulative expense recognized as of the beginning and end of that period.

2.3.16 Share-based payments (cont'd)

Service and non-market performance conditions are not taken into account when determining the grant date fair value of awards, but the likelihood of the conditions being met is assessed as part of the Group's best estimate of the number of equity instruments that will ultimately vest. Market performance conditions are reflected within the grant date fair value. Any other conditions attached to an award, but without an associated service requirement, are considered to be non-vesting conditions. Non-vesting conditions are reflected in the fair value of an award and lead to an immediate expensing of an award unless there are also service and/or performance conditions.

No expense is recognized for awards that do not ultimately vest because non-market performance and/or service conditions have not been met. Where awards include a market or non-vesting condition, the transactions are treated as vested irrespective of whether the market or non-vesting condition is satisfied, provided that all other performance and/or service conditions are satisfied.

When the terms of an equity-settled award are modified, the minimum expense recognized is the grant date fair value of the unmodified award, provided the original terms of the award are met. An additional expense, measured as of the date of modification, is recognized for any modification that increases the total fair value of the share-based payment transaction, or is otherwise beneficial to the employee.

Where an award is cancelled by the entity or by the counterparty, any remaining element of the fair value of the award is expensed immediately through profit or loss.
The dilutive effect of outstanding options is reflected as additional share dilution in the computation of diluted earnings per share (further details are given in Note 30).

(2) Cash-settled share-based payment transactions

The Group measures the goods and services provided in the cash-settled share-based payment transactions and the liabilities incurred in cash-settled share-based payment transactions as the fair value of the liability. Fair value is re-measured at the end of each reporting period from the initial grant date until the settlement of the liability, and changes in fair value are recognized in profit or loss. Fair value is recognized as an expense over the vesting period and recognizes a corresponding liability.

2.3.17 Provisions

Provisions are recognized when the Group has a present obligation (legal or constructive) as a result of a past event, it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation and a reliable estimate can be made of the amount of the obligation. When the Group expects some or all of a provision to be reimbursed, for example, under an insurance contract, the reimbursement is recognized as a separate asset, but only when the reimbursement is virtually certain. The expense relating to a provision is presented in the consolidated statement of comprehensive income (loss) net of any reimbursement.

If the effect of the time value of money is material, provisions are discounted using a current pre-tax rate that reflects, when appropriate, the risks specific to the liability. When discounting is used, the increase in the provision due to the passage of time is recognized as a finance cost.

Warranty provisions
The Group provides warranties for general repairs of defects that existed at the time of sale, as required by law. Provisions related to these assurance-type warranties are recognized when the product is sold or the service is provided to the customer. Initial recognition is based on historical experience. The initial estimate of warranty-related costs is revised annually

2.3.17 Provisions (cont'd)

Greenhouse gas emissions
The Group receives free emission rights as a result of emission trading schemes. The rights are received on an annual basis and, in return, the Group is required to remit rights equal to its actual emissions. The Group has adopted the net liability approach to the emission rights granted. Therefore, a provision is recognized only when actual emissions exceed the emission rights granted and still held. The emission costs are recognized as other operating costs. Where emission rights are purchased from other parties, they are recorded at cost, and treated as a reimbursement right, whereby they are matched to the emission liabilities and remeasured to fair value. The changes in fair value are recognized in the consolidated statement of comprehensive income (loss).

Onerous contracts
If the Group has a contract that is onerous, the present obligation under the contract is recognized and measured as a provision. However, before a separate provision for an onerous contract is established, the Group recognizes any impairment loss that has occurred on assets dedicated to that contract.

An onerous contract is a contract under which the unavoidable costs (i.e., the costs that the Group cannot avoid because it has the contract) of meeting the obligations under the contract exceed the economic benefits expected to be received under it. The unavoidable costs under a contract reflect the least net cost of exiting from the contract, which is the lower of the cost of fulfilling it and any compensation or penalties arising from failure to fulfil it.

Contingent liabilities recognized in a business combination
A contingent liability recognized in a business combination is initially measured at its fair value. Subsequently, it is measured at the higher of the amount that would be recognized in accordance with the requirements for provisions above or the amount initially recognized less, when appropriate, cumulative amortization recognized in accordance with the requirements for revenue recognition.

2.3.18 Revenue from contracts with customers

The Group has applied KIFRS 1115 *Revenue from Contracts with Customers,* with the initial application date of January 1, 2018.

(1) Identifying performance obligations

The Group is engaged in the manufacture and sale of marine diesel engines, diesel power plants and others. Revenue from contracts with customers is recognized when control of the goods or services are transferred to the customer at an amount that reflects the consideration to which the Group expects to be entitled in exchange for those goods or services.

(2) Performance obligations satisfied over time

In accordance with KIFRS 1115, if the Group's performance creates or enhances an asset that the customer controls as the asset is created or enhanced or if the Group's performance does not create an asset with an alternative use to the Group and the Group has an enforceable right to payment for performance completed to date, the Group recognizes revenue using the percentage-of-completion method.

(3) Variable consideration

The variable consideration is estimated based on the expected value method which better predicts the amount of consideration to which the Group will be entitled and recognizes revenue by including an amount of variable consideration in the transaction price only to the extent it is highly probable that a significant revenue reversal in the amount of cumulative revenue recognized will not occur. The Group recognizes refund liabilities for the consideration received or receivable to which the Group expects to be entitled.

2.3.18 Revenue from contracts with customers (cont'd)

(4) Consideration payable to a customer

Consideration payable to a customer includes cash amounts that the Group pays, or expects to pay, to the customer (or other party purchasing the goods or services from the customer). The consideration payable to a customer is accounted for as a reduction of the revenue unless the payment to the customer is in exchange for a distinct good or service that the customer transfers to the Group.

(5) Significant financing component

In determining the transaction price under KIFRS 1115, if the timing of payments agreed to by the parties to the contract provides the customer or the Group with a significant benefit of financing the transfer of goods or services to the customer, the Group recognizes at an amount that reflects the price that a customer would have paid for the promised goods or services if the customer had paid cash for those goods or services when they transfer to the customer.

(6) Warranty obligation

The Group typically provides warranties for general repairs of defects that existed at the time of sale, as required by law. These assurance-type warranties are accounted for under KIFRS 1037 *Provisions, Contingent Liabilities and Contingent Assets.* Refer to the Note 16 on warranty provisions.

(7) Contract balance

Contract assets
A contract asset is the right to consideration in exchange for goods or services transferred to the customer. If the Group performs by transferring goods or services to a customer before the customer pays consideration or before payment is due, a contract asset is recognized for the earned consideration that is conditional.

Trade receivables
A receivable represents the Group's right to an amount of consideration that is unconditional (i.e., only the passage of time is required before payment of the consideration is due).

Contract liabilities
A contract liability is the obligation to transfer goods or services to a customer for which the Group has received consideration (or an amount of consideration is due) from the customer. If a customer pays consideration before the Group transfers goods or services to the customer, a contract liability is recognized when the payment is made or the payment is due (whichever is earlier). Contract liabilities are recognized as revenue when the Group performs under the contract.

2.3.19 Taxes

(1) Current income tax

Current income tax assets and liabilities are measured at the amount expected to be recovered from or paid to the taxation authorities. The tax rates and tax laws used to compute the amount are those that are enacted or substantively enacted at the reporting date in the countries where the Group operates and generates taxable income.

Current income tax relating to items recognized directly in equity is recognized in equity and not in the consolidated statement of comprehensive income (loss). Management periodically evaluates positions taken in the tax returns with respect to situations in which applicable tax regulations are subject to interpretation and establishes provisions where appropriate.

2.3.19 Taxes (cont'd)

(2) Deferred tax

Deferred tax is provided using the liability method on temporary differences between the tax bases of assets and liabilities and their carrying amounts for financial reporting purposes at the reporting date.
Deferred tax liabilities are recognized for all taxable temporary differences, except:

- When the deferred tax liability arises from the initial recognition of goodwill or an asset or liability in a transaction that is not a business combination and, at the time of the transaction, affects neither the accounting profit nor taxable profit or loss
- In respect of taxable temporary differences associated with investments in subsidiaries, associates and interests in joint arrangements, when the timing of the reversal of the temporary differences can be controlled and it is probable that the temporary differences will not reverse in the foreseeable future

Deferred tax assets are recognized for all deductible temporary differences, the carry forward of unused tax credits and any unused tax losses. Deferred tax assets are recognized to the extent that it is probable that taxable profit will be available against which the deductible temporary differences, and the carry forward of unused tax credits and unused tax losses can be utilized, except:

- When the deferred tax asset relating to the deductible temporary difference arises from the initial recognition of an asset or liability in a transaction that is not a business combination and, at the time of the transaction, affects neither the accounting profit nor taxable profit or loss.
- In respect of deductible temporary differences associated with investments in subsidiaries, associates and interests in joint arrangements, deferred tax assets are recognized only to the extent that it is probable that the temporary differences will reverse in the foreseeable future and taxable profit will be available against which the temporary differences can be utilized.

The carrying amount of deferred tax assets is reviewed at each reporting date and reduced to the extent that it is no longer probable that sufficient taxable profit will be available to allow all or part of the deferred tax asset to be utilized. Unrecognized deferred tax assets are re-assessed at each reporting date and are recognized to the extent that it has become probable that future taxable profits will allow the deferred tax asset to be recovered.
Deferred tax assets and liabilities are measured at the tax rates that are expected to apply in the year when the asset is realized or the liability is settled, based on tax rates (and tax laws) that have been enacted or substantively enacted at the reporting date.

Deferred tax relating to items recognized outside profit or loss is recognized outside profit or loss. Deferred tax items are recognized in correlation to the underlying transaction either in OCI or directly in equity.

Tax benefits acquired as part of a business combination, but not satisfying the criteria for separate recognition at that date, are recognized subsequently if new information about facts and circumstances change. The recognized deferred tax benefits are applied to reduce the carrying amount of goodwill related to the acquisition. If the carrying amount of goodwill is zero, the deferred tax benefit is recognized in profit or loss.

Deferred tax assets and liabilities are offset only if there is a legally enforceable right to offset the related current tax liabilities and assets, and they relate to income taxes levied by the same tax authority and they intend to settle current tax liabilities and assets on a net basis.

The Group offsets deferred tax assets and deferred tax liabilities if and only if it has a legally enforceable right to set off current tax assets and current tax liabilities and the deferred tax assets and deferred tax liabilities relate to income taxes levied by the same taxation authority on either the same taxable entity or different taxable entities which intend either to settle current tax liabilities and assets on a net basis, or to realize the assets and settle the liabilities simultaneously, in each future period in which significant amounts of deferred tax liabilities or assets are expected to be settled or recovered.

2.4 New and amended standards and interpretations

2.4.1 Application of revised standards

The Group applied KIFRS 1116 for the first time. The nature and effect of the changes as a result of adoption of these new accounting standards are described below.

Several other amendments and interpretations apply for the first time in 2019, but do not have an impact on the consolidated financial statements of the Group. The Group has not early adopted any standards, interpretations or amendments that have been issued but are not yet effective.

KIFRS 1116 Leases

KIFRS 1116 supersedes KIFRS 1017 *Leases*, KIFRS 2104 *Determining whether an Arrangement contains a Lease*, KIFRS 2015 *Operating Leases-Incentives* and KIFRS 2027 *Evaluating the Substance of Transactions Involving the Legal Form of a Lease*. The standard sets out the principles for the recognition, measurement, presentation and disclosure of leases and requires lessees to recognize most leases on the balance sheet.

Lessor accounting under KIFRS 1116 is substantially unchanged from KIFRS 1017. Lessors will continue to classify leases as either operating or finance leases using similar principles as in KIFRS 1017. Therefore, KIFRS 1116 does not have an impact for leases where the Group is the lessor.

The Group adopted KIFRS 1116 using the modified retrospective method of adoption, with the date of initial application of January 1, 2019. The Group elected to use the transition practical expedient to not reassess whether a contract is, or contains, a lease at January 1, 2019. Instead, the Group applied the standard only to contracts that were previously identified as leases applying KIFRS 1017 and KIFRS 2104 at the date of initial application. The Group also elected to use the recognition exemptions for lease contracts that, at the commencement date, have a lease term of 12 months or less and do not contain a purchase option (short-term leases), and lease contracts for which the underlying asset is of low value (low-value assets).

Impact on the consolidated statement of financial position (increase/(decrease)) is as follows (Korean won in thousands):

		Increase(Decrease)
Assets		
Right-of-use assets	₩	3,896,184
Advanced payment		(4,076)
Total assets	₩	3,892,108
Liabilities		
Lease liabilities	₩	3,892,108
Total liabilities	₩	3,892,108

(1) Effects of KIFRS 1116 for the first time

The Group has lease contracts for various items of plant, machinery, vehicles and other equipment. Before the adoption of KIFRS 1116, the Group classified each of its leases (as lessee) at the inception date as either a finance lease or an operating lease. A lease that transferred substantially all the risks and rewards incidental to ownership to the Group was classified as a finance lease and the other was classified as an operating lease. In the case of finance leases, the lesser of the present value of the minimum lease payments and the fair value of the leased assets measured at the lease date is recognized as finance lease assets and finance lease liabilities, respectively, at the commencement of the lease term. Minimum lease payment for each reporting period is classified as finance cost and lease obligation repayment. Operating lease payments were recognized as an operating expense in the consolidated statement of income (loss) on a straight-line basis over the lease term. Prepaid or unpaid lease payments were recognized as advance payments and other payables, respectively.

2.4.1 Application of revised standards - KIFRS 1116 Leases (cont'd)

Upon adoption of KIFRS 1116, the Group applied a single recognition and measurement approach for all leases except for short-term leases and leases of low-value asset. The standard provides specific transition requirements and practical expedients, which have been applied by the Group.

Leases previously classified as finance leases
The Group did not change the initial carrying amounts of recognised assets and liabilities at the date of initial application for leases previously classified as finance leases (i.e., the right-of-use assets and lease liabilities equal the lease assets and liabilities recognised under KIFRS 1017). The requirements of KIFRS 1116 were applied to these leases from 1 January 2019.

Leases previously classified as operating leases
The Group recognized right-of-use assets and lease liabilities for those leases previously classified as operating leases, except for short-term leases and leases of low-value assets. In most leases, the right-of-use assets were recognized based on the amount equal to the lease liabilities, adjusted for any related prepaid and accrued lease payments previously recognized. Lease liabilities were recognized based on the present value of the remaining lease payments, discounted using the incremental borrowing rate at the date of initial application.

The Group also applied the available practical expedients wherein it:

- Used a single discount rate to a portfolio of leases with reasonably similar characteristics
- Relied on its assessment of whether leases are onerous immediately before the date of initial application
- Applied the short-term leases exemptions to leases with lease term that ends within 12 months of the date of initial application
- Excluded the initial direct costs from the measurement of the right-of-use asset at the date of initial application
- Used hindsight in determining the lease term where the contract contained options to extend or terminate the lease

The lease liabilities as of 1 January 2019 can be reconciled to the operating lease commitments as of 31 December 2018, as follows (Korean one in thousands):

		Amount
Operating lease commitments as of December 31, 2018	₩	4,168,120
Incremental borrowing rate as of January 1, 2019		5.48% .~ .6.08%
Discounted operating lease commitments as of January 1, 2019		3,896,184
Less:		
Advanced payment		(4,076)
Lease liabilities as of January 1, 2019	₩	3,892,108

(2) Summary of new accounting policies
The new accounting policy of the Group upon adoption of KIFRS 1116 has been applied from the date of initial application.

Right-of-use assets
The Group recognises right-of-use assets at the commencement date of the lease (i.e., the date the underlying asset is available for use). Right-of-use assets are measured at cost, less any accumulated depreciation and impairment losses, and adjusted for any remeasurement of lease liabilities. The cost of right-of-use assets includes the amount of lease liabilities recognised, initial direct costs incurred, and lease payments made at or before the commencement date less any lease incentives received. If the Group does not reasonably expect the ownership of the leased asset to transfer to the Group at the end of the lease term, right-of-use assets are depreciated on a straight-line basis over the shorter of the lease term and the estimated useful lives of the assets. The right-of-use assets are also subject to impairment.

2.4.1 Application of revised standards - KIFRS 1116 Leases (cont'd)

Lease liabilities
At the commencement date of the lease, the Group recognises lease liabilities measured at the present value of lease payments to be made over the lease term. The lease payments include fixed payments (including in-substance fixed payments) less any lease incentives receivable, variable lease payments that depend on an index or a rate, and amounts expected to be paid under residual value guarantees. The lease payments also include the exercise price of a purchase option reasonably certain to be exercised by the Group and payments of penalties for terminating the lease, if the lease term reflects the Group exercising the option to terminate. Variable lease payments that do not depend on an index or a rate are recognised as expenses (unless they are incurred to produce inventories) in the period in which the event or condition that triggers the payment occurs.

In calculating the present value of lease payments, the Group uses its incremental borrowing rate at the lease commencement date because the interest rate implicit in the lease is not readily determinable. After the commencement date, the amount of lease liabilities is increased to reflect the accretion of interest and reduced for the lease payments made. In addition, the carrying amount of lease liabilities is remeasured if there is a modification, a change in the lease term, a change in the lease payments (e.g., changes to future payments resulting from a change in an index or rate used to determine such lease payments) or a change in the assessment of an option to purchase the underlying asset.

Short-term leases and leases of low-value assets
The Group applies the short-term lease recognition exemption to its short-term leases of machinery and equipment (i.e., those leases that have a lease term of 12 months or less from the commencement date and do not contain a purchase option). It also applies the lease of low-value assets recognition exemption to leases of office equipment that are considered to be low value (less than ₩5 million). Lease payments on short-term leases and leases of low value assets are recognised as expense on a straight-line basis over the lease term.

Determining the lease term of contracts with renewal and termination options – Group as lessee
The Group determines the lease term as the non-cancellable term of the lease, together with any periods covered by an option to extend the lease if it is reasonably certain to be exercised, or any periods covered by an option to terminate the lease, if it is reasonably certain not to be exercised. The Group did not include the renewal period as part of the lease term for leases of vehicles as the Group has an accounting policy that restricts the lease term of less than three years for leased vehicles.

(3) Amount recognized in consolidated statement of financial position and consolidated statement of income (loss)

The carrying amount of the Group's right-of-use assets and lease liabilities and the amount of changes during the reporting period are as follows (Korean one in thousands):

	Right-of-use assets			Lease liabilities
	Building	Vehicles	Total	
Beginning Balance	₩ -	₩ -	₩ -	₩ -
Effects of changes in accounting standards	3,613,581	282,603	3,896,184	3,892,108
Acquisition	129,902	24,297	154,199	101,980
Depreciation	(1,840,612)	(113,471)	(1,954,083)	-
Interest expense	-	-	-	179,289
Disposal	(30,461)	-	(30,461)	-
Payment	-	-	-	(2,062,495)
Ending Balance	₩ 1,872,410	₩ 193.429	₩ 2,065,839	₩ 2,110,882

The Group recognized the rental fee of ₩460,588 thousand and ₩47,311 thousand for short-term and leases of low-value assets during the current term.

2.4.1 Application of revised standards (cont'd)

KIFRS 2123 Uncertainty over Income Tax Treatment

The Interpretation addresses the accounting for income taxes when tax treatments involve uncertainty that affects the application of KIFRS 1012 *Income Taxes*. It does not apply to taxes or levies outside the scope of KIFRS 1012, nor does it specifically include requirements relating to interest and penalties associated with uncertain tax treatments. The Interpretation specifically addresses the following:

- Whether an entity considers uncertain tax treatments separately
- The assumptions an entity makes about the examination of tax treatments by taxation authorities
- How an entity determines taxable profit (tax loss), tax bases, unused tax losses, unused tax credits and tax rates
- How an entity considers changes in facts and circumstances

The Group determines whether to consider each uncertain tax treatment separately or together with one or more other uncertain tax treatments and uses the approach that better predicts the resolution of the uncertainty. The Group applies significant judgement in identifying uncertainties over income tax treatments. Since the Group operates in a complex multinational environment, it assessed whether the Interpretation had an impact on its consolidated financial statements.

Upon adoption of the Interpretation, the Group considered whether it has any uncertain tax positions, particularly those relating to transfer pricing. The Group's and the subsidiaries' tax filings in different jurisdictions include deductions related to transfer pricing and the taxation authorities may challenge those tax treatments. The Group determined, based on its tax compliance and transfer pricing study, that it is probable that its tax treatments (including those for the subsidiaries) will be accepted by the taxation authorities. The Interpretation did not have an impact on the consolidated financial statements of the Group.

Amendments to KIFRS 1109: Prepayment Features with Negative Compensation

Under KIFRS 1109, a debt instrument can be measured at amortized cost or at fair value through other comprehensive income, provided that the contractual cash flows are 'solely payments of principal and interest on the principal amount outstanding' (the SPPI criterion) and the instrument is held within the appropriate business model for that classification. The amendments to KIFRS 1109 clarify that a financial asset passes the SPPI criterion regardless of an event or circumstance that causes the early termination of the contract and irrespective of which party pays or receives reasonable compensation for the early termination of the contract. These amendments had no impact on the consolidated financial statements of the Group.

Amendments to KIFRS 1019: Plan Amendment, Curtailment or Settlement

The amendments to KIFRS 1019 address the accounting when a plan amendment, curtailment or settlement occurs during a reporting period. The amendments specify that when a plan amendment, curtailment or settlement occurs during the annual reporting period, an entity is required to determine the current service cost for the remainder of the period after the plan amendment, curtailment or settlement, using the actuarial assumptions used to remeasure the net defined benefit liability (asset) reflecting the benefits offered under the plan and the plan assets after that event. An entity is also required to determine the net interest for the remainder of the period after the plan amendment, curtailment or settlement using the net defined benefit liability (asset) reflecting the benefits offered under the plan and the plan assets after that event, and the discount rate used to remeasure that net defined benefit liability (asset). The amendments had no impact on the consolidated financial statements of the Group as it did not have any plan amendments, curtailments, or settlements during the period.

2.4.1 Application of revised standards (cont'd)

Amendments to KIFRS 1028: Long-term interests in associates and joint ventures

The amendments clarify that an entity applies KIFRS 1109 to long-term interests in an associate or joint venture to which the equity method is not applied but that, in substance, form part of the net investment in the associate or joint venture (long-term interests). This clarification is relevant because it implies that the expected credit loss model in KIFRS 1109 applies to such long-term interests. The amendments also clarified that, in applying KIFRS 1109, an entity does not take account of any losses of the associate or joint venture, or any impairment losses on the net investment, recognized as adjustments to the net investment in the associate or joint venture that arise from applying KIFRS 1028 *Investments in Associates and Joint Ventures*. The amendments are retrospectively applied from the fiscal year beginning on or after January 1, 2019, and can be early adopted. These amendments had no impact on the consolidated financial statements as the Group does not have long-term interests in its associate and joint venture.

Annual Improvements 2015-2017 Cycle

KIFRS 1103 Business Combination
The amendments clarify that, when an entity obtains control of a business that is a joint operation, it applies the requirements for a business combination achieved in stages, including remeasuring previously held interests in the assets and liabilities of the joint operation at fair value. In doing so, the acquirer remeasures its entire previously held interest in the joint operation. An entity applies those amendments to business combinations for which the acquisition date is on or after the beginning of the first annual reporting period beginning on or after January 1, 2019, with early application permitted and disclosure required. These amendments had no impact on the consolidated financial statements of the Group as there is no transaction where joint control is obtained

KIFRS 1111 Joint Arrangements
An entity that participates in, but does not have joint control of, a joint operation might obtain joint control of the joint operation in which the activity of the joint operation constitutes a business as defined in KIFRS 1103. The amendments clarify that the previously held interests in that joint operation are not remeasured. An entity applies those amendments to transactions in which it obtains joint control on or after the beginning of the first annual reporting period beginning on or after January 1, 2019, with early application permitted and disclosure required. These amendments had no impact on the consolidated financial statements of the Group as there is no transaction where joint control is obtained

KIFRS 1012 Income Taxes
The amendments clarify that the income tax consequences of dividends are linked more directly to past transactions or events that generated distributable profits than to distributions to owners. Therefore, an entity recognizes the income tax consequences of dividends in profit or loss, other comprehensive income or equity according to where the entity originally recognized those past transactions or events. An entity applies those amendments for annual reporting periods beginning on or after January 1, 2019, with early application is permitted. When an entity first applies those amendments, it applies them to the income tax consequences of dividends recognized on or after the beginning of the earliest comparative period. Since the Group's current practice is in line with these amendments, the Group does not expect any effect on its consolidated financial statements.

KIFRS 1023 Borrowing Costs
The amendments clarify that an entity treats as part of general borrowings any borrowing originally made to develop a qualifying asset when substantially all of the activities necessary to prepare that asset for its intended use or sale are complete. An entity applies those amendments to borrowing costs incurred on or after the beginning of the annual reporting period in which the entity first applies those amendments. An entity applies those amendments for annual reporting periods beginning on or after January 1, 2019, with early application permitted. Since the Group's current practice is in line with these amendments, the Group does not expect any effect on its consolidated financial statements.

2.4.2 Standards issued but not yet effective

The standards and interpretations that are issued, but not yet effective, up to the date of issuance of the Group's financial statements are disclosed below.

Amendments to KIFRS 1003: *Definition of a Business*
In October 2018, the KASB issued amendments to the definition of a business in KIFRS 1003 *Business Combinations* to help entities determine whether an acquired set of activities and assets is a business or not. They clarify the minimum requirements for a business, remove the assessment of whether market participants are capable of replacing any missing elements, add guidance to help entities assess whether an acquired process is substantive, narrow the definitions of a business and of outputs, and introduce an optional fair value concentration test. New illustrative examples were provided along with the amendments.

Since the amendments apply prospectively to transactions or other events that occur on or after the date of first application, the Group will not be affected by these amendments on the date of transition.

Amendments to KIFRS 1001 and KIFRS 1008: *Definition of Material*
In October 2018, the IASB issued amendments to KIFRS 1001 *Presentation of Financial Statements* and KIFRS 1008 *Accounting Policies, Changes in Accounting Estimates and Errors* to align the definition of 'material' across the standards and to clarify certain aspects of the definition. The new definition states that, 'Information is material if omitting, misstating or obscuring it could reasonably be expected to influence decisions that the primary users of general purpose financial statements make on the basis of those financial statements, which provide financial information about a specific reporting entity.'

The amendments to the definition of material is not expected to have a significant impact on the Group's consolidated financial statements.

3. Estimates and assumptions

The key assumptions concerning the future and other key sources of estimation uncertainty at the reporting date that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year, are described below. The Group based its assumptions and estimates on parameters available when the consolidated financial statements were prepared. Existing circumstances and assumptions about future developments, however, may change due to market changes or circumstances arising beyond the control of the Group. Such changes are reflected in the assumptions when they occur.

Other disclosures about the Group 's exposure to risks and uncertainties include capital management (Note 4), financial risk management and policies (Note 4), and sensitivity analysis (Notes 4 and 16).

Other significant sources of significant assumptions and estimates of uncertainties for the future as of the end of the reporting period that have material risks that could cause significant adjustments to the carrying amounts of assets and liabilities in the next financial year are as follows. The Group based its assumptions and estimates on parameters available when the consolidated financial statements were prepared. Existing circumstances and assumptions about future developments, however, may change due to market changes or circumstances arising beyond the control of the Group. Such changes are reflected in the assumptions when they occur.

3.1 Impairment of non-financial assets

The Group assesses, at each reporting date, whether there is an indication that an asset may be impaired. Goodwill and intangible assets with indefinite useful lives are tested for impairment annually, or when circumstances indicate that the carrying value may be impaired. Other non-financial assets are tested for impairment when circumstances indicate that its carrying amount may not be recoverable. In determining a value in use, management estimates future cash flows to be derived from the asset or CGU, and applies the appropriate discount rate to those future cash flows

3.2 Share-based payments

The Group measures the cost of equity-settled transactions with employees by reference to the fair value of the equity instruments at the date at which they are granted. Estimating fair value for share-based payment transactions requires determination of the most appropriate valuation model, which depends on the terms and conditions of the grant. This estimate also requires determination of the most appropriate inputs to the valuation model including the expected life of the share option, volatility and dividend yield and making assumptions about them. The assumptions and models used for estimating fair value for share-based payment transactions are disclosed in Note 19.

3.3 Deferred tax assets

Deferred tax assets are recognized for unused tax losses to the extent that it is probable that taxable profit will be available against which the losses can be utilized. Significant management judgment is required to determine the amount of deferred tax assets that can be recognized, based upon the likely timing and the level of future taxable profits together with future tax planning strategies.

3.4 Defined benefit plans (pension benefits)

The cost of the defined benefit pension plan and other post-employment medical benefits and the present value of the pension obligation are determined using actuarial valuations. An actuarial valuation involves making various assumptions that may differ from actual developments in the future. These include the determination of the discount rate, future salary increases, mortality rates and future pension increases. Due to the complexities involved in the valuation and its long-term nature, a defined benefit obligation is highly sensitive to changes in these assumptions. All assumptions are reviewed at each reporting date.
In determining the appropriate discount rate, management considers the interest rates of corporate bonds in currencies consistent with the currencies of the post-employment benefit obligation with at least an ‘AA’ rating or above, as set by an internationally acknowledged rating agency. The mortality rate is based on publicly available mortality tables for the specific countries. Future salary increases and pension increases are based on expected future inflation rates for the respective countries.

3.5 Development costs

Development costs are capitalized in accordance with the accounting policy. Initial capitalization of costs is based on management’s judgment that technological and economic feasibility is confirmed, usually when a product development project has reached a defined milestone according to an established project management model. In determining the amounts to be capitalized, management makes assumptions regarding the expected future cash generation of the project, discount rates to be applied and the expected period of benefits. As of December 31, 2019, the carrying amount of capitalized development costs was ₩1,066 million (December 31, 2018: ₩1,627 million).

4. Financial risk management

The Group is exposed to various financial risks, such as market (foreign currency risk and interest rate risk), credit and liquidity related to its operations. The purpose of risk management policy is to minimize potential risks, which could have an adverse effect on financial performance.

Financial risk management activities are performed by Treasury Department, in accordance with the aforementioned documented risk management policies. In addition, the Group enters into derivative contracts to hedge against certain risks.

(1) Market risk

1) Foreign exchange risk

The Group is exposed to various financial risks, such as market (foreign currency risk and interest rate risk), credit and liquidity related to its operations. The purpose of risk management policy is to minimize potential risks, which could have an adverse effect on financial performance.

Foreign currency risk is managed by the Group's policy on foreign currencies. The Group's basis for foreign currency management is to reduce income/loss volatility. The Group reduces exposure to foreign currency risk by matching the inflow and the outflow of foreign currencies (natural hedge) and manages foreign currency risk, by using currency derivatives, such as currency forwards, for the remaining exposure.

The book value of the Group's monetary assets and liabilities denominated in foreign currencies, which represents the maximum exposure to foreign currency risk as of December 31, 2019 and 2018, is as follows (Korean won in thousands):

	2019				
	USD	EUR	CNY	Others (*1)	Total
Assets	₩ 81,795,980	₩ 104,647	₩ 7,164,104	₩ 355,687	₩ 89,420,418
Liabilities	(5,707,789)	(12,247,494)	(174,449)	(6,283,735)	(24,413,467)
Net assets (liabilities)	₩ 76,088,191	₩ (12,142,847)	₩ 6,989,655	₩ (5,928,048)	₩ 65,006,951

(*1) Others are assets and liabilities denominated in foreign currencies other than USD, EUR and CNY.

	2018				
	USD	EUR	CNY	Others (*1)	Total
Assets	₩ 59,665,104	₩ 2,930,433	₩ 7,114,609	₩ 336,773	₩ 70,046,919
Liabilities	(6,324,325)	(9,188,201)	(155,371)	(3,864,697)	(19,632,594)
Net assets (liabilities)	₩ 53,340,779	₩ (6,257,768)	₩ 6,959,238	₩ (3,627,924)	₩ 50,414,325

(*1) Others are assets and liabilities denominated in foreign currencies other than USD, EUR and CNY.

Net foreign currency translation loss for the years ended December 31, 2019 and 2018, is ₩1,275,130 thousand and ₩243,593 thousand, respectively.

A sensitivity analysis on the Group's income before tax, assuming a 10% increase and decrease in currency exchange rates, for the years ended December 31, 2019 and 2018, is as follows (Korean won in thousands):

	2019		2018	
	10% increase	10% increase	10% increase	10% decrease
Income before tax	₩ 6,500,695	₩ (6,500,695)	₩ 5,041,433	₩ (5,041,433)

The above-mentioned sensitivity analysis is based on monetary assets and liabilities denominated in foreign currencies other than the Group's functional currency as of December 31, 2019 and 2018.

4. Financial risk management (cont'd)

2) Interest rate risk

The Group's interest rate risk is related to borrowings and bank deposits with floating interest rates, and related interest income and expense are exposed to interest rate risk. The Group is exposed to interest rate risk mainly due to its deposits and borrowing with floating interest rates. The purpose of interest rate risk management is to minimize uncertainty and financial expense arising from interest rate fluctuation.

To manage its interest rate risk, the Group minimizes external borrowings using internal funds and reduces borrowings with high interest rates, and maintains an appropriate balance between borrowings with floating interest rate and fixed interest rate and short-term and long-term borrowings. The Group manages its interest rate risk preemptively through regular monitoring and adjustments to the changing domestic and overseas market conditions and nature of its interest rates.

The book value of the Group's financial assets and liabilities with floating interest rates exposed to interest rate risk as of December 31, 2019 and 2018, is as follows (Korean won in thousands):

	2010	2018
Assets	₩ 30,962,344	₩ 59,660,408
Liabilities	(42,074,965)	(27,680,931)
Net assets (liabilities)	₩ (11,112,621)	₩ 31,979,477

A sensitivity analysis on the Group's income before tax assuming 1% increase and decrease in interest rates for the years ended December 31, 2019 and 2018, is as follows (Korean won in thousands):

	2019		2018	
	1% increase	1% decrease	1% increase	1% decrease
Income before tax	₩ (111,126)	₩ 111,126	₩ 319,795	₩ (319,795)

3) Price risk

The Group regularly measures the price fluctuation risk of listed equity instruments. Significant investments in the portfolio are also managed individually and all decisions to acquire and divest investments require the approval of the board of directors

(2) Credit risk

The credit risk refers to risk of financial losses to the Group when the counterparty defaults on the obligations of the contract. The credit risk arises from AFS financial assets that are not equity securities, deposits in financial institution, financial derivatives and guarantee limit, as well as from the Group's normal transaction and investing activity. To manage credit risk, the Group evaluates the creditworthiness of each customer or counterparty considering the financial status, past experience and other factors. The Group establishes credit limit for each customer and counterparty.

The Group evaluates the creditworthiness using opened financial information and information provided by credit rating institutions when it contracts with new customers. The Group decides credit transaction limit and is provided with collateral and guarantee based on evaluation.

Also, the Group revaluates customers' creditworthiness periodically, reassesses credit transaction limit and readjusts level of collateral. The Group reports the present condition of delayed collection and collection measures periodically to financial assets, which has delayed collection, and takes measures by causes of delay.

4. Financial risk management (cont'd)

The maximum credit risk exposure for financial assets maintained by the Group and the book value for the financial assets as of December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019	2018
Loans and receivables:		
Cash and cash equivalents	₩ 21,128,921	₩ 59,806,017
Financial instruments	21,922,130	27,063,599
Trade and other receivables	77,168,132,	20,163,273
Long-term and short-term loans	599,435	928,013
Long-term other receivables	547,743	2,013,319
Derivative assets	4,322,824	1,522,694
	₩ 125,689,185	₩ 111,496,915

The Group applies the simplified method of recognizing the total expected credit losses on trade receivables as provision for losses. To measure expected credit losses, trade receivables are separated by credit risk characteristics and age. The allowance for losses at the end of the year is as follows. Expected credit losses include forward-looking information. (Korean won in thousands):

	December 31, 2019						
	Individually assessed receivables	Receivables assessed for impairment on a collective basis					
		Within due	0–3 months	3 months–6 months	6 months–12 months	More than 12 months	Total
Expected loss rate	-	-	-	0.12%	0.31%	57.44%	-
Book Value	₩ 2,907,987	₩ 62,514,492	₩ 13,432,628	₩ 488,144	₩ 402,174	₩ 387,236	₩ 80,132,661
Loss allowance	2,907,987	1,747	391	586	1,233	222,432	3,134,376

	January 1, 2018						
	Individually assessed receivables	Receivables assessed for impairment on a collective basis					
		Within due	0–3 months	3 months–6 months	6 months–12 months	More than 12 months	Total
Expected loss rate	-	0.05%	0.06%	2.47%	7.29%	52.97%	-
Book Value	₩ 2,865,782	₩ 15,162,493	₩ 3,703,057	₩ 573,962	₩ 197,836	₩ 287,609	₩ 22,790,740
Loss allowance	2,849,332	7,884	2,287	14,187	14,428	152,349	3,040,467

An allowance account is recognized by applying appropriate allowance rate for receivables that can be assessed for impairment individually due to insolvency, bankruptcy and others and is currently set as ₩2,907,987 thousand as of December 31, 2019 (₩2,849,332 thousand as of December 31, 2018). A group of financial assets that are not individually significant and have similar credit risk characteristics are assessed for impairment on a collective basis. An allowance account is recognized based on aging analysis and the Group's past experience of receivables collection.

In addition, due to the nature of the assets, such as financial assets measured at amortized costs, financial assets at FVOCI, financial assets at FVTPL, deposits in financial institutions and financial derivative instruments, the Group individually assesses whether there is an indication that the assets may be impaired and recognizes the related losses.

4. Financial risk management (cont'd)

(3) Liquidity risk

Liquidity risk is the risk that the Group will encounter difficulty in meeting its financial liability obligations related to its financing for its operation.

The Group forecasts cash flows from operating, investing and financing activities through a cash flow budget regularly. This secures and retains a necessary liquidity scale in advance. Also, this manages a possible liquidity risk for the future.

The Group's maturity analysis on major non-derivative liabilities as of December 31, 2019 and 2018 is as follows (Korean won in thousand):

	2019					
	Book value	Nominal cash flows according to the contract				
		Total	Less than 1 year	1 year-2 years	2 years -5 years	More than 5 years
Financial liabilities(*1)	₩ 405,004,555	₩ 403,583,695	₩ 400,775,600	₩ 2,808,095	₩ -	₩ -
Interest expense	-	4,536,894	4,536,894	-	-	-
	₩ 405,004,555	₩ 408,120,589	₩ 405,312,494	₩ 2,808,095	₩ -	₩ -

	2018					
	Book value	Nominal cash flows according to the contract				
		Total	Less than 1 year	1 year-2 years	2 years -5 years	More than 5 years
Financial liabilities(*1)	₩ 307,085,402	₩ 307,128,691	₩ 303,116,655	₩ 4,012,036	₩ -	₩ -
Interest expense	-	7,050,515	7,050,515	-	-	-
	₩ 307,085,402	₩ 314,179,206	₩ 310,167,170	₩ 4,012,036	₩ -	₩ -

(*1) The convertible bond assumed early repayment claim.

The above-mentioned financial liabilities are the undiscounted contractual principal, which differs from the carrying amount of the financial liabilities in the consolidated statement of financial position and includes interest on the financial liabilities to be paid in the future. Apart from the above-mentioned non-derivative liabilities, the maximum amounts of guarantee by the Group as of December 31, 2019, in the financial guarantee contract are explained in Note 31.

(4) Capital risk

The Group performs capital risk management to maintain its ability to continuously provide profits to stockholders and parties in interest and to maintain optimum capital structure to reduce capital expenses.

Debt-to-equity ratio, calculated as total liabilities divided by equity, is used as an index to manage the Group's capital similar to overall industry practice.

Debt-to-equity ratios as of December 31, 2019 and 2018 are as follows (Korean won in thousand):

	2019	2018
Total liabilities	₩ 641,618,851	₩ 512,377,526
Total equity	188,520,288	231,028,961
Debt-to-equity ratio	340,34%	221.78%

4. Financial risk management (cont'd)

(5) Changes in liabilities from financial activities

	Beginning						Cash flow	
	Jan. 1		Effects of changes in accounting policies (*1)		Beginning Balance			
Short-term borrowings	₩	42,680,931	₩	-	₩	42,680,901	₩	28,300,000
Asset backed Loans("ABL")		-		-		-		43,600,000
Current portion of bond		135,685,365		-		135,685,365		(41,400,000)
Current portion of convertible bonds		45,271,347		-		45,271,347		-
Lease liabilities		-		3,892,108		3,892,108		(2,062,495)
	₩	223,637,643	₩	3,892,108	₩	227,529,751	₩	28,437,505

	Non-cash changes								Dec. 31	
	Amortization of present value		Foreign exchange rate movement		Increase (*2)		Others			
Short-term borrowings	₩	-	₩	45,719	₩	-	₩	9,648,315	₩	80,674,965
Asset backed Loans("ABL")		(247,576)		-		-		-		43,352,424
Current portion of bond		(183,510)		-		-		(9,600,000)		84,501,855
Current portion of convertible bonds		1,895,234		-		-		-		47,166,581
Lease liabilities		179,289		-		101,980		-		2,110,882
	₩	1,643,438	₩	45,719	₩	101,980	₩	48,315	₩	257,806,708

(*1) The effect of initial adoption of KIFRS 1116 (Lease) is non-cash changes in entirety.
(*2) This is the acquisition of a new lease.

5. Restricted financial instruments

Details of restricted financial instruments as of December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019		2018		Remarks
Short-term financial instruments	₩	5,823,317	₩	5,518,920	A pledge to KEB Hana Bank
		-		4,045,452	A pledge to Korea Hydro & Nuclear Power Co.Ltd
		4,286,002		1,218,729	A pledge to NongHyup Bank
		-		5,874,497	A pledge to Kyongnam Bank
		10,206,811		10,000,000	A pledge to Korea Development Bank
Subtotal		20,316,130		26,657,598	
Long-term financial instruments		6,000		6,000	Guarantee deposits for checking account
		1,600,000		1,600,000	A pledge to Kyongnam Bank
Subtotal		1,606,000		1,606,000	
Long-term investment securities		1,000,118		-	A pledge to Kyongnam Bank
Total	₩	22,922,248	₩	26,763,599	

6. Trade and other receivables

Trade and other receivables as of December 31, 2019 and 2018, consist of the following (Korean won in thousand):

	2019				2018		
	Gross	Allowance for doubtful accounts	Value Discount	Book value	Gross	Allowance for doubtful accounts	Book value
Current:							
Trade receivables	₩ 79,439,373	₩ (2,855,083)	₩ (1250)	₩ 76,584,290	₩ 22,301,965	₩ (2,790,537)	₩ 19,511,428
Other receivables	590,177	(279,293)		310,884	420,879	(249,930)	170,949
Accrued income	102,495	-		102,495	209,416	-	209,416
Guarantee deposits	67,353	-		67,353	203,583	-	203,583
Sub total	80,302,508	(3,134,376)		77,168,132	23,203,740	(3,040,467)	20,163,273
Non-current							
Guarantee deposits	548,993	-	(1250)	547,743	2,013,319	-	2,013,319
Subtotal	548,993	-	(1250)	547,743	2,013,319	-	2,013,319
Total	₩ 80,851,501	₩ (3,134,376)	₩ (1250)	₩ 77,715,875	₩ 25,217,059	₩ (3,040,467)	₩ 22,176,592

Changes in allowance for doubtful accounts for the year ended December 31, 2019, are as follows (Korean won in thousands):

	Jan. 1	Recognized	Derecognized	Dec. 31
Trade receivables	₩ (2,790,537)	₩ (64,546)		₩ (2,855,083)
Other receivables	(249,930)	(29,363)		(279,293)
	₩ (3,040,467)	₩ (93,909)		₩ (3,134,376)

Bad debt expenses recognized for impaired trade receivables are included in selling, general and administrative expenses and bad debt expenses recognized for impaired other receivables are included in other non-operating expenses in the consolidated statements of income (loss).

7. Inventories

Inventories as of December 31, 2019 and 2018, are summarized as follows (Korean won in thousands):

	2019			2018		
	Acquisition cost	Valuation allowance	Book value	Acquisition cost	Valuation allowance	Book value
Work in progress	160,502,370	(21,835,099)	138,667,271	₩ 134,727,725	₩ (29,119,737)	₩ 106,607,988
Raw materials	109,473,733	(21,791,176)	87,682,557	65,916,411	(21,301,058)	44,615,353
Materials in transit	4,378,477	-	4,378,477	1,930,732	-	1,930,732
	274,354,580	(43,626,275)	230,728,305	₩ 202,574,868	₩ (50,420,795)	₩ 152,154,073

Losses on inventory valuation (reversal) recognized as cost of sales amounted to ₩6,794,520 thousand and ₩8,467,637 thousand for the years ended December 31, 2019 and 2018, respectively. A portion of inventories above are provided as collateral in relation to export growth and performance guarantee (See Note 32- (2)).

8. Long-term investment securities

Long-term investment securities as of December 31, 2019 and 2018, are summarized as follows (Korean won in thousands):

	2019	2018
Financial assets at fair value through profit or loss		
Investment in capital of partnership:		
Korea Marine Equipment Association	₩ 20,000	₩ 20,000
Electronic Contractors' Financial Cooperative	52,047	52,047
Korea Facility Construction Credit Union	40,722	-
Equity securities in non-listed company		
Casco	1	1
Profitability securities		
Mirae Asset Global Dynamic Plus Securities Investment Trust NO.1(Bonds) A	1,000,118	-
	₩ 1,112,888	₩ 72,048

9. Derivatives

Details of the derivatives are as follows:

Purpose	Derivative instrument	Contract description
Fair value hedges	Foreign currency forwards	The amount of foreign currency upon maturity is fixed to the amount of won for the risk of exchange rate fluctuation exposed upon receipt of foreign currency receivables or payment of foreign currency payables.

Details of gains or losses on valuation of derivatives as of December 31, 2019 and 2018, are as follows (in foreign currencies and Korean won in thousands):

2019

	Buy		Sell				
Derivative instrument	Currency	Amount	Currency	Amount	Assets (liabilities)	Gains (losses)	Firm commitment
Foreign currency forwards	KRW	538,730,035	USD	472,392,224	₩ (5,997,748)	₩ 3,898,052	₩ 7,825,828
	EUR	8,278,000	KRW	10,892,424	(105,561)	(40,974)	116,357
	CHF	5,183,000	KRW	6,001,648	111,539	74,027	(116,397)
					₩ (5,991,770)	₩ 3,931,105	₩ 7,825,788

2018

	Buy		Sell				
Derivative instrument	Currency	Amount	Currency	Amount	Assets (liabilities)	Gains (losses)	Firm commitment
Foreign currency forwards	KRW	488,950,491	USD	452,809,300	₩ (12,189,025)	₩ (13,376,531)	₩ 9,363,949
	EUR	32,907,000	KRW	43,591,594	(1,062,229)	(1,018,514)	1,849,821
	CHF	9,702,000	KRW	11,190,902	14,944	49,417	30,817
					₩ (13,236,310)	₩ (14,345,628)	₩ 11,244,587

10. Financial instruments

(1) Categories of financial assets as of December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019				
	Financial assets at amortized cost	Financial assets at fair value through profit or loss	Derivatives	Book value	Fair value
Cash and cash equivalents	₩ 21,128,921	₩ -	₩ -	₩ 21,128,921	₩ 21,128,921
Long and short-term financial instruments	21,922,130	-	-	21,922,130	21,922,130
Trade and other receivables	77,168,132	-	-	77,168,132	77,168,132
Derivative assets	-	-	4,322,824	4,322,824	4,322,824
Long and short-term loans	599,435	-	-	599,435	599,435
Long-term investment securities	-	1,112,888	-	1,112,888	1,112,888
Long-term other receivables	547,743		-	547,743	547,743
	₩ 121,366,361	₩ 1,112,888	₩ 4,322,824	₩ 126,802,073	₩ 126,802,073

	2018				
	Loans and receivables	AFS financial assets	Derivatives	Book value	Fair value
Cash and cash equivalents	₩ 59,806,017	₩ -	₩ -	₩ 59,806,017	₩ 59,806,017
Long and short-term financial instruments	27,063,599	-	-	27,063,599	27,063,599
Trade and other receivables	20,163,273	-	-	20,163,273	20,163,273
Derivative assets	-	-	1,522,694	1,522,694	1,522,694
Long and short-term loans	928,013	-	-	928,013	928,013
Long-term investment securities	-	72,048	-	72,048	72,048
Long-term other receivables	2,013,319	-	-	2,013,319	2,013,319
	₩ 109,974,221	₩ 72,048	₩ 1,522,694	₩ 111,568,963	₩ 111,568,963

10. Financial instruments (cont'd)

(2) Categories of financial liabilities as of December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019			
	Financial liabilities at amortized cost	Derivatives	Book value	Fair value
Trade and other payables	₩ 146,500,635	₩ -	₩ 146,500,635	₩ 146,500,635
Borrowings and bonds	255,695,825	-	255,695,825	255,695,825
Derivative liabilities	-	10,314,594	10,314,594	10,314,594
Long-term other payables	2,808,095	-	2,808,095	2,808,095
	₩ 405,004,555	₩ 10,314,594	₩ 415,319,149	₩ 415,319,149

	2018			
	Financial liabilities at amortized cost	Derivatives	Book value	Fair value
Trade and other payables	₩ 79,435,725	₩ -	₩ 79,435,725	₩ 79,435,725
Borrowings and bonds	223,637,642	-	223,637,642	223,637,642
Derivative liabilities	-	14,759,004	14,759,004	14,759,004
Long-term other payables	4,012,036	-	4,012,036	4,012,036
	₩ 307,085,403	₩ 14,759,004	₩ 321,844,407	₩ 321,844,407

(3) Fair value measurements of financial instruments by fair value hierarchy levels as of December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019			
	Level 1	Level 2	Level 3	Total
Financial assets:				
Financial assets at fair value through profit or loss	₩	₩ 1,000,118	₩ 112,770	₩ 1,112,888
Derivatives designated as hedging instruments	-	4,322,824		4,322,824
Sub total	-			
Financial liabilities:		5,322,942	112,770	5,435,712
Derivatives designated as hedging instruments		(10,314,594)		(10,314,594)
	₩ -	₩ (4,991,652)	₩ 112,770	₩ (4,878,882)

	2018			
	Level 1	Level 2	Level 3	Total
Financial assets:				
AFS financial assets	-	₩ -	₩ 72,048	₩ 72,048
Derivatives designated as hedging instruments	-	1,522,694	-	1,522,694
Sub total	-	1,522,694	72,048	1,594,742
Financial liabilities:				
Derivatives designated as hedging instruments	-	(14,759,004)	-	(14,759,004)
	₩	₩ (13,236,310)	₩ 72,048	₩ (13,164,262)

10. Financial instruments (cont'd)

The Group uses the following hierarchy for determining and disclosing the fair value of financial instruments by valuation technique. The level of hierarchy of fair value is as follows:

Level 1	Unadjusted quoted prices in active markets for identical assets or liabilities
Level 2	Inputs other than quoted prices that are observable for the asset or liability, either directly or indirectly
Level 3	Inputs that are not based on observable market data (unobservable inputs)

The fair value of financial instruments traded in active markets is based on quoted market prices at the dates of the consolidated statements of financial position. These instruments are included in Level 1. Instruments included in Level 1 comprise primarily listed equity investments classified as trading securities or AFS securities.

The fair value of financial instruments that are not traded in an active market (for example, over-the-counter derivatives) is determined by using valuation techniques. These valuation techniques maximize the use of observable market data where it is available and rely as little as possible on entity-specific estimates. If all significant inputs required for fair value of an instrument are observable, the instrument is included in Level 2. If one or more of the significant inputs is not based on observable market data, the instrument is included in Level 3.

(4) Valuation techniques and inputs used for derivatives designated as hedging instruments (Level 2) are as follows:

Valuation methodology	Observable inputs	Explanation of inputs
Cash flow discount method	Forward exchange rate	It is based on forward exchange rate, disclosed on the market; its remaining period is the same to maturity of forward contracts. If the forward exchange rate is not disclosed on the market, it is calculated by using the interpolation method.
	Discount rate	It is determined by using yield curve that is disclosed at the end of the reporting period.

(5) Valuation techniques and inputs used for AFS financial assets designated as hedging instruments (Level 2) are as follows:

Valuation methodology	Observable inputs	Explanation of inputs
Black-Scholes valuation model	Closing price of common stock	Based on the closing price of common stock disclosed in the market

(6) Comprehensive income for each category of financial instruments for the years ended December 31, 2019 and 2018 is as follows (Korean won in thousands):

	2019							
	Profit or loss							Other comprehensive income
	Interest	Dividend	Valuation	Impairment /Reversal	Disposal	Foreign exchange	Others	
Financial instruments:								
Financial assets at amortized cost	₩ 815,039	₩ -	₩ 118	₩ (93,909)	₩ (13,870)	₩ 3,192,815	₩ -	₩ -
	₩ 815,039	₩	₩ 118	₩ (93,909)	₩ (13,870)	₩ 3,192,815	₩ -	₩ -
Financial liabilities:								
Financial liabilities at amortized cost	₩ (17,666,757)	₩ -	₩ -	₩ -	₩ -	₩ (315,324)	₩ -	₩ -
	₩ (17,666,757)	₩ -	₩ -	₩ -	₩ -	₩ (315,324)	₩	₩ -

10. Financial instruments (cont'd)

	2018							
	Profit or loss							Other comprehensive income
	Interest	Dividend	Valuation	Impairment /Reversal	Disposal	Foreign exchange	Others	
Financial instruments:								
Loans and receivables	₩ 888,036	₩ -	₩ -	₩ (96,763)	₩ -	₩ 3,340,046	₩ -	₩ -
AFS financial assets	-	8,462,456	-	-	-	-	-	-
	₩ 888,036	₩ 8,462,456	₩ -	₩ (96,763)	₩ -	₩ 3,340,046	₩ -	₩ -
Financial liabilities:								
Financial liabilities at amortized cost	₩ (17,058,401)	₩ -	₩ -	₩ -	₩ -	₩ (972,066)	₩ -	₩ -
	₩ (17,058,401)	₩ -	₩ -	₩ -	₩ -	₩ (972,066)	₩	₩ -

Comprehensive income (loss) from financial instruments other than the above for the years ended December 31, 2019 and 2018, is as follows (Korean won in thousands):

	2019			2018		
	Profit or loss		Other comprehensive income	Profit or loss		Other comprehensive income
	Valuation	Disposal		Valuation	Disposal	
Derivatives	₩ (3,931,105)	(23,149,280)	₩ -	₩ (14,345,628)	₩ (11,080,838)	₩ -

11. Investments in associates

(1) Investments in associates as of December 31, 2019 and 2018, consist of the following (Korean won in thousands):

Company	Country	Percentage of ownership (%)	Acquisition cost		Book value		Proportionate share of net assets	
			December 31, 2019	December 31, 2018	December 31, 2019	December 31, 2018	December 31, 2019	December 31, 2018
Dalian Samyoung Doosan Metal Product Co., Ltd. ("DSDMP") (*1)	China	10.80	₩ 2,675,402	₩ 2,675,402	₩ 2,586,764	₩ 2,557,167	₩ 2,586,764	₩ 2,557,167

(*1) Although the Group's ownership is less than 20%, the investee is classified as an associate as the Group has significant influence over it by exercising voting rights in the board of directors.

The above investments in subsidiaries and associates have no quoted market prices in active markets.

(2) Changes in investments in associates for the years ended December 31, 2019 and 2018 consist of the following (Korean won in thousands):

	2019					
	January 1,	Acquisition	Gain(loss) on valuation of associates	Increase (decrease) in equity of associates	Disposal	December 31,
DSDMP	₩ 2,557,167	₩ -	₩ (17,518)	₩ 47,115	₩ -	₩ 2,586,764

11. Investments in associates (cont'd)

	2018					
	January 1,	Gain(loss) on valuation of associates	Increase (decrease) in equity of associates	Disposal	Split off	December 31,
DSDMP	₩ 2,735,196	₩ (166,803)	₩ (11,226)	₩ -	₩ -	₩ 2,557,167
Doosan Cuvex Co., Ltd	3,648,343	11,232	-	-	(3,659,575)	-
DBC	5,781,716	(159,398)	-	(3,454,000)	(2,168,318)	-
	₩ 12,165,255	₩ (314,969)	₩ (11,226)	₩ (3,454,000)	₩ (5,827,893)	₩ 2,557,167

(3) The condensed financial information of the investees as of and for the years ended December 31, 2019 and 2018 is as follows (Korean won in thousands):

	2019							
	Assets		Liabilities					
Group	Current	Non-current	Current	Non-current	Sales	Net income (loss)	Comprehensive income (loss)	Dividends
DSDMP	₩ 15,832,475	₩ 16,141,992	₩ 5,205,378	₩ 2,817,573	₩ 13,317,728	₩ (162,204)	₩ 274,044	₩ -

	2018							
	Assets		Liabilities					
Group	Current	Non-current	Current	Non-current	Sales	Net income (loss)	Comprehensive income (loss)	Dividends
DSDMP	₩ 15,866,011	₩ 16,601,873	₩ 6,023,499	₩ 2,766,913	₩ 11,687,474	₩ (1,544,471)	₩ (1,648,419)	₩ -

(4) Reconciliation of book value of investments in associates as of December 31, 2019 and 2018 is as follows (Korean won in thousands):

	2019				
	Net assets (a)	Ratio (%) (b)	Net asset value (a*b)	Goodwill	Book value
DSDMP	₩ 23,951,515	10.80	₩ 2,620,494	₩ -	₩ 2,620,494

	2018				
	Net assets (a)	Ratio (%) (b)	Net asset value (a*b)	Goodwill	Book value
DSDMP	₩ 23,677,471	10.80	₩ 2,557,167	₩ -	₩ 2,557,167

12. Property, plant and equipment

(1) Changes in property, plant and equipment for the years ended December 31, 2019 and 2018 are as follows (Korean won in thousands):

	2019					
	Land	Buildings and structures	Machinery	Others	Construction-in-progress	Total
Jan. 1	₩ 259,350,576	₩ 126,634,030	₩ 47,683,507	₩ 1,752,720	₩ 1,193,787	₩ 436,526,103
Acquisition	27,957	105,337	1,618,556	2,916,221	3,329,381	7,997,452
Transfer (*1)	-	-	80,807	359,243	(1,193,787)	(753,737)
Net changes from revaluation	(1,098,199)	-	-	-	-	(1,098,199)
Disposal	(971,300)	(1,183,485)	(468,712)	(2,205)	-	(2,625,702)
Depreciation	-	(5,455,133)	(8,678,329)	(971,903)	-	(15,105,365)
Impairment loss	-	(193,035)	(2,641,497)	-	-	(2,834,532)
Foreign exchange difference	-	219,672	(187,241)	8,051	-	280,120
Dec. 31	₩ 257,309,034	₩ 120,127,386	₩ 37,646,729	₩ 3,973,610	₩ 3,329,381	₩ 422,386,1409
Acquisition cost	165,159,014	189,665,853	190,714,393	49,467,860	3,329,381	598,336,501
Accumulated depreciation	-	(69,345,432)	(150,426,167)	(45,494,250)	-	(265,265,849)
Accumulated impairment loss	-	(193,035)	(2,641,497)	-		(2,834,532)
Revaluation surplus	92,150,020	-	-	-	-	92,150,020

(*1) Some of construction-in-progress are transferred into intangible assets

(*2) The impairment test was conducted with the help of an independent valuation specialist for each individual asset to calculate the fair value of the process, and the impairment loss was reflected in the profit or loss of the current term as a cost item consistent with the function of the impaired asset.

	2018					
	Land	Buildings and structures	Machinery	Others	Construction-in-progress	Total
Jan. 1	₩ 289,903,314	₩ 142,453,365	₩ 55,128,621	₩ 1,696,791	₩ 346,656	₩ 489,528,747
Acquisition	-	-	1,403,411	500,572	1,193,936	3,097,919
Transfer (*1)	-	-	32,000	28,530	(223,321)	(162,791)
Split off (*2)	(30,552,738)	(10,095,633)	-	(674)	(123,484)	(40,772,529)
Disposal	-	(89,120)	(45,836)	(5,166)	-	(140,122)
Depreciation	-	(5,581,841)	(8,825,656)	(554,824)	-	(14,962,321)
Foreign exchange difference	-	(52,741)	(9,033)	(1,028)	-	(62,802)
Dec. 31	₩ 259,350,576	₩ 126,634,030	₩ 47,683,507	₩ 1,664,201	₩ 1,193,287	₩ 436,526,101
Acquisition cost	166,181,660	190,680,997	195,697,217	48,517,374	1,193,787	602,271,035
Accumulated depreciation	-	(64,046,967)	(148,013,710)	(46,853,173)	-	(258,913,850)
Revaluation surplus	93,168,916	-	-	-	-	93,168,916

(*1) Some of construction-in-progress are transferred into intangible assets

(*2) Property, plant and equipment in the investees were transferred to the Acquired Company since the spilt off on June 5, 2018.

The Company recognized the land subsequently measured at revaluation amount. If the land is stated at cost, the land would amount to ₩165,366,881 thousand and ₩166,181,660 thousand as of December 31, 2019 and 2018, respectively.

Part of the land above is collateralized to Korea Development Bank in relation to the opening of an import credit (see Note 32-(2)).

12. Property, plant and equipment (cont'd)

(2) Details of revaluation model, which the Group applies to measurement of the land are as follows:

The Group measured all land using fair value at the date of the revaluation. As of December 31, 2019, the fair value of land was determined from the appraisal that was undertaken by independently qualified valuator, Pacific Appraisal Group Limited ("Pacific") on October 31, 2019. Pacific is a member of Korea Association of Property Appraisers and comprises of certified professionals that have a significant amount of industry experience.

The fair value of the land was determined by referring to the standard land price of the land to be measured and the recent transaction price of similar land in the neighboring area.

(3) Fair value measurements of land by fair value hierarchy level as of December 31, 2019 and 2018, are as follows (Korean won in thousands)

	2019			2018		
	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Land	₩ -	₩ -	₩ 257,309,034	₩ -	₩ -	₩ 259,350,576

Valuation techniques and inputs used for fair value measurement of land assets (Level 3) are as follows:

Valuation technique	Significant inputs that are not based on observable market data (unobservable inputs)	Correlation between unobservable inputs and fair value arguments
Official Assessed Reference Land Price ("OARLP"): OARLP of similar parcels nearby the subject land and reflating corrections necessary for differences between the subject and the comparable	a. Fluctuation rate of land price and others	Fair value increases (decreases) if fluctuation rate of land price increases (decreases).
	b. Parcel conditions and others	Fair value increases (decreases) if correction of parcel conditions and others increase (decrease).
	c. Land conditions affecting the sales price and others	Fair value increases (decreases) if correction of land conditions affecting the sales price increases (decreases).

(4) Changes in land for the year ended December 31, 2019 are as follows (Korean won in thousands):

January 1, 2019	Acquisition	Disposal	Revaluation		December 31, 2019
			OCI	NI	
₩ 259,350,576	₩ 27,957	₩ (971,300)	₩ (890,322)	₩ (207,867)	₩ 257,309,034

(5) Changes in revaluation surplus and classification by the asset for the year ended December 31, 2019 are as follows (Korean won in thousands):

January 1, 2019	Increase	Decrease	Disposal	December 31, 2019
₩ 93,168,916	₩ 6,293	₩ (896,625)	₩ (128,564)	₩ 92,150,020

The above revaluation surplus represents an amount before reflecting the tax effects.

(6) A classification of depreciation expenses for the years ended December 31, 2019 and 2018 is as follows (Korean won in thousands):

	2019	2018
Cost of sales	₩ 16,010,849	₩ 14,682,898
Selling and administrative expenses	857,021	70,429
Selling and administrative expenses-expenditure on research and development	191,578	208,994
	₩ 17,059,448	₩ 14,962,321

13. Lease

(1) The details of right-of-use assets as of December 31, 2019 are as follows (Korean won in thousands):

	Acquisition	Accumulated depreciation	Disposal	Book value
Building	₩ 3,743,483	₩ (1,840,612)	₩ (30,461)	₩ 1,872,410
Vehicle	306,900	(113,471)	-	193,429
	₩ 4,050,383	₩ (1,954,083)	₩ (30,461)	₩ 2,065,839

(2) The changes in lease liabilities during the current term are as follows (Korean won in thousands):

	Conversion date	Acquisition	Interest expense	Lease payment	Transfer to current portion	2019
Current	₩ 1,977,055	₩ 36,259	₩ 179,289	₩ (2,062,495)	₩ 1,801,467	₩ 1,931,575
Non-current	1,915,053	65,721	-	-	-	179,307
	₩ 3,892,108	₩ 101,980	₩ 179,289	₩ (2,062,495)	₩ (1,801,467)	₩ 2,110,882

(3) The components of operating lease expenses by account are as follows (Korean won in thousands):

	Short-term lease	Low-value asset lease
Cost of sales	₩ 133,913	₩ 36,529
Selling and administrative expenses	326,675	10,782
	₩ 460,588	₩ 47,311

The Group have several lease agreements, including extension and termination options. These options are negotiated by management to provide flexibility in managing the leased asset portfolio and to meet the business needs. Management applies important judgement when deciding whether these extension and termination options are reasonably certain to be exercised (See Note 2.4.1).

Below are potential undiscounted future lease payments related to periods after the exercise date of the extension and termination options not included in the lease term (Korean won in thousands):.

	2019
Extension options not expected to be exercised	₩ 333,476
Termination options expected to be exercised	193,429
	₩ 526,905

14. Intangible assets

(1) Changes in intangible assets for the years ended December 31, 2019 and 2018 are as follows (Korean won in thousands):

	2019			
	Development costs	Software	Others	Total
January 1	₩ 1,626,696	₩ 2,023,854	₩ 2,412,817	₩ 6,063,367
Acquisition	-	111,400	153,300	264,700
Transfer	-	753,737	-	753,737
Disposal	-	-	(603,389)	(603,389)
Amortization	(559,698)	(788,730)	(184,664)	(1,533,092)
Reversal of impairment loss	-	-	-	-
December 31	₩ 1,066,998	₩ 2,100,261	₩ 1,778,064	₩ 4,945,323
Acquisition cost	₩ 25,022,729	₩ 16,834,199	₩ 2,894,038	₩ 44,750,966
Accumulated amortization	(23,955,731)	(14,733,938)	(1,115,974)	(39,805,643)

14. Intangible assets (cont'd)

	2018			
	Development costs	Software	Others	Total
January 1	₩ 2,186,395	₩ 1,332,752	₩ 2,945,942	₩ 6,465,089
Acquisition	-	1,048,982	1,066,661	2,115,643
Transfer	-	162,791	-	162,791
Disposal	-	-	(1,369,468)	(1,369,468)
Amortization	(559,698)	(520,671)	(191,195)	(1,271,565)
Impairment loss	-	-	(39,123)	(39,123)
December 31	₩ 1,626,696	₩ 2,023,854	₩ 2,412,817	₩ 6,063,367
Acquisition cost	₩ 25,022,729	₩ 15,969,062	₩ 3,502,448	₩ 44,494,239
Accumulated amortization	(23,396,033)	(13,945,208)	(1,089,631)	(38,430,872)

The carrying amount of membership with indefinite useful lives in other intangible assets item is ₩1,038,063 thousand and ₩1,488,153 thousand as of December 31, 2019 and 2018, respectively. Expenditure on research and development, which was recognized as expenses, amounted to ₩3,265,172 thousand and ₩4,063,604 thousand for the years ended December 31, 2019 and 2018, respectively.

(2) A classification of amortization expense for the years ended December 31, 2019 and 2018 is as follows (Korean won in thousands):

	2019	2018
Cost of sales	₩ 698,857	₩ 745,498
Selling and administrative expenses	714,236	406,067
expenditure on research and development	120,000	120,000
	₩ 1,533,093	₩ 1,271,565

(3) The impairment loss of intangible assets is as follows (Korean won in thousands):

			Amount of impairment loss		Method of valuation of recoverable amount
	Individual asset	Book value	Amount recognized in current period	Accumulated amount	
Development costs	SCR Development	₩ 1,066,998	₩ -	₩ (21,808,122)	Value in use

As a reliable valuation of fair value of the development cost is impossible, the recoverable amount was measured based on value in use. The future cash flows of 2 years for the value in use measurement were estimated based on past business performance and future business plan of the Group. The discount rate for the value in use measurement was estimated by weighted average capital cost of 12.28% reflecting unique risk of the asset.

15. Borrowing and bonds

(1) Short-term borrowings (Korean won in thousands):

	Financial institutions	Interest rate (%)	December 31 2019	December 31, 2018
Short-term borrowings in foreign currencies	Korea Exim Bank	3.00+LIBOR	₩ 2,774,965	₩ 2,680,931
			2,774,965	2,680,931
Short-term borrowings in Korean Won	NH Bank	3M MOR+4.25	8,000,000	₩ 10,000,000
		3.60	12,000,000	-
	Kyongnam Bank	4.29	15,000,000	15,000,000
		4,77	15,000,000	-
	Korea Development Bank	3.28	4,300,000	-
	Korea Exim Bank	5.58	20,000,000	-
		5.65	-	5,000,000
		5.50	-	10,000,000
	Shinyoung Securities	6.30	1,000,000	-
	Korea Asset Investment & Securities Co.	6.30	2,600,000	-
			77,900,000	40,000,000
			₩ 80,674,965	₩ 42,680,931

(2) Bonds and borrowings as of December 31, 2019 and 2018 are as follows (Korean won in thousands):

	Maturity	Interest rate (%)	2019	2018
The 8th(*1)	Apr. 26, 2019	4.60	₩ -	₩ 130,000,000
The 10th(*1)	Dec. 18, 2019	5.60	-	6,000,000
The 11th	Jan. 14. 2020	5.60	5,000,000	-
The 12th	Apr. 24. 2020	6.00	80,000,000	-
			85,000,000	136,000,000
Less: current portion			(84,501,855)	(135,685,365)
Less: discount on bonds			(498,145)	(314,635)
			₩ -	₩ -

(*1) The maturity of the 7th bond was fully paid during the current reporting period.

(3) Convertible bonds

	Interest rate (%)	2019	2018
The 9th	5.00	₩ 45,000,000	₩ 45,000,000
Bond premium		8,200,362	8,200,362
Less: discount on bonds		(123,303)	(162,033)
Less: adjustment of conversion rights		(5,910,478)	(7,766,982)
Less: current portion(*1)		(47,166,581)	(45,271,347)
		₩ -	₩

(*1) Due to the right to claim for early repayment, it is classified as current liability because the Group does not have any unconditional right to postpone settlement of the liability over 12 months after the reporting period.

15. Borrowing and bonds (cont'd)

Details of convertible bonds as of December 31, 2019 are as follows:

Types of bonds	Non-bearer type mortgage
Par type and par value	₩44 billion and two ₩100 million books (total of ₩45 billion)
Amount issued	Issuance of par value
Date of Issue	June 22, 2018
Expiration date	June 22, 2023
Nominal interest rate	5.00%
Maturity guaranteed return rate	8.00%
Repayment premium	118.2230%
Conversion period	One month from the date of issuance of bonds and one month from the date of principal payment
Conversion price	1 stock (face value of ₩1,000) to ₩4,667
Matters concerning adjustment of conversion value	(1) issuance of shares through stock dividends, capitalization of reserves, etc., or capital increase by issuing price below market value; or 2) convertible value or convertible value to market value below issuance price If the issuance of securities entitled to acquire new shares is to be adjusted, the conversion value shall be adjusted. (2) In the event that the adjustment of the conversion price is necessary by merger, reduction of capital, stock split and merger, change of stock par value, conversion rights are exercised right before the merger, capital decrease, stock split and merger, If the stock has been converted into shares, the conversion price shall be adjusted so that the number of shares that the conversion right holder could have immediately after the merger, reduction of capital, stock split and merger, and stock face change. (3) In addition to the adjustment to the exercise price pursuant to paragraphs (1) and (2) above, the issuer may, as long as the issuer is listed on the securities market or the KOSDAQ market established by the Korea Exchange (or its successor) the amount of the arithmetical average of the weighted arithmetic average of the past one month, one week, and the latest retrospectively based on the day before the adjustment date, (Hereinafter referred to as the "base stock price") falls below the exercise price at that time, it shall be adjusted to the "base stock price". However, the adjustment of the exercise price pursuant to Paragraph (3) above shall be made at the first exercise price (100% of the value calculated based on the case where the exercise price has already been adjusted for the reasons stated in paragraph (1) or (2) Cannot be less than 0.7 (4) If the adjusted conversion price is less than or equal to the face value of the common stock of the issuer, the face value shall be the conversion price. (5) After adjustments made by the above items, less than the basic level of convertible price shall be increased.

15. Borrowing and bonds (cont'd)

Conversion Rate	100% of the face value
Early repayment claim (*1)	(1) Repayment may be made on the early redemption date if the redemption request is made within 90 days before the date of one year after the issuance and every three months after the issuance (hereinafter referred to as "early redemption date") (2) From the day when the reason for the sale of the HSD engine stock to the investor "Socius Well-to-sea Investment Corporation No. 1 Corporate Financial Stabilization Private Equity Investment Company" 20 days before the date of the early redemption (hereinafter referred to as "early redemption date").
Call Option	Rights of Third Parties: From the date two years have elapsed since June 8, 2018 to the end of four years and one month, the related parties of the bond or bond holders shall convert 30% of the convertible bonds held by the bondholders The amount calculated by calculating the annual compound interest at 12% for the period from the acquisition date of the convertible bond to the date of issuance of the call option exercise price (the dividend received by the bondholder from the issuer in connection with the convertible bond until the exercise date of the actual call option) Interest is deducted).

(*1) In the case of the early redemption right implicit in convertible bonds, it is the same as the amortized cost of the debt instrument, which is the host contract to be paid when exercising the early redemption right.

According to the repliesof the Financial Supervisory Service, the Company classifies the balance after the deduction of debentures from the initial book value of the convertible bond with the condition of discounting the exercise prices when the stock price falls, as capital.

(4) Asset backed Loans("ABL")

The SPC has been established for the Company to securitize the receivables to be recovered in the future during 2019. The Group transferred the receivables to be recovered to the SPC in the future, and the SPC performed asset securitization in the form of issuing securitized securities based on the transferred assets. The details of the increase and reduction of the ABL are as follows (Korean won in thousands):

	2019
Beginning balance	₩ -
Accrual	50,000,000
Repayment amount	6,400,000
Ending balance	43,600,000
Present value discount	(247,576)
Less: current portion	(43,352,424)
	₩ -

(5) The details of the major arrangements related to the above liquidated debt are as follows.

	Type	Interest rate (%)	2019	2018
KB Securities	Borrowing	6.00	₩ 40,000,000	2019.04.25~2020.05.25
KB Securities	Bonds	6.00	10,000,000	2019.04.25~2020.07.25

16. Retirement benefit obligation

(1) The Group operates a defined benefit plan for employees, and the actuarial valuation of plan assets and defined benefit liability is performed by a reputable actuary using the projected unit credit method.

Details of retirement benefit obligation as of December 31, 2019 and 2018 are as follows (Korean won in thousands):

	2019	2018
Present value of defined benefit obligation	₩ 35,585,190	₩ 34,108,750
Fair value of plan assets	(26,849,740)	(28,335,893)
	₩ 8,735,450	₩ 5,772,857

(2) Expenses recognized in profit and loss for the years ended December 31, 2019 and 2018 are as follows (Korean won in thousands):

	2019	2018
Current service cost	₩ 3,742,566	₩ 3,910,302
Net interest expense (Interest expense – expected return on plan assets)	64,494	173,745
	₩ 3,807,060	₩ 4,084,047

(3) Classification of the expenses related to the retirement benefit obligation recognized in the statements of income (loss) for the years ended December 31, 2019 and 2018 is as follows (Korean won in thousands):

	2019	2018
Cost of sales	₩ 2,657,658	₩ 2,779,302
Selling and administrative expenses	984,013	1,139,121
Selling and administrative expenses expenditure on research and development	165,389	165,624
	₩ 3,807,060	₩ 4,084,047

(4) Changes in defined benefit obligations for the years ended December 31, 2019 and 2018 are as follows (Korean won in thousands):

	2019	2018
Beginning balance	₩ 34,108,750	₩ 33,232,700
Current service cost	3,742,566	3,910,302
Transfer in		116,928
Transfer out		(537,530)
Interest expense	886,919	1,097,218
Remeasurements of defined benefit liabilities:	403,538	7,098
Changes in demographic assumptions		(649,486)
Changes in financial assumptions	1,013,993	520,410
Others	(610,455)	136,174
Benefit paid	(3,556,583)	(3,717,966)
Ending balance	₩ 35,585,190	₩ 34,108,750

16. Retirement benefit obligation (cont'd)

(5) Changes in plan assets for the years ended December 31, 2019 and 2018 are as follows (Korean won in thousands):

	2019	2018
Beginning balance	₩ 28,335,893	₩ 30,282,077
Expected return on plan assets	822,424	923,472
Remeasurements of plan assets	(379,388)	(520,594)
Contributions by employer directly to plan assets		-
Benefit paid	(1,929,189)	(2,320,717)
Transfer in		-
Transfer out		(28,345)
Ending balance	₩ 26,849,740	₩ 28,335,893

(6) Assumptions used for actuarial valuation as of December 31, 2019 and 2018 are as follows:

	December 31, 2019	December 31, 2018
Discount rate for defined benefit obligations	2.89%	3.23%
Expected rate of salary increase:		
Employee	2.00%	2.00%
Officer	2.00%	2.00%

(7) Details of plan assets as of December 31, 2019 and 2018 are as follows (Korean won in thousands):

	2019	2018
Debt securities	₩ 4,121,445	₩ 124,798
Equity securities	2,899,970	4,360,072
Loans	620	99,466
Deposits	19,635,311	21,203,460
Others	192,394	2,548,097
	₩ 26,849,740	₩ 28,335,893

Plan assets are mostly invested in assets that have a quoted market price in an active market.

(8) The sensitivity analysis for the significant actuarial assumptions as of December 31, 2019 and 2018 is as follows (Korean won in thousands):

	2019		2018	
	Amount	Rate	Amount	Rate
Discount rate:				
1% increase	₩ (2,831,956)	(-)8.00%	₩ (2,662,828)	(-)7.81%
1% decrease	3,312,084	9.30%	3,117,111	9.14%
Salary increase rate:				
1% increase	3,380,135	9.50%	3,192,654	9.36%
1% decrease	(2,935,043)	(-)8.20%	(2,768,167)	(-)8.12%

16. Retirement benefit obligation (cont'd)

(9) Information about the maturity profile of the defined benefit obligation as of December 31, 2019 and 2018 is as follows (Korean won in thousands):

	2019			
	Less than 1 year	1 ~ 2 years	2 ~ 5 years	More than 5 years
Expected payment	₩ 1,873,209	₩ 1,953,648	₩ 6,026,998	₩ 17,483,861

	2018			
	Less than 1 year	1 ~ 2 years	2 ~ 5 years	More than 5 years
Expected payment	₩ 1,850,636	₩ 1,946,336	₩ 6,090,631	₩ 16,769,159

17. Provisions

Changes in provisions for the years ended December 31, 2019 and 2018 are as follows (Korean won in thousands):

	2019			2018		
	Warranty	Litigation	Total	Warranty	Litigation	Total
Beginning balance	₩ 9,205,925	₩ 1,775,875	₩ 10,981,800	₩ 10,121,944	₩ 755,040	₩ 10,876,984
Accrual	2,057,561	7,512,494	9,570,055	1,852,136	1,020,834	2,872,970
Reversal	(1,331,355)	(1,775,875)	(3,107,230)	(2,139,531)	-	(2,139,531)
Use	(1,771,105)	-	(1,771,105)	(2,567,739)	-	(2,567,739)
Others (*1)	1,509,555	-	1,509,555	1,939,116	-	1,939,116
Ending balance	₩ 9,670,581	7,512,494	17,183,075	₩ 9,205,925	₩ 1,775,875	₩ 10,981,800
Current	₩ 4,755,937	₩ 7,512,494	12,268,431	₩ 4,120,499	₩ 1,775,875	₩ 5,896,374
Non-current	4,914,644	-	4,914,644	5,085,426	-	5,085,426

(*1) Others are amounts settled by the technician based on the cause of defects repair.

A provision is recognized for expected warranty claims on products sold during the year, based on past experience of the level of repairs and returns. It is expected that these costs will be incurred in the next financial year. Assumptions used to calculate the provision for warranties were based on current sales levels and current information available about returns based on the warranty period for all products sold.

18. Share capital and capital surplus

(1) Changes in share capital and capital surplus for the year ended December 31, 2019 are as follows (Korean won in thousands, except for number of shares):

	2019			
	Number of shares	Par value	Capital stock	Capital surplus
Beginning balance	₩ 32,947,142	₩ 1,000	₩ 32,947,142	₩ 174,081,655
Ending balance	₩ 32,947,142	₩ 1,000	₩ 32,947,142	₩ 174,081,655

(2) Details of capital surplus as of December 31, 2019 and 2018 are as follows (Korean won in thousands):

	2019	2018
Stock issue premium	₩ 174,081,655	₩ 174,081,655
Conversion right to pay	546,612	546,612
	₩ 174,628,267	₩ 174,628,267

19. Other capital components

(1) Other capital components as of December 31, 2019 and 2018 are summarized as follows (Korean won in thousands):

	2019	2018
Treasury stock	₩ (30,233)	₩ (30,233)
Loss of reducing equity	(55,380,205)	(55,380,205)
Share options	621,478	621,478
	₩ (54,788,960)	₩ (54,788,960)

(2) Share-based payment

The Group granted share options to its directors several times. Share options are settled based on the board of directors' resolution by issuance of new stock, treasury stock or cash settlement. Vesting condition offers 2 year service after the resolution at the stockholders' meeting.

The number of granted options as of December 31, 2019 is as follows (Korean won in thousands):

	Date of grant	Number of granted options	Exercisable period	Exercisable price	Expected fair value at the date of grant
1st	2011.3.25	6,500 shares	2014.3.25 - 2021.3.24	₩ 21,600	₩ 10,343
2nd	2012.3.30	19,700 shares	2015.3.30 - 2022.3.29	13,300	4,653
3rd	2013.3.29	83,700 shares	2016.3.29 - 2023.3.28	9,050	3,383
4th	2014.3.28	12,500 shares	2017.3.28 - 2024.3.27	9,490	3,583

The Group calculated expenses by applying fair value approach. Assumptions used in determining fair value of share options are as follows:

	Risk-free interest rate (*1)	Expected exercisable period	Expected volatility	Expected dividend yield ratio
1st	3.66%	3 years	68.77%	0.00%
2nd	3.57%	3 years	55.03%	0.00%
3rd	2.45%	3 years	52.35%	0.00%
4th	2.88%	3 years	52.27%	0.00%

(*1) Risk-free interest rate is based on a 3 year Treasury bond yield rate.

Changes in share options for the year ended December 31, 2019, are as follows:

a) Number of common shares to be issued:

	January 1	Granted	Exercised	Canceled	December 31
1st	6,500	-	-	(6,500)	-
2nd	18,200	-	-	(16,200)	2,000
3rd	49,200	-	-	(49,200)	-
4th	12,500	-	-	(8,600)	3,900
	86,400	-	-	(80,500)	5,900

19. Other capital components (cont'd)

b) Valuation amount (Korean won in thousands):

	January 1	Granted	Exercised	Canceled	December 31
1st	₩ 112,739	₩ -	₩ -	₩ -	₩ 112,739
2nd	139,590	-	-	-	139,590
3rd	283,157	-	-	-	283,157
4th	85,992	-	-	-	85,992
	₩ 621,478	₩ -	₩ -	₩ -	₩ 621,478

20. Accumulated other comprehensive income

Accumulated other comprehensive income as of December 31, 2019 and 2018 is as follows (Korean won in thousands):

	2019	2018
Translation gain on overseas operation	683,141	526,241
Negative capital variation of equity method	1,081,754	1,034,640
Revaluation surplus of land	69,849,716	70,622,038
	₩ 71,614,611	₩ 72,182,918

21. Retained earnings (accumulated deficit)

Retained earnings (accumulated deficit) as of December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019	2018
Legal reserve	₩ 1,200,000	₩ 1,200,000
Voluntary reserve	2,700,000	2,700,000
Retained earnings (accumulated deficit) before appropriations (disposition)	(39,780,772)	2,159,593
Total	₩ (36,927,305)	₩ 6,059,593

Changes in retained earnings (accumulated deficit) for the years ended December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019	2018
Beginning balance	₩ 6,059,593	₩ (9,921,225)
Cumulative effect of changes in accounting policies	-	233,437,065
Changes due to split-off	-	(198,277,732)
Net loss	(41,444,358))	(18,680,216)
Remeasurements of defined benefit liabilities	(593,458)	(399,991)
Revaluation surplus of land	97,451	-
Ending balance	₩ (35,880,772)	₩ 6,059,593

22. Sales

(1) Details of sales for the years ended December 31, 2019 and 2018 are as follows (Korean won in thousands):

		2019		2018
Sales of goods	₩	666,806,831	₩	487,558,952
Construction sales		6,076,370		21,519,565
Others		1,394,932		2,223,597
	₩	674,278,133	₩	511,302,114

(2) Details of trade receivables, advances from customers and contract assets and liabilities from contracts with customers as of December 31, 2019 are as follows (Korean won in thousands):

		2019		2018
Trade receivables	₩	79,542,484	₩	22,369,862
Contract assets		12,605		1,151,005
Advances from customers		173,270,234		148,267,040
Contract liabilities		2,456,489		4,629,840

A contract asset is the right to consideration in exchange for goods or services transferred to the customer. When the consideration amount is billed to the customer, the consideration receivable is reclassified as trade receivable. A contract liability is the performance obligation that is satisfied over-time to transfer services, such as construction contracts and others, to a customer for which the Group has received consideration. Contract liabilities are recognized as revenue when the Group performs under the contract and transfers the goods or services to the customer.

(3) Details of the Group's profit classified by the timing of revenue recognition for the year ended December 31, 2019 are as follows (Korean won in thousands):

		2019		2018
Goods transferred at a point in time	₩	668,201,763	₩	489,782,549
Services transferred over time		6,076,370		21,519,565
	₩	674,278,133	₩	511,302,114

23. Segment information

The Group has a single reportable segment determined by considering the characteristics of the nature of goods and assets to create sales.

(1) The following table provides sale information by geographical segment for the years ended December 31, 2019 and 2018 (Korean won in thousands):

		2019		2018
Domestic	₩	461,391,988	₩	375,229,074
Overseas		216,711,764		142,887,339
		678,103,752		518,116,413
Adjustments		(3,825,619)		(6,814,299)
	₩	674,278,133	₩	511,302,114

(2) There is a single external customer who accounted for 10% or more of the Group's sales for the years ended December 31, 2019 and 2018 (Korean won in thousands):

		2019		2018
Samsung Heavy Industries Co., Ltd.	₩	104,616,951	₩	105,786,642
Daewoo Shipbuilding & Marine Engineering Co., Ltd.		284,492,879		158,416,915
	₩	389,109,830	₩	264,203,557

24. Construction contracts

(1) Details of construction contracts in progress for the years ended December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019					
	Accumulated Revenue	Accumulated cost	Accumulated profit	Receivables	Due from customers for construction contracts	Contract liabilities
Diesel engine	₩ 196,847,251	₩ 163,377,608	₩ 33,469,643	₩ 144,208	₩ 12,605	₩ 2,456,489

	2018					
	Accumulated Revenue	Accumulated cost	Accumulated profit	Receivables	Due from customers for construction contracts	Contract liabilities
Diesel engine	₩ 285,519,085	₩ 241,799,723	₩ 43,719,362	₩ 1,123,700	₩ 1,151,005	₩ 4,629,840

(2) Major construction contract for the years ended December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019					
Order	Description	Construction period	January 1	Increase (Decrease)	Sales	December 31
KHNP and 2 other companies	Singori No. 3 and No. 4 emergency generators, alternative AC power diesel engine and 5 others	2009-06-23 ~ 2022-09-30	₩ 34,266,085	₩ 3,161,759	₩ (6,076,370)	₩ 31,351,474

	2018					
Order	Description	Construction period	January 1	Increase (Decrease)	Sales	December 31
KHNP and 6 other companies	Singori No. 3 and No. 4 emergency generators, alternative AC power diesel engine and 11 others	2009-06-23 ~ 2022-09-30	₩ 20,685,325	₩ 35,100,325	₩ (21,519,565)	₩ 34,266,085

(3) Under the stage-of-completion method, changes in total contract revenues, estimated total contract costs, and due from customers for construction contracts from changes in accounting estimates for the years ended December 31, 2019, are as follows (Korean won in thousands):

	Changes in estimated total contract costs	Impact on the current profit (loss)	Impact on the future profit (loss)	Changes in unbilled construction receivables	Provision for construction losses
Diesel engine	₩ 2,834,542	₩ (321,145)	₩ 3,109,781	₩ 45,906	₩ 3,109,781

The effect on profit or loss is determined based on the current estimates of total contract revenue and total contract costs which reflect circumstances until the current period. The estimates of total contract revenue and total contract cost may change in the subsequent periods.

24. Construction contracts (cont'd)

(4) The contracts which contract price is at least 5% of previous sales which is recognized on the percentage of completion method applying the cost incurred method are as follows (Korean won in thousands):

				Due from customers for construction contracts		Receivables from construction contracts	
	Contract date	Expected date of completion	Percentage of completion	Total amount	Impairment losses	Total Amount	Allowance for doubtful accounts
Sinhanwool Unit 1 and 2 Emergency Generator	2012-01-26	2020-03-31	99.69%	₩ -	₩ -	₩ -	₩ -
Sin-Kori Units 5 and 6 AAC DG PJT	2018-10-10	2022-09-30	0.04%	₩ 12,605	₩ -	₩ -	₩ -
LPX #2 PJT	2015-11-04	2020-11-30	92.83%	₩ -	₩ -	₩ 144,208	₩ -

25. Expenses classified by nature

Expenses classified by nature for the years ended December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019	2018
Changes in inventories	₩ (78,574,232)	₩ 18,408,874
Purchase of raw materials	551,087,233	355,545,846
Salaries	55,636,523	61,192,628
Other employee benefits	13,072,771	14,447,689
Depreciation and amortization	18,558,024	16,233,885
Royalty usage expenses	51,731,345	26,564,878
Others	84,604,280	54,235,314
	₩ 696,115,944	₩ 546,629,114

26. Selling and administrative expenses

Selling and administrative expenses for the years ended December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019	2018
Salaries	₩ 14,287,526	₩ 15,544,184
Other employee benefits	3,426,446	3,674,083
Pension benefits	984,013	1,139,121
Commission expenses	5,342,516	7,659,206
Depreciation	857,021	70,429
Amortization	714,236	406,066
Advertising and marketing expenses	91,356	336,431
Rental expenses	506,619	1,189,462
Allowance for bad debt	64,546	96,763
Research and ordinary development costs	3,265,172	4,063,604
Royalty usage expenses	43,841	11,472
Others	2,963,647	3,085,857
	₩ 32,546,939	₩ 37,186,678

27. Financial income and expenses

Finance income and expenses for the years ended December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019	2018
Finance income:		
Interest income	₩ 815,039	₩ 888,036
Dividend income	-	8,462,456
Gain on foreign currency transaction	19,678,301	16,117,935
Gain on foreign currency translation	512,143	557,048
Gain on derivative transaction	7,150,163	1,726,877
Gain on valuation of derivatives	6,251,587	1,641,765
Gain on valuation of firm commitments	34,272,351	28,217,753
Total	68,679,584	57,611,869
Finance expenses:		
Interest expenses	17,666,757	17,058,401
Expense for financial guarantee	762,677	542,189
Loss on foreign currency transaction	15,525,678	13,506,388
Loss on foreign currency translation	1,787,273	800,641
Loss on derivative transaction	30,299,444	12,807,715
Loss on valuation of derivatives	10,182,692	15,987,393
Loss on valuation of firm commitments	10,034,152	3,695,573
Total	86,258,673	64,398,299
Net finance income(expenses)	₩ (17,579,089)	₩ (6,786,430)

28. Other non-operating income and expenses

Other non-operating income and expenses for the years ended December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019	2018
Other non-operating income:		
Rental income	₩ 56,646	₩ 147,562
Gain on disposal of property, plant and equipment	164,029	20,797
Gain on disposal of intangible assets	273	107,909
Long-term investment & securities valuation gains	118	-
Other income	108,985	12,995,430
Total	330,051	13,271,698
Other non-operating expenses:		
Loss on disposal of trade receivables	13,870	-
Loss on disposal of property, plant and equipment	368,123	139,034
Loss on disposal of intangible assets	11,116	102,832
Impairment loss on Property, plant and equipment	2,834,531	-
Impairment loss on intangible assets		39,123
Loss on revaluation of land	207,867	-
Other impairment loss	29,363	-
Donations	35,236	5,088
Other loss	3,142,035	146,937
Total	₩ 6,642,141	₩ 433,013
Net other non-operating income(expenses)	₩ (6,312,090)	₩ 12,838,685

29. Income tax expense

(1) Details of income tax expense for the years ended December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019	2018
Current income tax expense	₩ -	₩ -
Changes in deferred tax assets (liabilities) related to temporary differences	(4,707,078)	(10,862,688)
Deferred tax assets (liabilities) directly reflected in equity	404,928	(46,811)
Income tax expense (benefit)	₩ (4,302,150)	₩ (10,909,499)

(2) Changes in deferred tax assets and liabilities for the years ended December 31, 2019 and 2018 are as follows (Korean won in thousands):

	2019			
		Change		
	January 1	Profit or loss	Equity	December 31
Net foreign currency translation	₩ 32,443	₩ 269,021	₩ -	₩ 301,464
Depreciation	3,849,343	1,113,089	-	4,962,432
Allowance for doubtful accounts	2,054,501	(107,017)	-	1,947,432
Accrued income	(50,679)	60,754	-	10,075
inventory valuation	13,614,164	(2,356,60)	-	11,257,504
Currency forwards	3,203,187	(1,753,179)	-	1,450,008
Firm commitment assets	(2,721,190)	827,350	-	(1,893,840)
Investment assets	970,458	-	-	970,458
Other intangible assets	40,327	(39,528)	-	799
Accrued expenses	3,590,700	782,503	-	4,373,203
Unearned revenue	(147,089)	11,458	-	(135,631)
Provision for warranty	2,227,834	112,446	-	2,340,280
Contract liabilities	-	755	-	755
Cost for transfer DMI	97,834	-	-	97,834
Provision for defined pension liabilities	1,397,031	527,480	189,468	2,113,979
Gain on revaluation of land and buildings	(56,362,192)	81,417	215,460	(56,065,315)
Advance payment	14,940	1,153,312	-	1,168,252
Provision for litigation	429,762	1,388,262	-	1,818,024
Development costs	8,536,599	(1,052,977)	-	7,483,622
Convertible bond	(1,879,610)	449,274	-	(1,430,336)
Lease Asset	-	(499,933)	-	(499,933)
Lease liabilities	-	510,834	-	510,834
Others	1,983,178	3,826	-	1,987,004
Subtotal	(19,038,054)	1,482,487	404,928	(17,231,044)
Tax deficit carryforwards	23,544,178	2,819,667	-	26,363,845
Subtotal	23,544,178	2,819,667	-	26,363,845
Total	₩ 4,425,719	₩ 4,302,154	₩ 9,286,838	₩ 9,132,801

29. Income tax expense (cont'd)

	2018				
		Change			
	January 1	Profit or loss	Equity	Inc & Dec due to split off	Dec 31
Net foreign currency translation	₩ 310,849	₩ (278,406)	₩ -	₩ -	₩ 32,443
Depreciation	3,625,009	224,334	-	-	3,849,343
Allowance for doubtful accounts	587,898	1,466,603	-	-	2,054,501
Accrued income	(8,964)	(41,715)	-	-	(50,679)
Inventory valuation	10,379,501	3,234,663	-	-	13,614,164
Currency forwards	(4,348,869)	7,552,057	-	-	3,203,187
Firm commitment assets	4,864,940	(7,586,130)	-	-	(2,721,190)
Investment assets	(11,837,772)	-	-	12,808,230	970,458
Other intangible assets	106,554	(66,227)	-	-	40,327
Accrued expenses	5,422,677	(1,831,977)	-	-	3,590,700
Unearned revenue	110,368	(257,457)	-	-	(147,089)
Provision for warranty	2,449,510	(221,677)	-	-	2,227,834
Cost for transfer to DMI	-	97,834	-	-	97,834
Provision for defined pension liabilities	676,002	593,328	127,701	-	1,397,031
Gain on revaluation of land and buildings	(57,855,178)	375,366	-	1,117,620	(56,362,192)
Advance payment	14,940	-	-	-	14,940
Provision for litigation	182,720	247,042	-	-	429,762
Development costs	9,589,576	(1,052,977)	-	-	8,536,599
Dividends Income	(1,791,925)	1,791,925	-	-	-
Convertible bond	-	(1,705,098)	(174,512)	-	(1,879,610)
Others	572,318	1,410,860	-	-	1,983,178
Subtotal	(36,949,846)	3,952,348	(46,811)	13,925,850	(19,118,459)
Tax deficit carryforwards	16,587,031	6,957,147	-	-	23,544,178
Subtotal	16,587,031	6,957,147	-	-	23,544,178
Total	₩ (20,362,815)	₩ 10,909,495	₩ (46,811)	₩ 13,925,850	₩ 4,425,719

(3) Deductible temporary differences, tax deficit and unused tax credit, which have not been recognized as deferred income tax assets expired and unused, as of December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019	2018
Deductible temporary differences:		
Donations in excess of tax limit	₩ 1,712,716	₩ 1,803,318
Unused tax deficit	343,086,144	317,115,566
Unused tax credit	417,932	1,073,387

Maturities of deductible temporary differences and unused tax credit, which have not been recognized as deferred tax assets, are as follows (Korean won in thousands):

	0–1 year	1 year–2 years	2 years–3 years	More than 3 years	Total
Deductible temporary differences:					
Donations in excess of tax limit	-	-	-	1,712,716	1,712,716
Unused tax deficit	-	-	793,633	342,292,511	343,086,144
Unused tax credit	₩ 141,146	₩ 84,078	₩ 44,670	₩ 148,038	₩ 417,932

The probability of deferred tax assets being realized depends on the Group's ability to generate taxable income in future years, the economic situation and the industry forecast. The Group periodically reviews such matters.

29. Income tax expense (cont'd)

(4) Temporary differences associated with investments in subsidiaries and associates, which are not recognized as deferred tax assets, as of December 31, 2019 and 2018, are as follows (Korean won in thousands):

		2019		2018	Description
Subsidiaries	₩	5,670,025	₩	4,758,272	Timing of reversal can be controlled
Associates		88,638		118,235	Reversibility is not probable.
	₩	5,758,663	₩	4,876,507	

(5) Deferred tax assets (liabilities) and income tax benefits (expenses) added to (deducted from) the equity as of December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019			2018					
	Before tax	Deferred tax assets (liabilities)	After tax		Before tax		Deferred tax assets (liabilities)		After tax
Remeasurements of defined benefit liabilities	(3,540,166)	856,720	(2,683,446)	₩	(2,757,240)	₩	667,252	₩	(2,089,988)
Revaluation surplus of land	92,150,020	(22,300,305)	69,849,715		93,168,916		(22,546,878)		70,622,038
	88,609,854	(21,443,585)	67,166,269	₩	90,411,676	₩	(21,879,626)	₩	68,532,050

(6) A reconciliation of income tax expense and accounting income before income tax expense for the years ended December 31, 2019 and 2018, is as follows (Korean won in thousands):

	2019	2018
Loss before income tax expense	₩ (45,746,508)	₩ (29,589,715)
Income tax expense at statutory income tax rate	(11,070,655)	(7,160,711)
Adjustments:	-	-
Additional payment of income tax	-	-
Non-temporary difference	(24,363)	(34,225)
Tax deduction	-	-
Temporary difference not recognized as deferred income tax	6,064,499	(3,669,943)
Others	728,369	44,620
Income tax expense (benefit)	₩ (4,302,150)	(10,909,499)
Effective tax rate	(*1)	(*1)

(*1) The effective tax rate was not calculated due to net loss before tax.

30. Loss per share

(1) Basic earnings (losses) per share

Basic earnings (losses) per share are computed by dividing net income (loss) by the weighted-average shares number of common shares outstanding during the period (Korean won in thousands, except for the number of shares):

		2019		2018
Net loss available to common shares	₩	(41,444,358)	₩	(18,680,216)
Weighted-average number of common shares outstanding (*)		32,939,640		48,465,622
Basic net loss per share		(1,258)		(385)

30. Loss per share (cont'd)

(2) Details of the calculation of the weighted-average number of common shares as of December 31, 2019 are as follows:

2019

Details	Period	Number of shares	Weighted	Drop number
Jan 1	2019.1.1 ~ 2018.12.31	32,947,142	365	8,994,569,766
acquisition of own shares	2019.1.1 ~ 2018.12.31	(7,502)	365	(2,048,046)
		32,939,640		8,992,521,720

* Weighted average number of common shares: 12,022,968,600÷ 365days = 32,939,640

2018

Details	Period	Number of shares	Weighted	Drop number
Jan 1	2018.1.1 ~ 2018.12.31	69,500,000	365	25,367,500,000
Split off	2018.6.6 ~ 2018.12.31	(36,552,858)	210	(7,676,100,180)
Acquisition treasury stock	2018.6.22 ~ 2018.12.31	(7,502)	193	(1,447,886)
		32,939,640		17,689,951,934

* Weighted average number of common shares: 17,689,951,934 ÷ 365days = 48,465,622

(3) Diluted earnings per share

The Company does not compute diluted earnings per common share for the years ended December 31, 2019 and 2018, because there is no dilutive effect of potential ordinary share (share-based payment). Diluted earnings per share are equal to earnings per share for the years ended December 31, 2019 and 2018.

Due to the antidilutive effect for the years ended December 31, 2019 and 2018, the Company is not considering share option, which could dilute the basic earnings per share in the future. (Number of shares)

	2019	2018
Stock option	5,900	86,400
Convertible bond	13,020,833	9,940,357

31. Commitments and contingencies

(1) Notes and checks provided as collateral

As of December 31, 2019, the Group provides five blank notes (2018: 5) to Daewoo Shipbuilding & Marine Engineering Co. and four others in connection with the guarantee of the return of advanced payment and contract performance.

(2) Pending litigation

As of December 31, 2019, there is one pending lawsuit with total litigation value of ₩21,928 million, and the outcome of the lawsuit is not estimable. Also, there is one ongoing lawsuit regarding ordinary wages. The Company is unable to reasonably predict the outcome of the above litigation and is uncertain about the amount and timing of the outflow of resources. If the salary items previously not included in ordinary wages, such as regular bonuses, fall under ordinary wages, the Company may have to pay additional past wages in the future.
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31. Commitments and contingencies (cont'd)

(3) Commitments with financial institution (Korean won in thousands, CHF, JPY, EUR, USD)

	Financial institution	Credit limit		Amounts exercised	
Trade-Finance Agreement	Korea Development Bank	KRW	4,300,000	KRW	4,300,000
	Kyong Nam Bank	KRW	30,000,000	KRW	30,000,000
	NH Bank	KRW	20,000,000	KRW	20,000,000
	The Export-Import Bank of Korea	KRW	20,000,000	KRW	20,000,000
Electronic loan facilities	Kookmin Bank	KRW	600,000	KRW	149,802
Issuance of letter of credit	Kyong Nam Bank	USD	10,000,000	USD	6,323,068
	KEB Hana Bank	USD	1,500,000	USD	671,996
Other guarantees in foreign currency	KEB Hana Bank	USD	4,935,981	USD	4,935,981
	Woori Bank	USD	3,168,000	USD	3,168,000
	NH Bank	USD	2,501,850	USD	2,501,850
	Kyong Nam Bank	USD	11,681,000	USD	11,505,521
	The Export-import Bank of Korea	USD	9,504,900	USD	9,504,900
	Seoul Guarantee Insurance	USD	19,328,867	USD	19,328,867
	Company	EUR	1,143,917	EUR	1,143,917
Other guarantees in Korean won	Woori Bank	KRW	450,183	KRW	450,183
	Seoul Guarantee Insurance Company	KRW	12,117,101	KRW	12,117,101

(4) Technology transfer contract

The Group has 8 technical licenses agreements with several foreign companies for the purpose of manufacturing engines. In accordance with the agreements, the Group is committed to pay a royalty calculated based on the cumulative horse power of engines manufactured during the year. The royalty amounted to ₩51,731,345 thousand and ₩26,564,878 thousand for the years ended December 31, 2019 and 2018, respectively.

32. Guarantees and pledged assets

(1) Guarantees

Guarantees provided to the Group from third parties as of December 31, 2019, are as follows (in foreign currencies and thousands of Korean won):

Guarantee received from	Guaranteed amount (foreign currency)		Description of guarantee
KEB Hana Bank	USD	4,935,981	Fulfillment of a contract
Woori Bank	USD	3,168,000	Guarantee for advance receipts, defect and fulfillment of a contract
	KRW	450,184	
NH Bank	USD	2,501,850	Guarantee for advance receipts
Kyong Nam Bank	USD	11,505,521	Guarantee for advance receipts, defect and fulfillment of a contract
The export-import Bank of Korea	USD	9,504,900	Guarantee for advance receipts, fulfillment of a contract
Seoul Guarantee Insurance Company	USD	19,328,867	Guarantee for advance receipts, defect and fulfillment of a contract
	EUR	1,143,917	
	KRW	12,117,101	
subtotal	USD	50,945,119	Guarantee for advance receipts, defect and fulfillment of a contract
	EUR	1,143,91	
	KRW	12,567,284	

(2) Pledged assets

The Group has pledged fixed assets as collateral in relation to the property, plant & equipment and inventories. Details of collateralized items are as follows (See Note 12) (in foreign currencies and Korean won in thousands):

	Financial institution	Pledged assets	Book value	Established amount	Amount of collateral
Limited loan	Korea Development Bank	Land, Buildings	₩ 6,159,191	₩ 7,565,340	₩ 4,300,000
12th Bond	Korea Real Estate Investment & Trust Co., Ltd	Land, Buildings, Machinery	₩ 378,023,968	₩ 96,000,000	₩ 80,000,000
9th Convertible Bond	Korea Real Estate Investment & Trust Co., Ltd	Land, Buildings, Machinery	₩ 378,023,968	₩ 54,000,000	₩ 45,000,000
Loans, L/C opening and foreign currency payment guarantee	Kyong Nam Bank	Land, Buildings, Machinery	₩ 378,023,968	₩ 59,750,737	₩ 46,887,992
Loans and Payment Guarantees of Foreign currency	NH Bank.,	Land, Buildings, Machinery	₩ 378,023,968	₩ 24,000,000	₩ 20,000,000
Import fund, export growth fund and export planet guarantee	Export-Import Bank of Korea	Inventories	₩ 145,110,093	₩ 62,500,000	₩ 20.000,000

33. Related parties

(1) Related parties of the Company and their relationship with the Company as of December 31, 2019 and 2018 are as follows:

< December 31, 2019>

Relationship	Related parties
Controlling company(*1)	Socius Well to Sea Investment No.1 Recovery Private Equity Fund
Associates	Dalian Samyoung Doosan Metal Product Co., Ltd. (DSDMP)
Other related parties(*2)	Inhwa Co., Ltd., Daeyeon Co., Ltd., Haedong Co., Ltd., Samhwan Co., Ltd., Bnp Co., Ltd.

(*1) On June 5, 2018, the Socius Well To Sea acquired 42.66% ownership of the Group previously held by Doosan Heavy Industries Construction Co., Ltd. and became the largest shareholder of the Group.

(*2) Inhwa holds a 59.86% ownership in Socius Well to Sea Investment No. 1., the controlling company.

<December 31, 2018>

As of June 5, 2018, as Doosan Heavy Industries Construction sold 42.66% of its holdings to Socius Well to Sea, the related party relation has been extinguished. The related party relations before the sale were as follows.

Relationship	Related parties
Controlling company	Socius Well to Sea Investment No.1 Recovery Private Equity Fund(*1)
Ultimate controlling company	Doosan Corporation (“DS”)
Intermediate controlling company	Doosan Heavy Industries Construction Co., Ltd. (“DHIC”)
Associates	DSDMP, Doosan Cuvex Co., Ltd., DBC
Other related parties of ultimate and intermediate controlling companies	Doosan Infracore Co., Ltd., Doosan Bobcat Co., Ltd. (“DB”), Doosan Engineering & Construction Co., Ltd. (“Doosan E&C”), Oricom Inc. (“Oricom”), Doosan Bears Inc., Doosan Tower Co., Ltd. (“Doosan Tower”)
Affiliates of large-scale conglomerate	Neo Holdings, Bigant
Other related parties(*2)	Inhwa Co., Ltd, Daeyeon Co., Ltd, Haedong Co., Ltd, Samhwan Co., Ltd, Bnp Co., Ltd

(*1) On June 5, 2018, the Socius Well To Sea acquired 42.66% ownership of the Group previously held by Doosan Heavy Industries Construction Co., Ltd. and became the largest shareholder of the Group.

(*2) Inhwa holds a 59.86% ownership in Socius Well to Sea Investment No. 1., the controlling company.

33. Related parties (cont'd)

(2) Significant transactions with related parties for the years ended December 31, 2019 and 2018, are as follows (Korean won in thousands):

		2019			
		Sales		Purchases	
	Company name	Sales	Other income	Purchases	Other expenses
Controlling company	Socius Well to Sea	₩ -	₩ -	₩ -	₩ 2,250,000
Associates	DSDMP	56,502	-	-	-
Other related parties	Inhwa Co., Ltd.	959,518	-	21,302,246	-
		₩ 1,016,020	₩ -	₩ 21,302,246	₩ 2,250,000

		2018				
		Sales		Purchases		
	The related parties	Sales	Other incomes	Purchases	Acquisition of property, plant and equipment and intangible assets	Other expenses
Controlling company	Socius Well to Sea Investment	₩ -	₩ -	₩ -	₩ -	₩ 1,189,726
Ultimate controlling company	DS(*1)	753,068	394,305	2,658,583	142,000	650,017
Intermediate controlling company	DHIC(*1)	-	-	16,881,184	-	-
Associates	DSDMP	569,774	-	-	-	-
	Doosan Cuvex Co. Ltd. (*1)	-	2,285	492,804	-	-
Other related parties	Inhwa Co., Ltd.	153,563	-	6,070,927	-	-
	Doosan E&C(*1)	-	-	68,442	149	-
	Others(*1)	-	-	24,583	-	505,679
		₩ 1,476,405	₩ 396,590	₩ 26,187,286	₩ 142,149	₩ 2,345,422

(*1) The above significant transactions with the related parties are based on the transactions occurred before June 5, 2018, the date of which Doosan Heavy Industries Construction Co., Ltd. disposed of its 42.66% ownership of the Group and was excluded from the related party disclosure.

(3) Significant balances related to the transactions between the Group and related parties are as follows (Korean won in thousands):

		2019					
		Sales			Purchases		
	The related parties	Trade receivables	Other receivables	Loans	Trade payables	Other payables	Convertible Bond
Controlling company	Socius Well To Sea	₩ -	-	-	-	567,123	45,000,000
Associates	DSDMP	1,324	-	-	-	-	-
Other related parties	Inhwa Co., Ltd.	85,662	-	-	1,079,628	-	-
		₩ 86,986	₩ -	₩ -	₩ 1,079,628	₩ 567,123	₩ 45,000,000

33. Related parties (cont'd)

		2018					
		Sales			Purchases		
	The related parties	Trade receivables	Other receivables	Loans	Trade payables	Other payables	Convertible Bond
Controlling company	Socius Well To Sea	-	-	-	-	-	45,000,000
Associates	DSDMP	7,551	-	-	-	-	-
Other related parties	Inhwa Co., Ltd.	-	-	-	-	-	-
		₩ 7,551	₩ -	₩ -	₩ -	₩ -	₩ 45,000,000

(4) The Group defines key management personnel as registered officer and non-registered officer who have the authority and responsibility for planning, operation and control and are in charge of business or division unit. Compensation to key management personnel of the Group for the years ended December 31, 2019 and 2018, is as follows (Korean won in thousands):

	2019	2018
Salaries	₩ 1,173,250	₩ 2,166,472
Pension benefits	106,988	175,882
	₩ 1,280,238	₩ 2,342,354

34. Consolidated statements of cash flows

(1) The adjustments and changes in operating assets and liabilities in the statements of cash flows for the years ended December 31, 2019 and 2018, are as follows (Korean won in thousands):

	2019	2018
Expenses not involving cash outflows:		
Interest expenses	₩ 17,666,757	₩ 17,058,401
Pension benefits	3,807,060	4,084,047
Loss on valuation of inventories	-	8,467,637
Bad debt expenses	64,546	96,763
Other allowance for doubtful accounts	29,363	-
Depreciation	15,105,365	14,962,321
Right-of-use assets depreciation	1,954,083	-
Amortization	1,533,093	1,271,565
Loss on foreign currency translation	1,787,273	800,641
Loss on foreign exchange	-	193,223
Loss on valuation of derivatives	10,182,692	15,987,393
Loss on valuation of firm commitments	10,034,152	3,695,573
Loss on disposal of property, plant and equipment	368,123	139,034
Impairment loss on property, plant and equipment	2,834,531	-
Loss from revaluation of land	207,867	-
Loss on disposal of intangible assets	11,116	102,831
Impairment loss on intangible assets	-	39,123
Provision for defects	2,057,561	-
Loss on valuation of investments in associates	17,518	326,201
Income not involving cash inflows:		
Interest income	(815,039)	(888,036)
Dividend income	-	(8,462,456)
Income tax profit	(4,302,150)	(10,909,499)
Reversal of loss on valuation of inventories	(6,794,520)	-
Gain on foreign currency translation	(512,143)	(557,047)
Gain on short-term financial asset valuation	(118)	-
Gain on valuation of derivatives	(6,251,587)	(1,641,765)
Gain on valuation of firm commitments	(34,272,351)	(28,217,753)
Gain on disposal of property, plant and equipment	(164,029)	(20,797)
Gain on disposal of intangible assets	(273)	(107,909)
Gain on valuation of investment in associates	-	(11,232)
Rental sales	(23,213)	(8,963)
Reversal of provisions	(4,611,191)	(287,396)
	₩ 9,914,486	₩ 16,111,900

34. Consolidated statements of cash flows (cont'd)

	2019	2018
Changes in operating assets and liabilities:		
Trade receivables	₩ (58,601,583)	₩ 6,694,246
Other receivables	(268,189)	189,096
Contract assets	1,138,400	300,136
Inventories	(71,775,296)	9,951,272
Other current assets	(6,645,207)	428,259
Long-term accounts receivable – other	1,464,686	1,814,476
Other non-current assets	1,362,736	(2,139,137)
Derivative instruments	(11,175,645)	16,861,218
Firm commitments	27,656,999	(6,825,464)
Trade payables	56,286,292	3,839,374
Other payables	8,626,218	(592,268)
Due to customers for construction contracts	(2,176,135)	(6,867,956)
Advance receipts	25,003,194	13,377,765
Other current liabilities	1,881,195	(11,563,383)
Long-term other payable	(1,387,629)	1,916,383
Payment of severance benefits	(1,627,394)	(1,397,248)
Transfer in	-	116,928
Transfer out	-	(509,185)
Provision	10,087,479	2,236,068
	₩ (20,149,879)	₩ 27,830,580

(2) Significant non-cash transactions for the years ended December 31, 2019 and 2018, are as follows (Korean won in thousands)

	2019	2018
Reclassification of construction-in-progress to property, plant and equipment	₩ 1,193,787	₩ 223,321
Transfer of property, plant and equipment	-	40,772,529
Transfer of financial assets at FVOCI	-	384,363,441
Transfer of investment in associates	-	5,827,893
Transfer of other receivables	-	4,350
Transfer of leasehold deposits	-	42,203
Transfer of short-term borrowings	-	135,000,000
Transfer of short-term lease leasehold deposits	-	1,619,503
Increase (decrease) in other payables from acquisition of property, plant and equipment	55,313	68,068
Revaluation of assets (after deduction of income tax)	(890,332)	1,129,697
Transfer of long-term loans to current portion	(6,619,220)	7,148,010
Reclassification of long-term bonds payable to short-term bonds payable	-	130,000,000
Reclassification of long-term borrowings to short-term borrowings	50,000,000	-
Transfer of provisions to current portion	635,437	34,658
Lease deposit resulting from acquisition of the right-of-use assets	56,295	-
Lease liabilities resulting from the acquisition of the right-of-use assets	3,994,088	-
Transfer of lease liabilities to current portion	1,931,575	-

35. Assumptions about going concern

The Group's consolidated financial statements have been prepared under the assumption that the Group will continue to exist as a going concern, where assets and liabilities are recorded on the basis that the Group will be able to realize its assets and discharge its liabilities in the normal course of business.

However, the Group recognized operating loss of ₩21,838 million and a net loss of ₩41,444 million during the year ended December 31, 2019. As of December 31, 2019, the Group's current liabilities exceeded its current assets by ₩240,541 million. These conditions indicate the existence of a material uncertainty that may cast significant doubt on the Group's ability to continue as a going concern.

The management expects to reduce current liabilities by financial activities such as repayment of short-term borrowings and extension of maturity, as well as by creating ordinary profits based on stable order volumes with enhanced profitability followed by improvement in operating cash flows.

If plans above are disrupted due to the changes in future events or circumstances and the Group is unable to continue to exist as a going concern, the Group may not realize its assets and discharge its liabilities in their carrying amounts in the normal course of business. The consolidated financial statements do not include the adjustments on the measurement, classification, and presentation of assets and liabilities and related profit and loss, which may incur as a result of the existence of uncertainty and concluding that going concern assumption is inappropriate.