



DOOSAN CORPORATION AND ITS SUBSIDIARIES

Consolidated Financial Statements

For the years ended December 31, 2018 and 2017

With the independent auditor's report

Doosan Corp.

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Independent auditor's report

The Shareholders and Board of Directors Doosan Corporation

Opinion

We have audited the consolidated financial statements of Doosan Corporation (the "Company") and its subsidiaries (collectively referred to as the "Group"), which comprise the consolidated statements of financial position as of December 31, 2018 and 2017, and the consolidated statements of profit or loss, consolidated statements of comprehensive income, 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, 2018 and 2017, and its consolidated financial performance and its consolidated cash flows for the years then ended in accordance with Korean International Financial Reporting Standards.

Basis for opinion

We conducted our audit 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 audit 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.

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.

(1) Recognition of revenue based on the input method

As described in Note 2 to the consolidated financial statements, the Group measures percentage-of-completion using the input method and recognizes revenue over time by measuring progress towards complete satisfaction. This revenue recognition accounting policy applies primarily to Doosan Heavy Industries & Construction Co., Ltd and its subsidiaries in the Group.

Because revenue recognition based on the input method varies depending on the measured percentage-of-completion, management's judgment on the method of measuring progress, estimated total contract cost, and construction is required. Therefore, as revenue is exposed to the risk of overstatement due to errors in judgment or the intention, we have identified the recognition of revenue based on the input method of Doosan Heavy Industries & Construction Co., Ltd and its subsidiaries as a key audit matter.

The main audit procedures we have conducted in this regard include:

- Retrospective review of the actual cost incurred during the current period compared to expected costs as of December 31, 2017 by selecting significant projects completed during the current period.
- Inquiry and inspection of documents for projects with significant changes in estimated total contract cost
- Review on the causes of increase and decrease in the percentage-of-completion of construction by report periods
- Comparison review of percentage-of-completion by process (monthly progress report) and cost-based percentage-of-completion for major projects, and if there is a significant difference, inquiry and inspections of documents
- Check of evidences for verifying the existence of material costs and expenses input by the sampling method
- Selection and testing of a risk scenario on whether there has been any diversion of costs in projects by IT audit
- Review of materials in progress and on-site visits
- Recalculation of the percentage-of-completion by projects
- Review of changes in contract terms and inspection of related documents (Change Order and others) to check the adequacy of changes in contract price
- Inquiry and inspection of documents about contracts that are past the contractual delivery date by comparing and analyzing the contractual delivery date and the expected delivery date as of the end of the reporting period
- Review of appropriateness of the estimated amount of liquidated damages

(2) Evaluation on the recoverability of trade receivables and due from customers for contract work

As described in Note 2 to the consolidated financial statements, the Group calculates expected credit losses based on the expected duration of the expected credit losses and evaluates the recoverability of trade receivables and due from customers for contract work.

In calculating expected credit losses of Doosan Heavy Industries & Construction Co., Ltd and its subsidiaries, management's judgment is required in calculating expected credit losses due to the uncertainty over the collection of due from customers for contract work because of delays in payment of orders, changes in terms and conditions, and claims. Therefore, as trade receivables and due from customers for contract work are exposed to the risk of overstatement due to errors in judgment or the intention, we have identified the assessment of recoverability of the trade receivables and due from customers for contract work of Doosan Heavy Industries & Construction Co., Ltd and its subsidiaries as a key audit matter.

The main audit procedures we have conducted in this regard are as follows:

- Checking the contract and inquire the contractual payment terms, delay compensation, delivery time and other obligations for projects that due from customers for contract work have been increased significantly
- Inquiry and inspection of documents of long-term due from customers for contract work
- In the event of due from customers for contract work is in relation to a contract with provisions for trade receivables, inquire the financial soundness of order holder and inspection of related documents
- External inspection of major orders by sampling method

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

Management is responsible for the preparation and fair presentation of the consolidated financial statements in accordance with Korean International Financial Reporting Standards, and for such internal control as management determines is necessary to enable the preparation of 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 partner in charge of the audit resulting in this independent auditor's report is *Jee Hoon Kim*.



March 21, 2019

This audit report is effective as of March 21, 2019, the independent auditor's report date. Accordingly, certain material subsequent events or circumstances may have occurred during the period from the 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.

Doosan Corporation and its subsidiaries

Consolidated financial statements
for the years ended December 31, 2018 and 2017

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

Hyun Soo, Dong
Chief Executive Officer
Doosan Co., Ltd.

Doosan Corporation and its subsidiaries
Consolidated statements of financial position
as of December 31, 2018 and 2017

(Korean won)

	Notes	2018	2017
Assets			
Current assets:			
Cash and cash equivalents	4, 5, 10, 36	₩ 2,456,189,369,971	₩ 2,344,600,297,096
Short-term financial instruments	4, 5, 10, 34	395,467,218,033	283,255,604,788
Short-term investment securities	4, 6, 10, 34	35,673,839,601	133,975,273,587
Trade receivables	4, 7, 10, 34, 35	2,528,325,139,425	2,328,337,949,101
Other receivables	4, 7, 10, 35	605,416,390,270	500,116,696,254
Due from customers for contract work	4, 26	2,006,186,031,512	2,050,776,983,119
Current derivative assets	4, 9, 10	22,986,756,677	75,174,106,333
Current firm commitment assets	9	9,530,070,374	6,253,704,029
Inventories	8, 34	2,608,021,732,388	2,351,625,599,828
Other current assets		918,097,617,353	793,872,047,963
Total current assets		11,585,894,165,604	10,867,988,262,098
Non-current assets:			
Long-term financial instruments	4, 5, 10, 34	15,756,857,975	31,670,231,171
Long-term investment securities	4, 6, 10, 34	204,526,462,081	205,974,327,642
Investments in associates and joint ventures	11, 34	173,953,843,283	126,562,324,106
Property, plant and equipment	3, 12, 34	7,768,328,605,168	8,198,814,853,198
Intangible assets	3, 13	7,018,209,744,701	6,792,010,933,796
Investment properties	3, 14, 34	454,789,644,765	467,850,738,041
Long-term trade receivables	4, 7, 10, 35	11,364,182,143	18,578,556,010
Long-term other receivables	4, 7, 10, 35	747,991,638,334	1,037,325,128,700
Non-current derivative assets	4, 9, 10	21,848,672,708	56,861,129,282
Non-current firm commitment assets	9	14,740,733,510	2,747,639,542
Deferred tax assets	3, 31	479,880,839,786	548,167,214,070
Deposits	4, 5, 10	337,017,966,911	371,865,297,031
Other non-current assets		45,978,262,819	42,605,262,943
Total non-current assets		17,294,387,454,184	17,901,033,635,532
Total assets		₩ 28,880,281,619,788	₩ 28,769,021,897,630

(Continued)

Doosan Corporation and its subsidiaries
Consolidated statements of financial position
as of December 31, 2018 and 2017 (cont'd)
(Korean won)

	Notes	2018	2017
Liabilities			
Current liabilities:			
Trade payables	4, 10, 35	₩ 3,545,732,233,469	₩ 3,240,711,137,918
Other payables	4, 10, 35	1,337,419,605,353	1,161,790,680,862
Due to customers for contract work	26	1,248,826,919,349	841,840,468,599
Short-term borrowings	4, 10, 15, 33, 34	3,187,563,078,435	4,349,942,596,034
Current portion of bonds	4, 10, 15	1,409,156,416,811	1,331,969,108,362
Current portion of long-term borrowings	4, 10, 15, 34	868,681,480,591	999,491,179,765
Asset-backed loans	4, 10, 15, 34, 35	491,371,402,314	422,709,635,804
Current portion of long-term asset-backed loans	4, 10, 15, 34, 35	168,033,174,784	174,914,922,491
Current derivative liabilities	4, 9, 10	42,429,836,296	90,114,561,186
Current firm commitment liabilities	9	5,286,700,029	66,958,419,588
Current tax liabilities		49,885,396,408	93,269,062,735
Current provisions	3, 17, 26	195,227,848,456	173,366,615,667
Other current liabilities		767,305,324,431	774,834,105,734
Total current liabilities		13,316,919,416,726	13,721,912,494,745
Non-current liabilities:			
Bonds	4, 10, 15	2,502,807,608,984	2,878,122,090,507
Long-term borrowings	4, 10, 15, 34	3,667,600,341,106	2,270,385,145,427
Long-term asset-backed loans	4, 10, 15, 34, 35	248,788,085,785	197,479,161,174
Net defined benefit liabilities	3, 16	669,314,295,316	728,881,831,982
Long-term other liabilities	4, 10	344,638,559,155	398,405,631,057
Non-current derivative liabilities	4, 9, 10	48,693,726,567	107,394,126,440
Non-current firm commitment liabilities	9	22,322,947,888	49,556,383,328
Non-current provisions	3, 17	237,803,528,946	238,546,120,013
Deferred tax liabilities	3, 31	471,990,708,109	377,700,946,498
Other non-current liabilities		204,356,210,134	197,219,897,594
Total non-current liabilities		8,418,316,011,990	7,443,691,334,020
Total liabilities		21,735,235,428,716	21,165,603,828,765
Equity			
Equity attributable to owners of the parent:			
Share capital	1, 18	134,845,735,000	134,845,735,000
Capital surplus	18, 19	761,433,751,850	844,251,163,304
Other equity items	20	(396,336,775,538)	(444,472,068,908)
Accumulated other comprehensive income	6, 9, 21	551,449,281,371	606,921,334,392
Retained earnings	22	960,134,735,858	1,332,520,308,770
		2,011,526,728,541	2,474,066,472,558
Non-controlling interests	23	5,133,519,462,531	5,129,351,596,307
Total equity		7,145,046,191,072	7,603,418,068,865
Total liabilities and equity		₩ 28,880,281,619,788	₩ 28,769,021,897,630

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

Doosan Corporation and its subsidiaries
Consolidated statements of profit or loss
for the years ended December 31, 2018 and 2017
(Korean won)

	Notes	2018	2017
Sales	3, 24, 25, 26, 35	₩ 18,172,166,696,843	₩ 16,913,443,116,897
Cost of sales	27, 35	14,848,657,906,957	13,816,653,293,189
Gross profit		3,323,508,789,886	3,096,789,823,708
Selling and administrative expenses	27, 28	2,107,627,393,840	1,929,172,020,114
Operating profit	24	1,215,881,396,046	1,167,617,803,594
Finance income	10, 29	589,516,283,157	1,122,160,026,244
Finance expenses	10, 29	1,222,875,344,449	1,677,535,085,793
Other non-operating income	10, 30	80,443,311,770	189,082,513,412
Other non-operating expenses	10, 30	624,547,239,718	431,415,946,799
Share of loss of associates and joint ventures accounted for using the equity method	11	(27,864,644,356)	(13,979,629,376)
Profit before income tax expenses		10,553,762,450	355,929,681,282
Income tax expenses	31	258,855,449,060	244,347,905,964
Profit (loss) from continuing operations		(248,301,686,610)	111,581,775,318
Loss from discontinued operations	37	(92,209,307,904)	(65,632,664,385)
Profit (loss) for the year	23	₩ (340,510,994,514)	₩ 45,949,110,933
Profit (loss) for the year attributable to:			
Equity holders of the parent		₩ (116,862,087,818)	₩ 40,567,984,409
Non-controlling interests		₩ (223,648,906,696)	₩ 5,381,126,524
Earnings (losses) per share attributable to the equity holders of the parent	32		
Basic earnings (losses) per ordinary share from continuing operations		₩ (4,612)	₩ 2,891
Basic earnings (losses) per ordinary share		₩ (5,955)	₩ 1,909
Diluted earnings (losses) per ordinary share from continuing operations		₩ (4,612)	₩ 2,891
Diluted earnings (losses) per ordinary share		₩ (5,955)	₩ 1,909
Basic earnings (losses) per old-type preferred share from continuing operations		₩ (4,573)	₩ 2,920
Basic earnings (losses) per old-type preferred share		₩ (5,905)	₩ 1,928
Diluted earnings (losses) per old-type preferred share from continuing operations		₩ (4,573)	₩ 2,920
Diluted earnings (losses) per old-type preferred share		₩ (5,905)	₩ 1,928

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

Doosan Corporation and its subsidiaries
Consolidated statements of comprehensive income
for the years ended December 31, 2018 and 2017
(Korean won)

	Notes	2018	2017
Profit (loss) for the year		₩ (340,510,994,514)	₩ 45,949,110,933
Other comprehensive income	21		
Items not to be subsequently reclassified to profit or loss			
Remeasurements of net defined benefit liabilities	16	16,347,949,110	54,940,380,773
Land revaluation surplus	12	(65,270,819,772)	300,341,925,685
Gain on valuation of financial assets (designated) at fair value through Other Comprehensive Income	6	751,048,684	-
Items to be subsequently reclassified to profit or loss			
Gain on valuation of available-for-sale financial assets	6	-	5,448,822,419
Gain (loss) on valuation of derivatives designated as cash flow hedges	9	21,710,854,436	(37,353,099,563)
Gain (loss) on foreign operations translation		139,060,051,529	(129,194,172,434)
Share of other comprehensive loss of associates and joint ventures		(3,619,941,807)	(1,110,233,517)
Total other comprehensive income		108,979,142,180	193,073,623,363
Total comprehensive income (loss) for the year		₩ (231,531,852,334)	₩ 239,022,734,296
Profit (loss) attributable to:			
Equity holders of the parent		₩ (163,126,840,756)	₩ 178,792,606,203
Non-controlling interests		₩ (68,405,011,578)	₩ 60,230,128,093

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

Doosan Corporation and its subsidiaries
Consolidated statements of changes in equity
for the years ended December 31, 2018 and 2017
(Korean won)

	Share capital	Capital surplus	Other equity items	Accumulated other comprehensive income	Retained earnings	Non-controlling interests	Total
As of January 1, 2017	₩ 134,838,235,000	₩ 827,782,485,400	₩ (493,679,547,141)	₩ 511,895,897,145	₩ 1,410,689,241,495	₩ 5,509,361,812,964	₩ 7,900,868,124,863
Total comprehensive income:							
Profit for the year	-	-	-	-	40,567,984,409	5,381,126,524	45,949,110,933
Remeasurements of net defined benefit liabilities	-	-	-	-	21,724,396,123	33,215,984,650	54,940,380,773
Land revaluation surplus	-	-	-	115,028,477,082	21,474,788,424	163,838,660,179	300,341,925,685
Gain on valuation of available-for-sale financial assets	-	-	-	898,267,984	-	4,550,554,435	5,448,822,419
Loss on valuation of derivatives designated as cash flow hedges	-	-	-	(9,644,266,164)	-	(27,708,833,399)	(37,353,099,563)
Loss on foreign operations translation	-	-	-	(3,446,930,143)	-	(120,747,242,291)	(123,194,172,434)
Share of other comprehensive loss of associates and joint ventures	-	-	-	(2,810,111,512)	-	1,699,877,995	(1,110,233,517)
Subtotal				95,025,437,247	83,767,168,956	60,230,128,093	239,022,734,296
Transactions with shareholders directly reflected							
In shareholders' equity and others:							
Exercise of stock options	7,500,000	180,464,400	(62,050,400)	-	-	-	125,914,000
Cancellation of stock options	-	1,802,180,300	(1,802,180,300)	-	(100,425,616,900)	-	(166,111,458,185)
Payment of dividends	-	-	61,480,484,781	-	(61,480,484,781)	-	-
Retirement of treasury stocks	-	-	-	-	-	13,948,638,772	13,948,638,772
Changes in scope of consolidation	-	-	-	-	-	(189,929,723)	(168,025,679)
Transaction of treasury stocks in subsidiaries	-	21,904,044	-	-	-	(11,281,209,306)	(7,373,203,868)
Acquisition of investments by subsidiaries	-	3,908,005,438	-	-	-	128,545,873,829	127,715,152,536
Disposal of part of investments by subsidiaries	-	-	(830,721,283)	-	-	-	-
Stock options of subsidiaries	-	1,480,577,491	(1,480,577,491)	-	-	-	-
Conversion of convertible bonds of subsidiaries	-	(11,277,376)	-	-	-	22,020,685	10,743,309
Issuance of bonds with stock warrants in subsidiaries	-	22,621,793,787	-	-	-	62,327,760,578	84,949,554,365
Exercise of stock warrants of subsidiaries	-	(3,718,656,164)	-	-	-	8,268,514,706	4,549,858,542
Repayment of hybrid bonds of subsidiaries	-	-	(8,097,202,730)	-	-	(559,067,394,270)	(567,164,597,000)
Payment of dividends on hybrid bonds	-	-	-	-	-	(26,656,014,920)	(26,656,014,920)
Changes in share ratio of subsidiaries	-	(9,816,314,016)	(274,334)	-	-	9,527,236,184	(289,352,166)
Subtotal	7,500,000	16,468,677,904	49,207,478,233	606,921,334,392	(161,906,101,681)	(440,240,344,750)	(536,482,750,294)
As of December 31, 2017	₩ 134,845,735,000	₩ 844,251,163,304	₩ (444,472,068,908)	₩ 606,921,334,392	₩ 1,352,520,308,770	₩ 5,129,351,696,307	₩ 7,803,418,068,865

(Continued)

Doosan Corporation and its subsidiaries
Consolidated statements of changes in equity
for the years ended December 31, 2018 and 2017 (cont'd)
(Korean won)

	Share capital	Capital surplus	Other equity items	Accumulated other comprehensive income	Retained earnings	Non-controlling interests	Total
As of January 1, 2018	₩ 134,845,735,000	₩ 844,251,163,304	₩ (444,472,068,908)	₩ 605,921,334,392	₩ 1,332,520,308,770	₩ 5,129,351,596,307	₩ 7,603,418,068,865
Effect of adoption of new accounting standards (See Note 2)	-	-	-	(8,652,701,395)	(20,123,316,200)	(63,263,887,016)	(92,039,904,611)
As of January 1, 2018 (Modified)	₩ 134,845,735,000	₩ 844,251,163,304	₩ (444,472,068,908)	₩ 598,268,632,997	₩ 1,312,396,992,570	₩ 5,066,087,709,291	₩ 7,511,378,164,254
Total comprehensive loss:							
Loss for the year	-	-	-	-	(116,862,087,818)	(223,648,906,696)	(340,510,994,514)
Remeasurements of net defined benefit liabilities	-	-	-	-	(14,800,542,513)	30,948,491,623	16,347,949,110
Land revaluation surplus	-	-	-	(62,130,720,958)	14,697,285,503	(17,837,384,317)	(65,270,819,772)
Gain on valuation of financial assets (designated) at fair value through OCI	-	-	-	40,135,697	1,928,916	708,984,071	751,048,684
Gain on valuation of derivatives designated as cash flow hedges	-	-	-	6,809,385,283	-	14,901,469,153	21,710,854,436
Gain on foreign operations translation	-	-	-	10,189,877,855	-	128,870,173,674	139,060,051,529
Share of other comprehensive loss of associates and joint ventures	-	-	-	(1,122,102,721)	-	(2,347,839,086)	(3,619,941,807)
Subtotal	-	-	-	₩ (46,363,424,844)	₩ (116,763,415,912)	₩ (68,405,011,578)	₩ (231,531,852,334)
Transactions with shareholders directly reflected in shareholders' equity and others:							
Capital share issue costs	-	(877,900)	-	-	-	-	(877,900)
Cancellation of stock options	-	6,365,065,700	(6,365,065,700)	-	(177,090,255,099)	(85,329,824,576)	(242,420,079,677)
Payment of dividends	-	-	58,408,585,701	-	(58,408,585,701)	-	-
Retirement of treasury stocks	-	(52,518,091,993)	-	-	-	-	-
Divided combination of subsidiaries	-	(3,586,569,997)	(2,476,993,242)	(455,926,782)	34,245,322,412	34,245,322,412	(18,272,769,581)
Changes in scope of consolidation	-	1,431,233,389	(1,431,233,389)	-	(83,170,330,940)	(83,170,330,940)	(83,626,257,722)
Disposal of part of investments by subsidiaries	-	-	-	-	507,324,714,945	507,324,714,945	501,261,151,706
Stock options of subsidiaries	-	376,684,331	-	-	-	921,499,607	1,298,183,938
Issuance of stock warrants in subsidiaries	-	(34,884,854,984)	-	-	-	74,249,227,236	39,364,372,252
Exercise of stock warrants of subsidiaries	-	-	-	-	-	(333,286,268,697)	(333,286,268,697)
Repayment of hybrid bonds of subsidiaries	-	-	-	-	-	882,424,833	882,424,833
Changes in other equity items	-	-	-	-	-	-	-
Subtotal	-	₩ (82,817,411,454)	₩ 48,135,293,370	₩ (455,926,782)	₩ (235,498,840,800)	₩ 135,836,764,818	₩ (134,800,120,848)
As of December 31, 2018	₩ 134,845,735,000	₩ 761,433,751,850	₩ (396,336,775,538)	₩ 551,449,281,371	₩ 960,134,735,858	₩ 5,133,519,462,531	₩ 7,145,046,191,072

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

Doosan Corporation and its subsidiaries
Consolidated statements of cash flow
for the years ended December 31, 2018 and 2017

(Korean won)

	Notes	2018	2017
Cash flows from operating activities			
Cash generated from operating activities:	36		
Profit (loss) for the year		₩ (340,510,994,514)	₩ 45,949,110,933
Adjustments		2,294,576,298,861	2,155,587,737,423
Changes in operating assets and liabilities		<u>(299,659,338,989)</u>	<u>(954,300,569,657)</u>
		1,654,405,965,358	1,247,236,278,699
Interest received		52,894,921,686	60,864,969,310
Interest paid		(520,678,018,777)	(520,233,613,971)
Dividends received		6,131,074,238	7,367,751,616
Income tax paid		<u>(170,862,947,484)</u>	<u>(118,213,611,720)</u>
Net cash flows from operating activities		<u>1,021,890,995,021</u>	<u>677,021,773,934</u>
Cash flows from investing activities			
Cash inflows from investing activities:			
Disposal of short-term investment securities		200,977,779,377	219,697,745,764
Decrease in short-term loans		40,234,589,282	36,996,594,182
Decrease in long-term financial instruments		26,546,592,648	3,823,052,944
Disposal of long-term investment securities		14,396,075,445	86,185,277,209
Decrease in long-term loans		139,372,222,152	182,744,230,184
Disposal of investments in subsidiaries		18,190,238,952	37,756,392,584
Disposal of investments in associates and joint ventures		11,804,517,500	11,956,095,577
Disposal of property, plant and equipment		36,706,994,068	57,724,089,208
Disposal of intangible assets		3,788,564,450	7,640,687,129
Disposal of investment properties		-	64,884,198,399
Disposal of assets held for sale		-	29,078,999,531
Changes in other investing activities		<u>-</u>	<u>1,176,957,951</u>
		<u>492,017,573,874</u>	<u>739,664,320,662</u>
Cash outflows from investing activities:			
Increase in short-term financial instruments		120,431,705,357	11,702,136,736
Acquisition of short-term investment securities		80,025,034,640	149,999,116,631
Increase in long-term financial instruments		74,883,814,919	10,457,668,189
Acquisition of long-term investment securities		39,738,983,624	22,550,139,160
Increase in long-term loans		286,671,129,881	319,045,108,093
Acquisition of investments in associates and joint ventures		95,313,389,188	10,673,022,000
Acquisition of investments in subsidiaries		-	65,720,782,363
Acquisition of property, plant and equipment		384,081,509,067	394,795,154,967
Acquisition of intangible assets		336,396,271,637	308,850,381,966
Acquisition of investment properties		2,020,843,087	450,751,520
Acquisition of assets held for sale		-	1,442,031,725
Acquisition of Business		3,628,065,810	-
Changes in other investing activities		<u>11,907,323,457</u>	<u>-</u>
		<u>(1,435,098,070,667)</u>	<u>(1,295,686,293,350)</u>
Net cash flows used in investing activities		<u>(943,080,496,793)</u>	<u>(556,021,972,688)</u>

(Continued)

Doosan Corporation and its subsidiaries
Consolidated statements of cash flow
for the years ended December 31, 2018 and 2017 (cont'd)
(Korean won)

Cash flows from financing activities	Notes	2018	2017
Cash inflows from financing activities:			
Increase in short-term borrowings	₩	-	₩ 550,075,158,664
Increase in asset-backed loans		2,047,500,000,000	1,492,932,369,119
Increase in long-term asset-backed loans		337,112,406,111	-
Issuance of bonds		1,074,653,665,909	2,357,148,224,615
Increase in long-term borrowings		2,766,197,282,126	1,513,465,614,647
Exercise of stock options		-	125,914,000
Exercise of stock warrants of subsidiaries		31,647,475,060	112,830,400
Disposal of part of investments by subsidiaries		507,593,227,099	133,721,600,000
Changes in other financing activities		-	365,158,422
		<u>6,764,704,056,305</u>	<u>6,047,946,869,867</u>
Cash outflows from financing activities:			
Decrease in short-term borrowings		1,124,794,106,878	-
Decrease in asset-backed loans		2,204,081,747,692	1,386,950,000,000
Repayment of bonds		1,343,059,134,384	1,556,721,537,357
Repayment of long-term borrowings		1,474,238,855,134	2,033,942,828,591
Repayment of finance lease liabilities		11,502,834,836	9,609,537,173
Increase of capital share without consideration by subsidiaries		-	1,645,480
Decrease of stock options		877,900	-
Payment of dividends		242,420,079,677	166,111,458,185
Payment of dividends on hybrid bonds		-	26,656,014,920
Additional acquisition of investments in subsidiaries		-	7,373,203,868
Acquisition of treasury stocks in subsidiaries		135,234,686	167,738,853
Capital share issue costs in subsidiaries		8,247,908,039	-
Repayment of hybrid bonds		345,431,018,268	570,521,500,000
		<u>(6,753,911,797,494)</u>	<u>(5,758,055,464,427)</u>
Net cash flows provided by financing activities		<u>10,792,258,811</u>	<u>289,891,405,440</u>
Effects of exchange rate changes on cash and cash equivalents		<u>21,986,315,836</u>	<u>(85,610,227,921)</u>
Net increase in cash and cash equivalents		<u>111,589,072,875</u>	<u>325,280,978,765</u>
Cash and cash equivalents, beginning of the year		<u>2,344,600,297,096</u>	<u>2,019,319,318,331</u>
Cash and cash equivalents, end of the year	<u>₩</u>	<u>2,456,189,369,971</u>	<u>₩ 2,344,600,297,096</u>

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

Doosan Corporation and its subsidiaries
Notes to the consolidated financial statements
December 31, 2018 and 2017

1. General

1.1 The Parent company information

Doosan Corporation (the "Company") was incorporated on December 18, 1933, under the name of Sohwa-Kirin Beer, Ltd. to manufacture and sell beer. The Company has changed its name to Dongyang Beer, Ltd. in February 1948 and again to OB Beer, Ltd. in February 1996 and finally to Doosan Corporation on September 1, 1998.

Since June 1973, the Company's shares have been listed in the Korea Exchange. After several capital issues, the Company's share capital as of December 31, 2018 is ₩134,846 million, including ₩26,984 million of preferred shares.

The Company's ordinary shares as of December 31, 2018 are owned as follows:

	Number of ordinary shares owned	Ownership percentage (%)
Related parties	9,315,435	51.08
Treasury stocks	3,306,169	18.13
Others	5,616,498	30.79
	<u>18,238,102</u>	<u>100.00</u>

Meanwhile, 48.3% of preferred shares are owned by related parties including the largest shareholders and 51.7% of preferred shares are owned by other entities and individual shareholders.

1.2 Consolidated subsidiaries information

Details of the subsidiaries as of December 31, 2018 and 2017 are as follows:

Subsidiary	Type of business	Location	Ownership ratio of the Group (%)(*1)		Ownership ratio of non-controlling interests (%)(*1)		Financial closing date
			2018	2017	2018	2017	
Oricom Inc.	Advertising	Korea	65.5	65.5	34.5	34.5	December 31
Hancomm Inc.	Advertising	Korea	100	100	34.5	34.5	December 31
Doosanbears Inc	Sports	Korea	100	100	-	-	December 31
DLI Corporation	Education	Korea	100	100	-	-	December 31
Doosan Robotics Inc.(*4)	Software development and supply	Korea	100	100	-	-	December 31
Doosan Mecatec Co., Ltd.	Manufacturing	Korea	100	100	-	-	December 31
Doosan Mobility Innovation Inc(*5)	R&D and manufacturing	Korea	100	100	-	-	December 31
Doosan Electro-Materials Singapore Pte Ltd.	Wholesale and retail	Singapore	100	100	-	-	December 31
Doosan Hong Kong Ltd.	Wholesale and retail	China	100	100	-	-	December 31
Doosan Electro-Materials (Shen Zhen) Limited.	Wholesale and retail	China	100	100	-	-	December 31
Doosan Shanghai Chemical Materials Co., Ltd.	Wholesale and retail	China	100	100	-	-	December 31
Doosan Electro-Materials (Changshu) Co., Ltd.	Manufacturing	China	100	100	-	-	December 31
Doosan Second Real Estate Securitization Specialty Ltd. (*2)	Specialized in securitization	Korea	-	-	-	-	December 31
Doosan Information and Communications America, LLC	IT service	USA	100	100	-	-	December 31
Doosan Information and Communications China, Co., Ltd.	IT service	China	100	100	-	-	December 31
Doosan Mottrol (Jiangyin) Co., Ltd.	Manufacturing	China	100	100	-	-	December 31
Doosan Information & Communications Europe	IT service	UK	100	100	-	-	December 31

Doosan Corporation and its subsidiaries
Notes to the consolidated financial statements
December 31, 2018 and 2017

1.2 Consolidated subsidiaries information (cont'd)

Subsidiary	Type of business	Location	Ownership ratio of the Group (%)(*1)		Ownership ratio of non-controlling interests (%)(*1)		Financial closing date
			2018	2017	2018	2017	
Doosan Industrial Vehicle Europe N.A.	Wholesale and retail	Belgium	100	100	-	-	December 31
Doosan Industrial Vehicle U.K. Ltd.	Wholesale and retail	UK	100	100	-	-	December 31
Doosan Logistics Europe GmbH	Manufacturing	Germany	100	100	-	-	December 31
Doosan Industrial Vehicle America Corp.	Wholesale and retail	USA	100	100	-	-	December 31
Doosan Material Handling Solutions LLC.	Forklift rental and sales	USA	100	-	-	-	December 31
Doosan Industrial Vehicle Yantai Co., Ltd.	Manufacturing	China	100	100	-	-	December 31
Genesis Forklift Trucks Limited	Manufacturing	UK	100	100	-	-	December 31
Rushlift Holdings Ltd.	Holding company	UK	100	100	-	-	December 31
Doosan Materials Handling UK Ltd.	Holding company	UK	100	100	-	-	December 31
Rushlift Ltd.	Forklift rental and sales	UK	100	100	-	-	December 31
Doosan Electro-Materials America, LLC	Marketing	USA	100	100	-	-	December 31
Doosan Electro-Materials Luxembourg Sarl	Holding company	Luxembourg	100	100	-	-	December 31
Circuit Foil Luxembourg	Manufacturing	Luxembourg	100	100	-	-	December 31
Circuit Foil Asia Pacific (Zhangjiagang)	Manufacturing	China	100	100	-	-	December 31
Circuit Foil Asia Pacific (Hong Kong)	Wholesale and retail	China	100	100	-	-	December 31
CFT	Wholesale and retail	USA	100	100	-	-	December 31
Doosan Fuel Cell America, Inc.	Manufacturing	USA	100	100	-	-	December 31
Doosan Energy Solutions America, Inc.,	Electric power generation and sales	USA	100	100	-	-	December 31
Neoplux Co.,Ltd.	Finance	Korea	97.1	97.1	2.9	2.9	December 31
Doosan Corporation Europe Kft	Wholesale and retail	Hungary	100	-	-	-	December 31
Doosan Energy Solution Kft	Manufacturing	Hungary	100	-	-	-	December 31
Sunny Russel 8th Co., Ltd.(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
Doosan Heavy Industries & Construction Co., Ltd ("DHC")(*3)	Other engine and turbine manufacture	Korea	34.6	37.8	65.4	62.2	December 31
Doosan Heavy Industries Vietnam Co., Ltd.	Other engine and turbine manufacture	Vietnam	100	100	68.2	64.0	December 31
Doosan HF Controls Corp.	Manufacturing	USA	100	100	65.4	62.2	December 31
Doosan HF Controls Asia Co., Ltd.	Manufacturing	Korea	100	100	65.4	62.2	December 31
PT. Doosan Heavy Industries Indonesia	Manufacturing	Indonesia	55	55	81	79.2	December 31
Doosan Heavy Industries Malaysia Sdn. Bhd	Dormant corporation	Malaysia	100	100	65.4	65.4	December 31
Doosan Heavy Industries Japan Corp.	Wholesale and retail	Japan	100	100	65.4	62.2	December 31
S.C. Doosan IMGB S.A.	Manufacturing	Romania	99.9	99.9	65.4	62.3	December 31
Doosan Enpure Ltd.	Engineering and service	UK	100	100	65.4	62.2	December 31
Doosan Power Systems India Private Ltd.	Engineering and service	India	100	100	65.4	62.2	March 31
Doosan Heavy Industries Muscat LLC.	Manufacturing	Oman	70	70	75.8	73.6	December 31
Doosan Power Systems Arabia Company Limited	Manufacturing service	Saudi Arabia	51	51	82.4	80.7	December 31
Azul Torre Construction Corporation(*3)	Manufacturing	Philippines	40	40	86.2	84.9	December 31
Doosan Heavy Industries America Holdings Inc.	Holding company	USA	100	100	65.4	62.2	December 31
Doosan Heavy Industries America LLC	Wholesale and retail	USA	100	100	65.4	62.2	December 31
Doosan ATS America, LLC	Engineering and service	USA	100	100	65.4	62.2	December 31
Doosan Power Service America, LLC	Engineering and service	USA	100	100	65.4	62.2	December 31

Doosan Corporation and its subsidiaries
Notes to the consolidated financial statements
December 31, 2018 and 2017

1.2 Consolidated subsidiaries information (cont'd)

Subsidiary	Type of business	Location	Ownership ratio of the Group (%)(*1)		Ownership ratio of non-controlling interests (%)(*1)		Financial closing date
			2018	2017	2018	2017	
Doosan Turbomachinery Services Holding, Inc.	Holding company	USA	95.9	95.9	66.8	63.8	December 31
Doosan Turbomachinery Services Inc.	Manufacturing	USA	95.9	95.9	66.8	63.8	December 31
Doosan GridTech Inc.	Software and systems engineering	USA	100	100	65.4	62.2	December 31
Doosan GridTech LLC	Software and systems engineering	USA	100	100	65.4	62.2	December 31
Doosan GridTech CA LLC	Software and systems engineering	USA	100	100	65.4	62.2	December 31
Doosan GridTech EPC LLC	Software and systems engineering	USA	100	-	65.4	-	December 31
Doosan Skoda Power s.r.o	Manufacturing	Czech	100	100	65.4	62.2	December 31
Skoda Power Private Ltd.	Engineering	India	100	100	65.4	62.2	March 31
Doosan Power Systems Pension Trustee Company Ltd.	Specialized service	UK	100	100	65.4	62.2	December 31
Doosan Power Systems Overseas Investments Ltd.	Holding company	UK	100	100	65.4	62.2	December 31
Doosan Babcock Ltd.	Engineering and service	UK	100	100	65.4	62.2	December 31
Doosan Power Systems Europe Limited GmbH	Engineering and service	Germany	100	100	65.4	62.2	December 31
Doosan Power Systems Americas LLC	Engineering and service, Wholesale and retail	USA	100	100	65.4	62.2	December 31
Doosan Lentjes UK Limited	Dormant corporation	UK	100	100	65.7	62.6	December 31
Doosan Lentjes GmbH	Engineering and service	Germany	100	99	65.4	62.6	December 31
Doosan Power Systems S.A.	Holding company	Luxembourg	100	100	65.4	62.2	December 31
Doosan Babcock Energy Technologies (Shanghai) Ltd.	Engineering and service	China	100	100	65.4	62.2	December 31
Doosan Babcock Energy Services (Overseas) Ltd.	Engineering and service	UK	100	100	65.4	62.2	December 31
Doosan Babcock Energy Polska Sp z o.o.	Engineering and service	Poland	98.9	98.9	65.8	62.6	December 31
Doosan Babcock Energy Germany GmbH	Engineering and service	Germany	100	100	65.4	62.2	December 31
Doosan Lentjes Czech s.r.o	Specialized service	Czech	100	100	65.7	62.6	December 31
AE & E Lentjes Belgie N.V.	Dormant corporation	Belgium	100	100	65.7	62.6	December 31
Doosan Power Systems(Scotland) Ltd Partnership	Real estate	UK	100	100	65.4	62.2	December 31
Doosan Babcock General Maintenance Services LLC(*3)	Specialized service	UAE	49	49	83	81.5	December 31
Osungpower O&M	Engineering and service	Korea	100	-	65.4	-	December 31
KDPP 3rd Co., Ltd.(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
KDPP 4th Co., Ltd.(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
Happy Tomorrow 20th Co., Ltd.(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
Happy Tomorrow 25th Co., Ltd.(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
Happy Tomorrow 27th Co., Ltd.(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
U BEST 4th Co., Ltd.(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
New Star Power 1st Co., Ltd.(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
New Star Power 2rd Co., Ltd.(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
FSS 8th CO., LTD(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
Doosan Cuvex Co., Ltd	Golf and condominium	Korea	100	100	48.6	50.4	December 31
DBC Co., Ltd	Real estate development	Korea	100	100	58.8	56.7	December 31
Doosan Infracore Co., Ltd. ("DI")(*3)	Manufacturing mechanical device and equipment	Korea	36.3	36.3	87.4	86.3	December 31
Doosan Infracore China Co., Ltd.	Manufacturing, sales	China	80	80	90	89	December 31

Doosan Corporation and its subsidiaries
Notes to the consolidated financial statements
December 31, 2018 and 2017

1.2 Consolidated subsidiaries information (cont'd)

Subsidiary	Type of business	Location	Ownership ratio of the Group (%)(*1)		Ownership ratio of non-controlling interests (%)(*1)		Financial closing date
			2018	2017	2018	2017	
Doosan Infracore (China) Investment Co., Ltd.	Holding company	China	100	100	87.4	86.3	December 31
Doosan Infracore North America LLC	Sales	USA	100	100	87.4	86.3	December 31
Doosan Infracore Japan Corp.	Purchases	Japan	100	100	87.4	86.3	December 31
Doosan (China) Financial Leasing Corp.	Finance	China	100	100	88.4	87.4	December 31
Doosan Bobcat Chile S.A.	Sales	Chile	100	100	87.4	86.3	December 31
Doosan Infracore (Shandong) Co., Ltd.	Manufacturing, sales	China	100	100	89.1	88.1	December 31
Doosan Infracore Norway AS	Manufacturing, sales	Norway	100	100	87.4	86.3	December 31
Doosan Infracore South America Industria E Comercio De Maquinas De Construco LTDA	Sales	Brazil	100	100	87.4	86.3	December 31
Doosan Infracore Construction Equipment India Private Ltd.	Sales	India	100	100	87.4	86.3	March 31
Doosan Bobcat Inc.	Holding company	Korea	51	65.9	93.6	90.7	December 31
Doosan Bobcat Singapore Pte. Ltd.(*4)	Holding company	Singapore	100	100	93.6	90.7	December 31
Doosan Bobcat Korea Co., Ltd.(*4)	Sales	Korea	100	100	93.6	90.7	December 31
Doosan Bobcat Chile Compact SpA	Sales	Chile	100	100	93.6	90.7	December 31
Doosan Bobcat India Private Ltd.(*4)	Manufacturing, sales	India	100	100	93.6	90.7	March 31
Bobcat Corp.	Sales	Japan	100	100	93.6	90.7	December 31
Doosan Bobcat Mexico S.A. de C.V.(*4)	Other service	Mexico	100	100	93.6	90.7	December 31
Doosan Bobcat China Co., Ltd.	Manufacturing, sales	China	100	100	93.6	90.7	December 31
Clark Equipment Co.	Manufacturing, sales	USA	100	100	93.6	90.7	December 31
Bobcat Equipment Ltd.	Sales	Canada	100	100	93.6	90.7	December 31
Doosan International Australia Pty Ltd.	Sales	Australia	100	100	93.6	90.7	December 31
Doosan Infracore Europe S.A.	Sales	Belgium	100	100	93.6	90.7	December 31
Bobcat Bensheim GmbH.	Sales	Germany	100	100	93.6	90.7	December 31
Doosan Holdings France S.A.S.(*6)	Holding company	France	100	100	93.6	90.7	December 31
Doosan Techno Holding Co., Ltd.	Intellectual property right management	Ireland	100	100	93.6	90.7	December 31
Doosan Benelux SA.	Sales	Belgium	100	100	93.6	90.7	December 31
Doosan Infracore Europe B.V.(*4)	Sales	Netherlands	100	100	87.4	86.3	December 31
CJSC Doosan International Russia	Sales	Russia	100	100	93.6	90.7	December 31
Doosan International UK Ltd.	Sales	UK	100	100	93.6	90.7	December 31
Doosan International South Africa Pty Ltd.	Sales	Republic of South Africa	100	100	93.6	90.7	December 31
Doosan Bobcat EMEA s.r.o.(*7,8)	Sales	Czech	100	100	93.6	90.7	December 31
Bobcat France S.A.	Manufacturing	France	100	100	93.6	90.7	December 31
Geith International Ltd.	Sales	Ireland	100	100	93.6	90.7	December 31
Doosan International Luxembourg S.a r.l	Intellectual property right management	Luxembourg	100	100	93.6	90.7	December 31
Doosan Engineering & Construction Co., Ltd. ("DEC")	Construction	Korea	66.4	79.8	77	69.9	December 31
Valueworks Co., Ltd	Real estate	Korea	100	100	46.9	42.6	December 31
Doosan Heavy Industries Vietnam Haiphong	Manufacturing	Vietnam	100	100	77	69.9	December 31
Pinetree City 1st Co., Ltd.(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
DMbest3rd co.,ltd(*2)	Specialized in securitization	Korea	-	-	-	-	December 31

Doosan Corporation and its subsidiaries
Notes to the consolidated financial statements
December 31, 2018 and 2017

1.2 Consolidated subsidiaries information (cont'd)

Subsidiary	Type of business	Location	Ownership ratio of the Group (%)(*1)		Ownership ratio of non-controlling interests (%)(*1)		Financial closing date
			2018	2017	2018	2017	
DMbest4th co.,Ltd(*2)	Specialized in securitization	Korea	-	-	-	-	December 31
GMS 1st Co.,Ltd.	Specialized in securitization	Korea	-	-	-	-	December 31
Doosan E&C Third Co., Ltd	Specialized in securitization	Korea	-	-	-	-	December 31
Greatgm 4th Co.,Ltd	Specialized in securitization	Korea	-	-	-	-	December 31
Greatgm 6th. Co.,	Specialized in securitization	Korea	-	-	-	-	December 31
Treasury stock trust	Acquisition of treasury stocks	Korea	100	100	-	-	December 31

(*1) The ownership interest held by the parent represents the aggregated total of ownership interests directly held by each entity within the Group. The ownership interest held by non-controlling interests represents the proportion of ownership interests that is not attributable, directly or indirectly, to the entities within the Group and it may differ from the aggregated total, less the effective ownership interest held by the Group.

(*2) Although the Group does not own the equity of the special-purpose company, the Group gets profits from its operation according to the agreement, with structured investment. As the Group has control to decide its operational activity, it also influences the profits significantly.

(*3) Potential voting rights held by the Group on the above subsidiaries for assessing whether or not it controls the subsidiaries are less than 50%, but the Group concluded that the Group has de facto control over the subsidiaries.

(*4) For the year ended December 31, 2017, the name was changed from 'Doosan International South East Asia Pte. Ltd.' to 'Doosan Bobcat Singapore Pte. Ltd.' and 'Doosan Infracore India Private Ltd.' to 'Doosan Bobcat India Private Ltd.' and 'Doosan Infracore Bobcat Korea Co., Ltd.' to 'Doosan Bobcat Korea Co., Ltd.' and 'Doosan International Mexico S.A. de C.V' to 'Doosan Bobcat Mexico S.A. de C.V.' and 'DRA Inc.' to 'Doosan Robotics Inc.' and 'Doosan Infracore Customization Center Europe B.V.' to 'Doosan Infracore Europe B.V'.

(*5) For the year ended December 31, 2018, 'DAE Co., Ltd.' changed its name to 'Doosan Mobility Innovation Inc'.

(*6) For the year ended December 31, 2018, Doosan Infracore Bobcat Ireland Ltd. and Doosan International Italia S.r.L was liquidated, and Bobcat Lyon SAS was merged into Doosan Holdings France S.A.S.

(*7) For the year ended December 31, 2017, Doosan Trading Ltd. was merged into Doosan Holdings Europe Ltd., and for the year ended December 31, 2018, Doosan Holdings Europe Ltd. was merged into Doosan Bobcat EMEA s.r.o.

(*8) For the year ended December 31, 2017, Doosan Bobcat Engineering s.r.o. was merged into Doosan Bobcat EMEA s.r.o.

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1.2.1 Changes in the scope of consolidation

Changes in the scope of consolidation for the year ended December 31, 2018 are as follows:

Subsidiary	Change	Description
Doosan Material Handling Solutions LLC.	Included	Newly established
Doosan Corporation Europe Kft.	Included	Newly established
Doosan Energy Solution Kft.	Included	Newly established
Doosan GridTech EPC LLC	Included	Newly established
Osungpower O&M	Included	Newly established
Greatgm 4th Co.,Ltd	Included	New borrowing
Greatgm 6th. Co.,.	Included	New borrowing
KDPP 4th Co., Ltd.	Included	New borrowing
FSS 8th CO., LTD	Included	New borrowing
DIP Holdings Co., Ltd.	Excluded	Merger
Dootamall Co., Ltd.	Excluded	Merger
Doosan Holdings Europe Ltd.	Excluded	Merger
GMS 2nd Co., Ltd.	Excluded	Repayment
Doosan E&C Second Co., Ltd.	Excluded	Repayment
DMbest2nd co.,ltd.	Excluded	Repayment of borrowing
Doosan Engine Co., Ltd (“DE”)	Excluded	Divided combination and disposal
Doosan Marine Industry(Dalian) Co., Ltd	Excluded	Disposal
Doosan Engine PNG Co., Ltd.	Excluded	Disposal
DOOSAN Asset Management Company Co., Ltd	Excluded	Liquidation
KDPP 1st Co., Ltd.	Excluded	Liquidation
KDPP 2nd Co., Ltd.	Excluded	Liquidation
Seung Li 3rd Co., Ltd.	Excluded	Liquidation
Doosan Infracore Bobcat Ireland Ltd.	Excluded	Liquidation
Doosan International Italia S.r.L	Excluded	Liquidation
Bobcat Lyon SAS	Excluded	Merger
Doosan Babcock WLL	Excluded	Loss of control

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1.3 Condensed financial information of the Group's significant consolidated subsidiaries

Condensed financial information of the Group's significant consolidated subsidiaries (or intermediate parent) as of and for the year ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018				
	Assets	Liabilities	Sales	Profit (loss) for the year	Total comprehensive income (loss)
	₩	₩	₩	₩	₩
DHC	11,342,250	7,401,593	4,101,664	(725,088)	(703,313)
Doosan Heavy Industries Vietnam Co., Ltd.	341,129	282,560	210,408	18,911	18,911
Doosan HF Controls Corp.	19,289	3,375	9,054	(168)	(168)
Doosan Heavy Industries Japan Corp.	16,040	12,775	1,987	94	94
S.C. Doosan IMGB S.A.	140,536	57,200	68,133	(5,238)	(5,238)
Doosan Enpure Ltd.	27,795	25,013	75,507	1,725	1,725
Doosan Power Systems India Private Ltd.	726,034	595,829	387,445	(29,128)	(29,185)
Doosan Heavy Industries Muscat LLC	23,303	26,682	21,532	(1,127)	(1,127)
Doosan Power Systems Arabia Company Limited	21,311	12,884	11,486	1,453	1,453
Doosan Heavy Industries America Holdings Inc.	124,595	21,430	-	401	401
Doosan Turbomachinery Services Inc.	30,302	14,729	40,911	1,070	1,070
Doosan Heavy Industries America LLC	14,105	7,668	2,751	393	393
Doosan GridTech Inc.	10,221	6,721	584	(8,333)	(8,333)
Doosan Skoda Power s.r.o	603,612	101,000	247,264	15,225	13,159
Doosan Power Systems Overseas Investments Ltd.	72,548	89,262	-	(3,553)	(3,553)
Doosan Babcock Ltd.	1,019,551	394,204	469,979	(1,171)	9,448
Doosan Power Systems Europe Limited GmbH	73,461	178,204	-	(22,130)	(22,130)
Doosan Lentjes GmbH	71,805	48,912	29,627	(12,042)	(10,962)
Doosan Power Systems S.A.	1,227,838	879,157	-	35,048	35,048
Doosan Babcock Energy Polska Sp z.o.o.	24,243	16,172	35,121	(53)	(59)
Doosan Power Systems (Scotland) Ltd. Partnership	30,912	1,704	-	1,779	1,779
Doosan Babcock General Maintenance Services LLC	26,730	58,402	45,026	(15,079)	(16,804)
Doosan Cuvex Co., Ltd	213,382	100,557	66,051	499	91
DBC Co., Ltd	282,276	178,214	-	(1,744)	(1,744)
DI	4,923,151	3,516,787	3,058,277	71,748	59,052
Doosan Infracore China Co., Ltd.	1,263,506	810,343	1,349,404	136,878	136,878
Doosan Infracore (China) Investment Co., Ltd.	216,075	5,885	11,022	2,830	2,830
Doosan Infracore North America LLC	283,852	218,800	259,405	3,460	3,040
Doosan (China) Financial Leasing Corp.	678,155	506,497	47,188	7,374	7,374
Doosan Infracore Europe B.V	281,619	275,760	501,261	6,093	6,127
Doosan Bobcat Co., Ltd. and its subsidiaries	6,446,324	2,706,721	3,970,766	264,497	282,749
DEC	2,336,841	2,015,019	1,504,060	(580,707)	(581,868)
Doosan Heavy Industries Vietnam Haiphong Co., Ltd.	40,191	7,521	38,317	1,944	1,944
Pinetree City 1st Co., Ltd.	56,955	56,958	2,403	7	7
DMbest3rd co.,ltd	70,013	70,013	3,417	-	-
DMbest4th co.,ltd	120,013	120,013	4,947	-	-

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1.3 Condensed financial information of the Group's significant consolidated subsidiaries (cont'd)

	2018				
	Assets	Liabilities	Sales	Profit (loss) for the year	Total comprehensive income (loss)
GMS 1st Co., Ltd.	₩ 15,646	₩ 15,648	₩ 1,316	₩ (5)	₩ (5)
Doosan E&C 3rd Co., Ltd.	73,629	73,627	2,576	-	-
Greatgm 4th Co.,Ltd	99,005	100,006	1,976	(401)	(401)
Greatgm 6th Co.,	152,404	152,728	3,030	(1)	(1)
Valueworks Co., Ltd.	208,862	864	5,427	2,393	2,393
Oricom Inc.	155,006	85,148	106,964	6,026	5,556
Hancomm Inc.	58,623	40,582	76,585	3,259	2,811
Doosan Mecatec Co., Ltd.	328,425	125,854	205,473	5,503	4,603
Doosan Industrial Vehicle America Corp.	83,042	52,301	193,963	2,414	2,414
Doosan Industrial Vehicle U.K. Ltd.	87,969	86,946	45,569	(815)	(815)
Doosan Industrial Vehicle Europe N.V.	42,143	26,523	99,118	1,458	1,458
Doosan Industrial Vehicle Yantai Co., Ltd.	42,360	29,544	71,911	2,792	2,792
Rushlift Ltd.	114,312	97,834	65,388	1,100	1,100
Doosانبears, Inc.	59,297	51,529	49,519	171	165
Doosan Mottrol (Jiangyin) Co., Ltd.	94,324	61,935	280,587	10,138	10,138
Doosan Electro-Materials Singapore Pte. Ltd.	10,073	12,679	51,770	867	867
Doosan Electro-Materials (Changshu) Co., Ltd.	138,662	119,007	164,724	4,644	4,644
Doosan Electro-Materials Luxembourg Sarl	56,063	17,717	-	16,435	16,435
Doosan Fuel Cell America, Inc.	239,821	221,068	201,270	(31,059)	(31,059)
Circuit Foil Luxembourg Sarl	151,711	71,930	146,957	9,516	9,341
Neoplux Co.,Ltd.	81,283	15,305	22,219	8,452	6,595

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1.3 Condensed financial information of the Group's significant consolidated subsidiaries (cont'd)

	2017				
	Assets	Liabilities	Sales	Profit (loss) for the year	Total comprehensive income (loss)
	₩	₩	₩	₩	₩
DHC	11,745,019	7,276,816	4,336,699	15,780	197,262
Doosan Heavy Industries Vietnam Co., Ltd.	332,151	294,443	191,641	(27,216)	(27,216)
Doosan HF Controls Corp.	19,235	3,815	13,497	2,287	2,287
Doosan Heavy Industries Japan Corp.	14,202	11,233	2,478	201	201
S.C. Doosan IMGB S.A.	138,982	67,343	57,420	(5,947)	(5,947)
Doosan Enpure Ltd.	15,916	14,788	43,187	(28)	(28)
Doosan Power Systems India Private Ltd.	627,610	562,047	301,030	(31,945)	(31,756)
Doosan Heavy Industries Muscat LLC	30,558	32,698	45,622	(2,215)	(2,215)
Doosan Power Systems Arabia	17,545	10,882	10,269	581	581
Doosan Heavy Industries America Holdings Inc.	268,777	21,883	-	11,226	11,226
Doosan Turbomachinery Services	23,541	9,661	12,134	(637)	(637)
Doosan Heavy Industries America Corp.	16,336	10,552	3,479	485	485
Doosan GridTech Inc.	10,471	6,989	1,014	(6,062)	(6,062)
Doosan Skoda Power s.r.o	627,189	108,615	265,403	19,327	30,253
Doosan Power Systems Overseas Investments Ltd.	73,529	88,486	-	(2,181)	(2,181)
Doosan Babcock Ltd.	1,037,905	415,090	522,919	(13,589)	6,626
Doosan Power Systems Europe Limited GmbH	86,338	168,364	-	(5,155)	(5,155)
Doosan Lentjes GmbH	81,015	53,236	29,082	(18,826)	(17,969)
Doosan Power Systems S.A.	1,233,367	884,382	2,334	(57,629)	(57,629)
Doosan Babcock Energy Polska Sp z.o.o.	19,294	9,396	35,501	687	682
Doosan Babcock Energy Germany GmbH	25,795	24,248	19,721	(3,039)	(3,039)
Doosan Power Systems (Scotland) Ltd. Partnership	31,326	1,723	-	1,749	1,749
Doosan Babcock General Maintenance Services LLC	26,448	42,074	28,917	(5,489)	(6,256)
Doosan Cuvex Co., Ltd	215,456	102,572	37,672	(1,002)	149
DBC Co., Ltd	262,805	-	-	(195)	(195)
DI	5,053,901	3,707,435	2,651,329	60,472	81,968
Doosan Infracore China Co., Ltd.	969,532	648,577	945,715	136,623	136,623
Doosan Infracore (China) Investment Co., Ltd.	214,767	6,212	8,714	2,310	2,310
Doosan (China) Financial Leasing Corp.	516,649	351,304	35,977	2,306	2,306
Doosan Infracore Customization Center Europe B.V.	84,556	84,663	186,954	(693)	(756)
Doosan Bobcat Co., Ltd. and subsidiaries	6,183,837	2,756,294	4,068,260	273,758	552,356
DEC	2,809,829	1,862,656	1,475,260	(185,632)	(185,963)
Doosan Heavy Industries Vietnam Haiphong Co., Ltd	44,536	10,837	57,762	6,376	6,376
Pinetree City 1st Co., Ltd.	60,664	60,673	2,525	1	1
DMbest2nd co.,Ltd	137,199	137,199	5,323	-	-
DMbest3rd co.,Ltd	110,012	110,012	4,377	-	-
DMbest4th co.,Ltd	100,011	100,011	4,074	-	-
GMS 1st Co., Ltd.	5,279	5,285	-	(6)	(6)
GMS 2nd Co., Ltd.	10,237	10,255	-	(18)	(18)

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1.3 Condensed financial information of the Group's significant consolidated subsidiaries (cont'd)

	2017				
	Assets	Liabilities	Sales	Profit (loss) for the year	Total comprehensive income (loss)
Doosan E&C Second Co., Ltd.	₩ 355	₩ 350	₩ 1,072	₩ 137	₩ 137
Doosan E&C Third Co., Ltd.	93,465	93,463	4,333	548	548
Valueworks Co., Ltd.	207,554	1,830	2,843	1,193	1,193
DE	1,238,012	682,047	761,832	(14,160)	4,920
Doosan Marine Industry(Dalian) Co., Ltd	20,813	12,019	8,964	(788)	(788)
Doosan Engine PNG Co., Ltd.	459	6,393	8,019	1,818	1,818
Oricom Inc.	148,698	81,947	100,266	2,709	3,388
Hancomm Inc.	67,187	51,957	67,971	2,243	2,275
Doosan Mecatec Co., Ltd.	329,194	131,318	189,946	(1,399)	(928)
Dootamall Co., Ltd.	716,789	471,244	62,942	23,342	23,401
DIP Holdings Co., Ltd.	374,732	326	2,000	8,895	8,895
Doosan Industrial Vehicle America Corp.	66,907	39,368	151,135	1,012	1,012
Doosan Industrial Vehicle U.K. Ltd.	76,560	74,724	38,703	1,899	1,899
Doosan Industrial Vehicle Europe N.A.	37,213	22,724	79,687	183	183
Doosan Industrial Vehicle Yantai Co., Ltd.	42,327	32,188	48,631	1,285	1,285
Rushlift Ltd.	90,240	74,617	52,956	1,656	1,656
Doosanbears Inc	60,935	52,144	55,636	5,928	6,544
Doosan Mottrol (Jiangyin) Co., Ltd.	71,441	48,846	154,887	6,401	6,401
Doosan Electro-Materials (Changshu) Co., Ltd.	119,447	104,252	186,233	13,613	13,613
Doosan Electro-Materials Luxembourg Sarl	57,679	24,725	-	7,747	7,747
Doosan Fuel Cell America, Inc.	257,698	209,485	241,054	571	571
Circuit Foil Luxembourg Sarl	143,407	55,639	141,136	13,013	14,129
Neoplux Co., Ltd.	63,495	6,126	19,129	2,862	(2,785)

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1.4 Cash flows information

Summarized cash flows information of main subsidiaries for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018					
	DHC and its subsidiaries		DI and its subsidiaries		DEC and its subsidiaries	
Cash flows from operating activities	₩	94,422	₩	837,778	₩	94,499
Cash flows from investing activities		247,959		(312,848)		(120,283)
Cash flows from financing activities		(273,420)		(422,559)		13,874
Effect of exchange rate changes on cash and cash equivalents		10,652		7,164		179
Net increase (decrease) in cash and cash equivalent		79,613		109,535		(11,731)
Cash and cash equivalents, beginning of the year		843,604		943,481		110,826
Cash and cash equivalents, end of the year	₩	923,217	₩	1,053,016	₩	99,095

	2017							
	DHC and its subsidiaries		DI and its subsidiaries		DEC and its subsidiaries		DE and its subsidiaries	
Cash flows from operating activities	₩	(159,049)	₩	665,691	₩	55,254	₩	(69,385)
Cash flows from investing activities		(478,154)		(256,289)		(42,297)		12,651
Cash flows from financing activities		838,496		32,267		18,348		56,612
Effect of exchange rate changes on cash and cash equivalents		(38,946)		(36,766)		(368)		(463)
Net increase (decrease) in cash and cash equivalent		162,347		404,903		30,937		(585)
Cash and cash equivalents, beginning of the year		681,257		538,578		79,889		72,821
Cash and cash equivalents, end of the year	₩	843,604	₩	943,481	₩	110,826	₩	72,236

Above financial information vested in non-controlling interests is based on consolidated financial information of intermediate controlling company. However, financial information of DHC and its subsidiaries does not include financial information of DI, DEC, DE and their subsidiaries, respectively.

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1.4 Cash flows information (cont'd)

The ownership interest held by non-controlling interests and details of financial position, result of operation and dividends vested in non-controlling interests by each of the major subsidiaries as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018							
	DHC and its subsidiaries		DI and its subsidiaries		DEC and its subsidiaries			
Ownership interest held by non-controlling interests (%)	65.4%		87.4%		77%			
Cumulative non-controlling interests	₩	1,435,427	₩	3,556,607	₩	103,176		
Net income (loss) vested in non-controlling interests	(148,454)		359,028		(437,598)			
Dividends paid to non-controlling interests(*1)	(23,452)		(41,034)		-			
	2017							
	DHC and its subsidiaries		DI and its subsidiaries		DEC and its subsidiaries		DE and its subsidiaries	
Ownership interest held by non-controlling interests (%)	62.2%		86.3%		69.9%		83.9%	
Cumulative non-controlling interests	₩	1,513,524	₩	2,619,839	₩	555,644	₩	410,587
Net income (loss) vested in non-controlling interests	(120,271)		246,245		(92,414)		(29,289)	
Dividends paid to non-controlling interests(*1)	(51,995)		(39,503)		-		-	

(*1) Oricom Inc. except for above subsidiaries paid dividends of ₩844 million vested in non-controlling interests.

Above financial information vested in non-controlling interests is based on consolidated financial information of intermediate controlling company. However, financial information of DHC and its subsidiaries does not include financial information of DI, DEC, DE and its subsidiaries, respectively.

2. Summary of significant accounting policies

2.1 Basis of preparation

The Group prepares statutory financial statements in Korean in accordance with KIFRS enacted by *the Act on External Audit of Stock Companies*. The accompanying consolidated financial statements have been translated into English from Korean financial statements. In the event of any differences in interpreting the financial statements or the independent auditor's report thereon, Korean version, which is used for regulatory reporting purposes, shall prevail.

Significant accounting policies applied in the preparation of the consolidated financial statements are described below. Significant accounting policies applied in the preparation of the consolidated financial statements for the year ended December 31, 2018 are the same as those adopted in the preparation of the consolidated financial statements for the year ended December 31, 2017, except for the effects related to the adoption of the standards or interpretations described below.

The accompanying consolidated financial statements have been prepared on the historical cost basis, except for certain properties/non-current assets and financial instruments that are measured at fair values, as explained in the accounting policies below. Historical cost is based on the fair values of the consideration given in exchange for assets.

2.1.1 New and amended standards and interpretations

The Group applied KIFRS 1115 *Revenue from Contracts with Customers* and KIFRS 1109 *Financial Instruments* 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 2018, 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 1115 Revenue from Contracts with Customers

KIFRS 1115 supersedes KIFRS 1011 *Construction Contracts*, KIFRS 1018 *Revenue* and related Interpretations and it applies, with limited exceptions, to all revenue arising from contracts with its customers. KIFRS 1115 establishes a five-step model to account for revenue arising from contracts with customers and requires that revenue be recognized at an amount that reflects the consideration to which an entity expects to be entitled in exchange for transferring goods or services to a customer.

KIFRS 1115 requires entities to exercise judgement, taking into consideration all of the relevant facts and circumstances when applying each step of the model to contracts with their customers. The standard also specifies the accounting for the incremental costs of obtaining a contract and the costs directly related to fulfilling a contract. In addition, the standard requires extensive disclosures.

The Group adopted KIFRS 1115 using cumulative catch-up method of adoption with the date of initial application of January 1, 2018. Under this method, the new standard can be applied either to all contracts at the date of initial application or only to contracts that are not completed at this date. The Group elected to apply the new standard only to contracts that were not completed as of January 1, 2018.

The cumulative effect of initial adoption of KIFRS 1115 is adjusted for the opening balance of retained earnings at the date of initial adoption. Therefore, comparative information was not restated and continues to be reported under KIFRS 1011, KIFRS 1018 and the related Interpretation. Significant changes and the resulting amount impact are as follows.

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2.1.1 New and amended standards and interpretations (cont'd)

The effect of adopting KIFRS 1115 is as follows:

[Impact on the consolidated statements of changes in equity as of January 1, 2018]

(Korean won in millions)

	<u>Adjustments</u>	<u>Amount before adopting KIFRS 1115</u>	<u>Adjustments</u>	<u>Amount adjusted</u>
Equity attributable to owners of the parent:		₩ 2,474,066	₩ (24,740)	₩ 2,449,326
Retained earnings	(c),(d),(e)	1,332,520	(24,740)	1,307,780
Accumulated other comprehensive income	(c),(d),(e)	606,921	-	606,921
Non-controlling interests		5,129,352	(53,338)	5,076,014
Total equity		<u>₩ 7,603,418</u>	<u>₩ (78,078)</u>	<u>₩ 7,525,340</u>

Each financial statement item affected as of December 31, 2018 and for the year then ended is as follows. The adoption of KIFRS 1115 does not have a significant impact on non-controlling interests or cash flows from operating, investing, and financing activities of the Group.

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2.1.1 New and amended standards and interpretations (cont'd)

[Impact on the consolidated statements of financial position as of December 31, 2018]

(Korean won in millions)

	Adjustments	Amount before adopting KIFRS 1115	Adjustments	Amount reported
Assets:				
Due from customers for contract work	(a), (d), (e)	₩ 2,004,168	₩ 2,018	₩ 2,006,186
Inventories	(f)	2,620,558	(12,536)	2,608,022
Other current assets	(b), (c), (d)	952,188	(34,090)	918,098
Total assets		28,924,889	(44,607)	28,880,282
Liabilities:				
Trade and other payables	(f)	4,895,688	(12,536)	4,883,152
Due to customers for contract work	(a), (d), (e)	1,243,937	4,890	1,248,827
Provisions	(a), (c)	188,561	6,667	195,228
Other current liabilities	(b), (c)	740,859	26,446	767,305
Total liabilities		21,709,768	25,467	21,735,235
Equity:				
Retained earnings		982,756	(22,621)	960,135
Non-controlling interests		5,182,176	(48,657)	5,133,519
Total equity		₩ 7,216,324	₩ (71,278)	₩ 7,145,046

[Impact on the consolidated statements of comprehensive income (loss) for the year ended December 31, 2018]

(Korean won in millions)

	Adjustments	Amount before adopting KIFRS 1115	Adjustments	Amount reported
Sales	(b), (c), (d), (e), (f)	₩ 18,365,406	₩ (193,239)	₩ 18,172,167
Cost of sales	(b), (c), (d), (e), (f)	15,051,451	(202,793)	14,848,658
Finance expenses, net	(e)	(630,605)	(2,754)	(633,359)
Loss for the year		(347,311)	6,800	(340,511)
Loss for the year attributable to:				
Equity holders of the parent		(118,982)	2,120	(116,862)
Non-controlling interests		(228,329)	4,680	(223,649)
Total comprehensive loss for the year		₩ (238,332)	₩ 6,800	₩ (231,532)

2.1.1 New and amended standards and interpretations year (cont'd)

The nature of the adjustments on January 1, 2018 and significant changes in the consolidated statements of financial position as of December 31, 2018 and consolidated statements of comprehensive income for the year then ended are as follows.

(a) Presentation of provision for construction loss

As a result of the adoption of KIFRS 1115, a provision for construction loss is no longer subject to KIFRS 1011 *Construction Contracts* and is subject to KIFRS 1037 *Provisions, Contingent Liabilities and Contingent Assets*. Accordingly, the Group recognized a provision for construction loss under provisions in accordance with KIFRS 1037 since the current period, which is presented as an adjustment to due from customers for contract work and due to customers for contract work until the year ended December 31, 2017.

(b) Identifying performance obligations

The Group mainly engages in business area, such as power generation facilities, industrial facilities, manufacture of casting and forgings, construction, and services. According to KIFRS 1115, the Group identifies performance obligations that are distinct from a contract with a customer and determines whether each performance obligation identified is satisfied at a point in time or over time.

The Group identifies a performance obligation as a distinct performance obligation when the customer can benefit from the good or service either on its own or together with other resources that are readily available to the customer and the Group's promise to transfer the good or service to the customer is separately identifiable from other promises in the contract. Also, for performance obligations that are distinct, a transaction price is allocated based on stand-alone selling prices or, if they are not directly observable, estimated them and allocated to meet the allocation objective.

Before adopting KIFRS 1115, the Group recognized revenue in accordance with KIFRS 1018 *Revenue* without separating the performance obligations of the transport and insurance services attributable to the sale of the goods. However, in accordance with KIFRS 1115, the insurance and transport costs provided after the transfer of control of the goods in the sale of the goods are identified as a separate performance obligation and recognized as service revenue.

(c) Variable consideration (return/refund accounting and consideration payable to the customer)

The Group estimates the variable consideration using an expected value method that it expects to better predict the consideration to be entitled under KIFRS 1115. Prior to the adoption of KIFRS 1115, provision for sales return was recognized by measuring the customer's right to return the product within a specified period on a net basis based on gross margin of sales in accordance with KIFRS 1037 *Provisions, Contingent Liabilities and Contingent Assets*. However, as a result of the adoption of KIFRS 1115, the Group recognizes the total amount expected to be refunded to the customer when the customer returns the product as a contract liability (refund liability) and, at the same time, as an asset (right to products returned) for its right to recover the product from the customer when the customer exercises the right to return.

In addition, the consideration payable to the customer includes the amount of cash that the Group will pay or expect to pay to the customer (or other parties that purchase the entity's goods or services from the customer). It also includes deductions or other items that can be applied to the amount that the customer has to repay to the Group (or to another party that purchases the entity's goods or services from the customer). In accordance with KIFRS 1115, the consideration paid by the Group to the customer was recognized as a deduction to the transaction price, thus revenue, for which the customer does not pay as consideration for the distinct goods or services transferred to the Group.

(d) Contract costs

The Group recognizes an asset the costs of obtaining a construction contract, and such costs include costs that would not have been incurred unless the contract was entered into with the customer. In accordance with KIFRS 1115, items of expenditure that did not meet the recognition requirements of an asset were expensed at the time of occurrence and, if the items of expenditure were included in the calculation of progress of the project, the effect was removed, and revenue was recognized by recalculating the progress of the project.

2.1.1 New and amended standards and interpretations year (cont'd)

(e) Significant financing components

In determining the transaction price in accordance with KIFRS 1115, the Group recognized revenue at an amount that reflects the price the customer would have paid if significant financing benefits were provided to the customer or to the Group in the event of the transfer of goods or services to the customer because of the timing of payment agreed between the parties to the contract.

(f) Principal versus agent considerations

For the specific product sales transaction recognized as revenue in gross amount under the previous standard, the Group determined itself as an agent in the adoption of KIFRS 1115 and recognized revenue in net amount deducting cost of sales. Accordingly, sales and costs of sales was decreased by the same amount during the year ended December 31, 2018, and inventories and trade payables were decreased as of December 31, 2018.

KIFRS 1109 *Financial Instruments*

KIFRS 1109 *Financial Instruments* replaces KIFRS 1039 *Financial Instruments: Recognition and Measurement* for annual periods beginning on or after January 1, 2018, bringing together all three aspects of the accounting for financial instruments: classification and measurement; impairment; and hedge accounting. With the exception of hedge accounting to be applied prospectively by the Group, the Group has adjusted the cumulative effect of initial adoption of KIFRS 1109 from its equity at the beginning of January 1, 2018 with the date of initial adoption of KIFRS 1109. The nature and effect of the major changes in accounting policies in accordance with the adoption of KIFRS 1109 are as follows.

Doosan Corporation and its subsidiaries
Notes to the consolidated financial statements
December 31, 2018 and 2017

2.1.1 New and amended standards and interpretations year (cont'd)

[Impact on the consolidated statements of financial position as of January 1, 2018]

(Korean won in millions)

	Classification according to KIFRS 1039	Classification according to KIFRS 1109	Book value according to KIFRS 1039	Book value according to KIFRS 1109
Financial assets:				
Cash and cash equivalents	Loans and receivables	Financial assets at amortized cost	₩ 2,344,600	₩ 2,344,600
Short-term and long-term financial instruments	Loans and receivables	Financial assets at amortized cost	314,926	314,926
Trade and other receivables(*1)	Loans and receivables	Financial assets at amortized cost	3,884,358	3,868,677
Short-term investment securities	Financial assets at fair value through profit or loss	Financial assets at fair value through profit or loss	34,182	34,182
	Available-for-sale financial assets	Financial assets (designated) at fair value through OCI	80,000	80,000
	Held-to-maturity financial assets	Financial assets at amortized cost	19,793	19,793
Long-term investment securities	Available-for-sale financial assets	Financial assets at fair value through profit or loss(*2)		185,251
		Financial assets (designated) at fair value through OCI(*3)		16,122
	Held-to-maturity financial assets	Financial assets at amortized cost(*4)	201,380	7
		Financial assets at fair value through profit or loss(*5)		900
Derivative assets	Financial assets at fair value through profit or loss	Financial assets at amortized cost	4,595	3,695
		Financial assets at fair value through profit or loss	14,537	14,537
	Derivatives designated as hedging instruments	Other financial assets	117,498	117,498
Deposits	Loans and receivables	Financial assets at amortized cost	371,865	371,865
	Total		₩ 7,387,734	₩ 7,372,053

Doosan Corporation and its subsidiaries
Notes to the consolidated financial statements
December 31, 2018 and 2017

2.1.1 New and amended standards and interpretations year (cont'd)

	Classification according to KIFRS 1039	Classification according to KIFRS 1109	Book value according to KIFRS 1039	Book value according to KIFRS 1109
Financial liabilities:				
Trade and other payables	Financial liabilities at amortized cost	Financial liabilities at amortized cost	₩ 4,787,286	₩ 4,787,286
Borrowings and bonds	Financial liabilities at amortized cost	Financial liabilities at amortized cost	12,625,014	12,625,014
Financial guarantee liabilities	Financial liabilities at amortized cost	Other financial liabilities	13,759	13,759
Derivative liabilities	Financial liabilities at fair value through profit or loss	Financial liabilities at fair value through profit or loss	65,384	65,384
	Derivatives designated as hedging instruments	Other financial liabilities	132,124	132,124
			<u>₩ 17,623,567</u>	<u>₩ 17,623,567</u>

(*1) Trade and other receivables classified as loans and receivables under KIFRS 1039 are classified as financial assets at amortized cost. Due to the adoption of KIFRS 1109, an additional ₩15,681 million of provision for loss allowances on trade and other receivables was recognized in retained earnings as of January 1, 2018.

(*2) Except for long-term investment securities designated as financial assets at fair value through other comprehensive income, equity instruments and beneficiary certificates, SOC, and cooperatives contributions of ₩185,251 million classified as available-for-sale financial assets under KIFRS 1039 are classified to financial assets at fair value through profit or loss according to the application of KIFRS 1109. Accordingly, the Group reclassified ₩8,625 million of gain (loss) on valuation of available-for-sale financial assets (accumulated other comprehensive income) to retained earnings as of January 1, 2018.

(*3) According to KIFRS 1109, the Group may elect irrevocably to present subsequent changes in fair value of equity investments on instrument-by-instrument basis as other comprehensive income for equity instruments and beneficiary certificates, SOC, and cooperative contributions not held for trading. Accordingly, the Group designated ₩16,122 million of equity instruments, which was classified as available-for-sale financial assets until the year ended December 31, 2017, as financial assets at fair value through other comprehensive income.

(*4) Debt instruments of ₩7 million of the classified as available-for-sale financial assets under KIFRS 1039 are classified to financial assets at amortized cost as they satisfies the SPPI conditions under KIFRS 1109.

(*5) Debt instruments of ₩900 million of the classified as held-to-maturity financial assets under KIFRS 1039 are reclassified to financial assets at fair value through profit or loss because they do not meet the SPPI conditions under KIFRS 1109.

2.1.1 New and amended standards and interpretations year (cont'd)

[Impact on the consolidated statements of changes in equity as of January 1, 2018]

(Korean won in millions)

	Adjustments	Amount before adopting KIFRS 1109	Adjustments	January 1, 2018
Equity attributable to owners of the parent:		₩ 2,474,066	₩ (4,036)	₩ 2,470,031
Retained earnings	(a),(b)	1,332,520	4,617	1,337,137
Accumulated other comprehensive income	(a),(b)	606,921	(8,653)	598,269
Non-controlling interests	(a),(b)	5,129,352	(9,926)	5,119,426
Total equity		₩ 7,603,418	₩ (13,962)	₩ 7,589,456

(a) Classification and measurement

KIFRS 1109 retained most of the existing requirements of KIFRS 1039 for the classification and measurement of financial liabilities. However, existing classification of held-to-maturity financial assets, loans and receivables and available-for-sale financial assets has been deleted. Financial assets are classified, at initial application, 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. Derivatives that are embedded in a contract whose host contract is a financial asset within the scope of KIFRS 1109 are not separated, but are classified based on a compound financial instrument as a whole.

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 ("SPPI") on the principal amount outstanding

The Group measures debt instruments at fair value through OCI if both of the following conditions are met and if not designated as fair value through profit or loss measurement:

- 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

2.1.1 New and amended standards and interpretations year (cont'd)

Upon initial recognition, the Group can elect to classify irrevocably its equity investments as equity instruments designated at fair value through OCI when they are not held for trading. The classification is determined on an instrument-by-instrument basis.

All other financial instruments not measured at amortized costs and fair value through other comprehensive income described above are measured at fair value through profit or loss. The Group may designate financial assets, which meet the requirements to measure at amortized cost or at fair value through OCI, as at fair value through profit or loss on initial recognition if doing so eliminates, or significantly reduces, and accounting mismatch. However, such designation is irrevocable.

Financial assets other than trade receivables that do not contain a significant financing component and are initially measured at their transaction price are initially measured at fair value plus, in case of financial assets not at fair value through profit or loss, transaction costs that are directly attributable to the acquisition.

	<u>Subsequent measurement</u>
Financial assets at fair value through profit or loss	These assets are subsequently measured at fair value. Net profit or loss, including interest and dividend income, is recognized in profit or loss.
Financial assets at amortized cost	These assets are subsequently measured at amortized cost using the effective interest rate method. The amortized cost is reduced by impairment losses, and interest income, foreign currency translation gains and losses, and impairment loss are recognized in profit or loss. The gain or loss upon derecognition is also recognized in profit or loss.
Debt instruments at fair value through OCI	These assets are subsequently measured at fair value. Interest income calculated using the effective interest rate method, foreign currency translation gains and losses, and impairment loss are recognized in profit or loss. Other net gains and losses are recognized in other comprehensive income. Upon derecognition, gains and losses accumulated in other comprehensive income are reclassified to profit or loss.
Equity instruments designated at fair value through OCI	These assets are subsequently measured at fair value. Dividends are recognized in profit or loss if dividends do not clearly represent a recovery of investment costs. Other net gains and losses are recognized in other comprehensive income and are never reclassified to profit or loss.

2.1.1 New and amended standards and interpretations year (cont'd)

(b) Impairment of financial assets

The adoption of KIFRS 1109 has fundamentally changed the Group's accounting for impairment losses for financial assets by replacing KIFRS 1039's incurred loss approach with a forward-looking expected credit loss (ECL) approach. The new impairment model applies to financial assets, contract assets, and debt instruments measured at amortized cost, and fair value through other comprehensive income, but does not apply to investments in equity instruments. Under KIFRS 1109, credit losses can be recognized earlier than KIFRS 1039.

Under KIFRS 1109, ECLs are recognized in two stages.

- 12-month ECL: Expected credit losses that result from default events that are possible within 12 months after the reporting date
- Lifetime ECL: Expected credit losses that result from all possible default events over the expected life of the financial instrument

For contract assets, trade receivables and other receivables, the Group applies the simplified approach and calculates expected credit losses on the basis of the expected life of the expected credit losses. The Group determines the expected credit loss rate for all receivables, including those with no significant increase in credit risk, considering its past credit loss experience.

(c) Hedge accounting

KIFRS 1109 applies mechanics of hedge accounting (fair value hedge accounting, cash flow hedge, foreign entities net investment hedge) specified in the current KIFRS 1039, however, the Group changed from the complex and rule-based hedge accounting requirements of KIFRS 1039 to the principle-based approach which focuses on the risk management activities. Requirements for application of hedge accounting are relaxed by enlarging items designated as hedges and hedging instruments, evaluating the high risk avoidance effects, and eliminating the quantitative criteria (80 ~ 125%).

2.1.1 New and amended standards and interpretations year (cont'd)

Amendments to KIFRS 1028 *Investments in Associates and Joint Ventures* - Clarification that measuring investees at fair value through profit or loss is an investment-by-investment choice

The amendments clarify that:

- An entity that is a venture capital organization, or other qualifying entity, may elect, at initial recognition on an investment-by-investment basis, to measure its investments in associates and joint ventures at fair value through profit or loss.
- If an entity, that is not itself an investment entity, has an interest in an associate or joint venture that is an investment entity, the entity may, when applying the equity method, elect to retain the fair value measurement applied by that investment entity associate or joint venture to the investment entity associate's or joint venture's interests in subsidiaries. This election is made separately for each investment entity associate or joint venture, at the later of the date on which: (a) the investment entity associate or joint venture is initially recognized; (b) the associate or joint venture becomes an investment entity; and (c) the investment entity associate or joint venture first becomes a parent.

The amendments have no effect on the Group's consolidated financial statements.

Amendments to KIFRS 1102 *Share-based Payment* — Classification and Measurement of Share-based Payment Transactions

The amendments to KIFRS 1102 *Share-based Payment* that address three main areas: the effects of vesting conditions on the measurement of a cash-settled share-based payment transaction; the classification of a share-based payment transaction with net settlement features for withholding tax obligations; and accounting where a modification to the terms and conditions of a share-based payment transaction changes its classification from cash settled to equity settled. On adoption, entities are required to apply the amendments without restating prior periods, but retrospective application is permitted if elected for all three amendments and other criteria are met. The Group's accounting policy for cash-settled share based payments is consistent with the approach clarified in the amendments. In addition, the Group has no share-based payment transaction with net settlement features for withholding tax obligations and had not made any modifications to the terms and conditions of its share-based payment transaction. Therefore, these amendments do not have any impact on the Group's consolidated financial statements.

Amendments to KIFRS 1040 *Investment Properties*

The amendments clarify when an entity should transfer properties, including property under construction or development into, or out of investment properties. The amendments state that a change in use occurs when the properties meets, or ceases to meet, the definition of investment properties and there is evidence of the change in use. A mere change in management's intentions for the use of a properties does not provide evidence of a change in use. The amendments have no effect on the Group's consolidated financial statements.

Amendments to KIFRS 2122 *Foreign Currency Transactions and Advance Consideration*

The Interpretation clarifies that, in determining the spot exchange rate to use on initial recognition of the related asset, expense or income (or part of it) on the derecognition of a non-monetary asset or non-monetary liability relating to advance consideration, the date of the transaction is the date on which an entity initially recognizes the non-monetary asset or non-monetary liability arising from the advance consideration. If there are multiple payments or receipts in advance, then the entity must determine the transaction date for each payment or receipt of advance consideration. The amendments have no effect on the Group's consolidated financial statements.

Amendments to KIFRS 1101 *First-time Adoption of International Financial Reporting Standards* - Deletion of short-term exemptions for first-time adopters

Short-term exemptions in paragraphs E3–E7 of KIFRS 1101 were deleted because they have now served their intended purpose. This amendment is not applicable to the Group.

2.1.2 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.

KIFRS 1116 Leases

KIFRS 1116 was issued in January 2016 and it replaces 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*. KIFRS 1116 sets out the principles for the recognition, measurement, presentation and disclosure of leases and requires lessees to account for all leases under a single on-balance sheet model similar to the accounting for finance leases under KIFRS 1017. The standard includes two recognition exemptions for lessees – leases of 'low-value' assets (e.g., personal computers) and short-term leases (i.e., leases with a lease term of 12 months or less). At the commencement date of a lease, a lessee will recognize a liability to make lease payments (i.e., the lease liability) and an asset representing the right to use the underlying asset during the lease term (i.e., the right-of-use asset). Lessees will be required to separately recognize the interest expense on the lease liability and the depreciation expense on the right-of-use asset.

Lessees will be also required to remeasure the lease liability upon the occurrence of certain events (e.g., a change in the lease term, a change in future lease payments resulting from a change in an index or rate used to determine those payments). The lessee will generally recognize the amount of the remeasurement of the lease liability as an adjustment to the right-of-use asset. Lessor accounting under KIFRS 1116 is not significantly changed from today's accounting under KIFRS 1017. Lessors will continue to classify all leases using the same classification principle as in KIFRS 1017 and distinguish between two types of leases: operating and finance leases.

KIFRS 1116 also requires lessees and lessors to make more extensive disclosures than under KIFRS 1017.

KIFRS 1116 is effective for annual periods beginning on or after January 1, 2019, with earlier application permitted. A lessee can choose to apply the standard using either the full retrospective approach or the modified retrospective approach. The standard's transition provisions allow several practical expedients. The Group is specifically analyzing the detailed effect of the adoption of this standard on its consolidated financial statements and plans to apply the amended standard on the specified effective date.

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 the 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.

The amendments should be applied retrospectively and are effective from January 1, 2019, with earlier application permitted. These amendments have no impact on the consolidated financial statements of the Group.

Amendments to KIFRS 1110 and KIFRS 1028: *Sale or Contribution of Assets between an Investor and its Associate or Joint Venture*

The amendments address the conflict between KIFRS 1110 and KIFRS 1028 in dealing with the loss of control of a subsidiary that is sold or contributed to an associate or joint venture. The amendments clarify that the gain or loss resulting from the sale or contribution of assets that constitute a business, as defined in KIFRS 1103, between an investor and its associate or joint venture, is recognized in full. Any gain or loss resulting from the sale or contribution of assets that do not constitute a business, however, is recognized only to the extent of unrelated investors' interests in the associate or joint venture. The KASB has deferred the effective date of these amendments indefinitely, but an entity that early adopts the amendments must apply them prospectively. The Group will apply these amendments when they become effective.

2.1.2 Standards issued but not yet effective (cont'd)

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 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
- Determine 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 also clarify that an entity first determines any past service cost, or a gain or loss on settlement, without considering the effect of the asset ceiling. This amount is recognized in profit or loss. An entity then determines the effect of the asset ceiling after the plan amendment, curtailment or settlement. Any change in that effect, excluding amounts included in the net interest, is recognized in other comprehensive income.

The amendments apply to plan amendments, curtailments, or settlements occurring on or after the beginning of the first annual reporting period that begins on or after January 1, 2019, with early application permitted. These amendments will apply only to any future plan amendments, curtailments, or settlements of the Group.

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 should be applied retrospectively and are effective from January 1, 2019, with early application permitted. The amendments will not have an impact on its consolidated financial statements.

KIFRS Interpretation 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 and 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 has to determine whether to consider each uncertain tax treatment separately or together with one or more other uncertain tax treatments. The approach that better predicts the resolution of the uncertainty should be followed. The interpretation is effective for annual reporting periods beginning on or after January 1, 2019, but certain transition reliefs are available. The Group will apply the interpretation from its effective date. Since the Group operates in a complex multinational tax environment, applying the Interpretation may affect its consolidated financial statements. In addition, the Group may need to establish processes and procedures to obtain information that is necessary to apply the Interpretation on a timely basis.

2.1.2 Standards issued but not yet effective (cont'd)

Annual Improvements 2015-2017 Cycle (issued in December 2017)

These improvements include:

KIFRS 1103 *Business Combinations*

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. These amendments will apply on future business combinations of the Group.

KIFRS 1111 *Joint Arrangements*

A party 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. These amendments are currently not applicable to the Group but may apply to future transactions.

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.

2.2 Basis of consolidation

The consolidated financial statements comprise the financial statements of the Group as of December 31, 2018. 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, and
- The ability to use its power over the investee to affect its returns

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 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 period are included in the consolidated statements 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.

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 is recognized at fair value.

2.3 Business combinations

Acquisitions of subsidiaries and businesses are accounted for using the acquisition method. The cost of an acquisition is measured as the aggregate of the consideration transferred, which is measured at acquisition date fair value, and the amount of any non-controlling interests in the acquiree. For each business combination, the Group elects whether to measure the non-controlling interests in the acquiree at fair value or at the proportionate share of the acquiree's identifiable net assets. Acquisition-related costs are recognized in profit or loss as incurred.

Acquired assets, liabilities and contingent liabilities that are identifiable at the acquisition date are recognized at fair value on the acquisition date except for the following:

- Deferred tax assets and liabilities or assets related to employee benefit arrangements are recognized and measured in accordance with KIFRS 1012 *Income Taxes* and KIFRS 1019 *Employee Benefits*, respectively.
- Liabilities or equity instruments related to share-based payment arrangements of the acquiree or share-based payment arrangements of the Group entered into to replace share-based payment arrangements of the acquiree are measured in accordance with KIFRS 1102 *Share-based Payment* at the acquisition date.
- Non-current assets (or disposal groups) classified as held for sale in accordance with KIFRS 1105 *Non-current Assets Held for Sale and Discontinued Operations* are measured in accordance with KIFRS 1105.

Goodwill is measured as the excess of the sum of the consideration transferred, the amount of any non-controlling interests in the acquiree and the fair value of the acquirer's previously held equity interest in the acquire (if any) over the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed. If, after reassessment, the net of the acquisition-date amounts of the identifiable assets acquired and liabilities assumed exceeds the sum of the consideration transferred, the amount of any non-controlling interests in the acquire and the fair value of the acquirer's previously held interest in the acquire (if any), the excess is recognized immediately in profit or loss as a bargain purchase gain.

Non-controlling interests that are present ownership interests and entitle their holders to a proportionate share of the entity's net assets in the event of liquidation may be initially measured either at fair value or at the non-controlling interests' proportionate share of the recognized amounts of the acquiree's identifiable net assets. The choice of measurement basis is made on a transaction-by-transaction basis. Other types of non-controlling interests are measured at fair value or, when applicable, on the basis specified in another KIFRS.

The transfer consideration of the Group as a result of the business combination includes the assets and liabilities from the contingent consideration arrangement and the contingent consideration is measured at the fair value at the acquisition date and is included as part of the consideration transferred. Changes in fair value after the acquisition date are adjusted retrospectively and adjusted in the corresponding goodwill if the conditions of the measurement period adjustments are met. Measurement Period Adjustments are adjustments that result from acquiring additional information about the facts and circumstances that existed at the acquisition date during the 'Adjustment Period' (which cannot exceed one year from the acquisition date).

Changes in fair value of contingent consideration that do not qualify for measurement period adjustments are accounted for in accordance with the classification of contingent consideration. Contingent consideration that is classified as equity is subsequently accounted for as equity if the settlement is not made at the reporting date. Contingent consideration that is classified as an asset or a liability is remeasured at subsequent reporting dates in accordance with KIFRS 1039 *Financial Instruments: Recognition and Measurement* or KIFRS 1037 *Provisions, Contingent Liabilities and Contingent Assets*. If the gain or loss is recognized, it is recognized in profit or loss.

In a staged business combination, the Group remeasures the previously held equity interest in the acquiree to its fair value at the acquisition date and, if any, the result is recognized in profit or loss. Recognition of changes in the value of interests in the acquiree prior to the acquisition date to other comprehensive income is reclassified to profit or loss in the same manner as if the previously held equity interests were disposed of directly.

If the initial accounting for the business combination cannot be completed by the end of the reporting period in which the business combination occurs, the Group reports provisional amounts in the consolidated financial statements for items for which accounting is not completed. In the event that there is newly acquired information about facts and circumstances that existed at the acquisition date during the measurement period (see above) the Group would have had an effect on the measurement of the amount recognized at the acquisition date. Recognized provision is adjusted retrospectively or additional assets and liabilities are recognized.

2.4 Investment in associates and joint ventures

An associate is an entity over which the Group has significant influence. Significant influence is the power to participate in the financial and operating policy decisions of the investee, but is not control or joint control over those policies.

A joint venture is a type of joint arrangement whereby the parties that have joint control of the arrangement have rights to the net assets of the joint venture. Joint control is the contractually agreed sharing of control of an arrangement, which exists only when decisions about the relevant activities require unanimous consent of the parties sharing control.

Except for the case where an investment in an associate or a joint venture is classified as a held for sale in accordance with KIFRS 1105 *Non-current Assets Held for Sale and Discontinued Operations*, the profit or loss, are included in the consolidated financial statements by applying the equity method. In applying the equity method, investments in associates and joint ventures are carried at the acquisition cost less any impairment loss on the investments in associates and joint ventures, adjusted for changes in equity in net assets of associates and joint ventures consolidated financial statements. Losses of associates and joint ventures that exceed the interests of the Group in relation to the associates and joint ventures (including long-term investments that substantially form part of the net investment of the Group in the associates and joint ventures) Are legally or aggressively obligated, or are required to be paid on behalf of the joint venture.

The cost of acquisition over the fair value of identifiable assets, liabilities and contingent liabilities of associates and joint ventures at the acquisition date in excess of the Group's interest is recognized as goodwill. Goodwill is included in the carrying amount of the investment and reviewed for impairment as part of the investment. If the Group's share of the net fair value of identifiable assets, liabilities and contingent liabilities exceeding the cost of the consideration, even after review, is recognized in profit or loss.

If the entity has retained some of the investment assets of existing associates and joint ventures even after it has lost significant influence over the associates and joint ventures, the fair value of the investment assets at the point of time when the significant influence is lost, Are considered to be the fair value at the initial recognition of the financial asset in accordance with KIFRS 1039. The difference between the carrying amount of the investment and the fair value of the investment is recognized in profit or loss, including the gain or loss on disposal of the associate. In addition, the investor accounts for all amounts recognized as other comprehensive income in relation to the associate and the joint venture on the same basis as the accounting treatment in case the associate and the joint venture directly dispose of the related asset or liability. Therefore, when an associate is required to reclassify the gain or loss previously recognized in other comprehensive income to the profit or loss as a result of the disposal of the asset or liability, the investor may reclassification gains or losses on equity Reclassified to profit or loss (reclassification adjustment).

If the equity method of accounting for associates or joint ventures decreases, but the equity method is applied, if the gain or loss previously recognized in other comprehensive income is reclassified to profit or loss as a result of the disposal of the related asset or liability, The proportionate portion of the decrease in ownership interest is reclassified to profit or loss. In addition, KIFRS 1105 is applied when a portion of investments in associates or joint ventures meets the criteria for sale.

The Group determines whether an impairment loss is recognized in respect of investments in associates and joint ventures in accordance with KIFRS 1039 *Financial Instruments: Recognition and Measurement*. If there is an indication of impairment, the total carrying amount of the associate and joint venture (including goodwill) is compared to the recoverable amount (the greater of fair value less cost to sell and value in use) in accordance with KIFRS 1036 *Asset Impairment*. The recognized impairment loss is not allocated to any assets (including goodwill) that are part of the carrying amount of associates and joint ventures. The reversal of impairment loss is recognized in accordance with KIFRS 1036 as the recoverable amount of the investment assets increases subsequently.

When an associate becomes a joint venture or, conversely, a joint venture becomes an associate, the Group continues to apply the equity method and does not remeasure residual equity.

When the Group transacts with an associate or a joint venture, the gain or loss on the transaction between the associate and the joint venture is recognized only to the extent of the equity interest in the associate and the joint venture, are recognized.

2.5 Investment in joint ventures

A joint venture is a type of joint arrangement whereby the parties that have joint control of the arrangement have rights to the net assets of the joint venture. Joint control is the contractually agreed sharing of control of an arrangement, which exists only when decisions about the relevant activities require unanimous consent of the parties sharing control.

When an entity performs an activity under a joint venture, the entity recognizes, as a co-operative, its own interest in the joint venture as follows:

- Own assets. Include own shares of assets that are jointly owned.
- Own debt. Including own shares of jointly-generated debt.
- The own share of output from joint sales.
- The own share of the output of the joint sales.
- Own expenses. Include own share of the costs incurred jointly.

The Group accounts for assets, liabilities, income and expenses of its own interests in joint ventures in accordance with the standards that apply to certain assets, liabilities, income and expenses.

If a joint operating entity, such as selling or investing in an asset in a joint operation, is deemed to perform a transaction with another party in the joint operation, the entity shall notify the other party. We are only aware of the limit on shareholding.

If the co-operative, the Group, conducts transactions such as joint sales and purchases of assets, the Group does not recognize its portion of the profit or loss until the assets are resold to a third party.

2.6 Goodwill

Goodwill resulting from an acquisition of a business is carried at cost as established at the date of acquisition of the business less accumulated impairment losses, if any.

For the purpose of impairment testing, goodwill is allocated to each of the cash-generating units (CGUs) (or groups of CGUs) that is expected to benefit from the synergies of the combination.

A CGU to which goodwill has been allocated is tested for impairment annually, or more frequently when there is indication that the unit may be impaired. If the recoverable amount of the CGU is less than its carrying amount, the impairment loss is allocated first to reduce the carrying amount of any goodwill allocated to the unit and then to the other assets of the unit on a pro rata basis based on the carrying amount of each asset in the unit. Any impairment loss for goodwill is recognized directly in profit or loss. An impairment loss recognized for goodwill is not reversed in subsequent periods.

On disposal of the relevant CGU, the attributable amount of goodwill is included in the determination of the profit or loss on disposal.

The Group's accounting policies for goodwill arising on the acquisition of an associate are set out in Note 2.4.

2.7 Non-current assets held for sale

Non-current assets and disposal groups are classified as held for sale if their carrying amount will be recovered principally through a sale transaction rather than through continuing use. This condition is regarded as met only when the sale is highly probable and the non-current asset (or disposal group) is available for immediate sale in its present condition. Management must be committed to the sale, which should be expected to qualify for recognition as a completed sale within one year from the date of classification.

If the Group commits a sale plan that results in a loss of control of the subsidiary, the Group will, if the Group has satisfied the conditions previously mentioned, regardless of whether the Group has a non-controlling interest in the former subsidiary after the sale, all assets and liabilities are classified as held for sale.

If the Group is committed to a sale of an investment in an associate or a joint venture, all or part of the investment in the associate or joint venture to be sold will be classified as held for sale if it meets the criteria for sale, and the Group ceases to apply the equity method for investments in associates or joint ventures related to the items classified as held for sale. The Group continues to apply the equity method of accounting for residual interests in investments in associates or joint ventures that are not classified as held for sale. However, if the Group has a significant influence over the associates or joint ventures, the Group ceases to apply the equity method at the time of sale.

Unless the Group continues to apply the equity method to the Group's remaining retained interests in an associate or joint venture after the sale of an investment in an associate or a joint venture, the Group shall retain the remaining amount of the investment in the associate or joint venture. *Corporate KIFRS 1039 Financial assets: Recognition and measurement.*

Non-current assets (and disposal groups) classified as held for sale are measured at the lower of their previous carrying amount and fair value less costs to sell.

2.8 Revenue from contracts with customers

A. Identifying performance obligations

The Group mainly engages in business areas, such as power generation facilities, industrial facilities, construction machinery, engines, manufacture of casting and forgings, and construction.

The Group identifies performance obligations that are distinct in the contract with the customer. Accordingly, a performance obligation, unit of revenue recognition, may be additionally identified in a single contract, or performance obligations in multiple contracts can be combined as a single performance obligation. The timing of the Group's revenue recognition may vary depending on whether each performance obligation identified is satisfied at a point in time or over time.

The Group identifies a performance obligation as a distinct performance obligation when the customer can benefit from the good or service either on its own or together with other resources that are readily available to the customer and the Group's promise to transfer the good or service to the customer is separately identifiable from other promises in the contract. Also, for performance obligations that are distinct, a transaction price is allocated based on stand-alone selling prices or, if they are not directly observable, estimated them and allocated to meet the allocation objective.

The Group identifies (a) the EPC contract and (b) the O&M service as distinct performance obligations and estimates the stand-alone selling price for each performance obligation to recognize revenue after allocating the transaction price. In addition, the Group recognizes a warranty that the customer has an option to purchase separately and shipping services and insurance provided in export sales as separate performance obligations. Revenue is recognized after the transaction price is allocated to such performance obligations.

2.8 Revenue from contracts with customers (cont'd)

B. Performance obligations satisfied over time

The power and industry sector of the Group engage in manufacturing and selling power generation equipment ordered by the customer with design elements designated. The Group determines the contract as a construction contract, measures the progress the input method, and recognizes revenue based on the percentage-of-completion.

The Group recognizes revenue according to the percentage-of-completion only in case when it does not create an asset with an alternative use to the Group as it performs its performance obligations and has an enforceable right to payment for performance completed to date since it considers the control of the goods or services is transferred over time.

As a result of review on possibility of alternative use and right to payment by contracts, the Group recognizes revenue by applying the percentage-of-completion.

C. Measurement of progress using input method

The power sector of the Group will purchase, manufacture, and install power generation related materials, such as boilers and turbines and generally carry out construction work over a long period of time.

At contract inception, the Group recognizes the same amount of revenue as the goods used to fulfil the performance obligation if the goods are not distinct and the costs of the goods transferred are expected to be significant compared to the total costs expected to be fully satisfied by the customer before the goods are received.

D. Variable consideration

The Group estimates variable consideration using the expected value method that better predicts to which it will be entitled and recognizes revenue in the amount of the transaction price that include variable consideration that is constrained until it is highly probable that a significant revenue reversal in the amount of cumulative revenue recognized until the expiry of return date. The Group recognizes a refund liability for the amount to which it does not expect to be entitled among the consideration received or expected to receive.

E. Allocation of the transaction price

The Group allocates the transaction price on the basis of the stand-alone selling price to the various performance obligations identified in a single contract. The Group uses the 'adjusted market assessment approach' to estimate the stand-alone selling price of each performance obligation and, in exceptional transactions, the 'expected cost plus a margin approach' to predict expected costs and add appropriate profit margins.

2.9 Rental income

The Group's policy for recognition of revenue from operating leases is described in Note 2.10.

2.10 Lease

Leases are classified as finance leases whenever the terms of the lease transfer substantially all the risks and rewards of ownership to the lessee. All other leases are classified as operating leases.

2.10.1 The Group as lessor

Amounts due from lessees under finance leases are recognized as receivables at the amount of the Group's net investment in the leases. Finance lease income is allocated to accounting periods so as to reflect a constant periodic rate of return on the Group's net investment outstanding in respect of the leases.

Rental income from operating leases is recognized on a straight-line basis over the term of the relevant lease. Initial direct costs incurred in negotiating and arranging an operating lease are added to the carrying amount of the leased asset and recognized on a straight-line basis over the lease term.

2.10.2 The Group as lessee

Assets held under finance leases are initially recognized as assets of the Group at their fair value at the inception of the lease or, if lower, at the present value of the minimum lease payments. The corresponding liability to the lessor is included in the consolidated statements of financial position as a finance lease obligation.

Lease payments are apportioned between finance expenses and reduction of the lease obligation, so as to achieve a constant rate of interest on the remaining balance of the liability. Finance expenses are recognized immediately in profit or loss, unless they are directly attributable to qualifying assets, in which case they are capitalized in accordance with the Group's general policy on borrowing costs (see Note 2.12). Contingent rentals are recognized as expenses in the periods in which they are incurred.

Operating lease payments are recognized as an expense on a straight-line basis over the lease term, except where another systematic basis is more representative of the time pattern in which economic benefits from the leased asset are consumed. Contingent rentals arising under operating leases are recognized as an expense in the period in which they are incurred.

2.11 Foreign currencies

The consolidated financial statements of the Group are presented in the currency of the primary economic environment in which the entity operates (its functional currency). For the purpose of the consolidated financial statements, the results and financial position of each group entity are expressed in Korean won, which is the functional currency of the entity and the presentation currency for the consolidated financial statements.

In preparing the financial statements, transactions in currencies other than the entity's functional currency (foreign currencies) are recognized at the rates of exchange prevailing at the dates of the transactions. At the end of each reporting period, monetary items denominated in foreign currencies are retranslated at the rates prevailing at that date. Non monetary items carried at fair value that are denominated in foreign currencies are retranslated at the rates prevailing at the date when the fair value was determined. Non monetary items that are measured in terms of historical cost in a foreign currency are not retranslated.

Exchange differences are recognized in profit or loss in the period in which they arise, except for:

- Exchange differences on foreign currency borrowings relating to assets under construction for future productive use, which are included in the cost of those assets when they are regarded as an adjustment to interest costs on those foreign currency borrowings
- Exchange differences on transactions entered into in order to hedge certain foreign currency risks (see Note 2.25 below for hedging accounting policies)
- Exchange differences on monetary items forming part of the net investment in the foreign operation.

In order to prepare consolidated financial statements, the assets and liabilities of foreign operations included in the Group are presented using the exchange rates at the end of the reporting period. Unless the foreign currency exchange rate fluctuates significantly during the period and the exchange rate at the transaction date is not required to be used, the items of profit or loss are translated at the average exchange rate for the year. Foreign exchange differences arising from such differences are recognized in other comprehensive income and accumulated in equity (If appropriate, allocate to non-controlling interests).

2.11 Foreign currencies (cont'd)

When a foreign operation is disposed of (In other words, the disposal of the entire amount of the Group's foreign operations, the disposal of the subsidiary including its overseas operations, the partial disposal of the equity of the joint venture, or the partial disposal of the equity interest in an associate If the equity interest is a financial asset that includes overseas business sites), the entire amount of foreign exchange differences related to the foreign operations attributable to the parent is reclassified to profit or loss. The cumulative exchange differences related to the foreign operations attributable to the non-controlling interests are eliminated but are not reclassified to profit or loss.

For certain dispositions that do not result in a loss of control over subsidiaries, including foreign operations, the proportionate share of the accumulated foreign exchange differences is reassigned to non-controlling interests and is not reclassified to profit or loss. For all other disposals (In other words, a decrease in ownership interest in an associate or joint venture of a group that does not result in significant influence or loss of joint control), the proportionate share of the accumulated foreign exchange differences is reclassified to profit or loss.

Fair value adjustments for goodwill and identifiable assets and liabilities arising from the acquisition of foreign operations are recognized in the income statement as assets and liabilities at the foreign operations and are translated at the exchange rates at the balance sheet date, the resulting foreign exchange difference is recognized as capital.

In determining the spot exchange rate to use on initial recognition of the related asset, expense or income (or part of it) on the derecognition of a non-monetary asset or non-monetary liability relating to advance consideration, the date of the transaction is the date on which the Group initially recognizes the non-monetary asset or non-monetary liability arising from the advance consideration. If there are multiple payments or receipts in advance, the Group determines the transaction date for each payment or receipt of advance consideration.

2.12 Borrowing costs

Borrowing costs directly attributable to the acquisition, construction or production of qualifying assets, which are assets that necessarily take a substantial period of time to get ready for their intended use or sale, are added to the cost of those assets, until such time as the assets are substantially ready for their intended use or sale.

Investment income earned on the temporary investment of specific borrowings pending their expenditure on qualifying assets is deducted from the borrowing costs eligible for capitalization.

All other borrowing costs are recognized in profit or loss in the period in which they are incurred.

2.13 Retirement benefit costs and termination benefits

The Group operates a defined benefit pension plan. The cost of providing benefits is determined using the projected unit credit method, with actuarial valuations being carried out at the end of each reporting period. Remeasurement, comprising actuarial gains and losses, the effect of the changes to the asset ceiling (if applicable) and the return on plan assets are reflected immediately in the consolidated statements of financial position with a charge or credit recognized in other comprehensive income in the period in which they occur. Remeasurement recognized in other comprehensive income is reflected immediately in retained earnings and will not be reclassified to profit or loss. Past service cost is recognized in profit or loss in the period of a plan amendment. Net interest is calculated by applying the discount rate at the beginning of the period to the net defined benefit liability or asset.

Defined benefit costs are composed of service cost (including current service cost, past service cost, as well as gains and losses on curtailments and settlements), net interest expense (income) and remeasurement.

2.13 Retirement benefit costs and termination benefits (cont'd)

The Group presents the service cost and net interest expense (income) components in profit or loss, and the remeasurement component in other comprehensive income. Curtailment gains and losses are accounted for as past service costs.

The retirement benefit liabilities recognized in the consolidated statements of financial position represents the actual deficit or surplus in the Group's defined benefit plans. Any surplus resulting from this calculation is limited to the present value of any economic benefits available in the form of refunds from the plans or reductions in future contributions to the plans.

A liability for a termination benefit is recognized at the earlier of when the entity can no longer withdraw the offer of the termination benefit and when the entity recognizes any related restructuring costs.

Contributions to defined contribution retirement benefit plans are recognized as an expense when employees have rendered service entitling them to the contributions.

2.14 Share-based payment transactions of the Group

Equity-settled share-based payments to employees are measured at the fair value of the equity instruments at the grant date.

The fair value determined at the grant date of the equity-settled share-based payments is expensed on a straight-line basis over the vesting period, based on the Group's estimate of equity instruments that will eventually vest. At the end of each reporting period, the Group revises its estimate of the number of equity instruments expected to vest. The impact of the revision of the original estimates, if any, is recognized in profit or loss, such that the cumulative expense reflects the revised estimate, with a corresponding adjustment in other component of equity.

2.15 Taxation

Income tax expenses represent the sum of the tax currently payable and deferred tax.

2.15.1 Current tax

The tax currently payable is based on taxable profit for the year. Taxable profit differs from profit as reported in the consolidated statements of profit or loss and comprehensive income because of items of income or expense that are taxable or deductible in other years and items that are never taxable or deductible. The Group's liability for current tax is calculated using tax rates that have been enacted or substantively enacted by the end of the reporting period.

2.15.2 Deferred tax

Deferred tax is recognized on temporary differences between the carrying amounts of assets and liabilities in the financial statements and the corresponding tax bases used in the computation of taxable profit. Deferred tax liabilities are generally recognized for all taxable temporary differences. Deferred tax assets are generally recognized for all deductible temporary differences to the extent that it is probable that taxable profits will be available against which those deductible temporary differences can be utilized. Such deferred tax assets and liabilities are not recognized if the temporary difference arises from goodwill or from the initial recognition (other than in a business combination) of other assets and liabilities in a transaction that affects neither the taxable profit nor the accounting profit.

The Group can control the timing of the extinguishment of the temporary difference and the additions to the subsidiary, the investment in the associate and the interest in the joint venture, unless it is probable that the temporary difference will not cease in the foreseeable future deferred tax liabilities are recognized for temporary differences. Deferred tax assets arising from temporary differences arising from these investments and investments are highly probable to be taxable enough to enable the benefits of the temporary difference and are likely to expire in the foreseeable future recognize only if high.

The carrying amount of deferred tax assets is reviewed at the end of each reporting period and reduced to the extent that it is no longer probable that sufficient taxable profits will be available to allow all or part of the asset to be recovered.

2.15.2 Deferred tax (cont'd)

Deferred tax assets and liabilities are measured at the tax rates that are expected to apply in the period in which the liability is settled or the asset realized, based on tax rates (and tax laws) that have been enacted or substantively enacted by the end of the reporting period. The measurement of deferred tax liabilities and assets reflects the tax consequences that would follow from the manner in which the Group expects, at the end of the reporting period, to recover or settle the carrying amount of its assets and liabilities.

Deferred income tax assets and liabilities are recognized when the Group has a legally enforceable right to offset current tax assets and current tax liabilities and are subject to the same taxation entities as the taxable entity. Are intended to settle the liabilities at the same time as they are expected to be settled at the balance sheet date, if the Group intends to settle the current tax liabilities and assets on a net basis, deferred tax liabilities are settled or deferred tax assets are recovered only offset.

2.15.3 Current and deferred taxes for the year

Current and deferred taxes are recognized in profit or loss, except when they relate to items that are recognized in other comprehensive income or directly in equity, in which case, the current and deferred taxes are also recognized in other comprehensive income or directly in equity, respectively. Where current tax or deferred tax arises from the initial accounting for a business combination, the tax effect is included in the accounting for the business combination.

2.16 Government grants

Government grants are not recognized until there is reasonable assurance that the Group will comply with the conditions attaching to them and that the grants will be received.

The benefit of a government loan at a below-market rate of interest is treated as a government grant, measured as the difference between proceeds received and the fair value of the loan based on prevailing market interest rates.

Government grants related to assets are presented in the consolidated statements of financial position by deducting the grant from the carrying amount of the asset. The related grant is recognized in profit or loss over the life of a depreciable asset as a reduced depreciation expense.

Government grants related to income are recognized in profit or loss on a systematic basis over the periods in which the Group recognizes as expenses the related costs for which the grants are intended to compensate. Government grants that are receivable as compensation for expenses or losses already incurred or for the purpose of giving immediate financial support to the Group with no future-related costs are recognized in profit or loss in the period in which they become receivable.

2.17 Property, plant and equipment

Property, plant and equipment are stated at cost less subsequent accumulated depreciation and accumulated impairment losses, other than land, for which revaluation model is applied after initial recognition. The cost of an item of property, plant and equipment is directly attributable to their purchase or construction, which includes any costs directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management. It also includes the initial estimate of the costs of dismantling and removing the item and restoring the site on which it is located.

Subsequent costs are recognized in carrying amount of an asset or as a separate asset if it is probable that future economic benefits associated with the assets will flow to the Group and the cost of an asset can be measured reliably. Routine maintenance and repairs are expensed as incurred.

The Group does not depreciate land. Depreciation expense is computed using the straight-line method based on the estimated useful lives of the assets as follows:

	<u>Estimated useful lives (in years)</u>
Buildings	4-50
Structures	2-40
Machinery	2-20
Other property, plant and equipment	2-20

If each part of an item of property, plant and equipment has a cost that is significant in relation to the total cost of the item, it is depreciated separately.

The Group reviews the depreciation method, the estimated useful lives and residual values of property, plant and equipment at the end of each annual reporting period. If expectations differ from previous estimates, the changes are accounted for as a change in an accounting estimate.

An item of property, plant and equipment is derecognized upon disposal or when no future economic benefits are expected to arise from the continued use of the asset. Any gain or loss arising on derecognition of the property (calculated as the difference between the net disposal proceeds and the carrying amount of the asset) is included in profit or loss in the period in which the property is derecognized.

2.18 Investment properties

Investment properties are properties held to earn rentals and/or for capital appreciation (including property under construction for such purposes). Investment properties are measured initially at cost, including transaction costs. Subsequent to initial recognition, investment properties are stated at fair value, with any gains or losses arising on fair value fluctuation recognized in profit or loss.

Subsequent costs are recognized in carrying amount of an asset or as a separate asset if it is probable that future economic benefits associated with the assets will flow into the Group and the cost of an asset can be measured reliably. Routine maintenance and repairs are expensed as incurred.

An investment property is derecognized upon disposal or when the investment property is permanently withdrawn from use and no future economic benefits are expected from the disposal. Any gain or loss arising on derecognition of the property (calculated as the difference between the net disposal proceeds and the carrying amount of the asset) is included in profit or loss in the period in which the property is derecognized.

2.19 Intangible assets

2.19.1 Intangible assets acquired separately

Intangible assets with finite useful lives that are acquired separately are carried at cost, less accumulated amortization and accumulated impairment losses. Amortization is recognized on a straight-line basis over their estimated useful lives. The estimated useful life and amortization method are reviewed at the end of each reporting period, with the effect of any changes in estimate being accounted for on a prospective basis. Intangible assets with indefinite useful lives that are acquired separately are carried at cost less accumulated impairment losses.

2.19.2 Internally generated intangible assets - research and development expenditure

Expenditure on research activities is recognized as an expense in the period in which it is incurred.

Expenditure arising from development (or from the development phase of an internal project) is recognized as an intangible asset if, and only if, the development project is designed to produce new or substantially improved products, and the Group can demonstrate the technical and economic feasibility and measure reliably the resources attributable to the intangible asset during its development.

Subsequent to initial recognition, internally generated intangible assets are reported at cost, less accumulated amortization and accumulated impairment losses, on the same basis as intangible assets that are acquired separately.

2.19.3 Intangible assets acquired in a business combination

Intangible assets that are acquired in a business combination are recognized separately from goodwill and are initially recognized at their fair value at the acquisition date (which is regarded as their cost). Subsequent to initial recognition, intangible assets acquired in a business combination are reported at cost less accumulated amortization and accumulated impairment losses, on the same basis as intangible assets that are acquired separately.

2.19.4 Derecognition of intangible assets

An intangible asset is derecognized on disposal or when no future economic benefits are expected from its use. Gains or losses arising from derecognition of an intangible asset, measured as the difference between the net disposal proceeds and the carrying amount of the asset, are recognized in profit or loss when the asset is derecognized.

2.19.5 Amortization of intangible assets

Intangible assets other than memberships with indefinite useful lives are amortized using the straight-line method with acquiring cost, except for residual value, with the amortization beginning when the asset is available for use. The estimated useful lives of the assets are as follows:

	<u>Estimated useful lives (in years)</u>
Development costs	4–12
Industrial rights	5-10
Other intangible assets	2–20

2.20 Impairment of tangible and intangible assets other than goodwill

At the end of each reporting period, the Group reviews the carrying amounts of its tangible and intangible assets to determine whether there is any indication that those assets have suffered an impairment loss. If any such indication exists, the recoverable amount of the asset is estimated in order to determine the extent of the impairment loss (if any). When it is not possible to estimate the recoverable amount of an individual asset, the Group estimates the recoverable amount of the CGU to which the asset belongs.

Memberships with indefinite useful lives and intangible assets not yet available for use are tested for impairment at least annually, and whenever there is an indication that the asset may be impaired.

Recoverable amount is the higher of fair value less costs to sell and value in use. If the recoverable amount of an asset (or a CGU) is estimated to be less than its carrying amount, the carrying amount of the asset (or the CGU) is reduced to its recoverable amount and the reduced amount is recognized in profit or loss.

Where an impairment loss subsequently reverses, the carrying amount of the asset (or a CGU) is increased to the revised estimate of its recoverable amount, but so that the increased carrying amount does not exceed the carrying amount that would have been determined had no impairment loss been recognized for the asset (or the CGU) in prior years. A reversal of an impairment loss is recognized immediately in profit or loss.

2.21 Inventories

Inventories are stated at the lower of cost and net realizable value. Cost of inventories, except for those in transit, are measured under the weighted-average cost formula and consists of the purchase price, cost of conversion and other costs incurred in bringing the inventories to their present location and condition. Net realizable value represents the estimated selling price for inventories, less all estimated costs of completion and costs necessary to make the sale.

When inventories are sold, the carrying amount of those inventories is recognized as an expense (cost of sales) in the period in which the related revenue is recognized. The amount of any write-down of inventories to net realizable value and all losses of inventories is recognized as an expense in the period the write-down or loss occurs. The amount of any reversal of any write-down of inventories, arising from an increase in net realizable value, is recognized as a reduction in the amount of inventories recognized as an expense in the period in which the reversal occurs.

2.22 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 the Group will be required to settle the obligation, and a reliable estimate can be made of the amount of the obligation.

The amount recognized as a provision is the best estimate of the consideration required to settle the present obligation at the end of the reporting period, taking into account the risks and uncertainties surrounding the obligation. When a provision is measured using the cash flows estimated to settle the present obligation, its carrying amount is the present value of those cash flows (where the effect of the time value of money is material). The discount rate used is a pretax rate that reflects current market assessments of the time value of money and the risks specific to the liability. Where discounting is used, the increase in the provision due to the passage is recognized in profit or loss as borrowing cost.

When some or all of the economic benefits required to settle a provision are expected to be recovered from a third party, a receivable is recognized as an asset if it is virtually certain that reimbursement will be received and the amount of the receivable can be measured reliably.

At the end of each reporting period, the remaining provision balance is reviewed and assessed to determine if the current best estimate is being recognized. If the existence of an obligation to transfer economic benefit is no longer probable, the related provision is reversed during the period.

2.23 Financial instruments

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.

2.23.1 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.

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)

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 rate (EIR) method and are subject to impairment. Gains and losses are recognized in profit or loss when the asset is derecognized, modified or impaired.

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

2.23.1 Financial assets (cont'd)

For debt instruments at fair value through OCI, interest income, foreign exchange revaluation and impairment losses or reversals are recognized in the statements of profit or 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.

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.

Gains and losses on these financial assets are never recycled to profit or loss. Dividends are recognized as other income in the statements of profit or 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 statements of financial position at fair value with net changes in fair value recognized in profit or loss.

This category contains derivatives and listed equity instruments that do not make an irrevocable choice to account for changes in fair value in other comprehensive income. Dividends on listed equity instruments are recognized in profit or loss at the time the rights are established.

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.

2.23.1 Financial assets (cont'd)

[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 statements 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]

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).

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.

2.23.2 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.

[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 profit or 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.

Loans and borrowings

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.

This category generally applies to interest-bearing loans and borrowings.

[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 profit or loss.

2.23.3 Offsetting of financial instruments

Financial assets and financial liabilities are offset and the net amount is reported in the consolidated statements 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.

2.23.4 Financial guarantee liabilities

A financial guarantee contract is a contract that requires the issuer to make specified payments to reimburse the holder for a loss it incurs because a specified debtor fails to make payments when due in accordance with the terms of a debt instrument.

Financial guarantee liabilities are initially measured at their fair values and, if not designated as financial liabilities at fair value through profit or loss, or unless the transfer of a financial asset does not meet the derecognition criteria or the continuing involvement approach is applied are subsequently measured at the higher of:

- The amount loss allowances determined in accordance with KIFRS 1109 5.5, and
- The amount initially recognized, less cumulative amortization recognized in accordance with the KIFRS 1115

2.24 Equity instruments

An equity instrument is any contract that evidences a residual interest in the assets of an entity after deducting all of its liabilities. Equity instruments issued by the Group are recognized at the proceeds received, net of direct issue costs.

Repurchase of the Group's own equity instruments is recognized and deducted directly in 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.

2.25 Derivative financial instruments and hedge accounting

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.

Before January 1, 2018, the documentation includes identification of the hedging instrument, the hedged item or transaction, the nature of the risk being hedged and how the Group 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.

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

Beginning January 1, 2018, the documentation includes identification of the hedging instrument, the hedged item, the nature of the risk being hedged and how the Group will assess whether the hedging relationship meets the hedge effectiveness requirements (including the analysis of sources of hedge ineffectiveness and how the hedge ratio is determined). A hedging relationship qualifies for hedge accounting if it meets all of the following effectiveness requirements.

- There is 'an economic relationship' between the hedged item and the hedging instrument.
- The effect of credit risk does not 'dominate the value changes' that result from that economic relationship.
- The hedge ratio of the hedging relationship is the same as that resulting from the quantity of the hedged item that the Group actually hedges and the quantity of the hedging instrument that the Group actually uses to hedge that quantity of hedged item.

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 statements of profit or loss. 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 statements of profit or loss.

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 statements of profit or loss. The cash flow hedge reserve is adjusted to the lower of the cumulative gain or loss on the hedging instrument and the cumulative change in fair value of the hedged item.

The Group uses forward currency contracts as hedges of its exposure to foreign currency risk in forecast transactions and firm commitments, as well as forward commodity contracts for its exposure to volatility in the commodity prices. The ineffective portion relating to forward contracts is recognized as finance income or finance expenses.

The amounts accumulated in OCI are accounted for, depending on the nature of the underlying hedged transaction. If the hedged transaction subsequently results in the recognition of a non-financial item, the amount accumulated in equity is removed from the separate component of equity and included in the initial cost or other carrying amount of the hedged asset or liability. This is not a reclassification adjustment and will not be recognized in OCI for the year. This also applies where the hedged forecast transaction of a non-financial asset or non-financial liability subsequently becomes a firm commitment for which fair value hedge accounting is applied.

For any other cash flow hedges, the amount accumulated in OCI is reclassified to profit or loss as a reclassification adjustment in the same period or periods during which the hedged cash flows affect profit or loss.

If cash flow hedge accounting is discontinued, the amount that has been accumulated in OCI must remain in accumulated OCI if the hedged future cash flows are still expected to occur. Otherwise, the amount will be immediately reclassified to profit or loss as a reclassification adjustment. After discontinuation, once the hedged cash flow occurs, any amount remaining in accumulated OCI must be accounted for depending on the nature of the underlying transaction as described above.

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

Hedges of a net investment in a foreign operation

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 statements of profit or loss. On disposal of the foreign operation, the cumulative value of any such gains or losses recorded in equity is transferred to the statements of profit or loss.

2.26 Fair value

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, regardless of whether that price is directly observable or estimated using another valuation technique. In estimating the fair value of an asset or a liability, the Group takes into account the characteristics of the asset or liability if market participants would take those characteristics into account when pricing the asset or liability at the measurement date. Fair value for measurement and/or disclosure purposes in these consolidated financial statements is determined on such a basis, except for share-based payment transactions that are within the scope of KIFRS 1102 *Share-based Payment*, leasing transactions that are within the scope of KIFRS 1017 *Leases* and measurements that have some similarities to fair value but are not fair value, such as net realizable value in KIFRS 1002 *Inventories*, or value in use in KIFRS 1036 *Impairment of Assets*.

In addition, for financial reporting purposes, fair value measurements are categorized into Levels 1, 2 or 3 based on the degree to which the inputs to the fair value measurements are observable and the significance of the inputs to the fair value measurement in their entirety, which are described in Note 10.

2.27 Approval of consolidated financial statements

The consolidated financial statements of the Group were approved by the Board of Directors on March 11, 2019 and will be finalized at the annual general meeting of shareholders on March 29, 2019.

3. Significant accounting judgements and key sources of estimation uncertainties

In the application of the Group's accounting policies, which are described in Note 2, management is required to make judgments, estimates and assumptions about the carrying amounts of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates.

The estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognized in the period in which the estimate is revised if the revision affects only that period or in the period of the revision and future periods if the revision affects both current and future periods.

3.1 Revenue recognition

Revenue from a contract to provide services is recognized by reference to the stage of completion of the contract. The stage of completion of the contract is determined as reasonable estimation and is subject to change as related factors change.

3.2 Impairment of goodwill

Determining whether goodwill is impaired requires an estimation of the value in use of the CGUs to which goodwill has been allocated. The value in use calculation requires the directors to estimate the future cash flows expected to arise from the CGU and a suitable discount rate in order to calculate the present value.

3.3 Defined benefit liabilities

The Group's defined benefit liabilities are determined based on the actuarial valuation carried out at the end of each annual reporting period. Actuarial assumptions are the Group's best estimates of the variables, such as discount rates, rates of expected future salary increases and mortality rates.

3.4 Provisions

Provisions for the expected cost of warranty obligations are recognized at the best estimate of the expenditure required to settle the Group's current and future obligations. Provisions are determined by the estimate based on past experience.

3.5 Revaluation model on land and fair value model on investment properties

As stated in Note 12 and Note 14, the Group uses evaluation technique, including inputs that are not based on observable market data to approximate revalued amount of land classified as property, plant and equipment and fair value of investment properties. The Group's management believes that the evaluation technique and assumptions that are used for valuation on land and investment properties are fair.

3.6 Deferred tax

Recognition and measurement of deferred tax assets and liabilities require the management's judgment, in particular, whether to recognize if the scope of deferred tax assets is affected by management's judgment and assumption in the future.

3.7 Estimated useful lives of property, plant and equipment and intangible assets

Useful lives for depreciation and amortization are determined by the management's judgment.

3.8 Fair value

When the fair values of financial instruments recorded in the consolidated statements of financial position cannot be measured based on quoted prices in active markets, their fair value is measured using valuation techniques including the discounted cash flow (DCF) model. The inputs to these models are taken from observable markets where possible, but where this is not feasible, a degree of judgement is required in establishing fair values. Judgements include considerations of inputs such as liquidity risk, credit risk and volatility. Changes in assumptions relating to these factors could affect the reported fair value of financial instruments.

3.9 Determination of consolidation

As of December 31, 2018, the parent company holds 33.8% of the voting rights of DHC and DHC holds 36.3% of the voting rights of DI. Most of the remaining stakes are held by small shareholders of less than 1%. The management of the Group reassess whether it controls subsidiaries listed above for the first time (January 1, 2013) and at the end of each subsequent reporting period. The executives of the Group concluded that they have control over the absolute size of the voting rights of the Group and the relative size of other shareholding voting rights and the degree of shareholding of other voting rights holders.

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 the operations of the Group. 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 and International Finance department, in accordance with the aforementioned documented risk management policies. In addition, the Group enters into derivative contracts to hedge against certain risks.

4.1 Market risk

4.1.1 Foreign currency risk

The Group's exposure to the risk of changes in foreign exchange rates relates primarily to the Group's operating activities (when revenue or expense is denominated in a foreign currency). The Group's basis for foreign currency risk management is to reduce income/loss volatility. Foreign currency risk is managed by the Group's policy on foreign currencies and foreign currency management for speculative purpose is strictly prohibited.

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 for the remaining exposure by using derivatives, such as currency forwards.

The carrying amount 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, 2018 and 2017 is as follows (Korean won in millions):

	December 31, 2018					
	USD	EUR	JPY	GBP	Others(*1)	Total
Financial assets in foreign currencies	₩ 1,573,441	₩ 335,510	₩ 17,778	₩ 137,057	₩ 463,828	₩ 2,527,614
Financial liabilities in foreign currencies	2,124,851	607,195	101,055	51,718	15,088	2,899,907
	<u>₩ (551,410)</u>	<u>₩ (271,685)</u>	<u>₩ (83,277)</u>	<u>₩ 85,339</u>	<u>₩ 448,740</u>	<u>₩ (372,293)</u>
	December 31, 2017					
	USD	EUR	JPY	GBP	Others(*1)	Total
Financial assets in foreign currencies	₩ 2,162,023	₩ 395,406	₩ 14,819	₩ 218,794	₩ 441,445	₩ 3,232,487
Financial liabilities in foreign currencies	2,528,463	614,422	78,340	184,674	34,488	3,440,387
	<u>₩ (366,440)</u>	<u>₩ (219,016)</u>	<u>₩ (63,521)</u>	<u>₩ 34,120</u>	<u>₩ 406,957</u>	<u>₩ (207,900)</u>

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

Net foreign currency translation gain (loss) for the years ended December 31, 2018 and 2017 is ₩(48,487) million and ₩148,611 million, respectively.

The table below summarizes the impact of 10% increase/decrease of currency exchange rates on profit before income tax expenses for the years are as follows (Korean won in millions):

	Impact on profit before income tax expenses	
	2018	2017
10% Increase	₩ (37,229)	₩ (20,790)
10% Decrease	37,229	20,790

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, 2018 and 2017.

4.1.2 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 borrowing with floating interest rates. The purpose of interest rate risk management is to minimize uncertainty and finance expenses 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 markets conditions and nature of its interest rates.

The carrying amount of the Group's financial assets and liabilities with floating interest rates exposed to interest rate risk as of December 31, 2018 and 2017 is as follows (Korean won in millions):

	December 31, 2018	December 31, 2017
Financial assets	₩ 458,919	₩ 546,293
Financial liabilities	(2,683,337)	(3,562,407)
	<u>₩ (2,224,418)</u>	<u>₩ (3,016,114)</u>

A sensitivity analysis on the Group's profit before income tax expenses assuming a 1% increase and decrease in interest rates for the years ended December 31, 2018 and 2017 is as follows (Korean won in millions):

	Impact on profit before income tax expenses	
	2018	2017
Increase	₩ (22,244)	₩ (30,161)
Decrease	22,244	30,161

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4.2 Credit risk (cont'd)

Details of trade receivables and due from customers for contract work exposed to credit risk, presented using forecast model, as of December 31, 2018 are as follows (Korean won in millions):

	Trade receivables								Due from customers for contract work (*1)	Total
	Individually assessed trade receivables (*1)	Trade receivables assessed for impairment on a collective basis(*2)						Total		
		Within due	Less than 3 months	3-6 months	6-12 months	More than 12 months				
Book value	₩ 2,470,849	₩ 1,516,910	₩ 149,251	₩ 33,399	₩ 45,584	₩ 55,808	₩ 3,880,635	₩ 2,066,026	₩ 5,946,661	
Expected credit loss rate	61.59%	0.35%	0.73%	4.32%	5.25%	53.14%	-	2.90%	-	
Expected credit loss	₩ 1,280,978	₩ 5,382	₩ 1,083	₩ 1,443	₩ 2,391	₩ 29,659	₩ 1,320,936	₩ 59,840	₩ 1,380,776	

(*1) Trade receivables with indication of impairment that are individually identifiable, such as bankruptcy.

(*2) Trade receivables that are not individually significant and are classified into groups according to their similar characteristics.

Details of other receivables among the financial assets as of December 31, 2018 are as follows (Korean won in millions):

	December 31, 2018						
	Individually assessed other receivables	Other receivables assessed for impairment on a collective basis					Total
		Within due	Less than 3 months	3-6 months	6-12 months	More than 12 months	
Loans and non-trade receivables	₩ 2,470,849	₩ 148,939	₩ 43,443	₩ 9,535	₩ 2,754	₩ 24,748	2,700,268
Accrued income	127,102	9,819	-	-	-	-	136,921
	₩ 2,597,951	₩ 158,758	₩ 43,443	₩ 9,535	₩ 2,754	₩ 24,748	2,837,189

	December 31, 2017						
	Individually assessed other receivables	Other receivables assessed for impairment on a collective basis					Total
		Within due	Less than 3 months	3-6 months	6-12 months	More than 12 months	
Loans and non-trade receivables	₩ 2,351,459	₩ 91,134	₩ 23,626	₩ 3,961	₩ 3,451	₩ 39,447	2,513,078
Accrued income	134,264	4,449	-	-	-	-	138,713
	₩ 2,485,723	₩ 95,583	₩ 23,626	₩ 3,961	₩ 3,451	₩ 39,447	2,651,791

As of December 31, 2018 and 2017, allowance for doubtful accounts on other receivables above amounts to ₩1,460,040 million and ₩1,113,391 million, respectively.

4.3 Liquidity risk

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

Based on the establishment of a regular funding plan, the Group prepares for the funding balance of its business activities, investment activities and financing activities for the maturity of financial assets and liabilities. The Group manages the liquidity risks that may occur in the future in advance by securing and maintaining required liquidity.

A summary of the Group's non-derivative liabilities' maturity as of December 31, 2018 and 2017 is as follows (Korean won in millions):

		December 31, 2018				
		Nominal cash flows according to contract				
			Less than			More than
	Book value	Total	1 year	1-2 years	2-5 years	5 years
Financial liabilities	₩ 17,797,632	₩ 17,915,312	₩ 11,012,411	₩ 3,219,081	₩ 2,320,024	₩ 1,363,796
Interest on financial liabilities	-	770,247	344,779	169,053	239,916	16,499
	<u>₩ 17,797,632</u>	<u>₩ 18,685,559</u>	<u>₩ 11,357,190</u>	<u>₩ 3,388,134</u>	<u>₩ 2,559,940</u>	<u>₩ 1,380,295</u>
		December 31, 2017				
		Nominal cash flows according to contract				
			Less than			More than
	Book value	Total	1 year	1-2 years	2-5 years	5 years
Financial liabilities	₩ 17,412,301	₩ 17,569,447	₩ 11,684,559	₩ 2,176,853	₩ 2,399,047	₩ 1,308,988
Interest on financial liabilities	-	805,089	336,544	152,187	239,833	76,525
	<u>₩ 17,412,301</u>	<u>₩ 18,374,536</u>	<u>₩ 12,021,103</u>	<u>₩ 2,329,040</u>	<u>₩ 2,638,880</u>	<u>₩ 1,385,513</u>

The above-mentioned maturity analysis is based on undiscounted cash flow according to the contract, which is different from non-derivative liabilities in the consolidated statements of financial position. Apart from the above-mentioned non-derivative liabilities, as of December 31, 2017, financial guarantee liabilities of the Group are explained in Note 33.

4.4 Capital risk

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

The Group manages its capital structure through dividend payments to shareholders, returns capital to shareholders and issues new shares and sells its assets for debt reduction. 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, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018	December 31, 2017
Total liabilities	₩ 21,735,235	₩ 21,165,604
Total equity	7,145,046	7,603,418
Debt-to-equity ratio	304.20%	278.37%

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5. Restricted financial assets

Details of restricted financial assets as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018	December 31, 2017	Description
Cash and cash equivalents	₩ 13,889	₩ 14,132	Establishment of the right of pledge, advances from construction contracts and others
Short-term financial instruments			
Long-term financial instruments	334,592	130,876	Government R&D(*1), shared growth fund, establishment of the right of pledge, collaterals for borrowings and PRS guarantee deposits(*2) and others
Deposits	10,607	594	
	3,898	69,754	Guarantee deposits on leases, bank transaction deposits, establishment of the right of pledge and others
	₩ 362,986	₩ 215,356	

(*1) Can only be used for the purpose of carrying out specific national R&D tasks.

(*2) Deposits for Price Return Swap signed at the time of shares disposals of Doosan Bobcat Inc.

6. Short-term and long-term investment securities

Details of short-term and long-term investment securities as of December 31, 2018 and 2017 are as follows (Korean won in millions):

		December 31, 2018
Short-term investment securities	Financial assets at amortized cost	₩ 1,815
	Financial assets (designated) at fair value through OCI	3,732
	Financial assets at fair value through profit or loss	30,127
Long-term investment securities(*1)	Financial assets at amortized cost	35,674
	Financial assets (designated) at fair value through OCI	20,291
	Financial assets at fair value through profit or loss	19,591
		164,644
		204,526
		₩ 240,200

(*1) Some of the long-term investment securities are provided as collateral for project financing. (See Note 33).

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6. Short-term and long-term investment securities (cont'd)

			December 31, 2017	
Short-term investment securities	Financial assets at fair value through profit or loss	Equity securities and others	₩	34,182
	Available-for-sale financial assets	Equity securities and others		80,000
	Held-to-maturity financial assets	Other debt securities and others		19,793
				<u>133,975</u>
Long-term investment securities	Available-for-sale financial assets	Equity securities and others		201,380
	Held-to-maturity financial assets	Other debt securities and others		4,595
				<u>₩ 339,950</u>

Short-term and long-term investment securities as of December 31, 2018 and 2017 are as follows (Korean won in millions):

			December 31, 2018	
Financial assets at amortized cost	Beneficiary certificates	DS Mookhyun 1st non-registered private bond	₩	18,400
	Debt securities	Government and public bonds and others		3,707
				<u>22,107</u>
Financial assets (designated) at fair value through OCI	Marketable equity securities	INFINITT Healthcare Co., Ltd. and others.		126
	Non-marketable equity securities	The Korea Economic Daily and others		19,464
	Debt securities	K-Partners 20th Co.,Ltd.		3,732
				<u>23,322</u>
Financial assets at fair value through profit or loss	Marketable equity securities	HTC and others		12,635
	Non-marketable equity securities	S-Y Highway Co., Ltd. and others		84,502
	Contributions	Construction Guarantee Cooperative and others		86,569
	Beneficiary certificates	Others		11,065
				<u>194,771</u>
				<u>₩ 240,200</u>

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6. Short-term and long-term investment securities (cont'd)

			December 31, 2017	
Financial assets at fair value through profit or loss	Marketable equity securities	Woori Bank	₩	34,182
Available-for-sale financial assets	Marketable equity securities	INFINITT Healthcare Co., Ltd.		414
	Non-marketable equity securities	Korea Defense Industry Association and others		199,734
	Beneficiary certificate	Gold Spoon JY 2nd Co., Ltd.		81,193
	Debt securities	Government and public bonds		39
				281,380
Held-to-maturity financial assets	Debt securities	Government and public bonds		94
	Other debt securities	Others		24,294
				24,388
			₩	339,950

Changes in financial assets at fair value for the year ended in December 31, 2018 are as follows (Korean won in millions):

		2018						
		Beginning balance	Effect of adoption of new accounting standards	Acquisition	Disposal	Valuation	Others	Ending balance
Financial assets (designated) at fair value through OCI	₩	-	₩ 96,121	₩ 83,016	₩ (162,529)	₩ 2,847	₩ 3,867	₩ 23,322
Financial assets at fair value through profit or loss		-	220,333	18,343	(33,443)	(21,088)	10,626	194,771
		-	₩ 316,454	101,359	₩ (195,972)	₩ (18,241)	₩ 14,493	₩ 218,093

Changes in gain (loss) on valuation of financial assets at fair value for the year ended in December 31, 2018 is as follows (Korean won in millions):

		2018						
		Beginning balance	Effect of adoption of new accounting standards		Valuation	Others	Ending balance	
			Account reclassification	Adjustments for the statements of changes in equity				
Financial assets (designated) at fair value through OCI	Marketable equity securities	₩	-	₩ 1,400	₩ (478)	₩ (37)	₩ (100)	₩ 785
	Non-marketable equity securities		-	(12,772)	(17,045)	(150)	(329)	(30,296)
	Income tax effect		-	(2,985)	1,226	126	(4)	(1,637)
	Consolidation adjustments		-	(1,652)	9,429	-	-	7,777
	Contributions		-	(16,009)	(6,868)	(61)	(433)	(23,371)
	Debt securities		-	5,859	(2,213)	-	-	3,646
	Beneficiary certificates		-	-	-	23	-	23
	Income tax effect		-	(2,535)	-	2	2,528	(5)
	Consolidation adjustments		-	(521)	428	266	(613)	(440)
			-	-	-	(189)	-	(189)
			-	2,803	(1,785)	102	1,915	3,035
		₩	-	₩ (13,206)	₩ (8,653)	₩ 41	₩ 1,482	₩ (20,336)
Financial assets at fair value through profit or loss	Marketable equity securities		-	-	-	-	(61)	-
	Non-marketable equity securities		-	-	-	-	(26,015)	-
	Contributions		-	-	-	-	3,250	-
	Beneficiary certificates		-	-	-	-	104	-
		₩	-	-	-	-	₩ (22,722)	₩

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7. Trade and other receivables (cont'd)

	December 31, 2017			
	Gross	Present value discount	Provision for impairment	Book value
Current:				
Trade receivables	₩ 3,712,786	₩ (13,001)	₩ (1,371,448)	₩ 2,328,337
Non-trade receivables	498,212	-	(165,829)	332,383
Accrued income	138,713	-	(34,131)	104,582
Short-term loans	199,601	-	(136,450)	63,151
	<u>₩ 4,549,312</u>	<u>₩ (13,001)</u>	<u>₩ (1,707,858)</u>	<u>₩ 2,828,453</u>

	December 31, 2017			
	Gross	Present value discount	Provision for impairment	Book value
Non-current:				
Long-term trade receivables	₩ 18,824	₩ -	₩ (246)	₩ 18,579
Long-term non-trade receivables	20,000	(890)	(8,751)	10,359
Long-term loans	1,795,265	(69)	(768,230)	1,026,966
	<u>₩ 1,834,089</u>	<u>₩ (959)</u>	<u>₩ (777,227)</u>	<u>₩ 1,055,903</u>

Changes in allowance for doubtful accounts for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018				
	Beginning balance	Provision for impaired receivables	Write off	Others(*1)	Ending balance
Current:					
Trade receivables	₩ 1,371,448	₩ 57,739	₩ (59,203)	₩ (49,289)	₩ 1,320,695
Non-trade receivables	165,829	13,925	(58,274)	63,611	185,092
Accrued income	34,131	390	(2,058)	-	32,463
Short-term loans	136,450	3,985	(117)	(57,733)	82,584
Non-current:					
Long-term trade receivables	246	(4)	-	-	242
Long-term non-trade receivables	8,751	(222)	-	-	8,529
Long-term loans	768,230	332,620	(8,004)	58,527	1,151,372
	<u>₩ 2,485,085</u>	<u>₩ 408,432</u>	<u>₩ (127,656)</u>	<u>₩ 15,117</u>	<u>₩ 2,780,977</u>

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7. Trade and other receivables (cont'd)

	2017				
	Beginning balance	Provision for impaired receivables	Write off	Others(*1)	Ending balance
Current:					
Trade receivables	₩ 1,522,646	₩ (9,930)	₩ (161,286)	₩ 20,017	₩ 1,371,448
Non-trade receivables	170,337	28,111	(1,780)	(30,839)	165,829
Accrued income	31,449	2,682	-	-	34,131
Short-term loans	137,385	(58)	-	(877)	136,450
Non-current:					
Long-term trade receivables	258	(12)	-	-	246
Long-term non-trade receivables	6,039	(4,994)	-	7,706	8,751
Long-term loans	647,704	120,586	(60)	-	768,230
	<u>₩ 2,515,818</u>	<u>₩ 136,385</u>	<u>₩ (163,126)</u>	<u>₩ (3,993)</u>	<u>₩ 2,485,085</u>

(*1) Changes are caused by transfer to current, non-current, business combination and foreign exchange difference and others.

Impairment loss (reversal of impairment loss) on impaired trade receivables is included in selling and administrative expenses in the consolidated statements of profit or loss, and that on receivables other than impaired trade receivables is included in other non-operating expenses (income).

8. Inventories

Inventories as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018			December 31, 2017		
	Acquisition cost	Valuation allowance	Book value	Acquisition cost	Valuation allowance	Book value
Merchandises	₩ 437,327	₩ (25,466)	₩ 411,861	₩ 375,494	₩ (29,436)	₩ 346,058
Finished goods	705,055	(32,889)	672,166	599,154	(34,644)	564,510
Work in process	414,272	(13,698)	400,574	482,951	(33,778)	449,173
Raw materials	788,971	(33,669)	755,302	748,316	(55,613)	692,703
Materials in transit	329,250	-	329,250	258,317	-	258,317
Supplies	33,259	(94)	33,165	36,878	(334)	36,544
Others	5,704	-	5,704	4,321	-	4,321
	<u>₩ 2,713,838</u>	<u>₩ (105,816)</u>	<u>₩ 2,608,022</u>	<u>₩ 2,505,431</u>	<u>₩ (153,805)</u>	<u>₩ 2,351,626</u>

The amount of reversal of write-down of inventories recognized is ₩6,036 million and ₩419 million for the years ended December 31, 2018 and 2017, respectively.

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9. Derivatives

Details of gain (loss) on valuation of derivatives as of December 31, 2018 and 2017 are as follows (Korean won in millions, foreign currency in thousands):

December 31, 2018							
Buy		Sell		Assets (liabilities)	Gain (loss)	Accumulated other comprehensive income(*1)	Firm commitment assets (liabilities)(*2)
Currency	Amount	Currency	Amount				
Currency forward contracts:							
KRW	3,191,040	USD	2,715,210,300	₩ (28,117)	₩ (51,923)	₩ 3,127	₩ (48,784)
KRW	301,357	EUR	203,069,100	6,866	5,495	1,302	7,810
KRW	286,908	JPY	26,760,741	7,316	(5,425)	(971)	27,391
KRW	218,479	Other foreign currencies		1,625	(2,235)	223	4,662
USD	2,136,224	KRW	2,347,744	4,318	35,311	380	10,125
EUR	426,227	KRW	571,989	(17,601)	(9,837)	(5,896)	(995)
JPY	30,852,891	KRW	349,668	(27,181)	(168)	1,298	(1,477)
Other foreign currencies		KRW	139,591	(4,377)	(1,477)	(2,162)	(1,508)
GBP and others	12,470,000	EUR and others	11,164,000	(8,966)	16,871	(451)	(909)
Interest rate swap:							
KRW 5,000, 3.15% and others		KRW 5,000, MOR 3M+1.38% and others		9,060	(3)	3,543	-
Long-term borrowings in foreign currency(*3):							
KRW	-	USD	-	-	-	-	347
Embedded derivatives and others				168	(1,734)	-	-
Commodity forward contracts				(356)	-	(1,247)	-
Currency swap				(11,626)	7,885	(8,950)	-
Stock options				14,834	(6,828)	-	-
Stock price swap(*4)				7,918	7,918	-	-
				(46,119)	(6,150)	(9,804)	(3,338)
Consolidation adjustments				(168)	1,826	42,673	-
Income tax effect				-	-	1,844	-
				₩ (46,287)	₩ (4,324)	₩ 34,714	₩ (3,338)

(*1) The amounts are gain (loss) on valuation of derivatives designated as cash flow hedges before income tax effect.

(*2) The Group recognizes ₩24,271 million and ₩27,610 million for firm commitment assets and liabilities, respectively, considering the amount adjusted for the current period sales in accordance with the application of fair value hedge accounting.

(*3) To avoid risk of fair value changes in firm commitment assets, the Group designated foreign currency long-term borrowings as hedging instruments.

(*4) During the current period, DHC, the Group's subsidiary, signed the Price Return Swap contract to exchange profits from changes in prices of shares and disposed of 10,578,070 shares of Doosan Bobcat Inc.

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9. Derivatives (cont'd)

December 31, 2017							
Buy		Sell		Assets (liabilities)	Gain (loss)	Accumulated other comprehensive income(*1)	Firm commitment assets (liabilities)(*2)
Currency	Amount	Currency	Amount				
Currency forward contracts:							
KRW	4,535,215	USD	4,072,648	₩ 141,816	₩ 277,101	₩ 8,433	₩ (126,198)
KRW	297,033	EUR	225,072	2,442	1,378	922	(73)
KRW	230,928	JPY	21,202,140	17,823	12,646	689	(7,800)
USD	2,541,914	KRW	2,817,889	(105,287)	(142,031)	(25,901)	24,988
EUR	433,120	KRW	573,367	(9,452)	(4,477)	(1,377)	1,688
JPY	32,454,700	KRW	372,671	(49,690)	(13,816)	(14,412)	1,215
GBP and others	-	EUR and others	-	(25,211)	(15,352)	(4,268)	(2,765)
Interest rate swap:							
KRW 5,000, 3.15% and others		KRW 5,000, MOR 3M+1.38% and others		2,730	(17)	818	-
Long-term borrowings in foreign currency(*3):							
KRW	210,710	USD	200,000	-	-	-	1,431
Embedded derivatives and others				1,902	(1,826)	-	-
Commodity forward contracts				(613)	-	(1,000)	-
Currency swap				(40,031)	(3,755)	(2,323)	-
				(63,571)	109,851	(38,419)	(107,514)
Consolidation adjustments				(1,902)	1,826	57,152	-
Income tax effect				-	-	9,089	-
				₩ (65,473)	₩ 111,677	₩ 27,822	₩ (107,514)

(*1) The amounts are gain (loss) on valuation of derivatives designated as cash flow hedges before income tax effect.

(*2) The Group recognizes ₩9,001 million and ₩116,515 million for firm commitment assets and liabilities, respectively, considering the amount adjusted for the prior period sales in accordance with the application of fair value hedge accounting.

(*3) To avoid risk of fair value changes in firm commitment assets, the Group designated foreign currency long-term borrowings as hedging instrument.

Meanwhile, the Group participates in SOC and development project such as Masan sewer pipe BTL, Sangju-Yeongcheon highway, Suwon-Gwangmyeong highway, Seoul-Munsan highway and others as an investor of the construction. The Group signed a put option contract worth ₩21,200 million regarding shares acquired by the financial investors in order to gather financial investors. The Group classifies the option contract as a derivative asset, and there is no amount recognized as loss on valuation of derivatives or derivative liabilities for the changes in fair value of options.

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10. Financial instruments by category

Categories of financial instruments as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018					
	Financial assets at fair value through profit or loss	Financial assets (designated) at fair value through OCI	Other financial assets(*1)	Financial assets at amortized cost	Book value	Fair value
Cash and cash equivalents	₩ -	₩ -	₩ -	₩ 2,456,189	₩ 2,456,189	₩ 2,456,189
Short-term and long-term financial instruments	9,000	-	-	402,224	411,224	411,224
Short-term and long-term investment securities	194,771	23,322	-	22,107	240,200	240,200
Trade and other receivables	-	37,579	-	3,855,518	3,893,097	3,893,097
Derivative assets	21,320	-	23,516	-	44,836	44,836
Deposits	-	-	-	337,018	337,018	337,018
	<u>₩ 225,091</u>	<u>₩ 60,901</u>	<u>₩ 23,516</u>	<u>₩ 7,073,056</u>	<u>₩ 7,382,564</u>	<u>₩ 7,382,564</u>

	December 31, 2018					
	Financial liabilities at fair value through profit or loss	Other financial liabilities(*1)	Financial liabilities at amortized cost	Book value	Fair value	
Trade and other payables	₩ -	₩ -	₩ 5,253,630	₩ 5,253,630	₩ 5,253,630	
Borrowings, bonds and asset-backed loans	-	-	12,544,002	12,544,002	12,544,002	
Derivative liabilities	51,497	39,627	-	91,124	91,124	
Financial guarantee liabilities	-	14,388	-	14,388	14,388	
	<u>₩ 51,497</u>	<u>₩ 54,015</u>	<u>₩ 17,797,632</u>	<u>₩ 17,903,144</u>	<u>₩ 17,903,144</u>	

(*1) Include derivative assets designated as effective hedging instruments.

	December 31, 2017						
	Financial assets at FVTPL	Loans and receivables	Available-for-sale financial assets	Held-to-maturity financial assets	Derivatives designated as hedging instruments	Book value	Fair value
Cash and cash equivalents	₩ -	₩ 2,344,600	₩ -	₩ -	₩ -	₩ 2,344,600	₩ 2,344,600
Short-term and long-term financial instruments	-	314,926	-	-	-	314,926	314,926
Short-term and long-term investment securities	34,182	-	281,380	24,388	-	339,950	339,950
Trade and other receivables	-	3,884,358	-	-	-	3,884,358	3,884,358
Derivative assets	14,537	-	-	-	117,498	132,035	132,035
Deposits	-	371,865	-	-	-	371,865	371,865
	<u>₩ 48,719</u>	<u>₩ 6,915,749</u>	<u>₩ 281,380</u>	<u>₩ 24,388</u>	<u>₩ 117,498</u>	<u>₩ 7,387,734</u>	<u>₩ 7,387,734</u>

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10. Financial instruments by category (cont'd)

	December 31, 2017					
	Financial liabilities at fair value through profit or loss	Financial liabilities at amortized cost	Derivatives designated as hedging instruments	Financial guarantee contracts	Book value	Fair value
Trade and other payables	₩	₩ 4,787,286	₩	₩ 13,759	₩ 4,801,045	₩ 4,801,045
Borrowings, bonds and asset-backed loans		12,625,015			12,625,015	12,625,015
Derivative liabilities	65,384	-	132,124		197,508	197,508
	<u>₩ 65,384</u>	<u>₩ 17,412,301</u>	<u>₩ 132,124</u>	<u>₩ 13,759</u>	<u>₩ 17,623,567</u>	<u>₩ 17,623,567</u>

Fair value measurements of financial instruments by fair value hierarchy levels as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018			
	Level 1	Level 2	Level 3	Total
Financial assets:				
Financial assets (designated) at fair value through OCI	₩ 126	₩ 41,310	₩ 19,465	₩ 60,901
Financial assets at fair value through profit or loss	12,718	30,152	182,221	225,091
Other financial assets	-	23,516	-	23,516
	<u>12,844</u>	<u>94,978</u>	<u>201,686</u>	<u>309,508</u>
Financial liabilities:				
Financial liabilities at fair value through profit or loss	-	(51,497)	-	(51,497)
Other financial liabilities	-	(39,627)	-	(39,627)
	<u>-</u>	<u>(91,124)</u>	<u>-</u>	<u>(91,124)</u>
	<u>₩ 12,844</u>	<u>₩ 3,854</u>	<u>₩ 201,686</u>	<u>₩ 218,384</u>

	December 31, 2017			
	Level 1	Level 2	Level 3	Total
Financial assets:				
Financial assets at fair value through profit or loss	₩ 34,182	₩ 14,537	₩ -	₩ 48,719
Available-for-sale financial assets	446	351	138,033	138,830
Derivative assets designated as hedging instruments	-	117,498	-	117,498
	<u>34,628</u>	<u>132,386</u>	<u>138,033</u>	<u>305,047</u>
Financial liabilities:				
Financial liabilities at fair value through profit or loss	-	(65,384)	-	(65,384)
Derivative liabilities designated as hedging instruments	-	(132,124)	-	(132,124)
	<u>-</u>	<u>(197,508)</u>	<u>-</u>	<u>(197,508)</u>
	<u>₩ 34,628</u>	<u>₩ (65,122)</u>	<u>₩ 138,033</u>	<u>₩ 107,539</u>

The above table does not include information for those financial instruments, which are not measured at fair value because the carrying amount approximates fair value.

10. Financial instruments by category (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:

	<u>Significance of input factor</u>
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 financial assets at fair value.

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.

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

<u>Valuation technique</u>	<u>Observable inputs</u>	<u>Explanation of input parameters</u>
Discounted cash flow method	Forward exchange rate	It is based on forward exchange rate, disclosed on the market that remaining period is the same till maturity of forward contracts. If the forward exchange rate is not disclosed on the market, it is calculated by using interpolation method.
	Discount rate	It is determined by using yield curve that is disclosed at the end of the reporting period.

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10. Financial instruments by category (cont'd)

Assumptions used in the valuation of financial assets at fair value that have been categorized into Level 3 as of December 31, 2018 are as follows:

Financial assets	Valuation techniques	Discount rate	Remarks
Tamra Offshore Wind Power Co., Ltd.	Expected selling value estimation method	-	Expected selling value
Incheon-Kimpo expressway Co, Ltd. and others	Dividend discount model	10.76%	Expected dividend cash flows
S-Y highway Co., Ltd.	Revenue ratio against the agreement	5.50%	Revenue ratio against the agreement
Metropolitan Western Expressway Co., Ltd.	Discounted cash flow model	5.61%	Forecasted cash flows
Daegu South Circulation Road Corporation	Dividend discount model	10.76%	Expected dividend cash flows
Seoul-Munsan highway Co., Ltd.	Past transaction model	-	Amount of recent capital increase
Kyunggi South Road Co., Ltd.	Dividend discount model and others	10.76%	Expected dividend cash flows
South-Seoul LRT CO. Ltd.,	Past transaction model	-	Amount of recent capital increase
West Seoul Urban Expressway Inc.	Past transaction model	-	Amount of recent capital increase
Machinery Financial Cooperative	Net asset value assessment	-	Net asset value
Construction Guarantee Cooperative	Past transaction model	-	Average of final bidding price of public sale
Engineering Guarantee Insurance	Expected selling value estimation method	-	Expected selling value
Neoplux 2010-7 Investment Partnership	Net asset value assessment	-	Net asset value
GGHIGHWAY	Net asset value assessment	-	Net asset value
Korea Exim Bank public carbon fund	Expected selling value estimation method	-	Expected selling value
Busan New Port The 2nd Rear Road Co.,Ltd.	Dividend discount model	10.76%	Expected dividend cash flows
UITrans LRT co.	Dividend discount model	10.76%	Expected dividend cash flows
Emerald Technology Venture	Expected selling value estimation method	-	Operating profit ratio
Others	Expected selling value estimation method and others	-	Expected selling value and others

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10. Financial instruments by category (cont'd)

Meanwhile, changes in the carrying amount of financial assets at fair value through profit or loss and financial assets (designated) at fair value through OCI that have been categorized into Level 3 of fair value hierarchy for the year ended December 31, 2018 are as follows (in millions of Korea won):

	Beginning balance	Effect of adoption of new accounting standards	Total comprehensive income (loss)					Ending balance	
			Profit or loss	Other comprehensive income	Buy	Sell	transfer		Others
Financial assets (designated) at fair value through OCI	₩ -	₩ 13,328	₩ -	₩ 945	₩ 3,091	₩ -	₩ 100	₩ 2,001	₩ 19,465
Financial assets at fair value through profit or loss	-	186,208	(22,657)	-	18,028	(12,309)	-	12,951	182,221

Comprehensive income (loss) by categories of financial instruments for the years ended December 31, 2018 and 2017 is as follows (Korean won in millions):

	2018							
	Profit or loss							
	Interest	Dividend	Financial guarantee	Valuation gain/loss (except for derivatives)	Impairment and reversal			Other comprehensive income(*1)
Impairment loss					Other impairment	Disposal		
Financial assets:								
Financial assets at amortized cost	₩ 28,549	₩ -	₩ -	₩ -	₩ (408,532)	₩ -	₩ (23,052)	₩ -
Financial assets (designated) at fair value through OCI	19,358	529	-	-	-	96	100	53
Financial assets at fair value through profit or loss	6	2,010	-	(22,722)	-	1,635	2,523	-
Other financial assets	-	-	-	-	-	-	-	-
	<u>₩ 47,913</u>	<u>₩ 2,539</u>	<u>₩ -</u>	<u>₩ (22,722)</u>	<u>₩ (408,532)</u>	<u>₩ 1,731</u>	<u>₩ (20,429)</u>	<u>₩ 53</u>
Financial liabilities:								
Financial liabilities at amortized cost	₩ (594,288)	₩ -	₩ -	₩ -	₩ -	₩ -	₩ (7,905)	₩ -
Others	-	-	(56)	-	-	-	-	-
	<u>₩ (594,288)</u>	<u>₩ -</u>	<u>₩ (56)</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ (7,905)</u>	<u>₩ -</u>

(*1) Other comprehensive income is before income tax effect.

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10. Financial instruments by category (cont'd)

	2017							
	Profit or loss				Impairment and reversal			Other comprehensive income(*1)
	Interest	Dividend	Financial guarantee	Valuation gain/loss (except for derivatives)	Impairment loss	Other impairment	Disposal	
Financial assets:								
Financial assets at fair value through profit or loss	₩ -	₩ -	₩ -	₩ (7,271)	₩ -	₩ -	₩ (817)	₩ -
Loans and receivables available-for-sale	42,500	-	-	-	(136,385)	-	(23,180)	-
financial assets	10,302	2,395	-	-	-	(15,596)	54,319	1,185
Held-to-Maturity financial assets	985	-	-	-	-	(464)	(9)	-
	<u>₩ 53,787</u>	<u>₩ 2,395</u>	<u>₩ -</u>	<u>₩ (7,271)</u>	<u>₩ (136,385)</u>	<u>₩ (16,060)</u>	<u>₩ 30,313</u>	<u>₩ 1,185</u>
Financial liabilities:								
Financial liabilities at amortized cost	₩ (569,143)	₩ -	₩ (6,274)	₩ -	₩ -	₩ -	₩ (25,200)	₩ -

(*1) Other comprehensive income is before income tax effect.

Apart from the above financial instruments, comprehensive income (loss) by derivatives for the years ended December 31, 2018 and 2017 is as follows (Korean won in millions):

	2018			2017		
	Profit or loss		Other comprehensive income(*1)	Profit or loss		Other comprehensive loss(*1)
	Valuation	Disposal		Valuation	Disposal	
Derivatives not designated as hedging instruments	₩ 42,295	₩ 5,187	₩ -	₩ (85,831)	₩ (5,188)	₩ -
Derivatives designated as fair value hedges	(28,223)	(2,615)	-	191,359	43,388	-
Derivatives designated as cash flow hedges	(18,396)	1,356	26,879	6,149	1,846	(48,622)
	<u>₩ (4,324)</u>	<u>₩ 3,928</u>	<u>₩ 26,879</u>	<u>₩ 111,677</u>	<u>₩ 40,046</u>	<u>₩ (48,622)</u>

(*1) Other comprehensive income (loss) is before income tax effect.

Meanwhile, most of the foreign exchange differences (gain (loss) on foreign currency translations or transactions) from foreign currency transactions arise from financial assets (liabilities) at amortized cost other than derivative contracts.

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10. Financial instruments by category (cont'd)

Financial assets and liabilities subject to an enforceable master-netting arrangement or similar agreement as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018			December 31, 2017		
	Gross recognized financial instruments	Gross financial instruments set off	Net amounts presented in the statements of financial position	Gross recognized financial instruments	Gross financial instruments set off	Net amounts presented in the statements of financial position
Financial assets:						
Trade receivables	₩ 22,815	₩ (7,647)	₩ 15,168	₩ 37,183	₩ (14,812)	₩ 22,371
Other receivables	161	(104)	57	261	(64)	196
Long-term investment securities	-	-	-	15,000	(15,000)	-
Derivative assets	57,919	(44,252)	13,667	156,128	(60,364)	95,764
	<u>₩ 80,895</u>	<u>₩ (52,003)</u>	<u>₩ 28,892</u>	<u>₩ 208,571</u>	<u>₩ (90,240)</u>	<u>₩ 118,331</u>
Financial liabilities:						
Trade payables	₩ (85,037)	₩ 7,751	₩ (77,286)	₩ (74,087)	₩ 6,310	₩ (67,778)
Other payables	-	-	-	(66,478)	8,566	(57,912)
Asset-backed loans	-	-	-	(15,000)	15,000	-
Derivative liabilities	(102,174)	44,252	(57,922)	(179,152)	60,364	(118,788)
	<u>₩ (187,211)</u>	<u>₩ 52,003</u>	<u>₩ (135,208)</u>	<u>₩ (334,718)</u>	<u>₩ 90,240</u>	<u>₩ (244,478)</u>

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11. Investments in associates and joint ventures

Details of investments in associates and joint ventures as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	Location	Ownership interests (%)	Acquisition cost		Book value	
			December 31, 2018	December 31, 2017	December 31, 2018	December 31, 2017
Associates:						
Tamra Offshore Wind Power Co., Ltd.(*5)	Korea	-	₩ -	₩ 11,880	-	11,413
The HS-Urban highway(*1)	Korea	27.29	9,578	9,578	4,920	9,700
Pospower Co., Ltd.(*1, 2, 4)	Korea	9	43,568	-	43,448	-
Daejeong Marine Wind Power Plant Co., Ltd.(*4)	Korea	25	2,827	-	2,772	-
Potenit Co., Ltd.(*6)	Korea	27.8	5,333	-	4,779	-
Dalian Samyoung Doosan Metal Product Co.,Ltd. ("DSDMP") (*5)	China	-	-	2,675	-	2,735
New Bundang Line Co., Ltd.(*1)	Korea	29.03	13,681	13,681	-	-
Gyeonggi Railway Co., Ltd.(*1, 2)	Korea	6.99	7,067	7,067	-	-
Neo Trans Co., Ltd.	Korea	42.86	43	43	21,645	20,987
New Seoul Railroad Co.(*1, 2)	Korea	13.76	8,794	8,794	7,144	7,528
KIAMCO Gyeonggi Railway Investment Private Equity Investment Trust (*1)	Korea	35.7	28,072	24,799	-	24,801
Incheon Furecell Co.,Ltd.(*4)	Korea	20	4,700	-	4,662	-
Dongbuk LRT(*4)	Korea	22	1,694	-	1,693	-
Daesan Green Energy Co., Ltd.(*2, 4)	Korea	10	5,100	-	4,527	-
Geaenzymes(*2, 4)	USA	10	750	-	703	-
New Wave 5th Initial Enterprise Professional Investment Union	Korea	30	408	930	774	952
KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership (*7)	Korea	19.68	1,571	2,579	1,958	3,109
2010 KIF-Neoplux IT Professional Investment Association	Korea	21.67	2,457	2,457	750	922
KoFC-Neoplux R&D Biz Creation 2013-1 Investment Partnership(*7)	Korea	19	4,674	6,327	6,530	7,620
Future Creation Neoplux Investment Partnership(*7)	Korea	16.25	4,711	7,070	5,715	6,978
Neoplux technology valuation investment combination(*7)	Korea	15	8,581	5,881	9,736	5,884
Neoplux Market Frontier Secondary Fund(*7)	Korea	15.79	7,243	4,686	8,391	4,679
Gyeonggi - Neoplux Superman Investment Fund(*7)	Korea	15.88	1,728	810	1,602	773
Shinhan - Neoplux Energy New Industry Investment Association(*7)	Korea	8.33	1,500	500	1,391	497
Neoplux First Private Equity Investment Company(*7)	Korea	15	3,618	3,618	152	72
KTC&P Growth Private Equity Investment Company(*7)	Korea	5.56	4,681	5,987	14,810	8,194
Neoplux No.3 Private Equity Fund(*7)	Korea	10	7,030	-	6,850	-
Prestolite Asia LTD.	Korea	32.31	467	467	2,346	2,183
KDDI Korea Corporation	Korea	17.63	4,176	4,176	3,572	3,116
			184,052	124,005	160,870	122,143
Joint venture:						
Sichuan Kelun-Doosan Biotechnology Company Limited	China	50	2,526	2,526	3,220	2,918
Doosan Babcock BlackCat W.L.L(*8)	Qatar	49	243	-	-	-
Haman Industrial Complex(*1, 3)	Korea	80	3,600	3,600	-	-
Doosan PSI LLC	USA	50	1,108	1,108	1,337	1,090
Doosan Infracore Liaoning Machinery Sales Co., Ltd	China	43	718	718	292	411
Tianjin Lovol Doosan Engine Co., Ltd.(*4)	China	50	12,727	-	8,235	-
			20,922	7,952	13,084	4,419
			₩ 204,974	₩ 131,957	173,954	126,562

(*1) Provided as collateral for project financing.

(*2) Although the Group has less than 20% shares in the investee, it is classified as an associate since the Group can exercise voting rights in its Board of Directors' meeting.

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11. Investments in associates and joint ventures (cont'd)

(*3) Although the Group has more than 50% shares in the investee, it is classified as a joint venture since the Group has no control due to the inter-shareholder agreement.

(*4) During the current period, the Group newly acquired the investee.

(*5) During the current period, the Group disposed the investee.

(*6) During the current period, DI, a subsidiary, acquired the 27.8% of shares of Potenit Co., Ltd for ₩5,333 million. Meanwhile, DI has a call option that allows DI to acquire an additional 34.6% of shares of Potenit Co., Ltd within five years after 2 years since the acquisition.

(*7) The Group classified Neoplux Co.,Ltd., which was a subsidiary, as an associate because it can exercise significant influence as a business executive member.

(*8) During the current period, the Group lost control of the investee and reclassified it as a joint venture from a subsidiary.

Changes in investment in associates and joint ventures for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018						
	Beginning balance	Acquisition (disposal)	Dividends	Share of profit (loss) of associates and joint ventures accounted for using the equity method	Share of other comprehensive income (loss) of associates and joint ventures	Other(*2)	Ending balance
Associates:							
Tamra Offshore Wind Power Co., Ltd.	₩ 11,413	₩ (4,400)	₩ -	₩ 5,898	₩ (1,753)	₩ (11,158)	₩ -
The HS-Urban highway Pospower Co., Ltd.	9,700	-	-	(2,830)	(1,941)	(9)	4,920
Daejeong Marine Wind Power Plant Co., Ltd	-	43,568	-	(121)	1	-	43,448
Potenit Co., Ltd	-	2,827	-	(55)	-	-	2,772
DSDMP	2,735	(2,857)	-	(553)	-	(1)	4,779
New Bundang Line Co., Ltd.	-	-	-	-	122	-	-
Gyeonggi Railway Co., Ltd.	-	-	-	-	-	-	-
Neo Trans Co., Ltd.	20,987	-	-	658	-	-	21,645
New Seoul Railroad Co.	7,528	-	-	(384)	-	-	7,144
KIAMCO Gyeonggi Railway Investment Private Equity Investment Trust	24,801	3,273	-	(28,074)	-	-	-
Incheon Furecell Co.,Ltd.	-	4,700	-	(38)	-	-	4,662
Dongbuk LRT	-	1,694	-	(1)	-	-	1,693
Daesan Green Energy Co. Ltd.	-	5,100	-	(573)	-	-	4,527
Geaenzymes	-	750	-	(80)	1	32	703
New Wave 5th Initial Enterprise Professional Investment Union(*1)	952	(522)	-	344	-	-	774
KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership (*1)	3,109	(1,008)	-	(144)	1	-	1,958
2010 KIF-Neoplux IT Professional Investment Association (*1)	922	-	-	(172)	-	-	750
KoFC-Neoplux R&D Biz Creation 2013-1 Investment Partnership (*1)	7,620	(1,653)	-	562	1	-	6,530
Future Creation Neoplux Investment Partnership(*1)	6,978	(2,359)	-	1,096	-	-	5,715

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11. Investments in associates and joint ventures (cont'd)

	2018						
	Beginning balance	Acquisition (disposal)	Dividends	Share of profit (loss) of associates and joint ventures accounted for using the equity method	Share of other comprehensive income (loss) of associates and joint ventures	Other(*2)	Ending balance
Associates:							
Neoplux technology valuation investment combination(*1)	₩ 5,884	₩ 2,700	₩ -	₩ 1,152	₩ -	₩ -	₩ 9,736
Neoplux Market Frontier Secondary Fund(*1)	4,679	2,557	(1,650)	2,805	-	-	8,391
Gyeonggi - Neoplux Superman Investment Fund(*1)	773	918	-	(89)	-	-	1,602
Shinhan - Neoplux Energy New Industry Investment Association(*1)	497	1,000	-	(106)	-	-	1,391
Neoplux First Private Equity Investment Company(*1)	72	-	-	80	-	-	152
KTC&P Growth Private Equity Investment Company(*1)	8,194	(1,306)	(7)	7,719	210	-	14,810
Neoplux No.3 Private Equity Fund(*1)	-	7,030	-	(180)	-	-	6,850
Prestolite Asia LTD.	2,182	-	-	164	-	-	2,346
KDDI Korea Corporation	3,117	-	(22)	477	-	-	3,572
	<u>122,143</u>	<u>67,345</u>	<u>(1,679)</u>	<u>(12,445)</u>	<u>(3,358)</u>	<u>(11,136)</u>	<u>160,870</u>
Joint ventures:							
Sichuan Kelun-Doosan Biotechnology Company Limited	2,918	-	(1,531)	1,850	(17)	-	3,220
Doosan Babcock BlackCat W.L.L	-	-	-	(281)	-	281	-
Doosan PSI LLC	1,090	-	-	196	-	51	1,337
Doosan Infracore Liaoning Machinery Sales Co., Ltd	411	-	-	(119)	-	-	292
Tianjin Lovol Doosan Engine Co., Ltd.	-	12,727	-	(3,998)	-	(494)	8,235
	<u>4,419</u>	<u>12,727</u>	<u>(1,531)</u>	<u>(2,352)</u>	<u>(17)</u>	<u>(162)</u>	<u>13,084</u>
	<u>₩ 126,562</u>	<u>₩ 80,072</u>	<u>₩ (3,210)</u>	<u>₩ (14,797)</u>	<u>₩ (3,375)</u>	<u>₩ (11,298)</u>	<u>₩ 173,954</u>

(*1) Share of profit (loss) of associates and joint ventures accounted for using the equity method of the above entities are classified as sales.

(*2) Changes due to exchange rate differences and the scope of consolidation.

(*3) Changes of the Haman Industrial Complex Co., Ltd. that ceased to apply the equity method is not recorded.

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11. Investments in associates and joint ventures (cont'd)

	2017						
	Beginning balance	Acquisition (disposal)	Dividends	Share of profit (loss) of associates and joint ventures accounted for using the equity method	Share of other comprehensive income (loss) of associates and joint ventures	Other(*2)	Ending balance
Associates:							
Tamra Offshore Wind Power Co., Ltd.	₩ 9,675	₩ -	₩ -	₩ (67)	₩ 1,806	₩ -	₩ 11,414
The HS-Urban highway DSDMP	-	-	-	(1,517)	1,639	9,578	9,700
New Bundang Line Co., Ltd.	3,043	-	-	(143)	(165)	-	2,735
Gyeonggi Railway Co., Ltd.	14,770	-	-	(14,770)	-	-	-
Neo Trans Co., Ltd.	1,893	-	-	(1,896)	3	-	-
New Seoul Railroad Co.	18,991	-	-	1,995	-	-	20,986
KIAMCO Gyeonggi Railway Investment Private Equity Investment Trust	7,837	-	-	(309)	-	-	7,528
New Wave 4th Investment Fund(*1)	23,149	1,650	-	2	-	-	24,801
New Wave 5th Initial Enterprise Professional Investment Union(*1)	-	(315)	(262)	183	(740)	1,134	-
KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership (*1)	-	(750)	(150)	686	(73)	1,239	952
2010 KIF-Neoplux IT Professional Investment Association (*1)	-	(1,166)	-	(103)	(612)	4,990	3,109
KoFC-Neoplux R&D Biz Creation 2013-1 Investment Partnership (*1)	-	(2,284)	-	(228)	(574)	4,008	922
Future Creation Neoplux Investment Partnership(*1)	-	551	-	(275)	(228)	7,572	7,620
Neoplux technology valuation investment combination(*1)	-	(1,272)	-	(963)	(787)	10,000	6,978
Neoplux Market Frontier Secondary Fund(*1)	-	2,430	(680)	756	65	3,313	5,884
Gyeonggi - Neoplux Superman Investment Fund(*1)	-	3,586	(92)	87	-	1,098	4,679
Shinhan - Neoplux Energy New Industry Investment Association (*1)	-	810	-	(37)	-	-	773
Neoplux First Private Equity Investment Company(*1)	-	500	-	(3)	-	-	497
KTC&P Growth Private Equity Investment Company(*1)	-	(3,708)	(2,199)	(1,569)	(1,618)	9,166	72
BNW&P 1st Private Equity Investment Company(*1)	-	(2,224)	-	1,944	(253)	8,727	8,194
Guang Dong Xingpu Steel Center	-	(228)	(183)	156	(4)	259	-
Others	1,323	(1,714)	-	-	(640)	1,031	-
	5,379	-	(179)	143	-	(44)	5,299
	<u>86,060</u>	<u>(4,134)</u>	<u>(3,745)</u>	<u>(15,928)</u>	<u>(2,181)</u>	<u>62,071</u>	<u>122,143</u>
Joint ventures:							
Sichuan Kelun Doosan Biotechnology Company Limited	2,937	-	(1,285)	1,446	(180)	-	2,918
Doosan PSI LLC	1,189	-	-	39	-	(137)	1,090
Doosan Infracore Liaoning Machinery Sales Co., Ltd	134	363	-	(77)	-	(8)	411
	<u>4,260</u>	<u>363</u>	<u>(1,285)</u>	<u>1,408</u>	<u>(180)</u>	<u>(145)</u>	<u>4,419</u>
	<u>₩ 90,320</u>	<u>₩ (3,771)</u>	<u>₩ (5,030)</u>	<u>₩ (14,520)</u>	<u>₩ (2,361)</u>	<u>₩ 61,926</u>	<u>₩ 126,562</u>

(*1) Share of profit (loss) of associates and joint ventures accounted for using the equity method of the above entities are classified as sales.

(*2) Changes due to exchange rate differences and the scope of consolidation.

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11. Investments in associates and joint ventures (cont'd)

The condensed financial information of associates and joint ventures as of and for the years ended December 31, 2018 and 2017 is as follows (Korean won in millions):

	2018			
	Total assets	Total liabilities	Sales	Profit (loss) for the year
Associates:				
The HS-Urban highway	₩ 178,270	₩ 159,208	₩ 9,328	₩ (5,437)
Pospower Co., Ltd.	425,632	35,760	-	(4,536)
Daejeong Marine Wind Power Plant Co., Ltd.	6,440	1,091	-	(590)
Potenit Co., Ltd.	8,478	11,575	813	(1,901)
New Bundang Line Co., Ltd.	865,489	976,609	87,340	(39,867)
Gyeonggi Railway Co., Ltd.	670,303	728,713	43,801	(36,376)
Neo Trans Co., Ltd.	67,484	16,983	90,893	1,534
New Seoul Railroad Co.	142,131	87,076	-	(2,795)
KIAMCO Gyeonggi Railway Investment Private Equity Investment Trust	78,689	16	-	4
Incheon Furecell Co., Ltd.	23,635	415	-	(191)
Dongbuk LRT	7,659	-	-	(3)
Daesan Green Energy Co. Ltd.	52,582	2,774	-	(1,192)
Geaenzymes	871	674	744	(787)
New Wave 5th Initial Enterprise Professional Investment Union	2,579	-	242	1,147
KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership	13,128	3,181	1,459	(729)
2010 KIF-Neoplux IT Professional Investment Association	3,463	-	-	(792)
KoFC-Neoplux R&D Biz Creation 2013-1 Investment Partnership	37,437	3,069	1,137	2,961
Future Creation Neoplux Investment Partnership	39,654	4,483	1,969	6,748
Neoplux technology valuation investment combination	65,975	1,065	143	7,683
Neoplux Market Frontier Secondary Fund	53,155	14	12,563	17,762
Gyeonggi - Neoplux Superman Investment Fund	10,087	-	12	(557)
Shinhan - Neoplux Energy New Industry Investment Association	16,697	-	22	(1,269)
Neoplux First Private Equity Investment Company	15,993	14,982	1,116	534
KTC&P Growth Private Equity Investment Company	276,107	9,535	138,267	138,923
Neoplux No.3 Private Equity Fund	69,159	664	49	(1,804)
Prestolite Asia LTD.	11,698	4,438	-	505
KDDI Korea Corporation	25,660	5,400	40,532	2,713
Joint ventures:				
Sichuan Kelun-Doosan Biotechnology Company Limited	11,108	4,669	8,641	3,701
Doosan Babcock BlackCat W.L.L	1,132	1,385	849	(352)
Doosan PSI LLC	8,695	6,021	16,091	387
Doosan Infracore Liaoning Machinery Sales Co., Ltd	1,826	780	15,415	(194)
Tianjin Lovol Doosan Engine Co. Ltd.	22,353	223	-	(2,334)

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11. Investments in associates and joint ventures (cont'd)

	2017			
	Total assets	Total liabilities	Sales	Profit (loss) for the year
Associates:				
New Wave 4th Investment Fund	₩ -	₩ -	₩ 740	₩ 733
New Wave 5th Initial Enterprise Professional Investment Union	3,205	33	2,291	2,288
KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership	19,151	3,353	1,875	(525)
2010 KIF-Neoplux IT Professional Investment Association	4,259	4	3,171	(1,054)
KoFC-Neoplux R&D Biz Creation 2013-1 Investment Partnership	43,918	3,811	1,626	(1,449)
Future Creation Neoplux Investment Partnership	47,540	4,601	1,395	(5,927)
Neoplux technology valuation investment combination	39,507	281	6,228	5,037
Neoplux Market Frontier Secondary Fund	29,973	342	1,881	546
Gyeonggi - Neoplux Superman Investment Fund	5,060	196	14	(236)
Shinhan - Neoplux Energy New Industry Investment Association	6,001	35	1	(34)
Neoplux First Private Equity Investment Company	15,459	14,982	(10,277)	(10,461)
KTC&P Growth Private Equity Investment Company	158,991	11,502	36,439	34,983
BNW&P 1st Private Equity Investment Company and others	35	-	22,550	16,383
Tamra Offshore Wind Power Co., Ltd.	163,740	132,036	4,392	(191)
The HS-Urban highway	191,935	160,626	3,562	2,658
DSDMP	35,448	10,122	10,668	(1,325)
New Bundang Line Co., Ltd.	901,754	973,007	83,125	(122,130)
Gyeonggi Railway Co., Ltd.	681,753	708,586	35,168	(54,262)
Neo Trans Co., Ltd.	65,086	16,118	91,447	4,658
New Seoul Railroad Co.	87,411	36,325	-	(2,005)
KIAMCO Gyeonggi Railway Investment Private Equity Investment Trust	75,400	15	-	7
Others	36,801	12,205	69,272	175
Joint ventures:				
Sichuan Kelun-Doosan Biotechnology Company Limited	7,504	1,668	7,226	2,889
Doosan PSI LLC	10,165	7,980	10,160	82
Doosan Infracore Liaoning Machinery Sales Co., Ltd	1,913	671	12,311	(4)

(*1) Condensed financial information of the Haman Industrial Complex Co., Ltd. that ceased to apply the equity method is not recorded.

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11. Investments in associates and joint ventures (cont'd)

Adjustments from net assets of associates and joint ventures to carrying amount of investments in associates and joint ventures as of December 31, 2018 and 2017 are as follows (Korean won in millions):

(*1)	December 31, 2018					
	Net assets	Percentage of ownership (%)	Group's shares in net assets	Adjustment amounts		Book value
				Goodwill	Internal transactions and others	
Associates:						
The HS-Urban highway	₩ 19,062	27.29	₩ 5,202	₩ -	₩ (282)	₩ 4,920
Pospower Co., Ltd.	389,872	9.00	35,088	8,360	-	43,448
Daejeong Marine Wind Power Plant Co., Ltd.	5,349	25.00	1,337	1,435	-	2,772
Potenit Co., Ltd.	(3,097)	27.80	(861)	5,640	-	4,779
New Bundang Line Co., Ltd.	(111,120)	29.03	(32,258)	-	32,258	-
Gyeonggi Railway Co., Ltd.	(58,410)	6.99	(4,082)	-	4,082	-
Neo Trans Co., Ltd.	50,501	42.86	21,645	-	-	21,645
New Seoul Railroad Co.	55,055	13.76	7,577	-	(433)	7,144
KIAMCO Gyeonggi Railway Investment Private Equity Investment Trust	78,673	35.70	28,090	-	(28,090)	-
Incheon Furecell Co.,Ltd.	23,220	20.00	4,644	-	18	4,662
Dongbuk LRT	7,659	22.00	1,685	-	8	1,693
Daesan Green Energy Co. Ltd.	49,808	10.00	4,981	-	(454)	4,527
Geaenzymes	196	10.00	20	683	-	703
New Wave 5th Initial Enterprise Professional Investment Union	2,579	30.00	774	-	-	774
KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership	9,947	19.68	1,958	-	-	1,958
2010 KIF-Neoplux IT Professional Investment Association	3,463	21.67	750	-	-	750
KoFC-Neoplux R&D Biz Creation 2013-1 Investment Partnership	34,369	19.00	6,530	-	-	6,530
Future Creation Neo Plux Investment Partnership	35,171	16.25	5,715	-	-	5,715
Neoplux technology valuation investment combination	64,910	15.00	9,736	-	-	9,736
Neoplux Market Frontier Secondary Fund	53,141	15.79	8,391	-	-	8,391
Gyeonggi - Neoplux Superman Investment Fund	10,087	15.88	1,602	-	-	1,602
Shinhan - Neoplux Energy New Industry Investment Association	16,697	8.33	1,391	-	-	1,391
Neoplux First Private Equity Investment Company	1,011	15.00	152	-	-	152
KTC&P Growth Private Equity Investment Company	266,572	5.56	14,810	-	-	14,810
Neoplux No.3 Private Equity Fund	68,496	10.00	6,850	-	-	6,850
Prestolite Asia LTD.	7,260	32.31	2,346	-	-	2,346
KDDI Korea Corporation	20,260	17.63	3,572	-	-	3,572

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11. Investments in associates and joint ventures (cont'd)

	December 31, 2018					
	Net assets	Percentage of ownership (%)	Group's shares in net assets	Adjustment amounts		Book value
				Goodwill	Internal transactions and others	
(*1)						
Joint ventures:						
Sichuan Kelun-Doosan Biotechnology Company Limited	6,439	50.00	3,220	-	-	3,220
Doosan Babcock BlackCat W.L.L	(253)	49.00	(124)	-	124	-
Doosan PSI LLC	2,674	50.00	1,337	-	-	1,337
Doosan Infracore Liaoning Machinery Sales Co., Ltd	1,046	43.00	450	-	(158)	292
Tianjin Lovol Doosan Engine Co. Ltd.	22,130	50.00	11,066	-	(2,831)	8,235

(*1) The adjustment of the Haman Industrial Complex Co., Ltd. that ceased to apply the equity method is not recorded.

Doosan Corporation and its subsidiaries
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11. Investments in associates and joint ventures (cont'd)

(*1)	December 31, 2017					
	Net asset at the end of the year	Percentage of ownership (%)	Group's shares in net assets	Adjustment amounts		Book value
				Goodwill	Internal transactions and others	
Associates:						
Tamra Offshore Wind Power Co., Ltd.	₩ 31,705	36.00	₩ 11,414	₩ -	₩ -	₩ 11,414
The HS-Urban highway DSDMP	31,309	27.29	8,544	-	1,156	9,700
New Bundang Line Co., Ltd.	25,326	10.80	2,735	-	-	2,735
Gyeonggi Railway Co., Ltd.	(71,253)	29.03	(20,685)	-	20,685	-
Neo Trans Co., Ltd.	(26,833)	7.35	(1,971)	-	1,971	-
New Seoul Railroad Co.	48,964	42.86	20,986	-	-	20,986
KIAMCO Gyeonggi Railway Investment Private Equity Investment Trust	51,086	15.40	7,867	-	(339)	7,528
New Wave 4th Investment Fund	75,385	32.91	24,809	-	(8)	24,801
New Wave 5th Initial Enterprise Professional Investment Union	-	-	-	-	-	-
KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership	3,172	30.00	952	-	-	952
2010 KIF-Neoplux IT Professional Investment Association	15,798	19.68	3,109	-	-	3,109
KoFC-Neoplux R&D Biz Creation 2013-1 Investment Partnership	4,255	21.67	922	-	-	922
Future Creation Neoplux Investment Partnership	40,107	19.00	7,620	-	-	7,620
Neoplux technology valuation investment combination	42,940	16.25	6,978	-	-	6,978
Neoplux Market Frontier Secondary Fund	39,226	15.00	5,884	-	-	5,884
Gyeonggi - Neoplux Superman Investment Fund	29,631	15.79	4,679	-	-	4,679
Shinhan - Neoplux Energy New Industry Investment Association	4,864	15.88	773	-	-	773
Neoplux First Private Equity Investment Company	5,966	8.33	497	-	-	497
KTC&P Growth Private Equity Investment Company	477	15.00	72	-	-	72
BNW&P 1st Private Equity Investment Company	147,489	5.56	8,194	-	-	8,194
Others	35	0.95	-	-	-	-
	24,428	-	5,299	-	-	5,299
Joint ventures:						
Sichuan Kelun-Doosan Biotechnology Company Limited	5,836	50.00	2,918	-	-	2,918
Doosan PSI LLC	2,184	50.00	1,092	-	-	1,090
Doosan Infracore Liaoning Machinery Sales Co., Ltd	1,243	43.00	534	-	(123)	411

(*1) The adjustment of the Haman Industrial Complex Co., Ltd. that ceased to apply the equity method is not recorded.

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12. Property, plant and equipment

Changes in property, plant and equipment for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018					
	Land	Buildings and structures	Machinery	Others	Construction in progress	Total
Beginning balance	₩ 5,071,608	₩ 1,538,929	₩ 1,015,975	₩ 335,510	₩ 236,793	₩ 8,198,815
Acquisition/capital expenditure	11,481	22,007	56,569	114,382	210,962	415,401
Reclassification	10,113	13,926	95,714	28,185	(111,763)	36,175
Disposal	(21,805)	(4,445)	(11,120)	(8,674)	(498)	(46,542)
Depreciation	(43)	(93,212)	(209,275)	(98,119)	-	(400,649)
Impairment	-	(1,607)	(801)	18	(2,465)	(4,855)
Changes in scope of consolidation(*1)	(259,351)	(131,094)	(51,223)	2,274	(685)	(440,079)
Others(*2)	(2,215)	8,440	2,318	(978)	2,498	10,063
Ending balance	₩ 4,809,788	₩ 1,352,944	₩ 898,157	₩ 372,598	₩ 334,842	₩ 7,768,329
Acquisition cost	₩ 3,086,313	₩ 2,485,008	₩ 3,341,647	₩ 1,151,249	₩ 334,842	₩ 10,399,059
Accumulated depreciation and accumulated impairment losses	-	(1,132,064)	(2,443,490)	(778,651)	-	(4,354,205)
Accumulated revaluation surplus	1,723,475	-	-	-	-	1,723,475

(*1) Changes due to transfer and acquisition of business are included.

(*2) Changes due to exchange rate difference and others.

	2017					
	Land	Buildings and structures	Machinery	Others	Construction in progress	Total
Beginning balance	₩ 4,688,725	₩ 1,597,684	₩ 1,013,243	₩ 327,670	₩ 281,851	₩ 7,909,173
Acquisition/capital expenditure	6,923	17,362	49,685	77,783	230,195	381,948
Reclassification	39,149	74,503	171,845	21,450	(251,567)	55,380
Disposal	(71,409)	(12,901)	(8,743)	(5,982)	(19,588)	(118,623)
Depreciation	(43)	(99,510)	(215,756)	(89,633)	-	(404,942)
Impairment	1,465	(4,031)	10,899	3,436	-	11,769
Changes in scope of consolidation	-	-	10,531	5,493	-	16,024
Asset revaluation	412,958	-	-	-	-	412,958
Others(*1)	(6,160)	(34,178)	(15,729)	(4,707)	(4,098)	(64,872)
Ending balance	₩ 5,071,608	₩ 1,538,929	₩ 1,015,975	₩ 335,510	₩ 236,793	₩ 8,198,815
Acquisition cost	₩ 3,124,810	₩ 2,707,181	₩ 3,466,163	₩ 1,120,203	₩ 236,793	₩ 10,655,149
Accumulated depreciation and accumulated impairment losses	-	(1,168,252)	(2,450,188)	(784,693)	-	(4,403,132)
Accumulated revaluation surplus	1,946,798	-	-	-	-	1,946,798

(*1) Changes due to exchange rate difference and others.

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

The Group recognized the land subsequently measured at revaluation amount, if the land were stated at cost, the land would amount to ₩3,086,313 million and ₩3,124,810 million as of December 31, 2018 and 2017, respectively.

Meanwhile, the Group's land and buildings are partially pledged as collateral for loans from KDB and others (see Note 34).

The details of revaluation model, which the Group applies to measurement of the land, are as follows:

The Group recognizes subsequent measurement of the land as revaluation, and the revaluation amount is the fair value of the revaluation date. As of December 31, 2018, the fair value of land assets was determined from the appraisal that was undertaken by independently qualified valuers, the First Appraisal & Consulting Co., Ltd ("FACC") and Mirae & Saehan Appraisal Co., Ltd., on October 31, 2017.

FACC and Mirae & Saehan Appraisal Co., Ltd. are members of Korea Association of Property Appraisers and comprise of certified professionals that have a significant amount of industry experience.

Fair value measurements of land assets by fair value hierarchy level as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018			December 31, 2017		
	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Land	₩ -	₩ -	₩ 4,809,788	₩ -	₩ -	₩ 5,071,608

Valuation technique 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)	Explanation of input parameters
Official Assessed Reference Land Price ("OARLP"):	Fluctuation rate of land price and others	Fair value increases (decreases), if rate of land price increases (decreases).
OARLP of similar parcels nearby the subject land and reflating corrections necessary for differences between the subject and the comparable	Parcel conditions and others	Fair value increases (decreases), if correction of parcel conditions and others increases (decreases).
	Land conditions affecting the sales price and others	Fair value increases (decreases), if correction of land conditions affecting the sales price increases (decreases).

The fair value of the land as of December 31, 2018 is not significantly different from the revalued amount as of December 31, 2017.

Changes related to the application of the revaluation model for land for the year ended December 31, 2017 are as follows (Korean won in millions):

Beginning balance	Acquisition	Reclassification	Disposal	Valuation			Ending balance
				Other comprehensive income	Profit or loss	Others	
₩ 4,688,725	₩ 6,923	₩ 39,149	₩ (71,409)	₩ 412,958	₩ 1,465	₩ (6,203)	₩ 5,071,608

Capitalized borrowing costs for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018	2017
Capitalized borrowing cost	₩ 4,846	₩ 4,380
Capitalization interest rate	3.65%~4.26%	3.44%~4.10%

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

Classification of depreciation for the years ended December 31, 2018 and 2017 is as follows (Korean won in millions):

	2018		2017	
Cost of sales	₩	325,537	₩	321,420
Selling and administrative expenses		47,660		45,904
Research and development cost and others		20,845		21,660
Profit from discontinued operations		6,607		15,958
	₩	<u>400,649</u>	₩	<u>404,942</u>

13. Intangible assets

Changes in intangible assets for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018				
	Goodwill	Industrial rights	Development costs	Other intangible assets	Total
Beginning balance	₩ 4,444,600	₩ 1,066,139	₩ 999,299	₩ 281,973	₩ 6,792,011
Acquisition/capital expenditure	-	872	336,454	22,524	359,850
Reclassification	-	537	(26,601)	30,852	4,788
Disposal	-	(79)	-	(2,979)	(3,058)
Amortization	-	(1,615)	(150,485)	(70,119)	(222,219)
Impairment	-	-	(45,898)	(11,464)	(57,362)
Reversal of impairment loss	-	-	-	19	19
Changes in scope of consolidation					
(*1)	1,222	-	(1,953)	(4,258)	(4,989)
Others(*2)	121,378	28,947	(2,226)	1,071	149,170
Ending balance	₩ 4,567,200	₩ 1,094,801	₩ 1,108,590	₩ 247,619	₩ 7,018,210
Acquisition costs	₩ 4,567,200	₩ 1,275,391	₩ 1,778,055	₩ 790,911	₩ 8,411,557
Accumulated amortization (accumulated impairment losses are included)	-	(180,590)	(669,465)	(543,292)	(1,393,347)

(*1) Merger, acquisition of subsidiaries and transfer of business.

(*2) Changes due to exchange rate difference and others.

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13. Intangible assets (cont'd)

	2017				
	Goodwill	Industrial rights	Development costs	Other intangible assets	Total
Beginning balance	₩ 4,574,667	₩ 1,160,915	₩ 945,808	₩ 272,942	₩ 6,954,332
Acquisition/capital expenditure	-	1,245	291,845	30,877	323,967
Reclassification	-	634	(55,641)	43,499	(11,508)
Disposal	-	(62)	-	(7,106)	(7,168)
Amortization	-	(14,534)	(143,056)	(68,297)	(225,887)
Impairment	-	-	(26,729)	(85)	(26,814)
Reversal of impairment loss	-	-	-	2,690	2,690
Changes in scope of consolidation (*1)	10,047	-	-	12,924	22,971
Others(*2)	(140,114)	(82,059)	(12,928)	(5,471)	(240,572)
Ending balance	₩ 4,444,600	₩ 1,066,139	₩ 999,299	₩ 281,973	₩ 6,792,011
Acquisition costs	₩ 4,444,600	₩ 1,244,002	₩ 1,656,143	₩ 784,275	₩ 8,129,020
Accumulated amortization (accumulated impairment losses are included)	-	(177,863)	(656,844)	(502,302)	(1,337,009)

(*1) Merger, acquisition of subsidiaries and transfer of business.

(*2) Changes due to exchange rate difference and others.

The carrying amount of membership with indefinite useful lives in other intangible assets is ₩44,962 million and ₩49,084 million as of December 31, 2018 and 2017, respectively.

Meanwhile, expenditure on research and development, which was recognized as expenses, amounted to ₩254,414 million and ₩267,646 million for the years ended December 31, 2018 and 2017, respectively.

Before impairment test, the carrying amount of goodwill was allocated to CGUs as follows (Korean won in millions):

Company	CGUs	December 31, 2018	December 31, 2017	Description
Doosan Corporation	Mottrol BG	₩ 84,562	₩ 84,562	Manufacturing and sale of hydraulic components
	Industrial vehicles BG	78,230	76,860	Manufacturing and sale of forklifts
	Fuel Cell BG	41,606	41,133	Manufacturing and sale of fuel cell
DHC	Power plant	648,433	651,367	Manufacturing and sale of power plant
DI	Construction machine	3,643,257	3,519,566	Manufacturing and sale of construction equipment
DEC	Construction industry	60,049	60,049	Housing construction and infrastructure construction
Oricom Inc.	Magazine	1,373	1,373	Advertising services
	Advertisement	9,690	9,690	
		₩ 4,567,200	₩ 4,444,600	

13. Intangible assets (cont'd)

The recoverable amount of CGU is determined based on a value in use calculation, and discount rate and permanent growth rate used in calculating value in use as of December 31, 2018 are as follows:

Company	CGUs	Discount rate	Permanent growth rate
Doosan Corporation	Mottrol BG	10.98%	1.00%
	Industrial vehicles BG	9.30%	1.00%
	Fuel Cell BG	11.48%	1.00%
DHC	Power plant	10.20%	1.00%
DI	Construction machine	8.98%, 9.83%	1.50%
DEC	Construction industry	12.39%	1.00%
Oricom Inc.	Magazine	8.00%	-
	Advertisement	8.00%	1.00%

Estimates for value in use calculation are as follows.

The Group uses cash flow projections based on financial budgets approved by the directors covering five-year periods for a value in use calculation. The financial budgets are determined based on historical result and expectation of market growth. Cash flows beyond that five-year periods have been extrapolated using a '0-3%' growth rate, continuing the fifth year cash flow. Permanent growth rate does not exceed long-term average growth rate of market, and the discount rates used reflect relevant risks specific to the CGUs.

The recoverable amount may change according to changes in key assumptions. Accordingly, the Group's management regularly observes relevant turnovers and industrial trends.

Capitalized borrowing costs for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018	2017
Capitalized borrowing cost	₩ 19,185	₩ 14,387
Capitalization interest rate	3.65%~4.19%	3.44%~4.10%

Classification of amortization for the years ended December 31, 2018 and 2017 is as follows (Korean won in millions):

	2018	2017
Cost of sales	₩ 149,393	₩ 142,882
Selling and administrative expenses	71,935	80,769
Research and development cost and others	365	526
Profit from discontinued operations	526	1,710
	<u>₩ 222,219</u>	<u>₩ 225,887</u>

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13. Intangible assets (cont'd)

Development costs for the year ended December 31, 2018 are as follows (Korea won in millions):

Company	Individual assets	December 31, 2018	Residual depreciation period(*1)
DHC	Large Gas Turbine	₩ 330,465	-
	Standard thermal power 500MW	49,119	-
	IGCC gasification plant	48,992	19.58 years
	Wind Power 3MW Class III Model	24,008	4.67 years
	USC CFB Boiler RPM	10,981	3.25 years
DI	Engine Development Project for Stage 5	38,150	-
	Loaders generation 6	22,155	-
	Engine Development Project for Vehicle	8,055	-
	Engine Development Project for Electronic Generators	5,241	-
	Large Excavator (DX800) Development Project	4,102	3.42 years

(*1) If the amortization begins, the remaining amortization period is recorded. If not started, it is marked with '-'. '.

Intangible assets for which an impairment loss has been recognized for the year ended December 31, 2018 are as follows (Korea won in millions):

Company	Classification	Individual assets	Amount of impairment loss		December 31, 2018	Recoverable amount assessment methods
			2018	Accumulated		
DHC	Development costs	60Hz 50" Longer LSB Development (*1)	₩ 6,348	₩ 6,348	₩ -	Value in use
		Prototype Monoblock Rotor & 10 others(*2)	8,178	8,178	-	Value in use
	Development costs	Skoda R&D	15,132	19,853	-	Value in use
	Development costs	Others	58	58	-	Value in use
DI	Development costs	Engine Development for the new battle tank(*4)	9,889	9,889	-	Value in use
	Development costs	Tier3 Engine Development for Vessel(*5)	3,663	3,663	-	Value in use
	Development costs	Engine Development for DV32 Generator(*5)	521	521	-	Value in use
	Development costs	DL06 Engine Development (*6)	1,738	1,738	1,826	Value in use
Doosan Corporation	Development costs	PL and PS Product Development and others(*5)	371	371	-	
			₩ 45,898	₩ 50,619	₩ 1,826	

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13. Intangible assets (cont'd)

Company	Classification	Individual assets	Amount of impairment loss		December 31, 2018	Recoverable amount assessment methods
			2018	Accumulated		
DHC	Other intangible assets	Skoda R&D	₩ 6,657	₩ 29,555	₩ 1,574	Value in use
	Other intangible assets	Echogen License Agreement(*3)	4,523	4,523	-	Value in use
	Other intangible assets	SCO2 Basic Design Investment(*3)	76	76	-	Value in use
	Other intangible assets	SCO2 Model Design(*3)	36	36	-	Value in use
DI	Other intangible assets	Golf membership (*7)	107	12,906	10,001	Fair value
DEC	Other intangible assets	Condo membership (*7)	1	60	-	Fair value
Doosanbears Inc	Other intangible assets	Golf membership (*7)	64	170	220	Fair value
			11,464	47,326	11,795	
			₩ 57,362	₩ 97,945	₩ 13,621	

(*1) The Group reduced all of the carrying amount, due to the uncertainty of securing applicable markets arising from changes in order environment.

(*2) Due to the uncertainty of getting projects arising from suspension of new nuclear power plants constructions and rapid demand decrease from environment regulations in China, the Group reduced all of the carrying amount.

(*3) Although the Group made a license contract with Echogen, located in the United States, to verify feasibility and technology reliability through early demonstration of SCO2 technology, the Group reduced all of the carrying amount, considering economic feasibility and low customer acceptability.

(*4) The Group recognized all of the carrying amount as impairment loss, due to the uncertainty of a timing of production arising from a delay in the government project.

(*5) The Group recognized all of the related carrying amount as impairment loss as it decided to discontinue the development.

(*6) The Group recognized part of the related carrying amount as impairment loss, due to a decrease in value in use arising from decline in volume compared to estimates at the time of development.

(*7) The recoverable amount is estimated by reflecting the fair value of the individual asset.

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13. Intangible assets (cont'd)

Intangible assets recognized for the reversal of impairment loss for the years ended December 31, 2018 are as follows (Korea won in millions):

Company	Classification	Individual asset	Reversal of impairment loss	Recoverable amount assessment methods
DHC	Other intangible assets	Golf membership(*1)	₩ 19	Fair value

(*1) The recoverable amount is estimated by reflecting the fair value of the individual asset.

The accounts on the statements of comprehensive income for which the Group recognizes an impairment loss (reversal) for the years ended December 31, 2018 and 2017 are as follows (Korea won in millions):

	2018	2017
Other non-operating expenses	₩ 57,362	₩ 26,814
Other non-operating income	19	2,690

14. Investment properties

Changes in investment properties for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018			2017		
	Land	Building	Total	Land	Building	Total
Beginning balance	₩ 382,456	₩ 85,395	₩ 467,851	₩ 367,770	₩ 96,519	₩ 464,289
Acquisition/capital expenditure	-	1,976	1,976	-	451	451
Disposal	-	(1,273)	(1,273)	(15,358)	(1,814)	(17,172)
Revaluation(*1)	3,792	(3,188)	604	32,495	(6,728)	25,767
Reclassification	(9,612)	(4,701)	(14,313)	(2,224)	(2,781)	(5,005)
Others(*2)	(55)	-	(55)	(227)	(252)	(479)
Ending balance	₩ 376,581	₩ 78,209	₩ 454,790	₩ 382,456	₩ 85,395	₩ 467,851

(*1) Gain or loss on revaluation of investment properties is included in other non-operating income and expenses in the consolidated statements of profit or loss.

(*2) Changes due to exchange rate difference and others.

The Group's land and buildings included in the above investment properties are pledged as collateral for borrowings from Woori Bank and others (see Note 34).

14. Investment properties (cont'd)

Meanwhile, lease income related to investment properties amounted to ₩29,604 million and ₩33,270 million for the years ended December 31, 2018 and 2017, respectively.

Details of fair value model that the Group applies for measurement of investment properties are as follows:

The Group recognizes subsequent measurement of investment properties using fair value, As of December 31, 2018, the fair value of investment properties was determined from the appraisal that was undertaken by independently qualified valuers, the First Appraisal & Consulting Co., Ltd (“FACC”) and Mirae & Saehan Appraisal Co., Ltd., on November 30, 2018.

FACC and Mirae & Saehan Appraisal Co., Ltd. are members of Korea Association of Property Appraisers, and comprise of certified professionals who have a significant amount of industry experience.

Fair value measurements of investment properties by fair value hierarchy level as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018			December 31, 2017		
	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Land	₩ -	₩ -	₩ 376,581	₩ -	₩ -	₩ 382,456
Buildings	-	-	78,209	-	-	85,395
	₩ -	₩ -	₩ 454,790	₩ -	₩ -	₩ 467,851

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

Valuation techniques	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	Fluctuation rate of land price and others Parcel conditions and others Land conditions affecting the sales price and others	Fair value increases (decreases), if rate of land price increases (decreases). Fair value increases (decreases), if correction of parcel conditions and others increases (decreases). Fair value increases (decreases), if correction of land conditions affecting the sales price increases (decreases).
Sales comparison approach : Fair value is based on sales comparison of a similar object based on marketability with target object, while measuring fair value as compared with circumstance correction, time correction and individual factors	Circumstance correction Regional factors Comparative value of individual factors	Fair value increase (decrease) if circumstance correction increases (decreases). Fair value increase (decrease) if regional factors increases (decreases). The comparative value of individual factors increases (decreases) if the fair value increases (decreases).
Estimated cost price approach: Fair value is based on depreciation and replacement costs considered with structure, building materials, construction condition, building equipment, end use, present condition and management condition	Replacement cost	Fair value decreases (increases), if replacement cost increases (decreases).

15. Bonds and borrowings

15.1 Bonds

Bonds as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	Annual interest rate (%)	December 31, 2018	December 31, 2017
Public issued bonds	2.38~5.87	₩ 1,656,860	₩ 1,877,724
Private placement bonds(*1)	4.22~6.03	432,000	625,000
Convertible bonds	-	-	6,265
Bonds with stock warrants	1.00~4.00	1,224,771	1,194,175
Bonds payables in foreign currency(*2)	2.13~5.19	686,994	640,590
		<u>4,000,625</u>	<u>4,343,754</u>
Less: Conversion rights adjustment		-	(133)
Less: Warrants adjustment		(176,863)	(219,142)
More: Premium on bonds		123,209	126,933
Less: Discount on bonds		(35,007)	(41,321)
Less: Current portion of long-term bonds		(1,409,156)	(1,331,969)
		<u>₩ 2,502,808</u>	<u>₩ 2,878,122</u>

(*1) Property, plant and equipment are pledged as collateral for the above bonds (see Note 34).

(*2) The Group is provided with guarantees from Korea Exim Bank and Kookmin Bank in connection with foreign currency contingent assets (see Note 33).

15.2 Convertible bonds

Changes in convertible bonds issued by the Group for the year ended December 31, 2018 are as follows (Korean won in million):

	Beginning balance	Issue/ repayment(*1)	Exercise/ amortization	Ending balance
Convertible bonds	₩ 6,265	₩ (6,265)	₩ -	₩ -
Yield to maturity premium	679	(679)	-	-
Discount on bonds	(42)	-	42	-
Adjustment for conversion rights	(132)	-	132	-
Book value	6,770	(6,944)	174	-
Consideration for conversion rights (other capital surplus)	277	-	-	277

(*1) During the current period, DEC, a subsidiary, repaid 85th convertible bond issued in 2015.

15.3 Bonds with stock warrants

Changes in bonds with stock warrants issued by the Group for the year ended December 31, 2018 are as follows (Korean won in million):

	2018				
	Beginning balance	Issue/ repayment (*1)	Exercise/ amortization	Adjustment	Ending balance
Bonds with stock warrants	₩ 1,194,175	₩ (56,196)	₩ (5,252)	₩ 92,044	₩ 1,224,771
Yield to maturity premium	126,255	(4,227)	(3,647)	4,828	123,209
Discount on bonds	(21,285)	(924)	6,761	(6,368)	(21,816)
Adjustment for stock warrants	(219,142)	(2,122)	51,739	(7,338)	(176,863)
Book value	1,080,002	(63,468)	49,601	83,166	1,149,301
Consideration for stock warrants (other capital surplus)	103,903	1,298	(1,733)	-	103,468

(*1) During the current period, DEC, a subsidiary, made early redemption of part of 92nd bond with stock warrants issued in 2016 and newly issued 94th bond with stock warrants.

The 92nd bond with stock warrants issued by DEC, a subsidiary, is as follows (Korean won in millions):

Issue date	Maturity date	Par interest rate	Guaranteed rate of return	Exercisable period	Exercisable price (Korean won)	Par value	Issue value(*1)	Book value
June 24, 2016	June 24, 2019	3.00%	6.00%	From one month after the date of bond issue to one month before the date of repayment	₩3,185 per share	₩ 150,000	₩ 143,019	₩ 16,706

(*1) Issue value is the par value less the discount on bonds.

① Early repayment right

An early repayment right can be exercised for all or part of the principal amount outstanding on the interest payment date, which is 2 years from the issue date, and interest payment date of the 2.5 years from the issue date.

② Method of repayment at maturity

The bond pays interest at an interest rate of 3.00% and, for bonds that do not convert to maturity, the Group will repay 109.7809% of the principal amount of with the yield on maturity(YTM) at an annual rate of 6.00% (3-month compound interest) on June 24, 2019.

③ Exercise price

In case when a bond holder issues shares, such as capital transfer of reserves, share dividends, paid-in capital increase in the amount of issue that is below the pre-adjustment exercisable value before exercising stock warrants, or in the event of the adjustment of the exercise price from issuing securities granting stock warrants such as the issuance of stock warrants, or bonds with stock warrants or conversion rights, the exercise price is adjusted.

④ Exercise of stock warrants

Due to the exercise of stock warrants, 14.57% of the principal amount was exercised, and 4.57% of the bond principal was paid as of December 31, 2018. The number of shares issued from the exercise of stock warrants of a bond with stock warrant is 6,220,434 shares as of December 31, 2018.

15.3 Bonds with stock warrants (cont'd)

The 93rd bond with stock warrants issued by DEC, a subsidiary, is as follows (Korean won in millions):

Issue date	Maturity date	Par interest rate	Guaranteed rate of return	Exercisable period	Exercisable price (Korean won)	Par value	Issue value(*1)	Book value
March 21, 2017	March 21, 2020	2.50%	5.50%	From one month after the date of bond issue to one month before the date of repayment	₩2,515 per share	₩ 150,000	₩ 144,480	₩ 145,144

(*1) Issue value is the par value less the discount on bonds.

① Early repayment right

An early repayment right can be exercised for all or part of the principal amount outstanding on the interest payment date, which is 2 years from the issue date, and interest payment date of the 2.5 years from the issue date.

② Method of repayment at maturity

The bond pays interest at an interest rate of 2.50% and, for bonds that do not convert to maturity, the Group will repay 109.7128% of the principal amount of with the yield on maturity(YTM) at an annual rate of 5.50% (3-month compound interest) on March 21, 2020.

③ Exercise price

In case when a bond holder issues shares, such as capital transfer of reserves, share dividends, paid-in capital increase in the amount of issue that is below the pre-adjustment exercisable value before exercising stock warrants, or in the event of the adjustment of the exercise price from issuing securities granting stock warrants such as the issuance of stock warrants or bonds with stock warrants or conversion rights, the exercise price is adjusted.

④ Exercise of stock warrants

Due to the exercise of stock warrants, 14.73% of the principal amount was exercised, and 3.57% of the bond principal was paid as of December 31, 2018. The number of shares issued from the exercise of stock warrants of a bond with stock warrant is 7,465,686 shares as of December 31, 2018.

15.3 Bonds with stock warrants (cont'd)

94th bond with stock warrants issued by DEC, a subsidiary, is as follows (Korean won in millions):

Issue date	Maturity date	Par interest rate	Guaranteed rate of return	Exercisable period	Exercisable price (Korean won)	Par value	Issue value(*1)	Book value
May 11, 2018	May 11, 2021	4.00%	7.00%	From one month after the date of bond issue to one month before the date of repayment	₩2,105 per share	₩ 70,000	₩ 67,033	₩ 67,641

(*1) Issue value is the par value less the discount on bonds.

① Early repayment right

An early repayment right can be exercised for all or part of the principal amount outstanding on the interest payment date, which is 1.5 years from the issue date, and interest payment date of the 6 months from the issue date

② Method of repayment at maturity

The bond pays interest at an interest rate of 4.00% and, for bonds that do not convert to maturity, the Group will repay 109.9188% of the principal amount of with the yield on maturity(YTM) at an annual rate of 7.00% (3-month compound interest) on May 11, 2021.

③ Exercise price

In case when a bond holder issues shares, such as capital transfer of reserves, share dividends, paid-in capital increase in the amount of issue that is below the pre-adjustment exercisable value before exercising stock warrants, or in the event of the adjustment of the exercise price from issuing securities granting stock warrants such as the issuance of stock warrants or bonds with stock warrants or conversion rights, the exercise price is adjusted.

④ Exercise of stock warrants

Due to the exercise of stock warrants, 0.05% of the principal amount was exercised, and 0.04% of the bond principal was paid as of December 31, 2018. The number of shares issued from the exercise of stock warrants of a bond with stock warrant is 11,508 shares as of December 31, 2018.

15.3 Bonds with stock warrants (cont'd)

48th bond with stock warrants issued by DHC, a subsidiary, is as follows (Korean won in millions):

Issue date	Maturity date	Par interest rate	Guaranteed rate of return	Exercisable period	Exercisable price (Korean won)	Par value	Issue value(*1)	Book value
May 4, 2017	May 4, 2022	1.00%	2.00%	From one month after the date of bond issue to one month before the date of repayment	₩18,800 per share	₩ 500,000	₩ 491,546	₩ 459,053

(*1) Issue value is the par value less the discount on bonds.

① Early repayment right

An early repayment right can be exercised for all or part of the principal amount outstanding on the interest payment date, which is 3 years from the issue date.

② Method of repayment at maturity

The bond pays interest at an interest rate of 1.00% and, for bonds that do not convert to maturity, the Group will repay 105.2448% of the principal amount of with the yield on maturity(YTM) at an annual rate of 2.00% (3-month compound interest) on May 4, 2022.

③ Exercise price

In case when a bond holder issues shares, such as capital transfer of reserves, share dividends, paid-in capital increase in the amount of issue that is below the pre-adjustment exercisable value before exercising stock warrants, or in the event of the adjustment of the exercise price from issuing securities granting stock warrants such as the issuance of stock warrants or bonds with stock warrants or conversion rights, the exercise price is adjusted.

④ Exercise of stock warrants

Due to the exercise of stock warrants, 0.05% of the principal amount was exercised, and 0.04% of the bond principal was paid for as of December 31, 2018. The number of shares issued from the exercise of stock warrants of a bond with stock warrant is 11,322 shares as of December 31, 2018.

15.3 Bonds with stock warrants (cont'd)

31st bond with stock warrants issued by DI, a subsidiary, is as follows (Korean won in millions):

Issue date	Maturity date	Par interest rate	Guaranteed rate of return	Exercisable period	Exercisable price (Korean won)	Par value	Issue value(*1)	Book value
August 1, 2017	August 1, 2022	2.00%	4.75%	From one month after the date of bond issue to one month before the date of repayment	₩7,620 per share	₩ 500,000	₩ 491,607	₩ 460,757

(*1) Issue value is the par value less the discount on bonds.

① Early repayment right

An early repayment right can be exercised for all or part of the principal amount outstanding on the interest payment date, which is 3 years from the issue date.

② Method of repayment at maturity

The bond pays interest at an interest rate of 2.00% and, for bonds that do not convert to maturity, the Group will repay 115.4175% of the principal amount of with the yield on maturity(YTM) at an annual rate of 4.75% (3-month compound interest) on August 1, 2022.

③ Exercise price

In case when a bond holder issues shares, such as capital transfer of reserves, share dividends, paid-in capital increase in the amount of issue that is below the pre-adjustment exercisable value before exercising stock warrants, or in the event of the adjustment of the exercise price from issuing securities granting stock warrants such as the issuance of stock warrants or bonds with stock warrants or conversion rights, the exercise price is adjusted.

④ Exercise of stock warrants

Due to the exercise of stock warrants, 1.13% of the principal amount was exercised, and 1.09% of the bond principal was paid as of December 31, 2018. The number of shares issued from the exercise of stock warrants of a bond with stock warrant is 702,763 shares as of December 31, 2018.

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15.4 Short-term borrowings

Short-term borrowings as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	Creditor	Annual interest rate (%)	December 31, 2018(*3)	December 31, 2017
Borrowings in Korean won:				
Doosan Corporation (*2)	Korea Exim Bank and others	3.18~5.64	₩ 186,442	₩ 369,548
	Discount of notes receivable(*4)	-	-	2,436
DHC(*1)	KDB and others	1.40~4.69	1,023,950	1,328,450
	Discount of notes receivable(*4)	-	-	8,593
DI(*1)	Korea Exim Bank and others	3.95~4.40	607,375	988,200
DEC(*1)	Woori Bank and others	1.43~11.36	67,274	49,972
	Discount of notes receivable(*4)	-	-	13,074
DE(*1)	KDB and others	-	-	121,200
			<u>1,885,041</u>	<u>2,881,473</u>
Borrowings in foreign currency:				
Doosan Corporation (*2)	Woori Bank and others	0.80~5.09	144,814	211,340
	Disposal of receivables in foreign currency(*4)	-	1,645	-
DHC(*1)	Woori Bank and others	0.13~11.70	810,842	827,868
DI(*1)	KDB and others	0.30~5.96	331,010	390,796
	Disposal of receivables in foreign currency(*4)	-	13,090	30,291
DEC(*1)	Bank for Investment and Development of Vietnam and others	3.10~3.50	1,121	4,967
DE(*1)	Korea Exim Bank and others	-	-	3,208
			<u>1,302,522</u>	<u>1,468,470</u>
			<u>₩ 3,187,563</u>	<u>₩ 4,349,943</u>

(*1) DHC's foreign subsidiaries and consolidated subsidiaries of the DHC's subsidiaries are included.

(*2) The Group's subsidiaries other than above (*1) are included.

(*3) The Group pledges property, plant and equipment and investments in associates as collateral for the above borrowings (see Note 34).

(*4) In the case of the disposal of financial assets that do not meet the "derecognition of financial assets" requirement, the Group continues to recognize the assets in the consolidated statements of financial position, and the related receivable amount is recognized as short-term borrowings.

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15.5 Long-term borrowings

Long-term borrowings as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	Creditor	Annual interest rate (%)	December 31, 2018(*3)	December 31, 2017
Borrowings in Korean won:				
Doosan Corporation (*2)	Shinhan Bank and others	3.08~4.56	₩ 485,500	₩ 233,936
DHC(*1)	Korea Exim Bank and others	3.14~5.45	865,189	746,551
DI(*1)	KDB and others	3.99~4.40	380,000	38,333
DEC(*1)	KDB and others	8.00, CD+2.50	73,000	93,000
DE(*1)	KDB	-	-	30,000
Doosan Cuvex Co., Ltd(*1)	Dura Ace 1st	6.50	40,936	44,800
DBC Co., Ltd(*1)	The Korea Securities Finance Corporation	4.50~6.70	178,200	-
			2,022,825	1,186,620
Borrowings in foreign currency:				
Doosan Corporation (*2)	Korea Exim Bank and others	1.73~4.56	222,562	148,417
DHC(*1)	Mashreq bank and others	0.94~10.05	791,604	363,693
DI(*1)	Korea Exim Bank and others	2.30~8.00	1,512,341	1,581,367
			2,526,507	2,093,477
			₩ 4,549,332	₩ 3,280,097
Less: present value discounts			(13,051)	(10,220)
Less: current portion of long-term borrowings			(868,681)	(999,491)
			₩ 3,667,600	₩ 2,270,385

(*1) DHC's foreign subsidiaries and consolidated subsidiaries of the DHC's subsidiaries are included.

(*2) The Group's subsidiaries other than above (*1) are included.

(*3) The Group repays principal of above borrowings in instalments and pledges property, plant and equipment as collateral for the above borrowings (See Note 34).

15.6 Asset-backed loans

(Korean won in millions)

	Creditor	Annual interest rate (%)	December 31, 2018(*1)	December 31, 2017
Asset-backed loans:				
DHC	KDB and others	3.88~5.50	₩ 420,000	₩ 373,650
DEC	BNK Securities and others	7.30~7.50	492,000	423,700
			912,000	797,350
Less: present value discounts			(3,808)	(521)
Less: short-term asset-backed loans			(491,371)	(423,700)
Less: current portion of long-term asset-backed loans			(168,033)	(175,650)
			₩ 248,788	₩ 197,479

(*1) The Group pledges property, plant and equipment and others as collateral for the above asset-backed loans (see Note 34).

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16. Net defined benefit liabilities

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

Details of net defined benefit liabilities as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018	December 31, 2017
Present value of defined benefit liabilities	₩ 2,384,181	₩ 2,489,741
Fair value of plan assets	(1,714,867)	(1,760,859)
Net defined benefit liabilities	₩ 669,314	₩ 728,882

Pension costs charged to profit or loss for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018	2017
Current service costs	₩ 113,087	₩ 114,142
Net interest costs	30,699	33,265
Effect from curtailment and settlement	(5,634)	(2,027)
	₩ 138,152	₩ 145,380

Classification of the pension costs recognized in the consolidated statements of profit or loss for the years ended December 31, 2018 and 2017 is as follows (Korean won in millions):

	2018	2017
Cost of sales	₩ 93,017	₩ 87,745
Selling and administrative expenses	37,545	48,434
Research and development cost and others	5,814	4,628
Loss from discontinued operations	1,776	4,573
	₩ 138,152	₩ 145,380

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16. Net defined benefit liabilities (cont'd)

Assumptions used for actuarial valuation as of December 31, 2018 and 2017 are as follows:

	December 31, 2018	December 31, 2017
Discount rate (%)	1.29~7.76	1.03~7.76
Salary growth rate (%)	2.00~8.00	2.00~8.00

Details of plan assets as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018	December 31, 2017
Equity securities	₩ 302,645	₩ 334,651
Debt securities	623,806	607,006
Saving deposits and others	788,416	819,202
	<u>₩ 1,714,867</u>	<u>₩ 1,760,859</u>

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

The sensitivity analysis for the significant actuarial assumptions as of December 31, 2018 and 2017 is as follows (Korean won in millions):

			Amount	Ratio
December 31, 2018	Discount rate	1% increase	₩ (258,162)	(-)10.83%
		1% decrease	308,851	12.95%
	Salary growth rate	1% increase	67,030	2.81%
		1% decrease	(62,419)	(-)2.62%
December 31, 2017	Discount rate	1% increase	(285,591)	(-)11.47%
		1% decrease	356,729	14.33%
	Salary growth rate	1% increase	67,062	2.69%
		1% decrease	(62,159)	(-)2.50%

The weighted average maturity of defined benefit liabilities as of December 31, 2018 is 11.9 years.

Meanwhile, the Group expects to pay contributions amounting to ₩103,500 million in the following period. The amount recognized for the defined contribution retirement benefit plan is ₩20,792 million and ₩20,196 million as of December 31, 2018 and 2017, respectively.

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17. Provisions

Changes in provisions for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018							
	Beginning balance	Adoption of new accounting standards (*1)	Increase (decrease)	Used	Others(*2)	Ending balance	Current	Non-current
Provision for product warranties	₩ 399,983	₩ -	₩ 72,786	₩ (33,815)	₩ (27,951)	₩ 411,003	₩ 185,078	₩ 225,925
Provision for sales return	5,514	(179)	(5,427)	-	92	-	-	-
Provision for restoration	6,378	-	133	(743)	268	6,036	-	6,036
Provision for loss compensation	37	-	4	-	1	42	-	42
Provision for construction losses	-	10,143	6,111	(176)	(128)	15,950	10,150	5,800
	<u>₩ 411,912</u>	<u>₩ 9,964</u>	<u>₩ 73,607</u>	<u>₩ (34,734)</u>	<u>₩ (27,718)</u>	<u>₩ 433,031</u>	<u>₩ 195,228</u>	<u>₩ 237,803</u>

(*1) The Group recognized the adjustment amount of due from customers for contract work and due to customers for contract work as a provision as a result of the adoption of KIFRS 1115 (See Note 2).

(*2) It includes changes in the amounts from foreign exchange rate, the scope of consolidation, and so forth.

	2017						
	Beginning balance	Increase (decrease)	Used	Others	Ending balance	Current	Non-current
Provision for product warranties	₩ 352,889	₩ 324,595	₩ (264,130)	₩ (13,371)	₩ 399,983	₩ 167,852	₩ 232,131
Provision for sales return	2,519	1,702	(1,315)	2,608	5,514	5,514	-
Provision for restoration	6,041	133	-	204	6,378	-	6,378
Provision for loss compensation	9,060	4	-	(9,027)	37	-	37
	<u>₩ 370,509</u>	<u>₩ 326,434</u>	<u>₩ (265,445)</u>	<u>₩ (19,586)</u>	<u>₩ 411,912</u>	<u>₩ 173,366</u>	<u>₩ 238,546</u>

The Group recognizes the expected expenses due to quality assurance, exchange and refund, defect repair, and subsequent post-service as provisions based on the warranty period and past experience rate.

Meanwhile, the Group recognizes provisions for other liabilities amounting to ₩120,928 million related to pending litigations.

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18. Share capital and share premium

Changes in share capital and share premium for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions, except for share data):

	Number of shares		Share capital			Share premium
	Ordinary shares	Preferred shares	Ordinary shares	Preferred shares	Total	
Balance at January 1, 2017	20,206,888	5,396,759	₩ 107,854	₩ 26,984	₩ 134,838	₩ 355,736
Exercise of stock options	800	-	4	-	4	65
Retirement of shares	(1,010,385)	-	-	-	-	-
Exercise of stock options	700	-	4	-	4	115
Balance at December 31, 2017	19,198,003	5,396,759	₩ 107,862	₩ 26,984	₩ 134,846	₩ 355,916
Balance at January 1, 2018	19,198,003	5,396,759	₩ 107,862	₩ 26,984	₩ 134,846	₩ 355,916
Capital share issue cost	-	-	-	-	-	(1)
Retirement of shares	(959,901)	-	-	-	-	-
Balance at December 31, 2018	18,238,102	5,396,759	₩ 107,862	₩ 26,984	₩ 134,846	₩ 355,915

The Company's number of shares authorized is 400,000,000 shares with a par value of ₩5,000 per share. The amount of share capital is not the same as total par value of shares issued due to retirement of shares.

The number of shares with the limited voting rights under commercial law are 3,306,169 shares and 4,226,070 shares as of December 31, 2018 and 2017, respectively. Preferred shares do not have voting rights.

19. Capital surplus

Details of capital surplus as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018	December 31, 2017
Share premium	₩ 355,915	₩ 355,916
Revaluation reserves	277,542	277,542
Other capital surplus	127,977	210,793
	₩ 761,434	₩ 844,251

20. Other equity items

Other capital items as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018	December 31, 2017
Treasury stocks	₩ (203,567)	₩ (261,975)
Loss on disposal of treasury stocks	(16,738)	(16,738)
Stock options	4,066	10,431
Loss from capital reduction	(127,318)	(127,318)
Others	(52,780)	(48,872)
	₩ (396,337)	₩ (444,472)

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20.1 Treasury stocks

The Company acquired registered ordinary shares and non-voting preferred shares, and recognized them as other capital items for the stabilization of share price. Changes in treasury stocks for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions, except for share data):

	Number of treasury stocks			Book value of treasury stocks		
	Ordinary shares	Preferred shares	Total	Ordinary shares	Preferred shares	Total
Balance at January 1, 2017	5,276,455	673,054	5,949,509	₩ 308,404	₩ 15,052	₩ 323,456
Disposal (retirement of shares)	(1,010,385)	-	(1,010,385)	(61,481)	-	(61,481)
Balance at December 31, 2017	<u>4,266,070</u>	<u>673,054</u>	<u>4,939,124</u>	<u>₩ 246,923</u>	<u>₩ 15,052</u>	<u>₩ 261,975</u>
Balance at January 1, 2018	4,266,070	673,054	4,939,124	₩ 246,923	₩ 15,052	₩ 261,975
Disposal (retirement of shares)	(959,901)	-	(959,901)	(58,408)	-	(58,408)
Balance at December 31, 2018	<u>3,306,169</u>	<u>673,054</u>	<u>3,979,223</u>	<u>₩ 188,515</u>	<u>₩ 15,052</u>	<u>₩ 203,567</u>

20.2 Share-based payment

The Company granted stock options to its directors several times in the past. Stock options are settled based on the Board of Directors' decision by issuance of new shares, treasury stocks or cash settlement. Vesting condition offers two-year service after the resolution at the shareholders' meeting. The number of granted options as of December 31, 2018 is as follows (Korean won, except for share data):

	Date of grant	Number of granted options	Exercisable period	Exercisable price	Expected fair value at the date of grant
9th	2008.3.21	-	2011.3.21 - 2018.3.20	₩ 165,100	₩ 68,846
10th	2009.3.27	1,850	2012.3.27 - 2019.3.26	106,500	53,382
12th	2010.3.26	5,800	2013.3.26 - 2020.3.26	116,500	56,460
13th	2011.3.25	4,000	2014.3.25 - 2021.3.25	137,500	68,045
14th	2012.3.30	8,500	2015.3.30 - 2022.3.30	156,200	63,647
15th	2013.3.29	28,800	2016.3.29 - 2023.3.28	128,100	43,353
16th	2014.3.28	39,900	2017.3.28 - 2024.3.27	134,300	39,558

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

	Risk-free interest rate	Expected exercisable period	Expected volatility	Expected dividend yield ratio
9th	5.18%	3.00	58.89%	-
10th	3.71%	3.53	69.82%	22.00%
12th	3.82%	3.27	71.67%	35.00%
13th	3.66%	3.29	73.42%	40.00%
14th	3.57%	3.41	62.76%	43.00%
15th	2.45%	3.42	49.22%	46.00%
16th	2.88%	3.60	40.90%	48.00%

Risk-free interest rate is based on a three-year treasury bond yield rate.

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20.2 Share-based payment (cont'd)

Changes in stock options for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions, except for share data):

	2018							
	Number of ordinary shares to be issued			Valuation amount				
	Beginning	Forfeited	Ending	Beginning	Forfeited	Ending		
9th	11,900	(11,900)	-	₩ 819	₩ (819)	₩ -		
10th	1,850	-	1,850	99	-	99		
12th	39,310	(33,510)	5,800	2,219	(1,892)	327		
13th	15,500	(11,500)	4,000	1,055	(783)	272		
14th	23,300	(14,800)	8,500	1,483	(942)	541		
15th	50,400	(21,600)	28,800	2,185	(936)	1,249		
16th	65,000	(25,100)	39,900	2,571	(993)	1,578		
	<u>207,260</u>	<u>(118,410)</u>	<u>88,850</u>	<u>₩ 10,431</u>	<u>₩ (6,365)</u>	<u>₩ 4,066</u>		

	2017							
	Number of ordinary shares to be issued				Valuation amount			
	Beginning	Exercised	Forfeited	Ending	Beginning	Exercised	Forfeited	Ending
8th	800	(800)	-	-	₩ 23	₩ (23)	₩ -	₩ -
9th	11,900	-	-	11,900	819	-	-	819
10th	2,250	(200)	(200)	1,850	120	(11)	(11)	99
12th	40,810	(500)	(1,000)	39,310	2,304	(28)	(56)	2,219
13th	16,300	-	(800)	15,500	1,109	-	(54)	1,055
14th	25,000	-	(1,700)	23,300	1,591	-	(108)	1,483
15th	53,000	-	(2,600)	50,400	2,298	-	(113)	2,185
16th	101,900	-	(36,900)	65,000	4,031	-	(1,460)	2,571
	<u>251,960</u>	<u>(1,500)</u>	<u>(43,200)</u>	<u>207,260</u>	<u>₩ 12,295</u>	<u>₩ (62)</u>	<u>₩ (1,802)</u>	<u>₩ 10,431</u>

The weighted-average remaining contractual period (from December 31, 2018 to maturity) of stock options is 4.2 years.

21. Accumulated other comprehensive income

Accumulated other comprehensive income as of December 31, 2018 and 2017 is as follows (Korean won in millions):

	December 31, 2018	December 31, 2017
Loss on valuation of financial assets (designated) at fair value through OCI	₩ (20,336)	₩ -
Share of other comprehensive loss of associates and joint ventures	(8,676)	(5,517)
Loss on foreign operations translation	(98,366)	(108,453)
Gain on valuation of derivatives designated as cash flow hedges	37,760	30,866
Land revaluation surplus	641,067	703,231
Loss on valuation of available-for-sale financial assets	-	(13,206)
	<u>₩ 551,449</u>	<u>₩ 606,921</u>

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22. Retained earnings

Retained earnings as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018	December 31, 2017
Legal reserves	₩ 67,423	₩ 62,906
Discretionary reserves	10,000	26,666
Unappropriated retained earnings	882,712	1,242,948
	<u>₩ 960,135</u>	<u>₩ 1,332,520</u>

The Commercial Code of the Republic of Korea requires the Group to appropriate an amount equal to a minimum of 10% of annual cash dividends declared as a legal reserve until the reserve equals 10% of its issued share capital.

Changes in retained earnings for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018	December 31, 2017
Beginning balance	₩ 1,332,520	₩ 1,410,659
Effect of adoption of new accounting standards	(20,123)	-
Consolidated profit (loss) for the year	(116,862)	40,568
Actuarial loss on retained earnings	(14,601)	21,724
Dividends payments	(177,090)	(100,426)
Land revaluation surplus	14,697	21,475
Retirement of shares	(58,408)	(61,480)
Reclassification of gain on financial assets (designated) at fair value through OCI	2	-
Ending balance	<u>₩ 960,135</u>	<u>₩ 1,332,520</u>

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22. Retained earnings (cont'd)

Details of dividends for the year ended December 31, 2018 are as follows (Korean won, except for share data and dividend amount):

	2018		
	Preferred shares (old)	Preferred shares (new)	Ordinary shares
Par value per share	₩ 5,000	₩ 5,000	₩ 5,000
The 1st quarter:			
Number of shares issued	4,411,074	985,685	19,198,003
Number of treasury stocks	620,812	52,242	4,266,070
Shares eligible for dividends	3,790,262	933,443	14,931,933
Rate of dividend per par value	26%	26%	26%
Dividend per share	₩ 1,300	₩ 1,300	₩ 1,300
Dividend amount (Korean won in million)	₩ 4,927	₩ 1,213	₩ 19,412
The 2nd quarter:			
Number of shares issued	4,411,074	985,685	19,198,003
Number of treasury stocks	620,812	52,242	4,266,070
Shares eligible for dividends	3,790,262	933,443	14,931,933
Rate of dividend per par value	26%	26%	26%
Dividend per share	₩ 1,300	₩ 1,300	₩ 1,300
Dividend amount (Korean won in million)	₩ 4,927	₩ 1,213	₩ 19,412
The 3rd quarter:			
Number of shares issued	4,411,074	985,685	19,198,003
Number of treasury stocks	620,812	52,242	4,266,070
Shares eligible for dividends	3,790,262	933,443	14,931,933
Rate of dividend per par value	26%	26%	26%
Dividend per share	₩ 1,300	₩ 1,300	₩ 1,300
Dividend amount (Korean won in million)	₩ 4,927	₩ 1,213	₩ 19,412
Year end (planned):			
Number of shares issued	4,411,074	985,685	18,238,102
Number of treasury stocks	620,812	52,242	3,306,169
Shares eligible for dividends	3,790,262	933,443	14,931,933
Rate of dividend per par value	27%	26%	26%
Dividend per share	₩ 1,350	₩ 1,300	₩ 1,300
Dividend amount (planned) (Korean won in million)	₩ 5,117	₩ 1,213	₩ 19,412

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22. Retained earnings (cont'd)

Details of dividends paid by the Company for the year ended December 31, 2018 are as follows (Korean won in millions):

	<u>Preferred shares (old)</u>	<u>Preferred shares (new)</u>	<u>Ordinary shares</u>	<u>Total</u>
Annual dividends for prior year:				
Shares eligible for dividends	3,790,262	933,443	14,931,933	
Dividend per share (Korean won)	₩ 5,150	₩ 5,100	₩ 5,100	
	₩ 19,520	₩ 4,761	₩ 76,153	₩ 100,434
Interim dividends for the current year:				
Shares eligible for dividends	3,790,262	933,443	14,931,933	
Dividend per share (Korean won)	₩ 3,900	₩ 3,900	₩ 3,900	
	₩ 14,782	₩ 3,640	₩ 58,234	₩ 76,656
	₩ 34,302	₩ 8,401	₩ 134,387	₩ 177,090

23. Information for non-controlling interests

23.1 Hybrid bonds

23.1.1 Current period

DPS.S.A., a subsidiary, completely exercised the call option for its hybrid bonds (USD 300,000 thousand) issued on December 3, 2018.

23.1.2 Prior period

On October 5, 2017, DI, a subsidiary, completely exercised the call option for its hybrid bonds (USD 500,000 thousand) issued on October 5, 2012.

23.2 Redeemable convertible preferred share

Details of redeemable convertible preferred shares issued by the Group's subsidiary, DHC, as of December 31, 2018 are as follows:

	Details
Issue date	December 06, 2014
Issue purpose	For securement of liquidity and improvement of financial structure
Issued shares	Cumulative non-participating preferred shares
Total number of outstanding shares	13,203,540 shares
Issue price per share	₩28,250
Voting right	If there is a resolution of a general meeting of shareholders that is disadvantageous to the preferred share, it shall be subject to a resolution of a general meeting of shareholders of the preferred type separately from the general shareholders' meeting.
Dividend right	4.8% per annum based on the issue price (raised as 0.75% every year based on 5-year average rate since 5 years)
Redemption right	<ul style="list-style-type: none"> ① Redemption at the time of 1~5 years: Early redemption of 10% of the total amount of preferred shares, plus 10% per annum ② Redemption at 5 years: Redemption of part or all of the preferred shares at the end of 5 years from the date of payment. (Deduction of dividend prepayment from the amount of 5.48% per annum added to the issue price) ③ Redemption at the time of 5~10 years: Redemption can be made up to the amount raised from the above redemption amount to average rate.
Conversion right	<ul style="list-style-type: none"> ① Conversion rights: Preferred shareholders may convert all or part of the preferred shares. ② Conversion period: 1~10 years from the date of payment ③ Conversion ratio: Convert 1 share of preferred share to 1 share of ordinary share

Above redeemable convertible preferred shares are held by DHC, a subsidiary, and since there is no contractual obligations for delivering financial assets such as cash and others, the Group classified redeemable convertible preferred shares as equity instruments.

24. Operating segment information

The Group is engaged in various businesses, such as heavy industry, machinery manufacturing, apartment construction industry and service industry, key products and services of each division are as follows:

Operating segment	Main products and services
Electro-Materials BG	Manufacture and sale of copper clad laminates
Mottrol BG	Manufacture and sale of hydraulic equipment
Industrial Vehicle BG	Manufacture and sale of forklifts
Information and Communication BU	Development and maintenance service of information technology system and others
Others	Advertisement, manufacture and sale of industrial equipment, operations of golf club and condominium, etc.
DHC(*1)	NSSS, BOP, Turbine, freshwater and water treatment facilities, plant facilities installment construction, road construction, etc.
DI	Internal combustion engine, various construction machinery, transportation equipment and parts, etc.
DEC	Apartment construction etc.
DE(*2)	Marine engine, internal combustion engine, internal combustion power generation, nuclear emergency generator, etc.

(*1) During the current period, as DHC reorganized its business to improve synergy and efficiency among business units, the Group restated operating segment information for the prior period.

(*2) During the current period, as the Group sold DE and recognized profit or loss before the sale as profit or loss from discontinued operations, the Group restated operating segment information for the prior period.

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24. Operating segment information (cont'd)

Information on each business segment for the years ended December 31, 2018 and 2017 is as follows (Korean won in millions):

	2018				
	Total sales	Inter-segment sales(*2)	Net sales	Operating profit (loss)	Profit (loss) for the year
Electro-Materials BG	₩ 867,921	₩ (11,024)	₩ 856,897	₩ 92,475	₩ 65,808
Mottrol BG	594,350	(87,851)	506,499	59,407	46,497
Industrial Vehicle BG	870,222	(151)	870,071	56,534	35,864
Information and Communication BU	225,099	(203,618)	21,481	30,553	25,725
Others	1,479,746	(202,152)	1,277,594	57,283	(25,127)
DHC	5,806,630	(354,018)	5,452,612	203,140	(51,611)
DI	7,730,108	(63,333)	7,666,775	848,127	394,170
DEC	1,547,804	(49,390)	1,498,414	(52,151)	(551,780)
DE(*1)	200,186	-	200,186	(23,839)	(21,983)
	19,322,066	(971,537)	18,350,529	1,271,529	(82,437)
Adjustment for discontinued operations(*1)	(199,427)	21,065	(178,362)	24,395	29,668
Consolidation adjustments	(950,472)	950,472	-	(80,043)	(287,742)
	₩ 18,172,167	₩ -	₩ 18,172,167	₩ 1,215,881	₩ (340,511)

(*1) The Group classified it as a discontinued operation as it sold DE during the current period.

(*2) It contains the amount of adjustment for a discontinued operation, DE.

	2017				
	Total sales	Inter-segment sales(*2)	Net sales	Operating profit (loss)	Profit (loss) for the year
Electro-Materials BG	₩ 931,988	₩ (875)	₩ 931,113	₩ 133,212	₩ 104,867
Mottrol BG	415,275	(71,699)	343,576	35,216	28,887
Industrial Vehicle BG	786,061	(100)	785,961	64,826	43,034
Information and Communication BU	240,561	(232,833)	7,728	32,047	24,954
Others	1,329,724	(207,408)	1,122,316	95,922	62,171
DHC	5,970,576	(338,289)	5,632,287	187,573	(141,861)
DI	6,567,897	(60,717)	6,507,180	660,769	296,643
DEC	1,535,864	(46,704)	1,489,160	58,946	(184,024)
DE(*1)	768,870	(2,986)	765,884	13,477	(10,343)
	18,546,816	(961,611)	17,585,205	1,281,988	224,328
Adjustment for discontinued operations(*1)	(767,134)	95,372	(671,762)	(12,300)	19,743
Consolidation adjustments	(866,239)	866,239	-	(102,070)	(198,122)
	₩ 16,913,443	₩ -	₩ 16,913,443	₩ 1,167,618	₩ 45,949

(*1) The Group restated it since DE was classified as a discontinued operation during the current period.

(*2) It contains the amount of adjustment for a discontinued operation, DE.

Above inter-segment sales were based on the terms of transaction between independent business units.

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24. Operating segment information (cont'd)

Segment assets and liabilities as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018		December 31, 2017	
	Assets	Liabilities	Assets	Liabilities
Electro-Materials BG	₩ 623,736	₩ 329,968	₩ 596,010	₩ 341,542
Mottrol BG	335,935	244,506	284,050	191,064
Industrial Vehicle BG	584,517	355,744	504,961	337,024
Information and Communication BU	102,872	70,976	109,157	74,998
Others	5,074,403	2,701,429	5,426,645	2,317,835
DHC	11,679,351	9,288,372	11,405,595	9,101,798
DI	11,029,167	7,208,352	10,276,090	7,102,929
DEC	2,399,085	2,031,410	2,845,644	1,880,195
DE(*1)	-	-	1,231,347	688,177
	31,829,066	22,230,757	32,679,499	22,035,562
Consolidation adjustments	(2,948,784)	(495,522)	(3,910,477)	(869,958)
	₩ 28,880,282	₩ 21,735,235	₩ 28,769,022	₩ 21,165,604

(*1) The Group classified it as a discontinued operation as it sold DE during the current period.

The regional business sales performance for the prior year is as follows.

	2017		
	Total sales	Inter-segment sales(*2)	Net sales
Korea	₩ 8,320,650	₩ (651,083)	₩ 7,669,567
USA	3,192,761	(65,466)	3,127,295
Asia	3,129,578	(152,176)	2,977,402
Middle East	1,429,356	(4,070)	1,425,286
Europe	2,393,609	(88,816)	2,304,793
Other countries	80,862	-	80,862
	18,546,816	(961,611)	17,585,205
Adjustment for discontinued operations(*1)	(767,134)	95,372	(671,762)
Consolidation adjustments	(866,239)	(866,239)	-
	₩ 16,913,443	₩ -	₩ 16,913,443

(*1) The Group restated it since DE was classified as a discontinued operation during the current period.

(*2) It contains the amount of adjustment for a discontinued operation, DE.

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25. Revenues

25.1 Disaggregation of revenues

Details of disaggregation of revenues for the year ended December 31, 2018 are as follows (Korean won in millions):

	2018	
Revenues from contracts with customers:		
Sales on merchandise and finished goods	₩	10,771,340
Construction contracts		6,837,913
Others		483,565
		<u>18,092,818</u>
Others:		
Rental and others		79,349
	₩	<u>18,172,167</u>

	2018					
	Electro- Materials BG	Mottrol BG	Industrial Vehicle BG	Information and Communicatio n BU	Others	DHC
Geographical market:						
Korea	₩ 511,987	₩ 225,912	₩ 457,842	₩ 19,614	₩ 1,255,389	₩ 2,035,336
USA	14,039	-	195,083	18	22,205	97,523
Asia	275,147	280,587	21,498	1,496	-	1,208,625
Middle East	-	-	-	-	-	1,218,255
Europe	55,724	-	195,648	353	-	891,776
Others	-	-	-	-	-	1,097
	<u>₩ 856,897</u>	<u>₩ 506,499</u>	<u>₩ 870,071</u>	<u>₩ 21,481</u>	<u>₩ 1,277,594</u>	<u>₩ 5,452,612</u>
Timing of revenue recognition:						
Transfer at a point in time	₩ 856,818	₩ 500,648	₩ 793,242	₩ 605	₩ 811,385	₩ 282,741
Transfer over time	79	5,851	76,829	20,876	466,209	5,169,871
	<u>₩ 856,897</u>	<u>₩ 506,499</u>	<u>₩ 870,071</u>	<u>₩ 21,481</u>	<u>₩ 1,277,594</u>	<u>₩ 5,452,612</u>

	2018					
	DI	DEC	DE(*1)	Subtotal	Adjustment for discontinued operations(*1)	Total
Geographical market:						
Korea	₩ 1,739,249	₩ 1,454,792	₩ 152,853	₩ 7,852,974	₩ (131,029)	₩ 7,721,945
USA	3,233,952	38,317	158	3,601,295	(158)	3,601,137
Asia	1,402,286	-	39,573	3,229,212	(39,573)	3,189,639
Middle East	-	-	-	1,218,255	-	1,218,255
Europe	1,282,141	5,305	1,279	2,432,226	(1,279)	2,430,947
Others	9,147	-	6,323	16,567	(6,323)	10,244
	<u>₩ 7,666,775</u>	<u>₩ 1,498,414</u>	<u>₩ 200,186</u>	<u>₩ 18,350,529</u>	<u>₩ (178,362)</u>	<u>₩ 18,172,167</u>
Timing of revenue recognition:						
Transfer at a point in time	₩ 7,543,964	₩ 25,526	₩ 200,186	₩ 11,015,115	₩ (181,997)	₩ 10,833,118
Transfer over time	122,811	1,472,888	-	7,335,414	3,635	7,339,049
	<u>₩ 7,666,775</u>	<u>₩ 1,498,414</u>	<u>₩ 200,186</u>	<u>₩ 18,350,529</u>	<u>₩ (178,362)</u>	<u>₩ 18,172,167</u>

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25.1 Disaggregation of revenues (cont'd)

Details of revenues for the year ended December 31, 2017 are as follows (Korean won in millions):

	2017
Sales on merchandise and finished goods	9,282,005
Construction contracts	7,000,255
Others	631,183
	<u>₩ 16,913,443</u>

25.2 Contract balances

Receivables, contract assets and liabilities arising from contracts with customers as of December 31, 2018 are as follows (Korean won in millions):

	December 31, 2018
Receivables in trade and other receivables(*1)	₩ 2,719,247
Contract assets(*2)	2,010,667
Contract liabilities	(1,626,461)

(*1) Provisions of ₩1,320,936 million are included.

(*2) Provisions of ₩59,840 million are included.

Contract assets are amounts unbilled that the Group has a right to receive as consideration in exchange for the goods or services transferred to the customer and are transferred to receivables upon billings. Contract liabilities are advances from customers for construction contracts performed over time and are recognized as revenue as the Group transfers the goods or services to the customer.

The Group recognized assets for the costs it spent to enter into a contract with the customer, such as brokerage fees, which would not have been incurred unless the contract was entered into.

Details of incremental cost of obtaining a contract as of December 31, 2018 are as follows (Korean won in millions):

	2018
Incremental cost of obtaining a contract recognized as an asset as of December 31, 2018	₩ 45,579
Amount of amortization recognized as cost of sales for the year ended December 31, 2018	22,052

The incremental cost of obtaining a contract is amortized and recognized as expenses in the same manner as revenue recognized over the progress of the particular contract concerned.

The Group recognized design costs of an asset to be transferred for certain contracts that are not yet approved as an asset as they relate directly to a contract or to an anticipated contract with the customer that the entity can specifically identify, generate or enhance resources of the entity that will be used in satisfying performance obligations in the future, and are expected to be recovered.

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25.2 Contract balances (cont'd)

Details of costs to fulfill a contract as of December 31, 2018 are as follows (Korean won in millions):

	2018
Costs to fulfill a contract recognized as assets as of December 31, 2018	₩ 107,642
Amount of amortization recognized as cost of sales for the year ended December 31, 2018	22,893

The costs to fulfill a contract are amortized and recognized as expenses on a systematic basis consistent with the transfer of the related goods or services to the customers.

As a contract that recognizes revenue over time by applying the cost-based input method for the year ended December 31, 2017, details of accumulated gains (losses) on construction and assets (liabilities) related to construction are as follows (Korean won in millions):

	2017					
	Accumulated construction revenue	Accumulated construction cost	Accumulated profit or loss	Receivables from construction contracts		Due to customers
				Billed	Unbilled	
DHC	₩ 50,844,560	₩ 42,514,814	₩ 8,329,746	₩ 719,131	₩ 1,806,808	₩ (603,982)
DEC	7,929,865	7,026,948	902,918	1,091,173	245,072	(291,139)
DE(*1)	263,996	227,479	36,517	144	1,451	(11,492)
Doosan Mecatec Co., Ltd.	313,696	289,513	24,183	37,309	86,697	(10,237)
	59,352,117	50,058,754	9,293,364	1,847,757	2,140,028	(916,850)
Inter-company transactions	(166,243)	(150,023)	(16,220)	(18,696)	1	75,009
Amount attributable to discontinued operation segment	(305,168)	(266,352)	(38,816)	-	-	-
	₩ 58,880,706	₩ 49,642,379	₩ 9,238,328	₩ 1,829,061	₩ 2,140,029	₩ (841,841)

(*1) During the current period, the Group classified it as a discontinued operation.

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25.2 Contract balances (cont'd)

As a contract that recognizes revenue over time by applying the cost-based input method, changes in the balance of construction contracts for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

		2018			
	Project	Beginning balance	Changes	Recognized construction revenue	Ending balance
DHC	Fadhili CHP and others	₩ 17,030,437	₩ 3,525,560	₩ (5,174,824)	₩ 15,381,173
DEC(*1)	Gimhae Centum We've and others	7,163,280	2,063,280	(1,522,608)	7,703,952
DE(*2)	Shin-kori # 3,4 Emergency generator, alternate power diesel generator and 10 others	20,686	(2,428)	(18,258)	-
Doosan Mecatec Co., Ltd.	SPL Tr.6 MVA0-00002 and others	215,501	330,376	(205,398)	340,479
		24,429,904	5,916,788	(6,921,088)	23,425,604
Inter-company transactions		(458,840)	(20,535)	41,393	(437,982)
Amount attributable to discontinued operation segment		(37,022)	9,194	18,588	(9,240)
		<u>₩ 23,934,042</u>	<u>₩ 5,905,447</u>	<u>₩ (6,861,107)</u>	<u>₩ 22,978,382</u>

(*1) The construction contracts which belongs to discontinued operations are not transferred by the terms of transfer and acquisition of business contracts as of December 31, 2018 are included.

(*2) During the current period, the Group classified it as a discontinued operation.

		2017			
	Project	Beginning balance	Changes	Recognized construction revenue	Ending balance
DHC	UAE BNPP 3, 4 NSSS and others	₩ 16,826,968	₩ 5,519,080	₩ (5,315,611)	₩ 17,030,437
DEC(*1)	Ulsan Daehyun APT and others	6,523,604	2,137,462	(1,497,787)	7,163,279
DE(*2)	Shin-kori # 3,4 Emergency generator, alternate power diesel generator and 10 others	49,931	2,238	(31,483)	20,686
Doosan Mecatec Co., Ltd.	Bechtel CCL II (MVA0- 02) and others	145,449	259,775	(189,723)	215,501
		23,545,952	7,918,555	(7,034,604)	24,429,903
Inter-company transactions		(372,936)	(126,755)	40,852	(458,839)
Amount attributable to discontinued operation segment		(66,531)	(2,308)	31,817	(37,022)
		<u>₩ 23,106,485</u>	<u>₩ 7,789,492</u>	<u>₩ (6,961,935)</u>	<u>₩ 23,934,042</u>

(*1) The construction contracts which belongs to discontinued operations are not transferred by the terms of transfer and acquisition of business contracts as of December 31, 2017 are included.

(*2) During the current period, the Group classified it as a discontinued operation.

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26. Contract to apply cost-based input method

Changes in profit or loss in the current and succeeding reporting years and the amount of due from customers for contract work (excluding foreign currency translation effect) resulting from changes in total contract revenue and in total estimated contract costs for construction contracts in progress as of December 31, 2018 are as follows (Korean won in millions):

	2018					
	Changes in contract amount	Changes in total input cost	Impact on profit or loss for the current year	Impact on profit or loss for the succeeding year	Changes in due from/to customers for contract work	Provision for construction loss
DHC	₩ 407,366	₩ 293,930	₩ 100,386	₩ 13,050	₩ 100,386	₩ 14,150
DEC	86,435	117,514	(93,829)	62,750	(93,829)	915
Doosan Mecatec Co., Ltd.	4,947	(5,382)	5,266	5,063	5,266	885
	<u>₩ 498,748</u>	<u>₩ 406,062</u>	<u>₩ 11,823</u>	<u>₩ 80,863</u>	<u>₩ 11,823</u>	<u>₩ 15,950</u>

The impacts on profit or loss for the current year and succeeding year are determined based on total estimated contract costs which are estimated based on the circumstances present from the start of the contract to the end of current year and the estimated contract revenue as of December 31, 2018. The total contract costs and contract revenue may change in the future.

As of December 31, 2018, contracts in which revenue has been recognized over time, which is more than 5% of sales of the year ended December 31, 2017 are as follows (Korean won in millions):

	Contract date	Contractual completion date	Percentage-of-completion (%)	Due from customers		Trade receivables (receivables from construction contracts)	
				Total	Accumulated impairment loss	Total	Provision for impairment
UAE BNPP 1, 2 NSSS	2010-06-30	2019-08-30	98.00	₩ -	₩ -	₩ -	₩ -
Samcheok Thermal Power Plant Unit 1 and 2	2018-07-24	2024-04-30	1.00	-	-	-	-
Shin-Kori 5 and 6 NSSS	2014-08-28	2024-06-30	62.00	46,739	-	-	-
Vinh Tan 4 TPP (*1)	2014-02-26	2018-06-26	99.00	50,198	-	20,616	-
UAE BNPP 3, 4 NSSS	2010-06-30	2020-12-31	97.00	36,548	-	-	-
Shinhan Wool 1, 2 NSSS	2009-07-31	2020-09-03	98.00	282	-	-	-
Shin-Kori 3 and 4 NSSS	2006-08-28	2019-08-31	99.00	11,894	-	-	-
Yanbu ph.3 MSF	2012-12-04	2019-04-30	97.00	54,619	-	-	-
Qurayyah Add-On (*1)	2009-09-16	2014-10-15	99.00	26,609	-	28,290	-
Fadhili CHP	2016-11-12	2019-11-30	86.00	94,472	-	24,229	-
Song Hau1	2015-04-10	2019-10-02	76.00	-	-	887	-
Nghi Son II	2014-12-24	2022-07-10	8.00	11,022	-	37,795	-
Jawaharpur	2016-12-22	2021-10-21	16.00	-	-	11,633	-
Obra C	2016-12-22	2021-10-21	16.00	-	-	17,884	-

(*1) In discussions with the client regarding the extension of the contract period.

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27. Breakdown of expenses by nature

Breakdown of expenses by nature for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018	2017
Changes in inventories	₩ (256,396)	₩ (197,478)
Purchases of raw materials and merchandise	8,608,733	7,494,591
Employee benefits expenses	2,455,441	2,517,717
Depreciation and amortization	615,735	613,161
Others	5,532,772	5,317,834
	<u>₩ 16,956,285</u>	<u>₩ 15,745,825</u>

28. Selling and administrative expenses

Selling and administrative expenses for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018	2017
Salaries	₩ 684,671	₩ 671,619
Pension costs	40,556	45,495
Employee benefits	128,296	134,634
Travel expenses	63,205	61,870
Sales commission	100,452	85,532
Taxes and dues	36,054	37,563
Rental expenses	49,758	51,208
Depreciation	47,660	45,904
Insurance expenses	29,646	32,289
Repairing expenses	6,068	2,186
Advertising expenses	63,391	52,259
Packaging expenses	18,191	13,757
Research and development	227,413	209,933
Training expenses	9,610	13,645
Freight expenses	25,674	27,447
Promotional expenses	37,741	38,941
Commission expenses	258,624	199,332
Service contract expenses	28,561	28,459
(Reversal of) bad debt expenses	69,379	(5,077)
Amortization	71,935	80,769
Expansion expenses of overseas market	16,626	22,011
Warranty expenses	15,372	37,187
Others	78,744	42,209
	<u>₩ 2,107,627</u>	<u>₩ 1,929,172</u>

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29. Finance income and expenses

Finance income and expenses for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018	2017
Finance income:		
Interest income	₩ 47,546	₩ 52,654
Dividend income	2,539	2,395
Gain on foreign currency transaction	157,240	281,725
Gain on foreign currency translation	81,948	419,124
Gain on derivative transactions	123,850	153,127
Gain on valuation of derivatives	98,755	158,734
Gain on valuation of firm commitment	77,092	54,250
Financial guarantee income	545	152
	<u>589,515</u>	<u>1,122,161</u>
Finance expenses:		
Interest expense	583,609	551,859
Loss on foreign currency transactions	186,503	285,590
Loss on foreign currency translations	129,408	272,770
Loss on derivative transactions	119,923	149,889
Loss on valuation of derivatives	103,079	70,099
Loss on valuation of firm commitment	19,609	259,445
Loss on repayment of bonds	7,606	24,316
Loss on repayment of borrowings	298	884
Financial guarantee expense	70,147	59,152
Others	2,692	3,532
	<u>1,222,874</u>	<u>1,677,536</u>
	<u>₩ (633,359)</u>	<u>₩ (555,375)</u>

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30. Other non-operating income and expenses

Other non-operating income and expenses for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018		2017
Other non-operating income:			
Gain on disposal of short-term investment securities	₩ 1,277	₩	9,389
Gain on disposal of long-term investment securities	1,556		45,188
Gain on disposal of investments in subsidiaries	1,235		825
Gain on valuation of short-term financial assets	10,232		-
Gain on disposal of property, plant and equipment	2,230		4,623
Gain on disposal of intangible assets	1,021		929
Reversal of impairment loss of intangible asset	19		2,624
Gain on disposal of investment properties	-		333
Gain on valuation of investment properties	4,330		47,618
Gain on disposal of assets held for sale	-		2,183
Reversal of impairment loss of long-term financial assets	96		-
Others	58,447		75,371
	<u>80,443</u>		<u>189,083</u>
Other non-operating expenses:			
Loss on disposal of trade receivables	23,257		23,168
Impairment loss (reversal of loss) of long-term investment securities	(1,635)		16,060
Loss on disposal of property, plant and equipment	11,204		10,317
Loss on disposal of intangible assets	291		376
Impairment loss of property, plant and equipment	4,873		6,746
Impairment loss of intangible assets	57,362		26,814
Loss on valuation of investment properties	3,726		21,850
Impairment loss of assets held for sale	-		183
Loss on disposal of investments in subsidiaries	-		11,959
Donations	18,543		25,757
Others	506,926		288,186
	<u>624,547</u>		<u>431,416</u>
	<u>₩ (544,104)</u>	₩	<u>(242,333)</u>

31. Income tax expenses

Details of income tax expenses for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018		2017
Current income tax on profit for the year	₩ 125,775	₩	155,320
Deferred tax:			
Origination and reversal of temporary differences	162,576		245,908
Charged or credited directly to equity	(11,713)		(104,908)
Others	278		(23,418)
Income tax expenses directly reflected to discontinued operations	(18,061)		(28,554)
Income tax expenses	<u>₩ 258,855</u>	₩	<u>244,348</u>

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31. Income tax expenses (cont'd)

Changes in deferred tax assets and liabilities for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018			Ending balance
	Beginning balance	Changes		
		Profit or loss	Equity	
Allowance for doubtful accounts	₩ 243,741	₩ (17,057)	₩ -	₩ 226,684
Derivatives	(736,357)	76,078	(5,632)	(665,911)
Property, plant and equipment	40,755	(49,271)	(12,941)	(21,457)
Intangible assets	482,496	(83,099)	-	399,397
Assets and liabilities in foreign currencies	(18,076)	17,987	138	49
Defined benefit liabilities	8,994	10,464	(4,815)	14,643
Reserve for research and human resource	20,957	(7,225)	-	13,732
Investment properties	(20,218)	(25,410)	-	(45,628)
Others	187,630	(110,771)	5,676	82,535
Consolidation adjustments	(39,456)	37,441	5,861	3,846
	<u>₩ 170,466</u>	<u>₩ (150,863)</u>	<u>₩ (11,713)</u>	<u>₩ 7,890</u>

	2017			Ending balance
	Beginning balance	Changes		
		Profit or loss	Equity	
Allowance for doubtful accounts	₩ 486,612	₩ (4,029)	₩ -	₩ 482,583
Derivatives	23,293	(14,034)	12,710	21,969
Property, plant and equipment	(699,203)	53,334	(95,644)	(741,513)
Intangible assets	54,249	(6,355)	-	47,894
Assets and liabilities in foreign currencies	23,358	(23,562)	82	(122)
Defined benefit liabilities	296,555	(15,964)	(27,916)	252,675
Reserve for research and human resource	(58,273)	37,299	-	(20,974)
Investment properties	(12,924)	(7,294)	-	(20,218)
Others	344,374	(167,749)	11,001	187,626
Consolidation adjustments	(41,667)	7,354	(5,141)	(39,454)
	<u>₩ 416,374</u>	<u>₩ (141,000)</u>	<u>₩ (104,908)</u>	<u>₩ 170,466</u>

The Group offsets deferred tax assets and deferred tax liabilities, if the Group has a legally enforceable right to set off current tax assets against current tax liabilities and the deferred tax assets against deferred tax liabilities relating to income taxes levied by the same taxation authority.

Temporary differences, net loss and tax credit carryforwards, which have not been recognized as deferred income tax assets and expired or unused as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018	December 31, 2017
Deductible temporary differences and others	₩ 4,647,243	₩ 3,744,239

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

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31. Income tax expenses (cont'd)

Temporary differences from investments in subsidiaries, joint ventures and associated investments, which are not recognized as deferred tax assets (liabilities), are as follows (Korean won in millions):

	December 31, 2018	December 31, 2017	Remarks
Investments in subsidiaries	₩ 114,165	₩ (493,908)	Able to control the reversal of the temporary difference
Investments in associates and joint ventures	70,809	76,233	Probable that the temporary difference will not reverse in the foreseeable future
	<u>₩ 184,974</u>	<u>₩ (417,675)</u>	

A reconciliation of income tax expenses and profit before income tax expenses for the years ended December 31, 2018 and 2017 is as follows (Korean won in millions):

	2018	2017
Profit before income tax expenses	₩ 10,554	₩ 355,930
Tax at domestic tax rates applicable to profit	2,554	86,135
Adjustments:		
Non-temporary difference	18,262	151,833
Temporary difference not recognized as deferred income tax	75,384	92,717
Tax credits	(21,791)	(18,072)
Effect of tax rate fluctuation	(608)	1,194
Additional income tax and tax paid (refunded) for prior years	(9,008)	3,990
Others	194,062	(73,449)
Income tax expenses	<u>₩ 258,855</u>	<u>₩ 244,348</u>
Average effective tax rate (Income tax expenses/Profit before income tax expenses)	2452.67%	68.65%

32. Earnings (losses) per share

Earnings (losses) per share for the years ended December 31, 2018 and 2017 are as follows (Korean won, except for share data):

32.1 Basic earnings (losses) per share

Basic earnings (losses) per share for the years ended December 31, 2018 and 2017 are as follows:

	2018		
	Continuing	Discontinued	Total
Basic losses per ordinary share	₩ (4,612)	₩ (1,343)	₩ (5,955)
Basic losses per old-type preferred share(*1)	(4,573)	(1,332)	(5,905)
	2017		
	Continuing	Discontinued	Total
Basic earnings (losses) per ordinary share	₩ 2,891	₩ (982)	₩ 1,909
Basic earnings (losses) per old-type preferred share(*1)	2,920	(992)	1,928

(*1) The Group calculated earnings (losses) per share for old-type preferred share due to the nature of the share, which does not have preferred right on dividends and liquidation. Therefore, the share is considered as ordinary share, based on KIFRS 1033 *Earnings per share*.

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32.1 Basic earnings (losses) per share (cont'd)

Profit (loss) for the year attributable to the ordinary equity holders of the parent is as follows:

	2018		
	Continuing	Discontinued	Total
Loss for the year attributable to the equity holders of the parent	₩ (91,763,504,442)	₩ (25,098,583,376)	₩ (116,862,087,818)
(-) Loss attributable to new-type preferred shares	5,558,761,182	-	5,558,761,182
(-) Loss attributable to old-type preferred shares	17,334,873,226	5,047,062,894	22,381,936,120
Loss for the year attributable to the ordinary equity holders of the parent	<u>₩ (68,869,870,034)</u>	<u>₩ (20,051,520,482)</u>	<u>₩ (88,921,390,516)</u>
	2017		
	Continuing	Discontinued	Total
Profit (loss) for the year attributable to the equity holders of the parent	₩ 58,996,090,118	₩ (18,428,105,709)	₩ 40,567,984,409
(-) Profit attributable to new-type preferred shares	(4,760,559,300)	-	(4,760,559,300)
(-) Loss (profit) attributable to old-type preferred shares	(11,066,040,288)	3,760,010,405	(7,306,029,883)
Profit (loss) for the year attributable to the ordinary equity holders of the parent	<u>₩ 43,169,490,530</u>	<u>₩ (14,668,095,304)</u>	<u>₩ 28,501,395,226</u>

The weighted-average number of ordinary shares and old-type preferred shares outstanding used in basic earnings per share calculation for the years ended December 31, 2018 and 2017 are as follows:

	2018		2017	
	Ordinary shares	Old-type preferred shares	Ordinary shares	Old-type preferred shares
Beginning outstanding shares	14,931,933	3,790,262	14,930,433	3,790,262
Exercise of stock options	-	-	638	-
Weighted-average number of shares outstanding	14,931,933	3,790,262	14,931,071	3,790,262

32.2 Diluted earnings (losses) per share

Diluted earnings (losses) per share for the years ended December 31, 2018 and 2017 are as follows:

	2018		
	Continuing	Discontinued	Total
Diluted losses per ordinary share	₩ (4,612)	₩ (1,343)	(5,955)
Diluted losses per old-type preferred share	(4,573)	(1,332)	(5,905)
	2017		
	Continuing	Discontinued	Total
Diluted earnings (losses) per ordinary share	₩ 2,891	₩ (982)	1,909
Diluted earnings (losses) per old-type preferred share	2,920	(992)	1,928

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32.2 Diluted earnings (losses) per share (cont'd)

Diluted profit (loss) for the year attributable to the ordinary equity holders of the parent for the years ended December 31, 2018 and 2017 is as follows:

	2018		
	Continuing	Discontinued	Total
Loss for the year attributable to ordinary equity holders of the parent	₩ (68,869,870,034)	₩ (20,051,520,482)	(88,921,390,516)
Share-based expense (after income tax)	-	-	-
Diluted loss for the year attributable to ordinary equity holders of the parent	<u>₩ (68,869,870,034)</u>	<u>₩ (20,051,520,482)</u>	<u>(88,921,390,516)</u>
	2017		
	Continuing	Discontinued	Total
Profit (loss) for the year attributable to the ordinary equity holders of the parent	₩ 43,169,490,530	₩ (14,668,095,304)	₩ 28,501,395,226
Share-based expense (after tax)	-	-	-
Diluted profit (loss) for the year attributable to the ordinary equity holders of the parent	<u>₩ 43,169,490,530</u>	<u>₩ (14,668,095,304)</u>	<u>₩ 28,501,395,226</u>

Diluted weighted-average number of ordinary shares outstanding for the years ended December 31, 2018 and 2017 is as follows:

	2018	2017
Weighted-average number of ordinary shares outstanding	14,931,933	14,931,071
Exercise of stock options	142	371
Diluted weighted-average number of ordinary shares outstanding	<u>14,932,075</u>	<u>14,931,442</u>

As there are no potential ordinary shares for old-type preferred share, diluted earnings (losses) per share for old-type preferred share are equal to basic earnings per share for old-type preferred share.

32.3 Conditions for preferred shares dividends

	Par value	Number of shares issued
Old-type preferred shares(*1)	₩ 5,000	4,411,074
New-type preferred shares(*2)	5,000	985,685

(*1) Cash dividends available to ordinary shares+1%

(*2) The Company should distribute 2% of par value of preferred shares annually. In case the Company distributes more than 2% of par value for ordinary shares, preferred shares are participated in dividends for the exceeded dividends.

33. Contingencies and commitments

33.1 Notes, bills and checks offered in security

As of December 31, 2018, the Group provided 2 general checks (par value: ₩9,679 million), 5 blank notes and 33 blank checks as collateral against financial institutions for guarantees to fulfill a contract and payment guarantees of the Group.

33.2 Financial covenant

33.2.1 DI

During 2016 and 2017, DI issued 28th foreign currency-denominated bonds for USD 300,000 thousand and 32nd foreign currency-denominated bonds for USD 300,000 thousand. In addition, the issued 28th and 32nd foreign currency-denominated bond has an early redemption clause for when and if DI's guarantor, KDB, becomes privatized. In addition, 11,178,538 shares and 10,882,765 shares of Doosan Bobcat Co., Ltd. held by Doosan Infracore Co., Ltd. are provided as collateral for the above bonds. If they do not meet the base price, additional shares or deposits equivalent to the difference should be provided as collateral. Meanwhile, as of December 31, 2018, 32nd foreign currency-denominated bonds of ₩48,343 million are provided as collateral for KDB and others.

DI has provided 16,341,780 shares of Doosan Babcat Co., Ltd. as collateral for borrowings of ₩350,000 million from 8 companies including KDB. The share or deposit should be provided as collateral when the contracted mortgage ceiling ratio is not met in relation to the above borrowings. In addition, if the long-term credit rating given by one or more of the three domestic credit rating agencies (Nice Credit Rating Co., Ltd., Korea Credit Rating Co., Ltd. and Korea Ratings & Co.) of DI is below BB0, it includes arrangements that constitute reasons for the loss of interest on the due date.

3,980,000 shares of Doosan Bobcat Inc., a subsidiary of DI, are provided as collateral for DI's borrowings of ₩100,000 million from Standard Chartered Bank Korea Ltd. If contractual ratio of collateral limit amount of the borrowings is not fulfilled, DI should provide additional collaterals (shares or deposits) or make early redemption of part of the borrowings.

DI has signed a contract for a transfer of interests in the intellectual property for the compact tractor product development and development services with Daedong Industrial Co., Ltd., and the amount contracted is ₩4,252 million.

DI has signed investment agreements with Nautilus Venture Partners Fund II, L.P. and ICONIQ Strategic Partners IV-B, LP., and the amount of agreements are USD 10,000 thousand and USD 3,000 thousand, respectively.

33.2.2 DEC

DEC entered into construction contracts with INTDC Co., Ltd. and Daewon Plus Constructions Co., Ltd. to develop Ilsan Zenith project and Haeundae Zenith project, respectively. DEC has provided guarantees to customers, who purchase the Ilsan Zenith and Haeundae Zenith apartments for the consideration paid to purchase the apartments during the repurchase guarantee periods (two to three years after the date of sale), should customers apply for such guarantees (see Note 33.8). As of December 31, 2018, the Group's consolidated financial statements do not reflect the effect from such guarantees, as the Group cannot reasonably predict the number of purchasers applying for the guarantee and the related guaranteed amount.

33.2.3 DHC

As of December 31, 2018, DHC has entered into an agreement with Namyangju Baebong District Apartment Housing, Yangsan Deokge 2nd and Gyeongju yonggang Doosan We've projects to take over debt (conditional limit: ₩521,100 million) on condition that the liability is completed or not yet completed.

33.3 Transferred trade receivables

Outstanding trade receivables sold with recourse by the Group are in the amount of ₩14,735 million and ₩54,394 million as of December 31, 2018 and 2017, respectively. Because the Group retains some level of risks and rewards relating to trade receivables, the Group has recognized its carrying amount of it and cash receipt from transfer as short-term borrowings, in consolidated statements of financial position (see Note 15.4).

33.4 Litigation in progress

Details of major lawsuits are as follows (Korean won in millions):

	Claim	Claimed amount
Doosan Corporation	Claims for damages and others	17,990
DHC and its subsidiaries	LNG tank collusion claims for damages and others	664,405
DI and its subsidiaries	Claims for damages and others	721,394
DEC and its subsidiaries	Claims for damages and others	97,447
		1,501,236

The Group is in the process of filings for damages of ₩1,501.2 billion and refusing to pay taxes amount to ₩141.1 billion against overseas taxation authorities as of December 31, 2018 and arbitration regarding delayed payment of Korea Midland Power Co., Ltd. and Shin Boryong TPP #1, 2 main equipment commercial operation. The outcome of lawsuits cannot be estimated as of December 31, 2018.

Before the prior period, Hyundai Engineering & Construction Co., Ltd. requested International Chamber of Commerce to arbitrate disputes on manufacture of HRSG and warranties for general repairs with the Group. As of December 31, 2018, arbitration is in process, and the outcome of the arbitration cannot be reasonably estimated.

Besides, in 2011, outside investors invested 20% shares of Doosan Infracore China Co., Ltd., subsidiary of Doosan Infracore Co., Ltd. at ₩380 billion, and they have the right to request to jointly sell the shares held by the other party to a third party according to shareholder's agreement with Doosan Infracore Co., Ltd. In principle, Doosan Infracore Co., Ltd. should jointly sell its shares upon request by the outside investors, but it also has the right to purchase shares of outside investors at the price they are willing to sell.

In 2014, outside investors requested a due diligence report as a preliminary step to proceed with the sale process, but Doosan Infracore Co., Ltd. has not been able to provide due diligence materials including confidential information since the sale has not been confirmed. As a result, outside investors filed a lawsuit for the provision of due diligence to the Seoul Central District Court. Seoul Central District Court (March 2, 2015) dismissed an application for disposition of outside investors because Doosan Infracore Co., Ltd. did not have any obligation to provide due diligence data to outside investors.

Outside investors filed a lawsuit in November 2015 seeking the payment of the proceeds from the sale of shares (foreign investors' proceeds of sale: ₩709.3 billion, lawsuit value of ₩10 billion). Seoul Central District Court (January 12, 2017) dismissed outside investor's claims for DI's non-fulfillment of the sale process. Then, Seoul High Court (February 21, 2018) recognized the obligation for the sale process and ruled that DI pay a portion of ₩709.3 billion of the proceeds from the sale which is ₩10 billion.

DI objected to the second judgment and appealed to the Supreme Court on February 26. Seoul High Court (February 28, 2018) suspended enforcement by the second judgment.

Even if the Supreme Court rules that DI is required to pay the plaintiffs' claims and obtain the shares to be acquired, the Group is unable to reliably measure future profits and losses that may arise from such transactions.

33.4 Litigation in progress (cont'd)

Meanwhile, external investors filed an additional lawsuit against the remaining proceeds from the sale of shares (lawsuit amount of ₩705.1 billion) in March 2015, and it is in progress in the first trial as of December 31, 2018.

DI pledged 8,288,196 ordinary shares of Doosan Bobcat Inc. and paid ₩10 billion in suspense payment for external investors, in compliance with recommendation for reconciliation issued by Seoul Central District Court in July 2018, regarding compensation procedure for ongoing litigation. If DI wins in the Supreme Court, the external investors should cancel the establishment of pledge and return the suspense payment.

33.5 Technical contract

The Group has technical license agreements with Mitsubishi Heavy Industries, Ltd. and others for the year ended December 31, 2018 and the Group paid ₩4,587 million and ₩11,672 million for the years ended December 31, 2018 and 2017, respectively, as license fee.

33.6 Operating leases

Details of non-cancelable operating leases contract as of December 31, 2018 are as follows (Korean won in millions):

	December 31, 2018
Within one year	47,912
Later than one year but not later than five years	137,197
Later than five years	71,467
	<u>256,576</u>

33.7 Credit lines for borrowings

The Group has entered into bank overdraft agreements amounting to ₩9,422,152 million with various financial institutions as of December 31, 2018.

33.8 Guarantees of payment

Guarantees of payment provided by the Group as of December 31, 2018 are as follows (Korean won in millions):

Provided by	Provided to	December 31, 2018
Doosan Corporation	KDFA	740
Circuit Foil Luxembourg Sarl	Alsarec and others	2,482
DHC and its subsidiaries	Rentees of Yongin Doosan we've Apt. and others	199,223
DI and its subsidiaries	Daewoo Engineering & Construction and others	186,811
DEC and its subsidiaries	Ilsan Zenith's customers and others	1,413,345
		<u>1,802,601</u>

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33.8 Guarantees of payment (cont'd)

Guarantees of payment provided by third parties to the Group as of December 31, 2018 are as follows (Korean won in millions):

Provided to	Provided by	December 31, 2018	
Doosan Corporation	Korea Defense Industry Association	63,867	
	Seoul Guarantee Insurance	178,220	
	KDB	25,863	
	Machinery Financial Cooperative	28,334	
	Woori Bank and others	28,422	
	Korea Software Financial Cooperative	2,270	
Doosan Robotics Co., Ltd	Seoul Guarantee Insurance	141	
Doosan Mobility Innovation Inc	Seoul Guarantee Insurance	10	
DLI Corporation	Seoul Guarantee Insurance	-	
Doosan Mecatec Co., Ltd.	KEB Hana Bank	53,166	
	Woori Bank	67,816	
	KDB	9,590	
	Machinery Financial Cooperative and others	71,728	
Doosanbears Inc	Seoul Guarantee Insurance	138	
Circuit Foil Luxembourg Sarl	The Bank of Tokyo-Mitsubishi UFJ Ltd, London and others	12,021	
Oricom Inc.	Seoul Guarantee Insurance	2,020	
Hancomm Inc.	Seoul Guarantee Insurance	1,576	
Doosan Energy Solutions America, Inc.,	KDB	25,863	
DHC and its subsidiaries	Korea Exim Bank	1,105,435	
	Machinery Financial Cooperative	2,127,613	
	Seoul Guarantee Insurance	537,855	
	Construction Guarantee Cooperative	437,426	
	KEB Hana Bank	161,513	
	Korea Federation of Small and Medium Business	45,739	
	Korea Trade Insurance Corporation	43,342	
	Others	3,843,365	
	DI and its subsidiaries	KDB	670,860
		Seoul Guarantee Insurance	6,110
Machinery Financial Cooperative		47,198	
Woori Bank		229	
DEC and its subsidiaries	Construction Guarantee Cooperative	1,915,889	
	Korea Housing Guarantee	1,669,615	
	Woori bank	1,680	
	Machinery Financial Cooperative	41,110	
	Asia Commercial Bank	749	
	KEB Hana Bank	1,230	
	Seoul Guarantee Insurance	28,201	
	Others	212,952	
		<u>13,469,156</u>	

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33.8 Guarantees of payment (cont'd)

Guarantees of payment to DEC, and DHC for PF of developer as of December 31, 2018 are as follows (Korean won in millions):

<u>Business name</u>	<u>Bond institution</u>	<u>The term of guarantee</u>	<u>Limit of guarantee</u>	<u>The balance</u>	<u>Description</u>
Loans:					
Pohang New Port	Shinhan bank and others	2010.03.26~ 2025.12.31	₩ 3,385	₩ 3,385	Joint guarantee
Daejeon Cheonbyeon	KEB Hana Bank	2004.05.06~ 2024.05.06	3,300	3,300	Joint guarantee
			6,685	6,685	
Short-term bonds:					
Hongcheon Mokok CC	KB Securities and others	2018.04.18~ 2019.04.18	227,500	227,500	Debt acceptance
Cheonan Cheongdang-dong	HMC investment securities	2018.11.28~ 2019.02.28	20,000	20,000	Joint guarantee
Cheonan Cheongdang-dong	HMC investment securities	2018.12.07~ 2019.03.07	20,000	20,000	Joint guarantee
Cheonan Cheongdang-dong	HMC investment securities	2018.11.30~ 2019.02.28	41,500	41,500	Joint guarantee
Yongin 3 ga	HMC investment securities	2018.12.28~ 2019.03.28	60,000	60,000	Joint guarantee
			369,000	369,000	
			₩ 375,685	₩ 375,685	

33.9 Covenant related to consolidated structured entities

The carrying amount of assets and liabilities related to the consolidated structured entities' interests in the consolidated entity, details of the financial support provided and the maximum exposure amount of the Group to structured entity's losses as of December 31, 2018 are as follows (Korean won in millions):

	Financial support for structured entities	Book value of liabilities regarding structured entities' interests	The maximum exposure amount of the Group to structured entities' losses
DEC:			
Greatgm 6th. Co.,(*1)	₩	130,700	₩ 130,700
Pinetree City 1st Co., Ltd.(*2)		56,300	56,300
DMbest3rd co.,Ltd(*3)		70,000	70,000
DMbest4th co.,Ltd (*4)		120,000	120,000
GMS 1st Co., Ltd.(*5)		15,000	15,000
Greatgm 4th. Co. Ltd.(*6)		100,000	100,000
Doosan E&C Third Co., Ltd(*7).	The duty to replenishment of principal and interest of borrowings and others	73,000	73,000
DHC:			
KDPP 3rd Co., Ltd.(*8)		40,000	40,000
U BEST 4th Co., Ltd(*9)		160,000	160,000
KDPP 4th Co., Ltd.(*10)		203,000	203,000
FSS 8th CO., LTD.(*10)		97,000	97,000
Doosanbears Inc:			
Sunny Russel 8th Co., Ltd(*11)		10,000	10,000

33.9 Covenant related to consolidated structured entities (cont'd)

Details of securitization assets and method are as follows:

Securitization assets and method

- (*1) The Greatgm 6th Co., is a company established with the aim of liquidating future construction bonds for Goyang Hyang-dong section 4 and six other contractors held by DEC, a subsidiary, and is financed mainly by issuing ABS bonds from financial institutions. As of December 31, 2018, the amount of underlying assets is ₩150,000 million based on the book amount of the securitized company's financial statements.
- (*2) Pinetree City 1st Co., Ltd is a company established with the aim of implementing loans by receiving the Changwon 2 plant, owned by DEC, a subsidiary, as subordinated collateral, and it is funded mainly by issuing ABS bonds from financial institutions. Its underlying asset is ₩56,300 million based on the book amount of the securitized company's financial statements as of December 31, 2018. The Group provides part of the property, plant and equipment as collateral to fulfill the financial support obligation for Pinetree City 1st Co., Ltd.
- (*3) DM BEST 3rd Co., Ltd. is a company established with the aim of liquidating future construction bonds for Hanam Line section 2 and seven other contractors held by DEC, a subsidiary, and is financed mainly by issuing ABS bonds from financial institutions. As of December 31, 2018, the amount of underlying assets is ₩70,000 million based on the book amount of the securitized company's financial statements.
- (*4) DM BEST 4th Co., Ltd. is a company established with the aim of liquidating future construction bonds for Seoul-Munsan highway Co., Ltd. and ten other contractors held by DEC, a subsidiary, and is financed mainly by issuing ABS bonds from financial institutions. As of December 31, 2018, the amount of underlying assets is ₩120,000 million based on the book amount of the securitized company's financial statements.
- (*5) GMS 1st Co., Ltd. is a company established with the aim of liquidating future construction bonds for Gimhae Centum We've Construction held by DEC, a subsidiary, and is financed mainly by issuing ABS bonds from financial institutions. As of December 31, 2018, the amount of underlying assets is ₩150,000 million based on the book amount of the securitized company's financial statements.
- (*6) Greatgm 4th Co., Ltd is a company established with the aim of liquidating future construction bonds for Pusan District and five other contractors held by DEC, a subsidiary, and is financed mainly by issuing ABS bonds from financial institutions. As of December 31, 2018, the amount of underlying assets is ₩100,000 million based on the book amount of the securitized company's financial statements.
- (*7) Doosan E&C Third Co., Ltd. is a company established with the aim of implementing loans by receiving the Changwon 2 plant, owned by DEC, a subsidiary, as senior collateral and is funded mainly by issuing ABS bonds from financial institutions. Its underlying asset is ₩73,000 million based on the book amount of the securitized company's financial statements as of December 31, 2018. The Group provides part of the property, plant and equipment as collateral to fulfill the financial support obligation for Doosan E&C Third Co., Ltd.
- (*8) KDPP 3rd Co., Ltd is a company established with the aim of liquidating ordinary shares and convertible preferred shares of subsidiaries held by DEC, a subsidiary, and is financed mainly by issuing ABCPs from financial institutions. As of December 31, 2018, the amount of underlying assets is ₩40,000 million based on the book amount of the securitized company's financial statements.
- (*9) U BEST 4th Co., Ltd. is a company established with the aim of liquidating new issuance bonds of DHC and DI, subsidiaries, and is financed mainly by issuing ABCPs from financial institutions. As of December 31, 2018, the amount of underlying assets is ₩160,000 million based on the book amount of the securitized company's financial statements.
- (*10) KDPP 4th Co., Ltd and FSS 8th CO., LTD are companies established with the aim of liquidating future construction bonds held by DHC, a subsidiary, and is financed mainly by issuing ABSTB and others from financial institutions. As of December 31, 2018, the amount of underlying assets is ₩203,000 million and ₩97,000 million based on the book amount of the securitized company's financial statements.
- (*11) Sunny Russel 8th Co., Ltd is a company established with the aim of liquidating future sales bonds of Doosanbears, Inc., a subsidiary, and is financed mainly by issuing ABLs from financial institutions. As of December 31, 2018, the amount of underlying assets is ₩10,000 million based on the book amount of the securitized company's financial statements.

33.10 Joint liability for contract execution

As of December 31, 2018, the Group provides joint and several guarantees amounting to ₩380,769 million for the performance of construction contracts to other construction companies. In addition, the Group provides joint and several guarantees for construction performance to Korea Housing & Finance Corporation related to the guarantee for housing sales, which was provided by Korea Housing Finance Corporation to the developers. And, investors associated with SOC business have an agreement of providing for an insufficient fund when the agreement is terminated or insufficient to repay the loan principal and interest by buy price or payment arising from purchase requirement from authorities.

34. Pledged assets

The Group pledged certain assets as collateral for its long-term and short-term borrowings as of December 31, 2018 as follows.

As of December 31, 2018, the Group is committed to liability for ₩375,000 million of the PF loan contract signed by its subsidiary, DBC Co., Ltd, to build the Doosan Bundang Center and provides 1,723,560 shares of DBC Co., Ltd's stock held by the Group (₩86,178 million in collateral) and rights to claim for construction insurance (₩263,112 million in collateral) as collaterals.

As of December 31, 2018, DHC, a subsidiary of the Group, signed a share exchange claim agreement with Korea Exim Bank regarding hybrid bonds issued by Doosan Power Systems S.A, a subsidiary of DHC. Accordingly, DHC is obliged to settle the cash in the issue price (USD 300,000 thousand) upon request from Korea Exim Bank in case when the bank holds hybrid bonds as the investors exercise put option. In this regard, DHC provides the Korea Exim Bank 75,509,366 shares of DI as collateral.

As of December 31, 2018, DHC, a subsidiary, also has confirmed its responsibility in connection with the construction project for the Samcheok Thermal Power Plant Unit 1 and 2 and provides 1,193,066 shares of Pospower Co., Ltd. as collateral.

Clark Equipment Co., a subsidiary of Doosan Infracore Co., Ltd., repaid all borrowings it borrowed jointly with Doosan Holdings Europe Ltd. on May 28, 2014. It newly borrowed USD 1,345,000 thousand and entered into a borrowing agreement with the limit of USD 150,000 thousand on May 18, 2017. Doosan Bobcat EMEA s.r.o. provided all shares in Clark Equipment Co., Doosan Bobcat EMEA s.r.o. and Doosan Bobcat Singapore Pte. Ltd. as collaterals, and the related borrowings as of December 31, 2018 are USD 971,463 thousand.

Doosan Infracore Co., Ltd., a subsidiary, provides all shares in Doosan Infracore North America LLC and Doosan Infracore Norway AS, its subsidiaries, as collaterals for borrowings of USD 117,600 thousand borrowed from Korea Exim Bank.

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34. Pledged assets (cont'd)

The Group pledged certain assets as collateral for its financial liabilities as of December 31, 2018 as follows (Korean won in millions):

Provided by	Pledged assets	Institution	Financial liabilities	Pledged amount
Doosan Corporation	Property, plant and equipment	KDB and others	₩ 372,980	₩ 802,761
DLI Corporation(*2)	Investment properties	KEB Hana Bank and others	25,500	36,478
Doosan Mecatec Co., Ltd.	Inventories	Korea Exim Bank	4,800	8,483
Doosan Electro-Materials (Changshu) Co., Ltd.	Property, plant and equipment	China Citic Bank	13,033	13,033
Doosan Industrial Vehicle America Corp.	Trade receivables, Inventories	US Bank	19,902	54,383
Doosan Industrial Vehicle Yantai Co., Ltd.	Property, plant and equipment	Woori Bank	2,442	6,908
Doosanbears Inc	Property, plant and equipment	KEB Hana Bank	19,500	48,700
DHC and its subsidiaries	Property, plant and equipment	KDB and others	983,485	1,375,093
	Investments in subsidiaries	Standard Chartered Bank Korea and others	90,000	107,601
	Shares contributed	Construction Guarantee Cooperative and others	3,950	19,760
DI and its subsidiaries	Property, plant and equipment(*1)	KDB and others	343,011	628,999
	Inventories(*1)	Korea Exim Bank and others	80,000	195,000
DEC and its subsidiaries	Short-term financial instruments	IBK	1,000	1,000
	Cash and cash equivalents	KEB Hana Bank	1,230	1,353
	Property, plant and equipment(*3)	KDB and Others	129,300	196,575
	Investments in associates	Woori Bank	29,000	234,055
	Equity share	Construction Guarantee Cooperative	27,039	34,746
Doosan Cuvex Co., Ltd	Property, plant and equipment	Saeng bo estate trust Co., Ltd	26,200	42,900
			<u>₩ 2,172,372</u>	<u>₩ 3,807,828</u>

(*1) Benefit entitlement on property, plant and equipment and inventories has been provided as collateral to KDB and others.

(*2) As of December 31, 2018, the Group has established the real estate beneficiary certificates (maximum pledge amount of ₩20,800 million) of land and buildings (pledged amount of ₩43,941 million) for the loan agreements with KDB Capital Corporation and others.

(*3) As of December 31, 2018, part of the property, plant and equipment of the Group's subsidiary, DEC, is provided to KDB and others (amount collateralized: ₩110,000 million) as collateral for the borrowings of the Group's subsidiary, Doosan Mecatec Co., Ltd.

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34. Pledged assets (cont'd)

Details of collateral provided by the Group for third parties are as follows (Korean won in millions):

Provided by	Pledged assets	Book value	Institution	Provided to
DHC	Long-term investment securities and others	₩ 22,782	Kookmin Bank and others	Inchen-Kimpo express highway Co., Ltd. and others
DEC	Long-term investment securities	65,726	KDB and others	Metropolitan West Highway and others
	Investments in associates and joint ventures	7,144	KDB and others	New Seoul Railroad Co., Ltd and others
		72,870		
		₩ 95,652		

35. Related party transactions

Relationship with the Group	Related parties
Associates (*1, 2, 4, 5, 6, 7)	Tamra Offshore Wind Power Co., Ltd.(*5), The HS-Urban highway(*1), Pospower Co., Ltd.(*1, 2, 4), Daejeong Marine Wind Power Plant Co., Ltd.(*4), Potenit Co., Ltd(*6) New Bundang Line Co., Ltd.(*1), Gyeonggi Railway Co., Ltd.(*1, 2), Neo Trans Co., Ltd., New Seoul Railroad Co.(*1, 2), KIAMCO Gyeonggi Railway Investment Private Equity Investment Trust(*1), Incheon Furecell Co.,Ltd.(*4), Dongbuk LRT(*4), Daesan Green Energy Co. Ltd.(*2, 4), Geaenzymes(*2, 4), New Wave 5th Initial Enterprise Professional Investment Union, KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership(*7), 2010 KIF-Neoplux IT Professional Investment Association, KoFC-Neoplux R&D Biz Creation 2013-1 Investment Partnership(*7), Future Creation Neoplux Investment Partnership(*7), Neoplux technology valuation investment combination(*7), Neoplux Market Frontier Secondary Fund(*7), Gyeonggi - Neoplux Superman Investment Fund (*7), Shinhan - Neoplux Energy New Industry Investment Association(*7), Neoplux First Private Equity Investment Company(*7), KTC&P Growth Private Equity Investment Company(*7), Neoplux No.3 Private Equity Fund(*7), Dalian Samyoung Doosan Metal Product Co., Ltd.("DSDMP")(*5), Prestolite Asia LTD., KDDI Korea Corporation and others
Joint ventures (*1, 3, 4, 8)	Sichuan Kelun-Doosan Biotechnology Company Limited, Doosan Babcock BlackCat W.L.L (*8), Haman Industrial Complex Co., Ltd.(*1, 3), Doosan PSI LLC, Doosan Infracore Liaoning Machinery Sales Co., Ltd, Tianjin Lovol Doosan Engine Co., Ltd.(*4) and others
Other related parties	Doosan Credit Union, Yeongang Foundation, Chung-Ang University, Dongdaemun Future Foundation and others

(*1) Provided as collateral for project financing.

(*2) Although the Group has less than 20% shares of the entity, it is classified as an associate since the Group can exercise voting rights in its Board of Director's meeting.

(*3) Although the Group has more than 50% shares of the entity, it is classified as a joint venture since the Group has no control due to the inter-shareholder agreement.

(*4) During the current period, the Group newly acquired it.

(*5) During the current period, the Group disposed it.

(*6) During the period, DI, a subsidiary, acquired the 27.8% of shares of Potenit Co., Ltd for ₩5,333 million. Meanwhile, DI has a call option that allows DI to acquire an additional 34.6% of shares of Potenit Co., Ltd within five years after 2 years since the acquisition.

(*7) The Group classified Neoplux Co.,Ltd., which was a subsidiary, as an associate because it can exercise significant influence as a business executive member.

(*8) During the current period, the Group lost control over the entity and reclassified it as a joint venture from a subsidiary.

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35. Related party transactions (cont'd)

Significant transactions for the years ended December 31, 2018 and 2017, between the Group and related parties are as follows (Korean won in millions):

Associates	Related parties	2018			
		Sales	Other income	Purchases	Other expenses
	Gyeonggi Railway New Bundang Line Co., Ltd.	₩ 17,007	₩ -	₩ -	₩ -
	Tamra Offshore Wind Power Co., Ltd.	7,096	-	432	-
	New Seoul Railroad Co.	29,476	-	-	-
	Neo Trans Co., Ltd.	8,648	-	-	-
	KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership	-	-	-	-
	KoFC-Neoplux R & D Biz Creation 2013-1 Investment Cooperative	568	-	-	-
	Future Creation Neoplux Investment Partnership	715	-	-	-
	Neoplux First Private Equity Investment Company	234	-	7	-
	KTC&P Growth Private Equity Investment Company	662	-	-	-
	Neoplux Market Frontier Secondary Fund	1,231	-	-	-
	Neoplux technology valuation investment combination	1,067	-	-	-
	Prestolite Asia LTD.	-	-	4,474	-
	Others	5,331	-	-	100
		<u>72,035</u>	<u>-</u>	<u>4,918</u>	<u>100</u>

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35. Related party transactions (cont'd)

		2018			
	Related parties	Sales	Other income	Purchases	Other expenses
Joint ventures	Tianjin Lovol				
	Doosan Engine Co. Ltd.	₩ -	₩ 6,147	₩ -	₩ -
		-	6,147	-	-
Other related parties	Chung-Ang University	105	-	3,661	4,600
	Doosan Credit Union	202	-	1	-
	Doosan Yonkang Foundation	1,346	16	2,702	1,949
	Others	728	-	-	-
		2,381	16	6,364	6,549
	₩ 74,416	₩ 6,163	₩ 11,282	₩ 6,649	

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35. Related party transactions (cont'd)

	Related parties	2017			
		Sales	Other income	Purchases	Other expenses
Associates	Gyeonggi Railway New Bundang Line Co., Ltd.	₩ 26,578	₩ -	₩ -	₩ -
	Tamra Offshore Wind Power Co., Ltd.	-	-	32	-
	New Seoul Railroad Co.	23,059	-	-	-
	Neo Trans Co., Ltd.	16,475	-	-	-
	KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership	8,813	-	-	27
	KoFC-Neoplux R & D Biz Creation 2013-1 Investment Cooperative	176	-	-	-
	Future Creation Neoplux Investment Partnership	685	-	-	-
	Neoplux First Private Equity Investment Company	895	-	-	-
	KTC&P Growth Private Equity Investment Company	6,180	-	-	-
	Neoplux Market Frontier Secondary Fund	811	-	-	-
	Neoplux technology valuation investment combination	-	-	-	-
	Prestolite Asia LTD.	-	-	-	-
	Others	5,011	-	-	-
		<u>88,683</u>	<u>-</u>	<u>32</u>	<u>27</u>

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35. Related party transactions (cont'd)

		2017			
	Related parties	Sales	Other income	Purchases	Other expenses
Joint ventures	Tianjin Lovol				
	Doosan Engine Co. Ltd.	₩ -	₩ -	₩ -	₩ -
Other related parties	Chung-Ang University	12	-	2,847	7,543
	Doosan Credit Union	-	-	-	-
	Doosan Yonkang Foundation	1,374	8	5,304	769
	Others	768	-	77	-
		<u>2,154</u>	<u>8</u>	<u>8,228</u>	<u>8,312</u>
	<u>₩ 90,837</u>	<u>₩ 8</u>	<u>₩ 8,260</u>	<u>₩ 8,339</u>	

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35. Related party transactions (cont'd)

Significant balances related to the transactions between the Group and related parties as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	December 31, 2018					
	Related parties	Trade receivables	Other receivables	Loans	Trade payables	Other payables
Associates	Gyeonggi Railway	₩ 792	₩ -	₩ 30,362	₩ -	₩ -
	New Bundang Line Co., Ltd.	11,023	-	32,573	-	-
	Tamra Offshore Wind Power Co., Ltd.	-	-	-	-	-
	Neo Trans Co., Ltd.	989	-	-	248	152
	KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership	-	-	-	-	-
	KoFC-Neoplux R & D Biz Creation 2013-1 Investment Cooperative	567	-	-	-	-
	Future Creation Neoplux Investment Partnership	715	-	-	-	-
	Neoplux First Private Equity Investment Company	2,754	-	-	-	-
	KTC&P Growth Private Equity Investment Company	152	-	-	-	-
	Neoplux Market Frontier Secondary Fund	14	-	-	-	-
	Neoplux technology valuation investment combination	1,065	-	-	-	-
	New Seoul Railroad Co.	-	9	-	-	-
	The HS-City Expressway Co., Ltd	-	-	-	-	-
	Others	663	-	-	-	-
		18,734	9	62,935	248	152

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35. Related party transactions (cont'd)

		December 31, 2018					
Related parties		Trade	Other	Loans	Trade	Other	
		receivables	receivables		payables	payables	
Joint ventures	Haman Industrial Complex	₩ 826	₩ 3,002	₩ -	₩ -	₩ -	
		826	3,002	-	-	-	
Other related parties	Chung-Ang University	61	-	-	85	390	
	Doosan Credit Union	18	-	-	-	84	
	Doosan Yonkang Foundation	24	1,643	-	99	308	
	Others	18	-	-	-	-	
		121	1,643	-	184	782	
		₩ 19,681	₩ 4,654	₩ 62,935	₩ 432	₩ 934	

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35. Related party transactions (cont'd)

		December 31, 2017				
Related parties		Trade	Other	Loans	Trade	Other
		receivables	receivables		payables	payables
Associates	Gyeonggi Railway	₩ 12,000	₩ -	₩ 9,350	₩ -	₩ -
	New Bundang Line Co., Ltd.	11,023	-	32,574	1	-
	Tamra Offshore Wind Power Co., Ltd.	-	-	-	-	-
	Neo Trans Co., Ltd.	847	-	-	277	152
	KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership	3,353	-	-	-	-
	KoFC-Neoplux R & D Biz Creation 2013-1 Investment Cooperative	3,259	-	-	-	-
	Future Creation Neoplux Investment Partnership	4,596	-	-	-	-
	Neoplux First Private Equity Investment Company	2,519	-	-	-	-
	KTC&P Growth Private Equity Investment Company	2,864	-	-	-	-
	Neoplux Market Frontier Secondary Fund	-	-	-	-	-
	Neoplux technology valuation investment combination	-	-	-	-	-
	New Seoul Railroad Co.	-	-	-	-	-
	The HS-City Expressway Co., Ltd	2,723	-	-	-	-
	Others	853	9	-	-	-
		44,037	9	41,924	278	152

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35. Related party transactions (cont'd)

		December 31, 2017					
Related parties		Trade	Other	Loans	Trade	Other	
		receivables	receivables		payables	payables	
Joint ventures	Haman Industrial Complex	₩ 1,068	₩ 3,068	₩ -	₩ -	₩ 47	
		1,068	3,068	-	-	47	
Other related parties	Chung-Ang University	14	133	-	632	336	
	Doosan Credit Union	-	-	-	-	-	
	Doosan Yonkang Foundation	62	1,719	-	643	77	
	Others	33	-	-	-	84	
		109	1,852	-	1,275	497	
		₩ 45,214	₩ 4,929	₩ 41,924	₩ 1,553	₩ 696	

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35. Related party transactions (cont'd)

Fund and equity transactions for the years ended December 31, 2018 and 2017, between the Group and related parties are as follows (Korean won in millions):

	Related parties	2018					
		Loan		Contribution		Dividend	
		Loans	Repayment	Received	Provided	Income	Paid
Associates	Gyeonggi Railway	₩ 21,012	₩ -	₩ -	₩ -	₩ -	₩ -
	KDDI Korea Corporation	-	-	-	-	23	-
	Daesan Green Energy Co. Ltd.	-	-	-	5,100	-	-
	Geaenzymes	-	-	-	-	-	-
	KIAMCO Gyeonggi Railway Investment Private Equity Investment Trust	-	-	-	3,273	-	-
	Incheon Furecell Co.,Ltd.	-	-	-	4,700	-	-
	Potenit Co., Ltd	-	-	-	5,333	-	-
	Pospower Co., Ltd.	-	-	-	43,568	-	-
	Daejeong Marine Wind Power Plant Co., Ltd.	-	-	-	2,827	-	-
	Dongbuk LRT	-	-	-	1,694	-	-
	New Wave 5th Initial Enterprise Professional Investment Union	-	-	-	(522)	-	-
	KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership	-	-	-	(1,008)	-	-
	KoFC-Neoplux R&D Biz Creation 2013-1 Investment Partnership	-	-	-	(1,653)	-	-
	Future Creation Neoplux Investment Partnership	-	-	-	(2,359)	-	-
	Neoplux technology valuation investment combination	-	-	-	2,700	-	-
	Neoplux Market Frontier Secondary Fund	-	-	-	2,557	1,650	-
	Gyeonggi - Neoplux Superman Investment Fund	-	-	-	918	-	-
	Shinhan - Neoplux Energy New Industry Investment Association	-	-	-	1,000	-	-
	KTC&P Growth Champ 2011-2 Private Equity Fund	-	-	-	(1,306)	7	-
	Neoplux No.3 Private Equity Fund	-	-	-	7,030	-	-
Joint ventures	Tianjin Lovol Doosan Engine Co. Ltd.	-	-	-	12,727	-	-
	Sichuan Kelun-Doosan Biotechnology Co., Ltd.	-	-	-	-	1,531	-
Other related parties	Doosan Yonkang Foundation	-	-	-	-	-	15,456
	Dongdaemun Future Foundation	-	-	-	-	-	846
		₩ 21,012	₩ -	₩ -	₩ 86,579	₩ 3,211	₩ 16,302

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35. Related party transactions (cont'd)

	Related parties	2017					
		Loan		Contribution		Dividend	
		Loans	Repayment	Received	Provided	Income	Paid
Associates	KDDI Korea	₩ -	₩ -	₩ -	₩ -	₩ 81	₩ -
	Prestolite Asia	-	-	-	-	47	-
	KoFC-Neoplux R & D Biz Creation 2013-1 Investment Cooperative	-	-	950	399	-	-
	Neoplux technology valuation investment combination	-	-	2,700	270	680	-
	Neoplux Market Frontier Secondary Fund	-	-	3,700	114	92	-
	BNW&P 1st Private Equity Investment Company	-	-	-	227	183	-
	New Wave No. 4 Investment Fund	-	-	-	315	262	-
	Neoplux First Private Equity Investment Company	-	-	-	3,708	2,199	-
	Gyeonggi - Neoplux Superman Investment Fund	-	-	810	-	-	-
	Gyeonggi Railway Co., Ltd.	9,350	35,000	-	1,650	-	-
	New Wave 5th Initial Enterprise Professional Investment Union	-	-	-	750	149	-
	Shinhan - Neoplux Energy New Industry Investment Association	-	-	500	-	-	-
	KoFC-Neoplux Pioneer Champ 2010-7 Investment Partnership	-	-	-	1,166	-	-
	2010 KIF-Neoplux IT Professional Investment Association	-	-	-	2,284	-	-
	Future Creation Neo plux Investment Partnership	-	-	-	1,272	-	-
	KTC&P Growth Champ 2011-2 Private Equity Fund	-	-	-	2,225	-	-
	New Bundang Line Co., Ltd.	4,715	-	-	-	-	-
Joint ventures	Doosan Infracore Liaoning Machinery Sales Co., Ltd	-	-	-	363	-	-
	Sichuan Kelun- Doosan Biotechnology Co., Ltd.	-	-	-	-	1,285	-
Other related parties	Doosan Yonkang Foundation	-	-	-	-	-	8,781
	Dongdaemun Future Foundation	-	-	-	-	-	479
		₩ 14,065	₩ 35,000	₩ 8,660	₩ 14,743	₩ 4,978	₩ 9,260

35. Related party transactions (cont'd)

The Group provides guarantees of payment and others for related parties as of December 31, 2018 (See Notes 33 and 34).

Compensation to key management personnel of the Group for the years ended December 31, 2018 and 2017 is as follows (Korean won in millions):

	2018		2017
Employee benefits	₩ 83,221	₩	88,725
Pension costs	5,760		6,445
	<u>₩ 88,981</u>	₩	<u>95,170</u>

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36. Cash generated from (used in) operations

The adjustments and changes in cash generated from operating activities in the consolidated statements of cash flows for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018		2017
Adjustments for:			
(Reversal of) bad debt expenses	₩ 69,446	₩	(5,065)
Cost of sales (write-down of inventories)	(6,036)		(12,187)
Depreciation	400,648		404,942
Amortization	222,219		225,887
Pension costs	138,151		145,380
Share-based payment	-		109
Interest income	(47,913)		(53,786)
Dividend income	(2,539)		(2,395)
Gain on foreign currency translation	(82,704)		(423,664)
Gain on valuation of derivatives	(99,011)		(182,935)
Gain on valuation of firm commitment	(83,889)		(58,957)
Financial guarantee income	(545)		(127)
Interest expense	594,288		569,143
Loss on foreign currency translation	131,191		275,053
Loss on valuation of derivatives	108,152		71,259
Loss on valuation of firm commitment	20,901		323,496
Loss on repayment of bonds	7,606		24,316
Financial guarantee expenses	70,331		6,401
Increase in provisions	73,607		329,912
Gain on disposal of short-term investment securities	(1,277)		(9,389)
Gain on disposal of long-term investment securities	(1,556)		(45,188)
Gain on valuation of short-term financial assets	(10,232)		-
Gain on disposal of property, plant and equipment	(2,248)		(4,889)
Gain on disposal of intangible assets	(1,021)		(947)
Gain on disposal of investment properties	-		(333)
Gain on disposal of assets held for sale	-		(2,183)
Gain on disposal of business	-		(2,454)
Gain on valuation of investment properties	(4,330)		(47,618)
Reversal of impairment loss on property, plant and equipment	(18)		(18,515)
Reversal of impairment loss on intangible assets	(19)		(2,690)
Gain on transfer of business	(1,235)		(1,003)
Loss on disposal of trade receivables	23,257		23,180
Loss on disposal of long-term investment securities	4		1
Impairment loss (reversal) on long-term investment securities	(1,635)		16,060
Loss on disposal of investments in subsidiaries	-		11,959
Loss on disposal of property, plant and equipment	11,316		10,752
Loss on disposal of intangible assets	291		388
Loss on disposal of investment properties	1,273		3,568
Loss on valuation of investment properties	3,726		21,850
Impairment loss on property, plant and equipment	4,873		6,746
Impairment loss on intangible assets	57,362		26,814
Impairment loss on non-current assets held for sale	-		183
Other bad debt expenses	346,567		173,330
Share of loss of associates and joint ventures accounted for using the equity method	27,918		14,300
Income tax expenses	276,917		272,901
Other expenses	50,740		71,983
	<u>₩ 2,294,576</u>	<u>₩</u>	<u>2,155,588</u>

36. Cash generated from (used in) operations

	2018		2017
Changes in operating assets and liabilities:			
Increase in trade receivables	₩ (273,788)	₩	(243,156)
Increase in other receivables	(251,464)		(78,012)
Decrease (increase) in due from customers for contract work	17,472		(53,402)
Increase in derivative assets (liabilities)	(48,734)		(129,949)
Increase in inventories	(387,368)		(339,995)
Increase in other current assets	(12,772)		(1,813)
Increase in long-term other receivables	(19,447)		(1,032)
Decrease (increase) in other non-current assets	49,908		(50,376)
Increase in trade payables	283,466		675,827
Increase (decrease) in other payables	57,946		(38,751)
Increase (decrease) in due to customers for contract work	389,562		(53,252)
Decrease in provisions	(62,047)		(288,328)
Increase (decrease) in other current liabilities	56,620		(150,080)
Increase (decrease) in long-term other payables	43,173		(98,296)
Increase in other non-current liabilities	42,685		86,110
Retirement benefits paid	(69,272)		(43,656)
Increase in plan assets	(91,388)		(171,024)
Changes in other assets and liabilities related to operating activities	(24,211)		24,887
	<u>₩ (299,659)</u>	<u>₩</u>	<u>(954,298)</u>

Significant non-cash transactions for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018		2017
Reclassification of construction in progress to property, plant and equipment and others	₩ 111,763	₩	251,567

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36. Cash generated from (used in) operations

Details of changes in liabilities arising from financing activities for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018						
	Beginning balance	Financing activities	Business combination /disposal	Exchange rate change	Current portion of long-term borrowings	Others	Ending balance
Short-term borrowings	₩ 4,349,943	₩ (1,124,794)	₩ (65,738)	₩ 1,674	₩ 1,214	₩ 25,264	₩ 3,187,563
Asset-backed loans	795,104	180,531	-	-	(80,000)	(155,475)	740,160
Current portion of long-term asset-backed loans	-	-	-	-	80,000	88,033	168,033
Bonds	2,878,122	1,074,654	-	51,036	(1,622,030)	121,026	2,502,808
Current portion of bonds	1,325,199	(1,343,059)	(219,240)	3,879	1,622,030	20,348	1,409,157
Current portion of convertible bonds	6,770	-	-	-	-	(6,770)	-
Long-term borrowings	2,270,385	2,393,450	-	36,370	(992,946)	(39,659)	3,667,600
Current portion of long-term borrowings	999,491	(1,101,492)	(30,000)	8,708	991,732	242	868,681
Finance lease liabilities	17,220	(11,503)	-	-	-	6,730	12,447
	<u>₩ 12,642,234</u>	<u>₩ 67,787</u>	<u>₩ (314,978)</u>	<u>₩ 101,667</u>	<u>₩ -</u>	<u>₩ 59,739</u>	<u>₩ 12,556,449</u>

	2017						
	Beginning balance	Financing activities	Business combination /disposal	Exchange rate change	Current portion of long-term borrowings	Others	Ending balance
Short-term borrowings	₩ 3,862,706	₩ 550,076	₩ (14,105)	₩ (90,974)	₩ -	₩ 42,240	₩ 4,349,943
Asset-backed loans	679,963	105,982	-	-	-	9,159	795,104
Bonds	2,087,400	2,297,148	-	(133,495)	(1,284,314)	(88,617)	2,878,122
Current portion of bonds	1,379,038	(1,339,400)	-	(12,290)	1,284,314	13,537	1,325,199
Current portion of convertible bonds	156,106	(157,322)	-	-	-	7,986	6,770
Long-term borrowings	2,887,177	861,226	-	(205,986)	(1,238,802)	(33,230)	2,270,385
Current portion of long-term borrowings	1,178,915	(1,381,703)	(593)	(35,930)	1,238,802	-	999,491
Finance lease liabilities	15,586	(9,610)	-	-	-	11,244	17,220
	<u>₩ 12,246,891</u>	<u>₩ 926,397</u>	<u>₩ (14,698)</u>	<u>₩ (478,675)</u>	<u>₩ -</u>	<u>₩ (37,681)</u>	<u>₩ 12,642,234</u>

37. Discontinued operations

Details of discontinued operations as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018	
	DE business unit(*1)	HRSG business unit(*2)
Discontinued operations		
Main business	Manufacturing of internal combustion engine	Production and installation of power equipment
Date of disposal	2018.06.08	-
Method	Transfer of business	Transfer of business
Acquiring company	Socius-Well to Sea Investment	-
Disposal consideration	₩76.5 billion	-

	2017	
	DI, Machine-tools business unit	HRSG business unit(*2)
Discontinued operations		
Main business		Production and installation of power equipment
Date of disposal	-	-
Method	-	Transfer of business
Acquiring company	-	-
Disposal consideration	-	-

(*1) The Group sold the business unit of its subsidiary, DE. Accordingly, DE business unit was classified as a discontinued operation, and the comparative consolidated financial statements in respect of the prior period were restated.

(*2) During the prior period, the Group completed the sale of its HRSG business unit owned by the Group's subsidiaries, DEC and Doosan Heavy Industries Vietnam Co., Ltd.

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37. Discontinued operations (cont'd)

Details of loss from discontinued operations as of December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018		
	DE business unit	HRSG	Total
Sales	₩ 178,362	₩ 330	₩ 178,692
Cost of sales	188,147	242	188,389
Selling and administrative expenses	14,610	13,206	27,816
Operating loss	(24,395)	(13,118)	(37,513)
Non-operating loss	(7,369)	(4,855)	(12,224)
Loss before income tax expenses	(31,763)	(17,973)	(49,737)
Income tax benefit	(2,095)	-	(2,095)
Loss on discontinued operations	(29,668)	(17,973)	(47,641)
Loss on disposal of discontinued operations	(24,411)	-	(24,411)
Tax expenses related to disposal of discontinued operations	20,157	-	20,157
	(44,568)	-	(44,568)
Loss from discontinued operations	₩ (74,236)	₩ (17,973)	₩ (92,209)
Loss attributable to:			
Equity holders of the parent	(20,926)	(4,173)	(25,099)
Non-controlling interests	(53,310)	(13,800)	(67,110)

	2017		
	DE business unit	HRSG	Total
Sales	₩ 671,762	₩ 6,361	₩ 678,123
Cost of sales	622,058	3,960	626,018
Selling and administrative expenses	37,404	33,271	70,675
Operating profit (loss)	12,300	(30,870)	(18,570)
Non-operating profit (loss)	(26,963)	6,001	(20,962)
Loss before income tax expenses	(14,663)	(24,869)	(39,532)
Income tax expenses	5,080	-	5,080
Loss on discontinued operations	(19,743)	(24,869)	(44,612)
Profit on disposal of discontinued operations	-	2,454	2,454
Tax expenses related to disposal of discontinued operations	23,475	-	23,475
Loss from discontinued operations	₩ (43,218)	₩ (22,415)	₩ (65,633)
Loss attributable to:			
Equity holders of the parent	(11,833)	(6,595)	(18,428)
Non-controlling interests	(31,385)	(15,820)	(47,205)

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37. Discontinued operations (cont'd)

Cash flows from discontinued operations for the years ended December 31, 2018 and 2017 are as follows (Korean won in millions):

	2018		
	DE business unit	HRSG	Total
Net cash outflows from operating activities	₩ (22,536)	₩ (13,980)	₩ (36,516)
Net cash inflows from investing activities(*1)	4,681	-	4,681
Net cash inflows (outflows) from financing activities	(8,700)	13,980	5,280
Effect of exchange rate changes	713	-	713
Net decrease in cash flows from discontinued operations	₩ (25,842)	₩ -	₩ (25,842)
	2017		
	DE business unit	HRSG	Total
Net cash outflows from operating activities	₩ (68,464)	₩ (8,754)	₩ (77,218)
Net cash inflows (outflows) from investing activities (*1)	10,532	(1,442)	9,090
Net cash inflows from financing activities	78,372	10,196	88,568
Effect of exchange rate changes	37	-	37
Net increase in cash flows from discontinued operations	₩ 20,477	₩ -	₩ 20,477

(*1) Net cash flows of investing activities include cash flows related to the disposal of discontinued operations.

37. Events after the reporting period

DHC, a subsidiary, has decided to increase 85,000,000 registered ordinary shares and 9,363,103 registered redeemable convertible preferred shares at the Board of Directors' meeting held on February 21, 2019, and details are as follows (Korean won in billion, except for share data):

	Ordinary shares	Redeemable convertible preferred shares
Expected amount of capital increase	₩ 543.2	₩ 65.3
Shares to be issued	85,000,000	9,363,103
Issue price per share (Korean won)	₩ 6,390	₩ 6,970
Method of issuance of new shares	General public offering method of actual shares after allocation to shareholders	Shareholder allocation method

DEC, a subsidiary, has decided to increase 334,661,354 registered ordinary shares at its Board of Directors' meeting held on February 21, 2019, and details are as follows (Korean won in billion, except for share data):

	Details
Amount of capital increase participation	₩ 420
Number of ordinary shares acquired	334,661,354
Issue price per share (Korean won)	₩ 1,255
Method of issuance of new shares	Shareholder allocation method