1. General

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, 2019, is ₩123,738 million, including ₩24,447 million of preferred shares.

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

	Number of ordinary shares owned	Ownership percentage (%)
Related parties	7,805,623	47.24
Treasury stocks	3,000,866	18.16
Others	5,717,346	34.60
	16,523,835	100.00

Meanwhile, 35.9% of preferred shares are owned by the largest shareholder and others and 51.6% of preferred shares are owned by others.

2. Summary of significant accounting policies

2.1 Basis of preparation

The Company prepares statutory financial statements in Korean in accordance with KIFRS enacted by *the Act on External Audit of Stock Companies*. The Company’s financial statements are separate financial statements prepared in accordance with KIFRS 1027 *Separate Financial Statements*, in which the controlling company, investors of associates or participants of joint control company have stated investment assets as accounting based on direct equity investment, not based on the reported performance and net assets of the investee. The accompanying separate 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 separate financial statements are described below. Significant accounting policies applied in the preparation of the separate financial statements for the year ended December 31, 2019 are the same as those adopted in the preparation of the separate financial statements for the year ended December 31, 2018, except for the effects related to the adoption of the standards or interpretations described below.

The accompanying separate 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.

2.2 Changes of accounting policies and disclosure

2.2.1 New and amended standards and interpretations

The Company applied KIFRS 1116 *Leases*. The nature and effect of the changes as a result of adoption of these new accounting standards are described below.

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

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

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

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

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

The effects of the initial application of KIFRS 1116 on the consolidated statements of financial position as of 1 January 2019 is as follows (Korean won in millions).

		Increase(decrease)
Assets		
Tangible assets	₩	12,216
Right-of-use assets		12,216
Buildings and Structures		9,270
Other tangible assets		2,946
Total assets	₩	12,216
Liabilities		
Other Liabilities (*1)	₩	(5,253)
Current lease liabilities		10,934
Long-term other liabilities (*1)		(7,195)
Non-current lease liabilities		13,730
Total liabilities	₩	12,216
Equity		
Retained-earnings	₩	-
Total equity	₩	-

(*1) Decreases due to account reclassification to lease liabilities.

The Company has lease contracts for various items of buildings, vehicle transportations and other office equipments. Before the adoption of KIFRS 1116, the Company classified each of its leases (as lessee) at the inception date as either a finance lease or an operating lease. Leases that are transferred most of the risks and rewards of ownership of the lease assets are classified as finance leases and other leases as operating lease. In the case of a finance lease, small amounts of the present value of the minimum lease payment measured at the lease agreement date and the fair value of the lease assets were recognized as financial lease assets and financial lease liabilities at the lease commencement date, respectively. The minimum lease fee paid per annum was divided into financial cost and lease liability repayment amount. In the operating lease, the lease fee was recognized as an expense in the income statement on a flat basis over the lease term.

Upon adoption of KIFRS 1116, the Company applied a single recognition and measurement approach for all leases for which it is the lessee, except for short-term leases and leases of low-value assets. For accounting policies beginning on 1 January 2019, see Note 2.8 Leases. The standard provides specific transition requirements and practical expedients, which have been applied by the Company.

▷ Lease previously classified as finance leases

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

▷ Leases previously accounted for as operating leases

The Company recognized right-of-use assets and lease liabilities for those leases previously classified as operating leases, except for short-term leases and leases of low-value assets. The right-of-use assets for most leases were recognized based on the carrying amount as if the standard had always been applied, apart from the use of incremental borrowing rate at the date of initial application. In some leases, the right-of-use assets were recognized based on the amount equal to the lease liabilities, adjusted for any related prepaid and accrued lease payments previously recognized. Lease liabilities were recognized based on the present value of the remaining lease payments, discounted using the incremental borrowing rate at the date of initial application.

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

The Company has also applied the available practical expedients wherein it:

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

The lease liabilities as at 1 January 2019 can be reconciled to the operating lease commitments as of 31 December 2018, as follows (Korean won in millions).

		Amount
Operating lease agreement as of December 31, 2018	₩	15,787
Less: Contingency related to short-term leases and leases of low-value assets		(2,844)
		12,943
Weighted average incremental borrowing rate as at 1 January 2019		3.67%~5.26%
Discounted operating leases (excluding short-term leases and leases of low- value assets) as at 1 January 2019		12,216
Add: Commitments relating to leases previously classified as finance leases		12,448
Lease liabilities as at 1 January 2019	₩	24,664

Amendments to KIFRS 2123 *Uncertainty over Income Tax Treatments*
The Interpretation addresses the accounting for income taxes when tax treatments involve uncertainty that affects the application of KIFRS 1012 Income Taxes. It does not apply to taxes or levies outside the scope of KIFRS 1012, nor does it specifically include requirements relating to interest and penalties associated with uncertain tax treatments. The Interpretation specifically addresses the following:

- Whether tax treatments should be considered collectively
- Assumptions for taxation authorities' examinations
- Determination of taxable profit (tax loss), tax bases, unused tax losses, unused tax credits and tax rates
- Effect of changes in facts and circumstances

The Company determines whether to consider each uncertain tax treatment separately or together with one or more other uncertain tax treatments and uses the approach that better predicts the resolution of the uncertainty.

The Company applies significant judgement in identifying uncertainties over income tax treatments. Since the Company operates in a complex multinational environment, it assessed whether the Interpretation had an impact on its consolidated financial statements.

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

Amendments to KIFRS 1109 *Financial Instruments: Prepayment Features with Negative Compensation*
Under KIFRS 1109, a debt instrument can be measured at amortized cost or at fair value through other comprehensive income, provided that the contractual cash flows are 'solely payments of principal and interest on the principal amount outstanding' (the SPPI criterion) and the instrument is held within the appropriate business model for that classification. The amendments to KIFRS 1109 clarify that a financial asset passes the SPPI criterion regardless of an event or circumstance that causes the early termination of the contract and irrespective of which party pays or receives reasonable compensation for the early termination of the contract.

These amendments had no impact on the financial statements of the Company.

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

Amendments to KIFRS 1019 *Employee Benefits: Plan Amendment, Curtailment or Settlement*
The amendments to KIFRS 1019 address the accounting when a plan amendment, curtailment or settlement occurs during a reporting period. The amendments specify that when a plan amendment, curtailment or settlement occurs during the annual reporting period, an entity is required to determine the current service cost for the remainder of the period after the plan amendment, curtailment or settlement, using the actuarial assumptions used to remeasure the net defined benefit liability (asset) reflecting the benefits offered under the plan and the plan assets after that event. An entity is also required to determine the net interest for the remainder of the period after the plan amendment, curtailment or settlement using the net defined benefit liability (asset) reflecting the benefits offered under the plan and the plan assets after that event, and the discount rate used to remeasure that net defined benefit liability (asset). These amendments had no impact on the consolidated financial statements of the Company.

Amendments to KIFRS 1028 *Investment in Associates and Joint Ventures*: Long-term Investment in Associates and Joint Ventures
The amendments clarify that the entity should apply KIFRS 1109 to financial instruments that do not apply the equity method to associates or joint ventures and that these instruments include, in substance, long-term investment interests that form part of the entity's net investment in associates or joint ventures. This means that the expected credit loss model in KIFRS 1109 applies to such long-term investments. The amendments also clarified that in applying KIFRS 1109 an entity does not consider losses in associates or joint ventures or losses in net investments resulting from the application of IFRS 1028 *Investment in Associates and Joint Ventures*. An entity shall apply those amendments retrospectively for annual periods beginning on or after 1 January 2019. There is no significant effect on the financial statements by those amendments.

Annual Improvements 2015-2017 Cycle

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 had no impact on the financial statements of the Company as there is no transaction where joint control is obtained.

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

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 it originally recognized those past transactions or events. An entity applies the amendments for annual reporting periods beginning on or after January 1, 2019, with early application permitted. When the 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. These amendments had no impact on the financial statements of the Company.

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

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. The entity applies the 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. These amendments had no impact on the financial statements of the Company.

2.2.2 Standards issued but not yet effective

The details of the Standard and Interpretation of International Financial Reporting Standards and Interpretations issued as of the date of approval of the issue of the Company's financial statements but not yet adopted by the Company are as follows:

Amendments to KIFRS 1103 *Business Combinations: Definition of a business*
In October 2018, the IASB issued amendments to the definition of a business in KIFRS 1103 *Business Combinations* to help entities determine whether an acquired set of activities and assets is a business or not. They clarify the minimum requirements for a business, remove the assessment of whether market participants are capable of replacing any missing elements, add guidance to help entities assess whether an acquired process is substantive, narrow the definitions of a business and of outputs, and introduce an optional fair value concentration test. New illustrative examples were provided along with the amendments. Since the amendments apply prospectively to transactions or other events that occur on or after the date of first application, the Company will not be affected by these amendments on the date of transition.

Amendments to KIFRS 1001 and KIFRS 1008: *Definition of Material*
In October 2018, the IASB issued amendments to KIFRS *1001 Presentation of Financial Statements* and KIFRS 1008 *Accounting Policies, Changes in Accounting Estimates and Errors* to align the definition of 'material' across the standards and to clarify certain aspects of the definition. The new definition states that, 'Information is material if omitting, misstating or obscuring it could reasonably be expected to influence decisions that the primary users of general purpose financial statements make on the basis of those financial statements, which provide financial information about a specific reporting entity.' The amendments to the definition of material is not expected to have a significant impact on the Company's consolidated financial statements.

2.3 Investments in subsidiaries, joint ventures and associates

The Company has elected to use book value under previous generally accepted accounting principles as deemed cost for subsidiaries, joint ventures and associates at the date of transition to KIFRS. After the date of transition, subsidiaries, joint ventures and associates are measured at cost.

The Company determines whether an impairment loss is recognized in respect of investments in associates, joint ventures and associates in accordance with KIFRS 1036 *Financial Instruments: Recognition and Measurement*. If there is an indication of impairment, the total carrying amount of the subsidiaries, joint ventures and associates (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 the associates, joint ventures and associates. The reversal of impairment loss is recognized in accordance with KIFRS 1036 as the recoverable amount of the investment assets increases subsequently.

2.4 Operating segments

The Company's operating segments are disclosed in a manner consistent with the business segment reporting provided to the chief operating decision-maker, and the information is disclosed in Note 25 in accordance with KIFRS 1108 *Operating Segments*.

2.5 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.

2.6 Non-current assets held for sale and Discontinued operation

2.6.1 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.

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.

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

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

2.6.2 Assets scheduled for distribution to owners (or disposal groups)

The Company also applied the accounting policies related to the types, presentation and measurement of non-current assets (or disposal groups) classified as held for sale to non-current assets (or disposal entities) that are classified as scheduled for distribution to owners who exercise their qualifications as owners.

In addition, if all owners with the same kind of equity instruments are treated equally in distributing these non-cash assets to owners who exercise their qualifications as owners free of charge and the assets are ultimately not controlled by the same party or parties before and after the distribution, we recognize any dividend payable at the time of declaring the distribution (when approved in the shareholders' meeting). The dividend payable is measured at the fair value of the non-cash assets to be distributed at the end of each reporting period and at the settlement date, and the change in the carrying amount of the dividend payable is recognized in other capital items in the financial statement as an adjustment to the amount of the distribution.

In settling the dividend payable, the Company shall recognize any difference between the carrying amount of the non-cash assets distributed and the carrying amount of the dividend payable as profit or loss.

2.6.3 Discontinued operation

Disposal entity is a discontinued operation if:

- It is a separate main business line or business area.
- It is a part of a single plan to dispose of separate major business lines or business areas.
- It is a subsidiary acquired solely for sale.

2.6.3 Discontinued operation (cont'd)

The Company excludes the profit or loss from the results of the continuing operation and displays the profit or loss as a single amount in the income statement. Additional details of discontinued operations are disclosed in Note 37.

2.7 Revenue from contracts with customers

2.7.1 Identifying performance obligations

The Company's major businesses include manufacturing of copperplate, hydraulic equipment, forklift truck, and fuel cell and service such as IT system development/operating.

2.7.2 Variable consideration

If the consideration in a contract includes a variable amount, the Company estimates the amount of consideration to which it will be entitled in exchange for transferring the goods to the customer. The variable consideration is estimated at contract inception and constrained until it is highly probable that a significant revenue reversal in the amount of cumulative revenue recognized will not occur when the associated uncertainty with the variable consideration is subsequently resolved.

2.7.3 Allocation of the transaction price

The Company allocates the transaction price on the basis of the stand-alone selling price to the various performance obligations identified in a single contract. The Company 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.

2.8 Lease

The Company determines whether the contract itself is a lease or the contract contains lease at the time of agreement, considering whether the contract exchange the control of the identified asset for a certain period of time with price of the contract.

The Company as a lessee

The Company applies a single method on every lease except short-term leases and leases of low-value assets. The Company recognizes lease liabilities that represent the obligation to pay the leases and right-to-use assets that represents right-to-use.

2.8.1 Right-of-use assets

The Company recognizes right-of-use assets on lease commencement date (the date when the underlying asset is usable). Right-of-use asset is measured as cost, and the Company applies cost model on subsequent measurement. To apply cost model, the Company deducts accumulated depreciation and accumulated loss of impairment, and recognizes adjustments base on remeasurement of lease liabilities. The cost of the right-of-use assets includes the amount of the perceived lease liabilities, the initial direct cost, and the lease fee paid before or after the lease commencement date with received lease incentive deducted. The right-of-use assets are depreciated on a flat basis over a short period of time between the lease period and the estimated useful life of the assets.

If the ownership of the underlying asset is transferred to the Company at the end of the lease term or if the Company is expected to exercise the purchase option at the cost of the right-of-use assets, depreciation is calculated using the estimated useful life of the underlying asset of the asset.

The right-of-use assets are also subject to damage and the relevant accounting policy is described in Note 2.18.

2.8.2 Lease liabilities

On lease commencement date, the Company recognizes lease liabilities at the present value of the lease to be paid over the lease period. The lease fee consists of a fixed fee (including a substantial fixed fee, and the lease incentive to receive is deducted), a variable lease payment that varies according to the index or rate, and an amount expected to be paid according to the residual value guarantee. Lease fee also includes the amount to be borne to terminate the lease if the Company is fairly certain to exercise buying options, considering exercise cost of the buying options and termination options to lease term.

A variable lease that does not varies according to the index of rate (unless not from the production of inventories) is recognized during the period of time when an event or condition that causes a lease happens.

When the Company evaluates the present value of lease fee, it uses the incremental borrowing interest rate of the lease commencement date because it cannot easily calculate the internal rate of return of the lease. After the lease commencement date, the amount of lease liabilities increase to reflect interest and decreases to reflect the lease fee paid. In addition, the book values of the lease liabilities are remeasured if there is a change in the lease term, a change in the lease fee (for example, a change in the future lease due to a change in the index or rate used to calculate the lease fee), or a change in the option assessment to buy the underlying asset.

2.8.3 Short-term lease and lease of low-value assets

The Company applies exemption rule for the recognition of short-term lease, which has a lease-term less than 12 months from the lease commencement date and do not include purchase options. In addition, the Company applies exemption rule for the recognition of leases of low-value assets on office equipment, etc., which is considered as low value assets. Lease fee of Short-term lease and leases of low-value of assets are recognized as cost based on straight-line method through the lease term.

The Company as lessor

The Company classifies leases that do not transfer most of the risks and compensation for the ownership of underlying assets as operating leases. Lease revenues are recognized based on straight-line method through the lease term and it can be classified as sales in the consolidated statements of income depending on the nature of the business.

2.9 Foreign currencies

The separate financial statements of the Company are presented in the currency of the primary economic environment in which the entity operates (its functional currency). For the purpose of the separate financial statements, the results and financial position of the Company are expressed in Korean won, which is the functional currency of the entity and the presentation currency for the separate 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 2.23 below for hedging accounting policies)
- Exchange differences on monetary items forming part of the net investment in the foreign operation.

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 Company 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 Company determines the transaction date for each payment or receipt of advance consideration.

2.10 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.

2.11 Retirement benefit costs and termination benefits

The Company 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 separate statement 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.

The Company 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.

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

The retirement benefit liabilities recognized in the separate statement of financial position represents the actual deficit or surplus in the Company'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.

2.12 Share-based payment transactions of the Company

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 Company's estimate of equity instruments that will eventually vest. At the end of each reporting period, the Company 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.

2.13 Taxation

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

2.13.1 Current tax

The tax currently payable is based on taxable profit for the year. Taxable profit differs from profit as reported in the separate statement 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 Company's liability for current tax is calculated using tax rates that have been enacted or substantively enacted by the end of the reporting period.

2.13.2 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 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.

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 Company expects, at the end of the reporting period, to recover or settle the carrying amount of its assets and liabilities.

2.13.3 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.

2.14 Government grants

Government grants are not recognized until there is reasonable assurance that the Company 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 separate statement 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 Company 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 Company with no future-related costs are recognized in profit or loss in the period in which they become receivable.

2.15 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 Company and the cost of an asset can be measured reliably. Routine maintenance and repairs are expensed as incurred.

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

	Estimated useful lives (in years)
Buildings	5–50
Structures	2–30
Machinery	2–15
Other property, plant and equipment	2–10

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 Company 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.

2.16 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 Company 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.

2.17 Intangible assets

2.17.1 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.

2.17.2 Internally generated intangible assets

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 Company 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.

2.17.3 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.

2.17.4 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.

2.17.5 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:

	Estimated useful lives (in years)
Development costs	5–10
Industrial rights	5–10
Other intangible assets	4–15

2.18 Impairment of tangible and intangible assets other than goodwill

At the end of each reporting period, the Company 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 Company 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.

2.19 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.

2.20 Provisions

Provisions are recognized when the Company has a present obligation (legal or constructive) as a result of a past event, it is probable that the Company 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.

2.21 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.

2.21.1 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 Company’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 Company’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 Company commits to purchase or sell the asset.

2.21.1 Financial assets (cont'd)

[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 Company 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 Company measures debt instruments at fair value through OCI if both of the following conditions are met:

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

For debt instruments at fair value through OCI, interest income, foreign exchange revaluation and impairment losses or reversals are recognized in the statements of income 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 Company 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 income when the right of payment has been established, except when the Company 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 Company can elect to classify irrevocably its non-listed equity investments under this category.

2.21.1 Financial assets (cont'd)

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.

[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 Company's separate statements of financial position) when:

- The rights to receive cash flows from the asset have expired, or
- The Company 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 Company has transferred substantially all the risks and rewards of the asset, or (b) the Company has neither transferred nor retained substantially all the risks and rewards of the asset, but has transferred control of the asset

When the Company 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 Company continues to recognize the transferred asset to the extent of its continuing involvement. In that case, the Company 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 Company 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 Company could be required to repay.

2.21.1 Financial assets (cont'd)

[Impairment of financial assets]

The Company 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 Company 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 Company applies a simplified approach in calculating ECLs. Therefore, the Company does not track changes in credit risk, but instead recognizes a loss allowance based on lifetime ECLs at each reporting date. The Company 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.

2.21.2 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 Company 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.

2.21.2 Financial liabilities (cont'd)

[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.

2.21.3 Offsetting of financial instruments

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

2.21.4 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 of 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

2.22 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 Company are recognized at the proceeds received, net of direct issue costs.

Repurchase of the Company'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 Company's own equity instruments.

2.23 Derivative financial instruments and hedge accounting

The Company 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 Company formally designates and documents the hedge relationship to which the Company wishes to apply hedge accounting and the risk management objective and strategy for undertaking the hedge.

The documentation includes identification of the hedging instrument, the hedged item, the nature of the risk being hedged and how the Company 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 Company actually hedges and the quantity of the hedging instrument that the Company 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 income. 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 income.

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.

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

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 income. 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 Company 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.

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 income. 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.

2.24 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 Company 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 separate 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 entireties, which are described in Note 10.

2.25 Approval of separate financial statements

The separate financial statements of the Company were approved by the Board of Directors on March 5, 2020 and will be finalized at the annual general meeting of shareholders on March 30, 2020.

3. Significant accounting judgements and key sources of estimation uncertainties

In the application of the Company'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 Company'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 Company'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 Company'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 14, the Company 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 Company'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 Leases – Estimating the incremental borrowing rate

When the Company cannot readily determine the interest rate implicit in the lease, it uses its incremental borrowing rate (IBR) to measure lease liabilities. The IBR is the rate of interest that the Company would have to pay to borrow over a similar term, and with a similar security, the funds necessary to obtain an asset of a similar value to the right-of-use asset in a similar economic environment. The IBR therefore reflects what the Company 'would have to pay', which requires estimation when no observable rates are available (such as for subsidiaries that do not enter into financing transactions) or when they need to be adjusted to reflect the terms and conditions of the lease (for example, when leases are not in the subsidiary's functional currency).

The Company estimates the IBR using observable inputs (such as market interest rates) when available and is required to make certain entity-specific estimates (such as the Company's stand-alone credit rating).

3.9 Fair value

When the fair values of financial instruments recorded in the separate 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.

4. Financial risk management

The Company 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 Company. 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 Company enters into derivative contracts to hedge against certain risks.

4.1 Market risk

4.1.1 Foreign currency risk

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

The Company 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 Company's monetary assets and liabilities denominated in foreign currencies other than the Company's functional currency as of December 31, 2019 and 2018 is as follows (Korean won in millions):

	December 31, 2019					
	USD	EUR	JPY	GBP	Others	Total
Assets	₩ 281,536	₩ 44,035	₩ 4,392	₩ 83,385	₩ 28,164	₩ 441,512
Liabilities	(155,256)	(2,215)	(4,748)	(2,025)	(1,185)	(165,429)
	₩ 126,280	₩ 41,820	₩ (356)	₩ 81,360	₩ 26,979	₩ 276,083

4.1.1 Foreign currency risk (cont'd)

	December 31, 2018											
	USD		EUR		JPY		GBP		Others		Total	
Assets	₩	214,379	₩	33,656	₩	889	₩	61,885	₩	32,738	₩	343,547
Liabilities		(153,800)		(3,911)		(6,364)		(336)		(2,115)		(166,526)
	₩	60,579	₩	29,745	₩	(5,475)	₩	61,549	₩	30,623	₩	177,021

The table below summarizes the impact of 10% increase/decrease of currency exchange rates on profit before income tax expenses for the year.

	Impact on profit before income tax expenses			
	2019		2018	
10% Increase	₩	27,608	₩	17,702
10% Decrease		(27,608)		(17,702)

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

4.1.2 Interest rate risk

The Company'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 Company is exposed to interest rate risk mainly due to its borrowings 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 Company 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 Company 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 Company's financial assets and liabilities with floating interest rates exposed to interest rate risk as of December 31, 2019 and 2018 is as follows (Korean won in millions):

	December 31, 2019		December 31, 2018	
Financial assets	₩	110,585	₩	117,119
Financial liabilities		(159,629)		(181,574)
	₩	(49,044)	₩	(64,455)

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

	Impact on profit before income tax expenses			
	2019		2018	
Increase	₩	(490)	₩	(645)
Decrease		490		645

4.1.3 Price risk

The Company is exposed to equity price risks arising from its listed equity investments. The Company periodically measures the risk as the fair value or future cash flows of equity investments may fluctuate due to the changes in market prices. Important investments in the Company's portfolio are individually managed, and acquisition and disposal are approved by the Board of Directors.
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4.2 Credit risk

Credit risk refers to risk of financial losses to the Company when the counterparty defaults on the obligations of the contract. Credit risk arises from financial assets at fair value through OCI and financial assets at fair value through profit or loss which are not equity securities, deposits in financial institution, financial derivatives and guarantee limit, and others. As well as from the Company's normal transactions and investing activities. To manage credit risk, the Company evaluates the creditworthiness of each customer or counterparty considering the financial status, past experience and other factors. The Company establishes credit limit for each customer and counterparty.

The Company evaluates the creditworthiness using open financial information and information provided by credit rating institution when the Company contracts with new customers. The Company decides credit transaction limit and is provided with collateral and guarantee based on evaluation.

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

The carrying amount of the financial assets exposed to credit risk as of December 31, 2019 and 2018 is as follows (Korean won in millions). The carrying amount indicates the maximum exposure to credit risk.

		December 31, 2019
Loans and receivables:		
Cash and cash equivalents	₩	126,345
Short-term and long-term financial instruments		21,516
Trade and other receivables		448,340
Deposits		13,201
AFS financial assets:		
Short-term and long-term investment securities		10,764
Derivative assets		2,404
	₩	622,570

		December 31, 2018
Loans and receivables:		
Cash and cash equivalents	₩	114,171
Short-term and long-term financial instruments		10,329
Trade and other receivables		560,023
Deposits		13,822
AFS financial assets:		
Short-term and long-term investment securities		7,617
Derivative assets		1,184
	₩	707,146

Apart from the above, in the case of contracts such as financial guarantees provided by the Company, the amount of guarantees to be paid by the Company at the request of the guarantee is the maximum amount exposed to the credit risk (see Note 31).

4.2 Credit risk (cont'd)

Details of trade receivables exposed to credit risk, presented using forecast model, as of December 31, 2019 and 2018 are as follows (Korean won in millions):

	2019							
	Individually assessed trade receivables (*1)	Trade receivables assessed for impairment on a collective basis(*2)						
		Within due	Less than 3 months	3–6 months	6–12 months	More than 12 months	Subtotal	Total
Book value	₩ 254,468	₩ 118,701	₩ 17,174	₩ 544	₩ 451	₩ 729	₩ 137,599	₩ 392,067
Expected credit loss rate	8.18%	0.00%	0.06%	1.29%	3.99%	12.07%		
Expected credit loss	₩ 20,809	₩ -	₩ 11	₩ 7	₩ 18	₩ 88	₩ 124	₩ 20,933

	2018							
	Individually assessed trade receivables (*1)	Trade receivables assessed for impairment on a collective basis(*2)						
		Within due	Less than 3 months	3–6 months	6–12 months	More than 12 months	Subtotal	Total
Book value	₩ 211,016	₩ 169,492	₩ 14,167	₩ 3,901	₩ 32,108	₩ 4,119	₩ 223,787	₩ 434,803
Expected credit loss rate	9.22%	0.00%	0.21%	2.30%	0.82%	87.77%		
Expected credit loss	₩ 19,446	₩ 3	₩ 30	₩ 90	₩ 262	₩ 3,615	₩ 4,000	₩ 23,446

(*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.

4.3 Liquidity risk

Liquidity risk is the risk that the Company 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 Company prepares for the funding balance of its business activities, investment activities and financing activities for the maturity of financial assets and liabilities. The Company manages the liquidity risks that may occur in the future in advance by securing and maintaining required liquidity.

A summary of the Company's non-derivative liabilities' maturity as of December 31, 2019 and 2018 is as follows (Korean won in millions):

	December 31, 2019					
		Nominal cash flows according to contract				
	Book value	Total	Less than 1 year	1–2 years	2–5 years	More than 5 years
Financial liabilities	₩ 2,232,305	₩ 2,259,358	₩ 1,649,227	₩ 357,307	₩ 252,824	₩ -
Interest on financial liabilities	-	73,287	40,482	18,434	14,371	-
	₩ 2,232,305	₩ 2,332,645	₩ 1,689,709	₩ 375,741	₩ 267,195	₩ -

	December 31, 2018					
		Nominal cash flows according to contract				
	Book value	Total	Less than 1 year	1–2 years	2–5 years	More than 5 years
Financial liabilities	₩ 2,075,961	₩ 2,083,197	₩ 1,215,289	₩ 315,363	₩ 552,545	₩ -
Interest on financial liabilities	-	114,727	51,311	28,956	34,460	-
	₩ 2,075,961	₩ 2,197,924	₩ 1,266,600	₩ 344,319	₩ 587,005	₩ -

The above-mentioned maturity analysis is based on undiscounted cash flow according to the contract, which is different from non-derivative liabilities in the separate statements of financial position. Apart from the above-mentioned non-derivative liabilities, as of December 31, 2019, financial guarantee liabilities of the Company are explained in Note 31.

4.4 Capital risk

The Company 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 Company 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 Company's capital similar to overall industry practice.

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

	December 31, 2019	December 31, 2018
Total liabilities	₩ 2,607,723	₩ 2,428,715
Total equity	2,144,653	2,305,508
Debt-to-equity ratio	121.59%	105.34%

5. Restricted financial assets

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

	December 31, 2019	December 31, 2018	Description
Short-term financial instruments	₩ 19,250	₩ -	Bank transaction deposits, Shared growth deposit establishment of the right of pledge and others
Long-term financial instruments	2,129	10,329	Bank transaction deposits, deposits provided for business, establishment of the right of pledge and others
	₩ 21,379	₩ 10,329	

6. Short-term and long-term investment securities

Details of short-term and long-term investment securities as of December 31, 2019 and 2018 are as follows (Korean won in millions):

		December 31, 2019	December 31, 2018
Short-term investment securities	Financial assets at fair value through profit or loss	₩ 3,997	₩ 1,497
Long-term investment securities	Financial assets (designated) at fair value through OCI	220,150	361
	Financial assets at fair value through profit or loss	6,767	6,120
		226,917	6,481
		₩ 230,914	₩ 7,978

Short-term and long-term investment securities as of December 31, 2019 and 2018 are as follows (Korean won in millions):

			December 31, 2019	December 31, 2018
Financial assets (designated) at fair value through OCI	Marketable equity securities	Doosan Solus Co., Ltd. and Doosan Fuel Cell Co., Ltd.	₩ 219,915	₩ 126
	Non-marketable equity securities	The Korea Economic Daily	235	235
			220,150	361
Financial assets at fair value through profit or loss	Contributions	The Korea Federation of Financial Assets Expenditure and Credit Union	4,098	2,158
	Beneficiary certificates	Pangaea Ventures Fund IV	1,869	562
	Debt securities	Happy Tomorrow Apollo 4th Co., Ltd.	4,797	4,897
			10,764	7,617
			₩ 230,914	₩ 7,978

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

Changes in financial assets at fair value for the year ended in December 31, 2019 are as follows (Korean won in millions):

	2019					
	Beginning balance	Acquisition	Disposal	Valuation	Increase by spin off	Ending Balance
Financial assets (designated) at fair value through OCI	₩ 361	₩ -	₩ -	₩ 74,529	₩ 145,260	₩ 220,150
Financial assets at fair value through profit or loss	7,617	4,047	(900)	-	-	10,764
	₩ 7,978	₩ 4,047	₩ (900)	₩ 74,529	₩ 145,260	₩ 230,914

Changes in accumulated other comprehensive income of financial assets (designated) at fair value through OCI for the year ended December 31, 2019 and 2018 are as follows (Korean won in millions):

		2019		
		Beginning balance	Valuation	Ending balance
Equity instruments designated at fair value through OCI	Accumulated other comprehensive income before income tax	₩ 65	₩ 74,528	₩ 74,593
	Income tax effect	(15)	(18,036)	(18,051)
		₩ 50	₩ 56,492	₩ 56,542

		2018					
		Beginning balance	Effect of adoption of new accounting standards	Valuation	Disposal	Changes due to merger	Ending balance
Debt instruments at fair value through OCI	Accumulated other comprehensive income before income tax	₩ -	₩ (2,533)	₩ 355	₩ 2,178	₩ -	₩ -
	Income tax effect	-	613	(86)	(527)	-	-
		-	(1,920)	269	1,651	-	-
Equity instruments designated at fair value through OCI	Accumulated other comprehensive income before income tax	-	-	(35)	-	100	65
	Income tax effect	-	-	9	-	(24)	(15)
		-	-	(26)	-	76	50
		₩ -	₩ (1,920)	₩ 243	₩ 1,651	₩ 76	₩ 50

7. Trade and other receivables

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

	December 31, 2019			December 31, 2018		
	Gross	Provision for impairment	Book value	Gross	Provision for impairment	Book value
Current:						
Trade receivables	₩ 391,886	₩ (20,753)	₩ 371,113	₩ 434,622	₩ (23,266)	₩ 411,356
Non-trade receivables	29,179	(1,315)	27,864	103,228	(1,635)	101,593
Accrued income	179	-	179	80	-	80
Short-term loans	45,681	(763)	44,918	902	(5)	897
Others	73	-	73	88	-	88
	₩ 466,998	₩ (22,831)	₩ 444,167	₩ 538,920	₩ (24,906)	₩ 514,014
Non-current:						
Trade receivables	₩ 181	₩ (181)	₩ -	₩ 181	₩ (181)	₩ -
Non-trade receivables	35	(35)	-	35	(35)	-
Long-term loans	4,173	-	4,173	46,010	-	46,010
	₩ 4,389	₩ (216)	₩ 4,173	₩ 46,226	₩ (216)	₩ 46,010

Changes in allowance for doubtful accounts for the years ended December 31, 2019 and 2018 are as follows (Korean won in millions):

	2019				
	Beginning balance	Provision for impaired receivables	Write off	Spin off (see Note 36)	Ending balance
Trade receivables	₩ 23,266	₩ (1,769)	₩ (715)	₩ (29)	₩ 20,753
Non-trade receivables	1,635	(300)	(20)	-	1,315
Short-term loans	5	758	-	-	763
Long-term trade receivables	181	-	-	-	181
Long-term non-trade receivables	35	-	-	-	35
	₩ 25,122	₩ (1,311)	₩ (735)	₩ (29)	₩ 23,047

	2018				
	Beginning balance	Provision for impaired receivables	Write off	Merger	Ending Balance
Trade receivables	₩ 22,093	₩ 744	₩ (113)	₩ 542	₩ 23,266
Non-trade receivables	1,066	569	-	-	1,635
Short-term loans	5	-	-	-	5
Long-term trade receivables	181	-	-	-	181
Long-term non-trade receivables	35	-	-	-	35
	₩ 23,380	₩ 1,313	₩ (113)	₩ 542	₩ 25,122

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

8. Inventories

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

	December 31, 2019			December 31, 2018		
	Acquisition cost	Valuation allowance	Book value	Acquisition cost	Valuation allowance	Book value
Merchandise	₩ 18,181	₩ (1,956)	₩ 16,225	₩ 121,383	₩ (2,236)	₩ 119,147
Finished goods	46,357	(2,464)	43,893	102,362	(3,753)	98,609
Work in process	38,300	(7)	38,293	47,733	(228)	47,505
Raw materials	123,168	(4,019)	119,149	155,435	(3,939)	151,496
Materials in transit	15,380	-	15,380	37,252	-	37,252
Others	4,189	-	4,189	6,816	-	6,816
	₩ 245,575	₩ (8,446)	₩ 237,129	₩ 470,981	₩ (10,156)	₩ 460,825

The amount of (reversal of) write-down of inventories is ₩(-)496 million and ₩645 million for the years ended December 31, 2019 and 2018, respectively.

9. Derivatives

Details of derivative contracts are as follows:

Derivative contracts	Purpose	Description
Currency forward contracts	Cash flow hedge	Adjustment from foreign currency sales to Korean won to avoid cash flow risk arising from foreign currency forecast sales
Interest rate swap	Held for trading	Recognized in gain or loss of gap between floating-interest rate and fixed-interest rate
Stock warrants and others	Held for trading	Recognized gap of fair value as gain or loss

Details of gain (loss) on valuation of derivatives as of December 31, 2019 and 2018 are as follows (Korean won in millions, foreign currency in thousands):

December 31, 2019						
Buy		Sell				
Currency	Amount	Currency	Amount	Assets (liabilities)	Loss	Accumulated other comprehensive income(*1)
Currency forward contracts:						
KRW	101,799	USD	97,000	₩ 1,954	₩ -	₩ 1,954
KRW	3,091	GBP	2,000	55	-	55
KRW	33,338	CNY	202,000	2	-	2
Stock warrants and others(*2)				-	(168)	-
				₩ 2,011	₩ (168)	₩ 2,011

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

(*2) Valuation of stock warrants issued by Doosan Heavy Industries & Construction Co., Ltd.

9. Derivatives (cont'd)

December 31, 2018						
Buy		Sell				
Currency	Amount	Currency	Amount	Assets (liabilities)	Gain (loss)	Accumulated other comprehensive income(*1)
Currency forward contracts:						
KRW	112,377	USD	100,000	₩ 1,016	₩ -	₩ 1,016
KRW	31,287	CNY	194,000	(218)	-	(218)
Interest rate swap:						
KRW 5,000, 3.15%		KRW 5,000, MOR 3M+1.38%		-	(3)	-
Stock warrants and others(*2)				167	(1,735)	-
				₩ 965	₩ (1,738)	₩ 798

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

(*2) Valuation of stock warrants issued by Doosan Heavy Industries & Construction Co., Ltd.

10. Financial instruments by category

Categories of financial instruments as of December 31, 2019 and 2018 are as follows (Korean won in millions):

	December 31, 2019					
Financial assets	Financial assets at fair value through profit or loss	Financial assets (designated) at fair value through OCI	Derivatives designated as hedging instruments	Financial assets at amortized cost	Book value	Fair value
Cash and cash equivalents	₩ -	₩ -	₩ -	₩ 126,345	₩ 126,345	₩ 126,345
Short-term and long-term financial instruments	9,000	-	-	12,516	21,516	21,516
Short-term and long-term investment securities	10,764	220,150	-	-	230,914	230,914
Trade and other receivables	-	-	-	448,340	448,340	448,340
Derivative assets	-	-	2,404	-	2,404	2,404
Deposits	-	-	-	13,201	13,201	13,201
	₩ 19,764	₩ 220,150	₩ 2,404	₩ 600,402	₩ 842,720	₩ 842,720

	December 31, 2019					
Financial liabilities	Financial liabilities at fair value through profit or loss	Derivatives designated as hedging instruments	Financial guarantee contract	Financial liabilities at amortized cost	Book value	Fair value
Trade and other payables	₩ -	₩ -	₩ 3,690	₩ 662,333	₩ 666,023	₩ 666,023
Borrowings, bonds and asset-backed loans	-	-	-	1,569,573	1,569,573	1,569,573
Lease liabilities	-	-	-	17,509	17,509	17,509
Derivative liabilities	-	393	-	-	393	393
	₩ -	₩ 393	₩ 3,690	₩ 2,249,415	₩ 2,253,498	₩ 2,253,498

10. Financial instruments by category (cont'd)

	December 31, 2018					
	Financial assets at fair value through profit or loss	Financial assets (designated) at fair value through OCI	Derivatives designated as hedging instruments	Financial assets at amortized cost	Book value	Fair value
Cash and cash equivalents	₩ -	₩ -	₩ -	₩ 114,171	₩ 114,171	₩ 114,171
Short-term and long-term financial instruments	9,000	-	-	1,329	10,329	10,329
Short-term and long-term investment securities	7,617	361	-	-	7,978	7,978
Trade and other receivables	-	-	-	560,023	560,023	560,023
Derivative assets	168	-	1,016	-	1,184	1,184
Deposits	-	-	-	13,822	13,822	13,822
	₩ 16,785	₩ 361	₩ 1,016	₩ 689,345	₩ 707,507	₩ 707,507

	December 31, 2018					
	Financial liabilities at fair value through profit or loss	Derivatives designated as hedging instruments	Financial guarantee contract	Financial liabilities at amortized cost	Book value	Fair value
Trade and other payables	₩ -	₩ -	₩ 1,555	₩ 728,329	₩ 729,884	₩ 729,884
Borrowings, bonds	-	-	-	1,347,632	1,347,632	1,347,632
Derivative liabilities	-	218	-	-	218	218
	₩ -	₩ 218	₩ 1,555	₩ 2,075,961	₩ 2,077,734	₩ 2,077,734

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

	December 31, 2019			
	Level 1	Level 2	Level 3	Total
Financial assets at fair value:				
Financial assets at fair value through profit or loss	₩ -	₩ 9,000	₩ 10,764	₩ 19,764
Financial assets (designated) at fair value through OCI	219,915	-	235	220,150
Derivative assets designated as hedging instruments	-	2,404	-	2,404
	219,915	11,404	10,999	242,318
Financial liabilities (designated) at fair value :				
Financial liabilities at fair value through profit or loss	-	-	-	-
Derivative liabilities designated as hedging instruments	-	(393)	-	(393)
	-	(393)	-	(393)
	₩ 219,915	₩ 11,011	₩ 10,999	₩ 241,925

	December 31, 2018			
	Level 1	Level 2	Level 3	Total
Financial assets at fair value:				
Financial assets at fair value through profit or loss	₩ -	₩ 9,000	₩ 7,785	₩ 16,785
Financial assets (designated) at fair value through OCI	126	-	235	361
Derivative assets designated as hedging instruments	-	1,016	-	1,016
	126	10,016	8,020	18,162
Financial liabilities (designated) at fair value:				
Financial liabilities at fair value through profit or loss	-	-	-	-
Derivative liabilities designated as hedging instruments	-	(218)	-	(218)
	-	(218)	-	(218)
	₩ 126	₩ 9,798	₩ 8,020	₩ 17,944

10. Financial instruments by category (cont'd)

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.

The Company 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:

	Significance of input factor
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 separate 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.

Comprehensive income (loss) by categories of financial instruments for the years ended December 31, 2019 and 2018 is as follows (Korean won in millions):

	2019						
	Profit or loss(*1)						Other comprehensive income(*2)
	Interest	Dividends	Financial guarantee	Impairment (reversal)	Disposal	Foreign exchange	
Financial assets:							
Financial assets at amortized cost	₩ 5,009	₩ -	₩ -	₩ (3,087)	₩ (2,495)	₩ 16,700	₩ -
Financial assets at fair value through profit or loss	-	-	-	-	(160)	-	-
Financial assets (designated) at fair value through OCI	-	9	-	-	-	-	74,528
	₩ 5,009	₩ 9	₩ -	₩ (3,087)	₩ (2,655)	₩ 16,700	₩ 74,528
Financial liabilities:							
Financial liabilities at amortized cost	₩ (77,787)	₩ -	₩ -	₩ -	₩ (202)	₩ (8,641)	₩ -
Financial guarantee contract	-	-	1,741	-	-	-	-
	₩ (77,787)	₩ -	₩ 1,741	₩ -	₩ (202)	₩ (8,641)	₩ -

(*1) Profit or loss includes the amounts classified as profit or loss from discontinued operations in statement of profit or loss.

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

10. Financial instruments by category (cont'd)

	2018													
	Profit or loss(*1)												Other comprehensive income(*2)	
	Interest		Dividends		Financial guarantee		Impairment (reversal)		Disposal		Foreign exchange			
Financial assets:														
Financial assets at amortized cost	₩	2,671	₩	-	₩	-	₩	1,313	₩	(5,732)	₩	28,008	₩	-
Financial assets at fair value through profit or loss		-		-		-		-		(4)		-		-
Financial assets (designated) at fair value through OCI		3,088		5		-		-		(5,060)		-		2,498
	₩	5,759	₩	5	₩	-	₩	1,313	₩	(10,796)	₩	28,008	₩	2,498
Financial liabilities:														
Financial liabilities at amortized cost	₩	(56,633)	₩	-	₩	-	₩	-	₩	(294)	₩	17,573	₩	-
Financial guarantee contract		-		-		1,691		-		-		-		-
	₩	(56,633)	₩	-	₩	1,691	₩	-	₩	(294)	₩	17,573	₩	-

(*1) Profit or loss includes the amounts classified as profit or loss from discontinued operations in consolidated statement of profit or loss.

(*2) 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, 2019 and 2018 is as follows (Korean won in millions):

	2019						2018					
	Profit or loss				Other comprehensive loss(*1)		Profit or loss				Other comprehensive income(*1)	
	Valuation		Disposal				Valuation		Disposal			
Derivatives not designated as hedging instruments	₩	(168)	₩	(634)	₩	-	₩	(1,738)	₩	-	₩	-
Derivatives designated as hedging instruments		-		-		1,213		-		123		(547)
	₩	(168)	₩	(634)	₩	1,213	₩	(1,738)	₩	123	₩	(547)

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

Financial assets and liabilities subject to an enforceable master-netting arrangement or similar agreement as of December 31, 2019 and 2018 are as follows (Korean won in millions):

	December 31, 2019						December 31, 2018					
	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	₩	8,332	₩	(4,260)	₩	4,072	₩	22,815	₩	(7,647)	₩	15,168
Other receivables		67		(36)		31		161		(104)		57
	₩	8,399	₩	(4,296)	₩	4,103	₩	22,976	₩	(7,751)	₩	15,225
Financial liabilities:												
Trade payables	₩	40,247	₩	(4,296)	₩	35,951	₩	85,037	₩	(7,751)	₩	77,286

11. Investments in subsidiaries, joint ventures and associates

Details of investments in subsidiaries, joint ventures and associates as of December 31, 2019 and 2018 are as follows (Korean won in millions):

	Location	Ownership interests (%)	December 31, 2019	December 31, 2018
Subsidiaries:				
Doosan Heavy Industries & Construction Co., Ltd. ("DHC")(*4, 7)	Korea	34,36	₩ 1,374,533	₩ 1,232,946
Oricom Inc. ("Oricom")	Korea	62.30	23,168	23,168
Doosanbears Inc.	Korea	100.00	15,559	15,559
DLI Corporation	Korea	100.00	8,000	8,000
Doosan Digital Innovation America LLC.(*1)	USA	100.00	4,889	4,889
Doosan Digital Innovation China LLC.(*2)	China	100.00	3,230	3,230
Doosan Digital Innovation Europe Ltd(*3)	UK	100.00	4,870	4,870
Doosan Mottrol (Jiangyin) Co., Ltd.	China	100.00	21,601	21,601
Doosan Electro-Materials (Changshu) Co., Ltd.	China	100.00	45,964	45,964
Doosan Electro-Materials America, LLC	USA	100.00	1,101	1,101
Doosan Electro-Materials Luxembourg Sarl(*6)	Luxembourg	-	-	28,111
Doosan Corporation Europe Kft.(*6, 8)	Hungary	-	-	10,696
Doosan Industrial Vehicle Europe N.A.	Belgium	100.00	16,934	16,934
Doosan Industrial Vehicle U.K. Ltd.	UK	100.00	1,909	1,909
Doosan Logistics Europe GmbH	Germany	100.00	1,979	1,909
Doosan Industrial Vehicle America Corp.	USA	100.00	27,016	27,016
Doosan Industrial Vehicle Yantai Co., Ltd.	China	100.00	10,617	10,617
Doosan Fuel Cell America, Inc.(*9)	USA	100.00	112,512	61,402
Doosan Energy Solutions America, Inc.	USA	100.00	1,680	1,680
Doosan Cuvex Co., Ltd(*4)	Korea	25.76	32,636	32,636
DBC Co., Ltd(*4, 10)	Korea	46.00	49,004	19,822
Doosan Robotics Inc.(*11)	Korea	100.00	72,000	54,000
Doosan Mobility Innovation Inc.(*12)	Korea	100.00	42,900	30,600
Doosan Mecatec Co., Ltd.	Korea	100.00	197,853	197,853
Neoplux Co., Ltd.	Korea	96.77	49,047	49,047
Doosan Logistics Solution co., Ltd(*13)	Korea	100.00	20,000	-
D-Pay 1st Co., Ltd.	Korea	-	-	-
			2,139,002	1,905,560
Associates:				
Prestolite Asia Ltd.	Korea	28.36	468	468
Daesan Green Energy Co. Ltd.(*14)	Korea	-	-	5,100
Wise Fasion Co., Ltd.(*15)	Korea	20.88	3,018	-
			3,486	5,568
Joint venture:				
Sichuan Kelun-Doosan Biotechnology Company Limited	China	50.00	2,526	2,526
			₩ 2,145,014	₩ 1,913,654

(*1) During the current year, 'Doosan Information and Communications America LLC' changed its name to 'Doosan Digital Innovation America LLC'.

(*2) During the current year, 'Doosan Information and Communications China Co., Ltd.' changed its name to 'Doosan Digital Innovation China LLC'.

(*3) During the current year, 'Doosan Information and Communications Europe Ltd.' changed its name to 'Doosan Digital Innovation Europe Limited'.

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

(*4) The (potential) share of the decision-making rights of the above subsidiaries for assessing whether they have control or not is less than half, but it has been determined that they have de facto control.

(*5) Although the Company does not own a significant stake in a special-purpose company, considering the terms of the arrangement in which the structured entity was established, the Company decided that it had control over the activities of the structured entity that could have the most significant impact on the special-purpose company's earnings.

(*6) During the current year, the investee was succeeded to the newly established Doosan Solus Co., Ltd. by the spin off.

(*7) During the current year, the Company made its paid-in capital increase by ₩141,586 million.

(*8) During the current year, the Company made its paid-in capital increase by ₩11,275 million.

(*9) During the current year, the Company made its paid-in capital increase by ₩51,111 million.

(*10) During the current year, the Company acquired 469,439 shares and 109,321 shares of Doosan Heavy Industries & Construction Co., Ltd. and Doosan Engineering & Construction Co., Ltd., respectively (transaction amounts: ₩23,615 million and ₩5,499 million respectively).

(*11) During the current year, the Company made its paid-in capital increase by ₩18,000 million.

(*12) During the current year, the Company made its paid-in capital increase by ₩123 million.

(*13) During the current year, making an establishment investment by ₩20,000 million.

(*14) During the current year, the investee was succeeded to the newly established Doosan Fuel Cell Co., Ltd. by the spin off.

(*15) During the current year, the Company newly acquired the investee.

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

Announced market prices of investments in subsidiaries, joint ventures and associates as of December 31, 2019 and 2018 are as follows (Korean won in millions):

	December 31, 2019		December 31, 2018	
	Book value	Fair value	Book value	Fair value
Subsidiaries:				
DHC	₩ 1,374,533	₩ 397,294	₩ 1,232,946	₩ 427,594
Oricom	23,168	36,383	23,168	37,258

The Company determines whether impairment loss is recognized in respect of joint ventures and associates in accordance with KIFRS 1036 *Impairment of Assets.* The Company determined whether there is any indication of impairment of investment securities as of December 31, 2019. As a result, the Company performed an impairment test by comparing the carrying amount of the investment in DHC, a subsidiary, with the recoverable amount (the greater of the fair value less costs and value in use).

The carrying amount of investments in DHC before impairment test was ₩1,374,533 million as of December 31, 2019.

The recoverable amount of Investments in DHC is determined based on value in use. The discount rate and the permanent growth rate used in calculating value in use as of December 31, 2019 are as follows:

	December 31, 2019
Discount rate	7.90%~11.40%
Permanent growth rate	1.00%~1.50%

Estimates for value in use calculation are as follows.

The Company 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 the expected growth rate, continuing the five year cash flow. The 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 result of recoverable amount of the Company calculated based on value in use calculation was not to cause the aggregate carrying amount to exceed amount of the investment shares. Therefore, no impairment loss is recognized based on the impairment test for the year ended December 31, 2019.

A reasonably possible change in a key assumption would cause the change of recoverable amount. Therefore, management continuously observes related sales and industrial trend subsequently.

12. Property, plant and equipment

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

	2019					
	Land	Buildings and Structures	Machinery	Others	Construction in progress	Total
January 1	₩ 424,872	₩ 186,319	₩ 115,391	₩ 76,548	₩ 22,338	₩ 825,468
Effect of adoption of new accounting standards(see Note 2)	-	9,270	-	2,946	-	12,216
Acquisition/capital expenditure	388	3,422	8,992	42,623	29,786	85,211
Reclassification	(12,269)	(788)	12,821	5,756	(26,242)	(20,722)
Disposal	(35,162)	(10,665)	(2,240)	(4,128)	-	(52,195)
Depreciation	(43)	(17,027)	(21,585)	(32,596)	-	(71,251)
Decrease due to spin off(see Note 36)	(4,993)	(17,611)	(35,544)	(5,219)	(1,335)	(64,702)
Reclassification of assets as held for sale(see Note 38)	-	-	-	(10,961)	(710)	(11,671)
Impairment	-	(1,193)	(650)	-	(1,014)	(2,857)
Asset revaluation	12,185	-	-	-	-	12,185
Acquisition of government grants	-	-	(8)	(42)	-	(50)
December 31	₩ 384,978	₩ 151,727	₩ 77,177	₩ 74,927	₩ 22,823	₩ 711,632
Acquisition cost	₩ 332,135	₩ 222,368	₩ 317,716	₩ 232,415	₩ 23,871	₩ 1,128,505
Accumulated depreciation (accumulated impairment losses are included)	-	(70,641)	(239,636)	(157,466)	(1,048)	(468,791)
Government grants	-	-	(903)	(22)	-	(925)
Accumulated revaluation surplus	52,843	-	-	-	-	52,843

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

	2018					
	Land	Buildings and Structures	Machinery	Others	Construction in progress	Total
January 1	₩ 213,089	₩ 84,426	₩ 107,026	₩ 66,200	₩ 24,050	₩ 494,791
Acquisition/capital expenditure	663	1,245	12,167	22,045	25,257	61,377
Reclassification	13,584	7,826	18,272	230	(25,939)	13,973
Disposal	(47)	(31)	(1,052)	(4,809)	-	(5,939)
Increase due to merger(*1)	197,626	102,878	956	19,904	1,435	322,799
Depreciation	(43)	(10,011)	(21,046)	(27,022)	-	(58,122)
Impairment	-	(14)	(340)	-	(2,465)	(2,819)
Acquisition of government grants	-	-	(592)	-	-	(592)
December 31	₩ 424,872	₩ 186,319	₩ 115,391	₩ 76,548	₩ 22,338	₩ 825,468
Acquisition cost	₩ 376,837	₩ 249,106	₩ 375,067	₩ 228,230	₩ 23,386	₩ 1,252,626
Accumulated depreciation (accumulated impairment losses are included)	-	(62,787)	(258,591)	(151,681)	(1,048)	(474,107)
Government grants	-	-	(1,085)	(1)	-	(1,086)
Accumulated revaluation surplus	48,035	-	-	-	-	48,035

(*1) Increase due to the merger with DOOSANTOWER during the previous year.

Meanwhile, the Company's land and buildings are partially pledged as collateral for loans from KDB and others (see Note 32).

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

Changes in right-of-use assets classified as property, plant and equipment for the years ended December 31, 2019 are as follows (Korean won in millions):

	2019					
	Land	Buildings and Structures	Machinery	Others	Construction in progress	Total
January 1	₩ -	₩ -	₩ 1,270	₩ 10,712	₩ -	₩ 11,982
Effect of adoption of new accounting standards(see Note 2)	-	9,270	-	2,946	-	12,216
Acquisition/capital expenditure	-	493	644	3,859	-	4,996
Depreciation	-	(4,288)	(705)	(7,083)	-	(12,076)
Decrease due to spin off(see Note 36)	-	(1,209)	-	(301)	-	(1,510)
December 31	₩ -	₩ 4,266	₩ 1,209	₩ 10,133	₩ -	₩ 15,608
Acquisition cost	₩ -	₩ 8,112	₩ 4,123	₩ 28,246	₩ -	₩ 40,481
Accumulated depreciation	-	(3,846)	(2,914)	(18,113)	-	(24,873)

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

The Company recognizes subsequent measurement of the land as revaluation, and the revaluation amount is the fair value of the revaluation date. As of December 31, 2019, the fair value of land assets was determined from the appraisal that was undertaken by independently qualified valuators, the First Appraisal & Consulting Co., Ltd ("FACC") and Mirae & Saehan Appraisal Co., Ltd., on October 31, 2019.

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.

Other comprehensive income recognized in the statement of comprehensive income related to revaluation model, which the Company applies to measurement of the land is ₩12,185 million as of December 31, 2019.

The Company recognized the land subsequently measured at revaluation amount, if the land were stated at cost, the land would amount to ₩332,135 million and ₩376,837 million as of December 31, 2019 and 2018, respectively.

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

	December 31, 2019			December 31, 2018		
	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Land	₩ -	₩ -	₩ 384,978	₩ -	₩ -	₩ 424,872

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

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"): 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	Fair value increases (decreases), if rate of land price increases (decreases).
	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).
Trade Case Comparison method: When comparing the transaction case of an object that is similar to the target object, fair value is measured through the process of correcting the private information, correcting the timing, comparing the factors of the value formation and others	Private information correction	Fair value increases (decreases), If the private information correction increases (decreases)
	Point-in-time correction	Fair value increases (decreases), if the point-in-time correction increases (decreases)
	Value formation factor	Fair value increases (decreases), If the value forming factor increases (decreases)

Classification of depreciation for the years ended December 31, 2019 and 2018 is as follows (Korean won in millions):

	2019	2018
Cost of sales	₩ 39,298	₩ 35,721
Selling and administrative expenses	19,662	9,830
Research and development cost and others	1,817	1,543
Discontinued operating profit and loss	10,474	11,028
	₩ 71,251	₩ 58,122

Classification of depreciation for the year ended December 31, 2019 incurred in right-of-use assets classified as property, plant and equipment is as follows (Korean won in millions):

	2019
Cost of sales	₩ 6,271
Selling and administrative expenses	5,250
Loss from discontinued operations	555
	₩ 12,076

13. Intangible assets

Changes in intangible assets for the years ended December 31, 2019 and 2018 consist of the following (Korean won in millions):

	2019				
	Goodwill	Industrial rights	Development costs	Other intangible assets	Total
January 1	₩ 131,943	₩ 2,265	₩ 27,304	₩ 32,691	₩ 194,203
Acquisition/capital expenditure	-	511	15,646	3,430	19,587
Reclassification	-	-	(4,869)	9,818	4,949
Disposal	-	(59)	-	-	(59)
Amortization	-	(526)	(2,944)	(6,127)	(9,597)
Impairment	-	-	(3,457)	-	(3,457)
Acquisition of government grants	-	-	(398)	-	(398)
Decrease due to spin off (see Note 36)	(24,232)	(774)	(4,211)	(1,947)	(31,164)
Reclassification of assets as held for sale(see Note 38)	-	(29)	-	(9,765)	(9,794)
December 31	₩ 107,711	₩ 1,389	₩ 27,071	₩ 28,101	₩ 164,272
Acquisition costs	₩ 107,711	₩ 5,228	₩ 69,560	₩ 90,181	₩ 272,680
Accumulated amortization (accumulated impairment losses are included)	-	(3,839)	(36,158)	(62,080)	(102,077)
Government grants	-	-	(6,331)	-	(6,331)

13. Intangible assets (cont'd)

	2018				
	Goodwill	Industrial rights	Development costs	Other intangible assets	Total
January 1	₩ 131,943	₩ 1,924	₩ 15,590	₩ 37,185	₩ 186,642
Acquisition/capital expenditure	-	844	13,180	791	14,815
Reclassification	-	-	3,340	1,669	5,009
Disposal	-	(80)	-	(876)	(956)
Increase due to merger(*1)	-	99	-	1,363	1,462
Amortization	-	(522)	(2,224)	(7,441)	(10,187)
Impairment	-	-	(371)	-	(371)
Acquisition of government grants	-	-	(2,211)	-	(2,211)
December 31	₩ 131,943	₩ 2,265	₩ 27,304	₩ 32,691	₩ 194,203
Acquisition costs	₩ 131,943	₩ 5,544	₩ 66,253	₩ 100,811	₩ 304,551
Accumulated amortization (accumulated impairment losses are included)	-	(3,279)	(31,528)	(68,120)	(102,927)
Government grants	-	-	(7,421)	-	(7,421)

(*1) Increase due to the merger with DOOSANTOWER during the previous year.

The carrying amount of membership with indefinite useful lives in other intangible assets is ₩11,387 million and ₩12,475 million as of December 31, 2019 and 2018, respectively.

Meanwhile, expenditure on research and development, which was recognized as expenses, amounted to ₩34,382 million and ₩32,199 million for the years ended December 31, 2019 and 2018, respectively.

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

CGUs	December 31, 2019	December 31, 2018	Description
Mottrol BG	₩ 84,562	₩ 84,562	Manufacturing and sale of hydraulic components
Digital Innovation BU	2,015	2,015	Operation and development of software
Industrial vehicles BG	15,076	15,076	Manufacturing and sale of forklifts
Fuel Cell BG(*1)	6,058	30,290	Manufacturing and sale of fuel cell
	₩ 107,711	₩ 131,943	

(*1) Part of its goodwill (Carrying amount: ₩24,232 million) was transferred to the newly incorporated company, Doosan Fuel Cell Co., Ltd. due to the spin off in the current year (see Note 36).

The recoverable amount of CGU is determined based on value in use. The discount rate and the permanent growth rate used in calculating value in use as of December 31, 2019 are as follows:

	Mottrol BG	Digital Innovation BU	Industrial vehicles BG	Fuel Cell BG
Discount rate	11.97%	11.04%	10.14%	12.40%
Permanent growth rate	1.00%	0.00%	1.00%	1.00%

13. Intangible assets (cont'd)

Estimates for value in use calculation are as follows.

The Company 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 the expected 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 result of recoverable amount of the Company calculated based on value in use calculation was not to cause the aggregate carrying amount to exceed the aggregate recoverable amount of the CGUs. Therefore, no impairment loss is recognized based on the impairment test for the year ended December 31, 2019.

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

Classification of amortization for the years ended December 31, 2019 and 2018 is as follows (Korean won in millions):

	2019	2018
Cost of sales	₩ 2,017	₩ 1,637
Selling and administrative expenses	4,466	4,793
Research and development cost and others	151	136
Loss from discontinued operations	2,963	3,621
	₩ 9,597	₩ 10,187

14. Investment properties

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

2019	Land	Buildings	Construction In Progress	Total
January 1	₩ 434,930	₩ 105,483	₩ 1,820	₩ 542,233
Acquisition	-	22	4,169	4,191
Disposal	-	(1,188)	-	(1,188)
Reclassification	12,269	9,902	(5,975)	16,196
Decrease due to spin off(see Note 36)	(5,136)	-	-	(5,136)
Increase due to merger(*1)	-	-	-	-
Revaluation(*2)	11,402	(4,834)	-	6,568
December 31	₩ 453,465	₩ 109,385	₩ 14	₩ 562,864

2018	Land	Buildings	Construction In Progress	Total
January 1	₩ 151,780	₩ 1,128	₩ -	₩ 152,908
Acquisition	-	132	1,335	1,467
Disposal	-	(1,273)	-	(1,273)
Reclassification	(13,584)	(5,131)	-	(18,715)
Increase due to merger(*1)	291,374	114,428	485	406,287
Revaluation(*2)	5,360	(3,801)	-	1,559
December 31	₩ 434,930	₩ 105,483	₩ 1,820	₩ 542,233

14. Investment properties (cont'd)

(*1) Increase due to the merger with DOOSANTOWER during the previous year.

(*2) Gain or loss on the valuation of investment properties is included in other non-operating income and expenses in the separate statements of income.

The Company's land and buildings included in the above investment properties are pledged as collateral for borrowings from financial institutions (see Note 32).

Meanwhile, lease income related to investment properties amounted to ₩28,807 million and ₩17,857 million for the years ended December 31, 2019 and 2018, respectively.

Details of fair value model that the Company applies for measurement of investment properties are as follows: The Company recognizes subsequent measurement of investment properties using fair value, As of December 31, 2019, the fair value of investment properties was determined from the appraisal that was undertaken by independently qualified valuators, the First Appraisal & Consulting Co., Ltd ("FACC") and Mirae & Saehan Appraisal Co., Ltd., on November 30, 2019.

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.

14. Investment properties (cont'd)

Fair value measurements of investment properties by fair value hierarchy level as of December 31, 2019 and 2018 are as follows (Korean won in millions):

	December 31, 2019			December 31, 2018		
	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Land	₩ -	₩ -	₩ 453,465	₩ -	₩ -	₩ 434,930
Buildings	-	-	109,385	-	-	105,483
Construction In progress	-	-	14	-	-	1,820
	₩ -	₩ -	₩ 562,864	₩ -	₩ -	₩ 542,233

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"):	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).
Trade case comparison method: When comparing the transaction case of an object that is similar to the target object, fair value is measured through the process of correcting the private information, correcting the timing, comparing the factors of the value formation, etc	Private information correction	Fair value increases (decreases), If the private information correction increases (decreases)
	Point-in-time correction	Fair value increases (decreases), if point-in-time correction increases (decreases)
	Value formation factor	Fair value increases (decreases), If the value-forming factor 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

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

	Annual interest rate (%)(*1)	December 31, 2019	December 31, 2018
The 283-2nd	4.16	₩ -	₩ 80,000
The 289	4.20	-	120,000
The 290	4.85	-	100,000
The 291	4.77	100,000	100,000
The 292-1st	2.64	30,000	30,000
The 292-2nd	4.20	120,000	120,000
The 293	4.36	50,000	50,000
The 294	4.79	-	99,000
The 295-1st	4.22	20,000	30,000
The 295-2nd	4.64	-	20,000
The 296	4.37	30,000	-
The 297	4.50	53,000	-
The 298	4.52	55,000	-
		458,000	749,000
Discount on bonds payable		(1,111)	(2,068)
		456,889	746,932
Reclassification of current portion of long-term bonds:		(169,891)	(299,663)
Principal amount of bonds		170,000	300,000
Discount on bonds payable		(109)	(337)
		₩ 286,998	₩ 447,269

(*1) Nominal interest rate

Short-term borrowings as of December 31, 2019 and 2018 are as follows (Korean won in millions):

	Creditor	Annual interest rate (%)	December 31, 2019	December 31, 2018
Usance and D/A, D/P	KEB Hana Bank and others	-	₩ -	₩ 1,645
General borrowings	Korea Exim Bank and others	2.91~4.00	508,000	103,000
			₩ 508,000	₩ 104,645

Financial liabilities related to transferred trade receivables, which did not meet the derecognition criteria, amounted to ₩1,645 million as of December 31, 2018. The trade receivables were pledged as collateral for these liabilities (see Note 31).

Long-term borrowings as of December 31, 2019 and 2018 are as follows (Korean won in millions):

	Annual interest rate (%)	December 31, 2019	December 31, 2018
Borrowings in Korean won:			
KDB	3.81~3.90	₩ 90,000	₩ 90,000
Shinhan Bank	3.12~3.52	40,000	40,000
China Bank	3.89	30,000	30,000
Nonghyup Bank	3.90	25,000	55,000
KEB Hana Bank	3.90	30,000	30,000
Korea Exim Bank and others	3.08	90,000	90,000
NongHyup Life Insurance Co.,Ltd and others	3.90	125,000	125,000

15. Bonds and borrowings (cont'd)

	Annual interest rate (%)	December 31, 2019	December 31, 2018
Borrowings in foreign currency:			
Korea Exim Bank and others	4.41	₩ 26,629	₩ 38,574
		456,629	498,574
Present value discounts	`	(1,946)	(2,518)
		454,683	496,056
Reclassification of current portion of long-term borrowings		(143,315)	(82,858)
		₩ 311,368	₩ 413,198

During the current term, the Company transferred some of its future account receivables to a liquidated company to provide asset liquidity, and the details of the Asset-backed loan as of the end of the current term are as follows:

	Creditor	Annual interest rate (%)	December 31, 2019
Asset-backed loan	D-Pay 1st Co., Ltd.	4.20~4.75	₩ 150,000

With respect to the above Asset-backed loan, the carrying amount of the trade receivables recognized in the financial statement as of December 31, 2019 is ₩1,852 million, which did not meet the derecognition criteria (see Note 31).

16. Lease

16.1 Right-of-use assets

Changes in right-of-use assets and classification of depreciation expenses for each category of accounts for the current year are described in Note 12.

16.2 Lease liabilities

Changes in lease liabilities for the year ended December 31, 2019 are as follows (Korean won in millions):

		Lease liabilities
Beginning balance	₩	-
Effect of adoption of new accounting standards and account reclassification(see Note 2)		24,664
Acquisition of lease assets		4,996
Payment of lease fees		(12,715)
Interest expense		880
Decrease due to spin off(see Note 36)		(1,550)
Others		1,234
Ending balance	₩	17,509

The maturity analysis of lease liabilities for the year ended December 31, 2019 is as follows (Korean won in millions):

	Nominal cash flows according to contract									
	Total		Less than 1 year		1–2 years		2–5 years		More than 5 years	
Lease liabilities	₩	17,822	₩	9,006	₩	5,992	₩	2,824	₩	-

Classification of expenses for the years ended December 31, 2019 incurred in short-term lease and leases of low-value assets that are not included in right-of-use assets are as follows (Korean won in millions):

		2019
Cost of sales	₩	1,555
Selling and administrative expenses		2,766
Research and development cost and others		1,012
Loss from discontinued operations		72
	₩	5,405

During the current year, cash outflows from financing activities due to the repayment of lease liabilities are ₩12,715 million, and cash outflows from operating activities due to short-term and leases of low value fees are ₩5,405 million. Therefore, the total cash outflow of the lease is ₩18,120 million.

16.2 Lease liabilities (cont'd)

The minimum lease fee and present value of the finance lease liabilities as of December 31, 2018 are as follows (Korean won in millions):

	Minimum lease fee		Present value	
Less than 1 year	₩	5,614	₩	5,253
1-5 years		7,456		7,195
		13,070	₩	12,488
Current value adjustment amount		(622)		
Present value of finance lease liabilities	₩	12,448		

The above financial lease liabilities are classified as other and long-term liabilities in the financial statement as of December 31, 2018.

17. Net defined benefit liabilities

The Company 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, 2019 and 2018 are as follows (Korean won in millions):

	December 31, 2019		December 31, 2018	
Present value of defined benefit liabilities	₩	198,435	₩	190,741
Fair value of plan assets		(171,369)		(150,381)
Net defined benefit liabilities	₩	27,066	₩	40,360

Pension costs generated by defined benefits retirement pension charged to profit or loss for the years ended December 31, 2019 and 2018 are as follows (Korean won in millions):

	2019		2018	
Current service costs	₩	21,245	₩	20,209
Net interest costs		1,461		1,378
	₩	22,706	₩	21,587

Classification of the pension costs generated by defined benefits retirement pension recognized in the statements of income for the years ended December 31, 2019 and 2018 is as follows (Korean won in millions):

	2019		2018	
Cost of sales	₩	12,174	₩	11,191
Selling and administrative expenses		7,426		6,985
Others		424		269
Loss from discontinued operations		2,682		3,142
	₩	22,706	₩	21,587

17. Net defined benefit liabilities (cont'd)

Changes in net defined benefit liabilities for the years ended December 31, 2019 and 2018 are as follows (Korean won in millions):

	2019		
	Defined benefit liabilities	Plan assets	Net defined benefit liabilities
Beginning balance	₩ 190,741	₩ (150,381)	₩ 40,360
Profit or loss:			
Current service cost	21,245	-	21,245
Interest cost (income)	5,164	(3,703)	1,461
	26,409	(3,703)	22,706
Remeasurements:			
Actuarial loss from change in demographic assumptions	5	-	5
Actuarial loss from change in financial assumptions	11,469	-	11,469
Others	(2,846)	1,266	(1,580)
	8,628	1,266	9,894
Transfer in	3,714	(1,971)	1,743
Transfer out	(928)	586	(342)
Decrease due to spin off(see Note 36)	(17,365)	13,224	(4,141)
Contributions by employer directly to plan assets	-	(39,250)	(39,250)
Benefit payments	(12,764)	8,860	(3,904)
Ending balance	₩ 198,435	₩ (171,369)	₩ 27,066

	2018		
	Defined benefit liabilities	Plan assets	Net defined benefit liabilities
Beginning balance	₩ 162,928	₩ (128,535)	₩ 34,393
Profit or loss:			
Current service cost	20,209	-	20,209
Interest cost (income)	4,818	(3,440)	1,378
	25,027	(3,440)	21,587
Remeasurements:			
Actuarial loss from change in demographic assumptions	229	-	229
Actuarial loss from change in financial assumptions	4,858	-	4,858
Others	8,744	1,799	10,543
	13,831	1,799	15,630
Transfer in	2,402	(1,022)	1,380
Transfer out	(586)	420	(166)
Changes due to investment in kind	2,384	(1,570)	814
Contributions by employer directly to plan assets	-	(24,723)	(24,723)
Benefit payments	(15,245)	6,690	(8,555)
Ending balance	₩ 190,741	₩ (150,381)	₩ 40,360

17. Net defined benefit liabilities (cont'd)

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

	December 31, 2019	December 31, 2018
Discount rate (%)	2.18	2.85
Salary growth rate (%):		
Employee	3.0~5.0	3.0~5.0
Executive	2.3	2.1

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

	December 31, 2019	December 31, 2018
Debt securities	₩ -	₩ 2,323
Saving deposits and others	171,369	148,058
	₩ 171,369	₩ 150,381

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, 2019 and 2018 is as follows (Korean won in millions):

			Amount	Ratio
December 31, 2019	Discount rate	1% increase	₩ (13,289)	(-) 6.70%
		1% decrease	14,973	7.55%
	Salary growth rate	1% increase	14,004	7.06%
		1% decrease	(12,254)	(-) 6.18%
December 31, 2018	Discount rate	1% increase	(12,379)	(-) 6.49%
		1% decrease	14,115	7.40%
	Salary growth rate	1% increase	13,371	7.01%
		1% decrease	(11,979)	(-) 6.28%

The weighted average maturity of the defined benefit liabilities as of December 31, 2019 is 7.1 years. The Company expects to contribute ₩28,038 million for the defined benefit plans in 2019.

18. Provisions

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

	2019					
	Beginning balance	Increase (decrease)	Used	Ending balance	Current	Non-current
Provision for product warranties	₩ 6,611	₩ 4,989	₩ (2,207)	₩ 9,393	₩ 9,393	₩ -
Provision for restoration	967	63	-	1,030	-	1,030
Other provisions	37	-	-	37	37	-
	₩ 7,615	₩ 5,052	₩ (2,207)	₩ 10,460	₩ 9,430	₩ 1,030

	2018					
	Beginning balance	Increase (decrease)	Used	Ending balance	Current	Non-current
Provision for product warranties	₩ 4,930	₩ 2,392	₩ (711)	₩ 6,611	₩ 6,611	₩ -
Provision for restoration	1,650	60	(743)	967	-	967
Other provisions	37	-	-	37	37	-
	₩ 6,617	₩ 2,452	₩ (1,454)	₩ 7,615	₩ 6,648	₩ 967

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

19. Share capital and share premium

Changes in share capital and share premium for the years ended December 31, 2019 and 2018 are as follows (Korean won in millions, except for share data):

	Number of shares		Share capital			
	Ordinary shares	Preferred shares	Ordinary shares	Preferred shares	Total	Share premium
Balance at January 1, 2018	19,198,003	5,396,759	₩ 107,862	₩ 26,984	₩ 134,846	₩ 355,916
Capital share issue costs	-	-	-	-	-	(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
Balance at January 1, 2019	18,238,102	5,396,759	₩ 107,862	₩ 26,984	₩ 134,846	₩ 355,915
Spin off(*1)	(1,714,267)	(507,259)	(8,571)	(2,537)	(11,108)	(33,453)
Balance at December 31, 2019	16,523,835	4,889,500	₩ 99,291	₩ 24,447	₩ 123,738	₩ 322,462

(*1) The number of shares, share capital and share premium decreased due to the spin off of the Company (see Note 36).

19. Share capital and share premium (cont'd)

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 3,000,866 shares and 3,306,169 shares as of December 31, 2019 and 2018, respectively. Preferred shares do not have voting rights.

20. Capital surplus

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

		December 31, 2019		December 31, 2018
Share premium	₩	322,462	₩	355,915
Revaluation reserves		277,542		277,542
Other capital surplus		197,116		100,712
	₩	797,120	₩	734,169

21. Other equity items

Other capital items as of December 31, 2019 and 2018 are as follows (Korean won in millions):

		December 31, 2019		December 31, 2018
Treasury stocks(*1)	₩	(185,025)	₩	(203,567)
Loss on disposal of treasury stocks		(16,738)		(16,738)
Stock options		3,265		4,066
Loss from capital reduction(*2)		(948,311)		(127,318)
	₩	(1,146,809)	₩	(343,557)

(*1) According to the spin off during the current year, the long-term investment securities were recognized and removed from other capital items in the financial statements of the Company, as it was a share of the newly incorporated company among the treasury stock held by the Company before the spin off (see Note 36).

(*2) According to the spin off during the current year, the amount of non-cash assets distributed to the owner was ₩(-)865,554 million and the replacement amount from share capital and share premium amounted to ₩44,561 million were recognized as loss from capital reduction (see Notes 19, 36).

21.1 Treasury stocks

The Company acquired registered ordinary shares and non-voting preferred shares, and recognized them as other capital item for the stabilization of share price. Changes in treasury stocks for the years ended December 31, 2019 and 2018 are as follows (in millions of Korean won, 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, 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	3,306,169	673,054	3,979,223	188,515	15,052	203,567
Balance at January 1, 2019	3,306,169	673,054	3,979,223	188,515	15,052	203,567
Decrease due to spin off(see Note 36)	(310,760)	(63,264)	(374,024)	(17,719)	(1,415)	(19,134)
Acquisition	5,457	2,314	7,771	435	157	592
Balance at December 31, 2019	3,000,866	612,104	3,612,970	₩ 171,231	₩ 13,794	₩ 185,025

21.2 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, 2019 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
12th	2010.3.26	4,258	2013.3.26 - 2020.3.26	116,500	56,460
13th	2011.3.25	3,168	2014.3.25 - 2021.3.25	137,500	68,045
14th	2012.3.30	6,880	2015.3.30 - 2022.3.30	156,200	63,647
15th	2013.3.29	25,362	2016.3.29 - 2023.3.28	128,100	43,353
16th	2014.3.28	32,152	2017.3.28 - 2024.3.27	134,300	39,558

The Company 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
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.

21.2 Share-based payment (cont'd)

Changes in stock options for the years ended December 31, 2019 and 2018 are as follows (Korean won in millions, except for share data):

	2019							
	Number of ordinary shares to be issued				Valuation amount			
	Beginning	Forfeited	Spin off(*1)	Ending	Beginning	Forfeited	Spin off(*1)	Ending
10th	1,850	(1,850)	-	-	₩ 99	₩ (99)	₩ -	₩ -
12th	5,800	(1,100)	(442)	4,258	327	(62)	(25)	240
13th	4,000	(500)	(332)	3,168	272	(34)	(23)	215
14th	8,500	(900)	(720)	6,880	541	(57)	(46)	438
15th	28,800	(800)	(2,638)	25,362	1,249	(35)	(114)	1,100
16th	39,900	(4,400)	(3,348)	32,152	1,578	(174)	(132)	1,272
	88,850	(9,550)	(7,480)	71,820	₩ 4,066	₩ (461)	₩ (340)	₩ 3,265

(*1) During the current year, the Company was succeeded to the newly incorporated company according to the spin off (see Note 36).

	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
	207,260	(118,410)	88,850	₩ 10,431	₩ (6,365)	₩ 4,066

The weighted-average remaining contractual period (from December 31, 2019 to maturity) of stock options is 3.3 years.

22. Accumulated other comprehensive income

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

	December 31, 2019	December 31, 2018
Gain on valuation of derivatives designated as cash flow hedges	₩ 1,524	₩ 605
Gain on valuation of financial assets (designated) at fair value through OCI	56,542	50
Land revaluation surplus	143,290	136,359
	₩ 201,356	₩ 137,014

23. Retained earnings

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

	December 31, 2019	December 31, 2018
Legal reserves	₩ 67,423	₩ 67,423
Discretionary reserves	-	10,000
Unappropriated retained earnings	2,101,824	1,565,614
	₩ 2,169,247	₩ 1,643,037

The Commercial Code of the Republic of Korea requires the Company to appropriate an amount equal to a minimum of 10% of annual cash dividends declared as a legal reserve until the reserve equals 50% of its issued share capital.

Separate statements of appropriation of retained earnings for the years ended December 31, 2019 and 2018 are as follows (Korean won):

	2019
Unappropriated retained earnings:	
Unappropriated retained earnings carried over from the previous year	₩ 1,549,872,557,085
Profit for the year	633,803,581,789
Remeasurements of defined benefit plan	(7,499,246,560)
Retirement of treasury stocks	-
Interim dividends	(76,656,988,200)
Reclassification of land revaluation surplus due to land disposal	2,304,186,036
	2,101,824,090,150
Transfers retained earnings:	
Reversal of research and development reserves	-
	-
Appropriation of retained earnings:	
Earned profit reserves	-
Dividends	(23,312,085,500)
	(23,312,085,500)
Unappropriated retained earnings to be carried forward	₩ 2,078,512,004,650

	2018
Unappropriated retained earnings:	
Unappropriated retained earnings carried over from the previous year	₩ 1,553,896,816,596
Profit for the year	158,613,281,158
Remeasurements of defined benefit plan	(11,847,558,268)
Retirement of treasury stocks	(58,408,585,701)
Interim dividends	(76,656,988,200)
Reclassification of land revaluation surplus due to land disposal	17,434,000
	1,565,614,399,585
Transfers retained earnings:	
Reversal of research and development reserves	10,000,000,000
	10,000,000,000
Appropriation of retained earnings:	
Earned profit reserves	-
Dividends	(25,741,842,500)
	(25,741,842,500)
Unappropriated retained earnings to be carried forward	₩ 1,549,872,557,085

23. Retained earnings (cont'd)

Details of dividends for the years ended December 31, 2019 are as follows (Korean won, except for share data and dividend amount):

	2019		
	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	3,996,462	893,038	16,523,835
Number of treasury stocks	564,242	47,862	3,000,866
Shares eligible for dividends	3,432,220	845,176	13,522,969
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)	₩ 4,633	₩ 1,099	₩ 17,580

23. Retained earnings (cont'd)

Details of dividends paid by the Company for the year ended December 31, 2019 are as follows (Korean won in millions, except for share data):

	Preferred shares (old)		Preferred shares (new)		Ordinary shares		Total	
Annual dividends for previous year:								
Shares eligible for dividends		3,790,262		933,443		14,931,933		
Dividend per share (Korean won)	₩	1,350	₩	1,300	₩	1,300		
	₩	5,117	₩	1,213	₩	19,412	₩	25,742
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	₩	58,235	₩	76,657
	₩	19,899	₩	4,853	₩	77,647	₩	102,399

24. Revenues

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

24.1 Disaggregation revenue

	2019		2018	
Revenues from contracts with customers:				
Finished goods	₩	1,603,635	₩	1,594,917
Merchandise		222,792		218,788
Others		188,295		180,509
		2,014,722		1,944,214
Others:				
Dividend		22,208		84,897
Rental		23,775		17,532
		45,983		102,429
	₩	2,060,705	₩	2,096,643

24.2 Disaggregation revenues from contracts with customers

	2019		2018	
Type of Business:				
Electro-Materials BG	₩	576,896	₩	587,574
Industrial vehicles BG		753,499		738,217
Mottrol BG		473,358		536,297
Digital Innovation BU(*1)		124,802		119,816
Others		86,167		824,258
	₩	2,014,722	₩	2,806,162
Timing of revenue recognition:				
Transfer at a point in time	₩	1,823,739	₩	2,600,816
Transfer over time		190,983		205,346
	₩	2,014,722	₩	2,806,162

24.2 Disaggregation revenues from contracts with customers (cont'd)

(*1) Information and Communication BU changed its organization name to Digital Innovation BU during the current year.

25. Breakdown of expenses by nature

Breakdown of expenses by nature for the years ended December 31, 2019 and 2018 are as follows (Korean won in millions):

	2019	2018
Changes in inventories	₩ 4,270	₩ (45,996)
Purchases of raw materials and merchandise	1,388,813	1,039,996
Employee benefits expenses	351,671	325,648
Depreciation and amortization	66,856	53,660
Others	87,173	508,464
	₩ 1,898,783	₩ 1,881,772

26. Selling and administrative expenses

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

	2019	2018
Salaries	₩ 101,204	₩ 94,853
Pension costs	7,328	7,395
Employee benefits	20,144	17,875
Travel expenses	8,677	8,074
Utility expenses	678	808
Sales commission	20,297	22,526
Taxes and dues	6,174	5,025
Depreciation	19,662	9,830
Advertising expenses	7,830	7,151
Packaging expenses	5,284	5,660
Research and development	32,002	27,984
Training expenses	5,838	4,116
Freight expenses	9,264	8,461
Commission expenses	14,572	26,115
Samples expenses	2,337	2,458
Bad debt expenses(Reversal of provision)	(1,782)	743
Amortization	4,466	4,793
Others	1,161	22,191
	₩ 265,136	₩ 276,058

27. Finance income and expenses

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

	2019	2018
Finance income:		
Interest income	₩ 4,719	₩ 5,348
Dividend income	9	5
Gain on foreign currency transaction	21,292	13,716
Gain on foreign currency translation	8,002	4,971
Gain on derivative transactions	-	145
Financial guarantee income	1,741	1,691
	35,763	25,876
Finance expenses:		
Interest expense	65,605	45,512
Loss on foreign currency transactions	13,618	13,757
Loss on foreign currency translations	6,035	4,894
Loss on derivative transactions	634	23
Loss on valuation of derivatives	168	1,738
Loss on repayment of bonds	202	294
Other financial expenses	1,883	734
	88,145	66,952
	₩ (52,382)	₩ (41,076)

28. Other non-operating income and expenses

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

	2019	2018
Other non-operating income:		
Gain on disposal of property, plant and equipment	₩ 2,462	₩ 377
Gain on disposal of intangible assets	-	233
Gain on valuation of investment properties	11,434	5,360
Gain on transfer of business	-	3,766
Reversal of impairment loss of property, plant and equipment	1	-
Miscellaneous income	2,147	5,435
	16,044	15,171
Other non-operating expenses:		
Loss on disposal of trade receivables	2,492	2,560
Loss on disposal of property, plant and equipment	3,968	716
Impairment loss of property, plant and equipment	1,447	2,819
Loss on disposal of intangible assets	58	108
Impairment loss of intangible assets	3,104	-
Loss on disposal of investment properties	1,187	1,273
Loss on valuation of investment properties	4,867	3,801
Loss on disposal of short-term financial assets	160	-
Loss on disposal of long-term financial assets	-	5,064
Donations	7,016	5,044
Other bad debt expenses	(511)	570
Miscellaneous loss	5,709	5,341
	29,497	27,296
	₩ (13,453)	₩ (12,125)

29. Income tax expenses

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

		2019		2018
Current income tax on profit for the year	₩	24,523	₩	25,930
Deferred tax:				
Origination and reversal of temporary differences		38,901		(5,167)
Charged or credited directly to equity		(49,406)		3,310
Income tax revenues(expenses) classified as profit or loss from discontinued operations		3,172		(5,086)
Income tax expenses	₩	17,190	₩	18,987

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

	2019									
			Changes							
		Beginning balance		Profit or loss		Equity		Spin off (see Note 36)		Ending balance
Accrued revenues	₩	(5)	₩	(11)	₩	-	₩	-	₩	(16)
Write-down of inventories		2,458		1,205		-		(92)		3,571
Investment securities		943		6,391		(48,558)		-		(41,224)
Property, plant and equipment		(88,299)		(646)		(2,949)		(91)		(91,985)
Investment properties		(45,628)		5,289		-		-		(40,339)
Accrued expenses		13,902		4,042		-		(489)		17,455
Defined benefit liabilities		9,766		(4,654)		2,394		(957)		6,549
Reserve for research and human resource		-		-		-		-		-
Others		10,895		(1,111)		(293)		(931)		8,560
	₩	(95,968)	₩	10,505	₩	(49,406)	₩	(2,560)	₩	(137,429)

	2018									
			Changes							
		Beginning balance		Profit or loss		Equity		Merger		Ending balance
Accrued revenues	₩	(8)	₩	28	₩	-	₩	(25)	₩	(5)
Write-down of inventories		2,156		302		-		-		2,458
Investment securities		426		667		(605)		455		943
Property, plant and equipment		(22,428)		(857)		-		(65,014)		(88,299)
Investment properties		(16,454)		(731)		-		(28,443)		(45,628)
Accrued expenses		15,375		(1,627)		-		154		13,902
Defined benefit liabilities		8,004		(2,226)		3,782		206		9,766
Reserve for research and human resource		(2,420)		2,420		-		-		-
Others		4,904		3,882		132		1,977		10,895
	₩	(10,445)	₩	1,858	₩	3,309	₩	(90,690)	₩	(95,968)

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, 2019 and 2018 are nil.

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

29. Income tax expenses (cont'd)

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

	2019	2018	Remarks
Investments in subsidiaries	₩ (797,792)	₩ (933,098)	Able to control the reversal of the temporary difference

The aggregate deferred tax relating to items that are charged or credited directly to equity for the years ended December 31, 2019 and 2018 is as follows (Korean won in millions):

	2019			2018		
	Before tax	Income tax effect	After tax	Before tax	Income tax effect	After tax
Gain (loss) on valuation of financial assets (designated) at fair value through OCI	₩ 74,594	₩ (18,052)	₩ 56,542	₩ 65	₩ (15)	₩ 50
Gain (loss) on valuation of derivatives	2,011	(487)	1,524	798	(193)	605
Land revaluation surplus	161,284	(17,994)	143,290	152,139	(15,780)	136,359
Remeasurements of net defined benefit liabilities	(43,831)	10,607	(33,224)	(33,937)	8,213	(25,724)
Other capital surplus	126,126	(30,523)	95,603	-	-	-
	₩ 320,184	₩ (56,449)	₩ 263,735	₩ 119,065	₩ (7,775)	₩ 111,290

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

	2019	2018
Profit before income tax expenses	₩ 96,086	₩ 161,670
Tax at domestic tax rates applicable to profit	22,791	38,662
Adjustments:		
Non-temporary difference	2,849	(43,690)
Temporary difference not recognized as deferred income tax	(3,828)	(3,837)
Tax credits	(2,002)	221
Additional income tax and tax paid (refunded) for previous year	(2,880)	27,460
Others	260	171
Income tax expenses	₩ 17,190	₩ 18,987
Average effective tax rate (Income tax expenses/Profit before income tax expenses)	17.89%	11,74%

30. Earnings per share

30.1 Basic earnings per share

Basic earnings per share for the years ended December 31, 2019 and 2018 are as follows (Korean won, except for share data):

	2019						2018					
	Continuing		Discontinuing		Total		Continuing		Discontinuing		Total	
Basic earnings per ordinary share	₩	2,670	₩	30,353	₩	33,023	₩	7,210	₩	850	₩	8,060
Basic earnings per old-type preferred share(*1)		2,674		30,393		33,067		7,255		855		8,110

(*1) The Company calculated earnings 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*.

Profit for the year attributable to the ordinary equity holders of the Company is as follows:

	2019					
	Continuing		Discontinuing		Total	
Profit for the year	₩	78,896,016,749	₩	554,907,565,040	₩	633,803,581,789
(-)Profit attributable to new-type preferred shares		(30,085,368,168)		-		(30,085,368,168)
(-)Profit attributable to old-type preferred shares		(9,891,751,263)		(112,455,125,400)		(122,346,876,663)
Profit for the year attributable to the ordinary equity holders of the Company	₩	38,918,897,318	₩	442,452,439,640	₩	481,371,336,958

	2018					
	Continuing		Discontinuing		Total	
Profit for the year	₩	142,683,186,026	₩	15,930,095,132	₩	158,613,281,158
(-)Profit attributable to new-type preferred shares		(7,523,518,561)		-		(7,523,518,561)
(-)Profit attributable to old-type preferred shares		(27,497,950,418)		(3,240,944,390)		(30,738,894,808)
Profit for the year attributable to the ordinary equity holders of the Company	₩	107,661,717,047	₩	12,689,150,742	₩	120,350,867,789

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, 2019 and 2018 is as follows:

	2019		2018	
	Ordinary shares	Old-type preferred shares	Ordinary shares	Old-type preferred shares
Beginning outstanding shares	14,931,933	3,790,262	14,931,933	3,790,262
Decrease due to spin off	(355,136)	(90,246)	-	-
Weighted-average number of shares outstanding	14,576,797	3,700,016	14,931,933	3,790,262

30.2 Diluted earnings per share

Diluted earnings per share for the years ended December 31, 2019 and 2018 are as follows:

	2019			2018		
	Continuing	Discontinuing	Total	Continuing	Discontinuing	Total
Diluted earnings per ordinary share	₩ 2,670	₩ 30,353	₩ 33,023	₩ 7,210	₩ 850	₩ 8,060
Diluted earnings per old-type preferred share	2,674	30,393	33,067	7,255	855	8,110

Diluted profit for the year attributable to the ordinary equity holders of the Company for the years ended December 31, 2019 and 2018 is as follows:

	2019		
	Continuing	Discontinuing	Total
Profit for the year attributable to the ordinary equity holders of the Company	₩ 38,918,897,318	₩ 442,452,439,640	₩ 481,371,336,958
Share-based expense (after income tax)	-	-	-
Diluted profit for the year attributable to the ordinary equity holders of the Company	₩ 38,918,897,318	₩ 442,452,439,640	₩ 481,371,336,958

	2018		
	Continuing	Discontinuing	Total
Profit for the year attributable to the ordinary equity holders of the Company	₩ 107,661,717,047	₩ 12,689,150,742	₩ 120,350,867,789
Share-based expense (after income tax)	-	-	-
Diluted profit for the year attributable to the ordinary equity holders of the Company	₩ 107,661,717,047	₩ 12,689,150,742	₩ 120,350,867,789

Diluted weighted-average number of ordinary shares outstanding for the years ended December 31, 2019 and 2018 is as follows:

	2019	2018
Weighted-average number of ordinary shares outstanding	14,576,797	14,931,933
Exercise of stock options	-	142
Diluted weighted-average number of ordinary shares outstanding	14,576,797	14,932,075

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

30.3 Conditions for preferred shares dividends

		Par value	Number of shares issued
Old-type preferred share(*1)	₩	5,000	3,996,462
New-type preferred share(*2)		5,000	893,038

(*1) Cash dividends available to ordinary shares plus 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 dividend for the exceeded dividend.

31. Contingencies and commitments

31.1 Notes, bills and checks offered in security

As of December 31, 2019, the Company provided 2 blank as collateral against financial institutions for guarantees to fulfill a contract and payment guarantees of the Company.

31.2 Credit lines for borrowings

Credit lines for borrowings of the Company as of December 31, 2019 are as follows (Korean won in millions and foreign currency in thousands):

	Financial institutions	Ceiling	
Credit lines for operating borrowings and others	Korea Exim Bank and others	KRW	925,000
Credit bond mortgage limit	Woori Bank and others	KRW	58,400
Credit lines for facility borrowings and others	Korea Exim Bank and others	KRW	108,065
		USD	23,000
L/C guarantees of payment and others	KDB and others	USD	70,764
Commercial paper	KB Securities and others	KRW	175,000
Short-Term Bond	KIWOOM securities and others	KRW	80,000
Asset-backed loan	D-Pay 1st Co., Ltd.	KRW	150,000
		KRW	1,496,465
		USD	93,764

31.3 Transferred trade receivables

Outstanding trade receivables sold with recourse by the Company are in the amount of ₩1,645 million as of December 31, 2018. Because the Company retains some level of risks and rewards relating to trade receivables, the Company has recognized its carrying amount of it and cash receipt from transfer as short-term borrowings, in separate statements of financial position (see Note 15).

With respect to the Asset-backed loan, the carrying amount of the trade receivables recognized in the financial statement as of December 31, 2019 is ₩1,852 million, which did not meet the derecognition criteria (see Note 15).

31.4 Litigation in progress

The Company is involved in lawsuits as a defendant with claims exposure of ₩6,394 million as of December 31, 2019. The ultimate outcome of the lawsuit cannot presently be determined.

31.5 Technical contract

The Company has technical license agreements with Nabtesco, Horstman and others for the year ended December 31, 2019, and the Company paid ₩487 million as license fee.

31.6 Guarantees of payment

Guarantees of payment provided by the Company as of December 31, 2019 are as follows (Korean won in millions and foreign currency in thousands):

Provided to	Amount		Description
Subsidiaries:			
Doosan Mottrol (Jiangyin) Co., Ltd.	USD	7,000	An on-site guarantee of payment
	CNY	95,000	An on-site guarantee of payment
Doosan Electro Materials (Changshu) Co., Ltd	USD	35,000	An on-site guarantee of payment
Doosan Industrial Vehicle U.K	GBP	16,400	An on-site guarantee of payment
Doosan Industrial Vehicle Yantai Co., Ltd.	USD	10,000	An on-site guarantee of payment
Doosan Fuel Cell America, Inc.	USD	166,593	An on-site guarantee of payment
	KRW	2,285	An on-site guarantee of payment
Doosan Energy Solutions America, Inc.	USD	63,375	An on-site guarantee of payment
D-Pay 1st Co., Ltd.	KRW	150,000	An on-site guarantee of payment
Doosan Mecatec Co., Ltd.	USD	50,900	An on-site guarantee of payment
	KRW	30,000	An on-site guarantee of payment
Other related parties:			
Doosan Electro-Materials Luxembourg Sarl	USD	5,000	An on-site guarantee of payment
Circuit Foil Luxembourg Sarl	EUR	17,000	An on-site guarantee of payment
Doosan Energy Solution Kft.	EUR	64,000	An on-site guarantee of payment
Doosan Corporation Europe Kft.	USD	57,038	An on-site guarantee of payment
Korea Duty Free Shops Association	KRW	740	Performance guarantee
	USD	394,906	
	CNY	95,000	
	GBP	16,400	
	EUR	81,000	
	KRW	183,025	

31.6 Guarantees of payment (cont'd)

In addition to the above, according to the spin off during the current year, in accordance with Article 530-9, Paragraph 1 of the Commercial Act, the succeeding company after division (the Company) and the newly incorporated company (Doosan Fuel Cell and Doosan Solus Co., Ltd.) will be repaid in solidarity with respect to the debts of the company before the division (see Note 36). In this regard, borrowings and bonds subject to solidarity guarantee provided by the Company as of December 31, 2019 are as follows (Korean won in millions):

Provided to	Borrowings and Bonds	
Doosan Fuel cell Co., Ltd.	₩	99,000
Doosan Solus Co., Ltd.		40,000
	₩	139,000

Guarantees of payment provided by third parties to the Company as of December 31, 2019 are as follows (Korean won in millions and foreign currency in thousands):

Provided to	Amount		Description
Seoul Guarantee Insurance	KRW	166,272	Performance guarantee(*1)
Korea Defense Industry Association	KRW	78,897	Performance guarantee(*1)
Machinery Financial Cooperative	KRW	46,000	Performance guarantee(*1)
Korea Software Financial Cooperative(*2)	KRW	1,828	Performance guarantee(*1)
KDB	USD	12,831	Debt guarantee
Woori Bank and others	USD	17,945	L/C guarantee of payment
	KRW	293,452	
	USD	30,776	

(*1) Some of the contracts subject to the performance guarantee were transferred to newly incorporated company Doosan Fuel Cell and Doosan Solus Co., Ltd.) according to the spin off during the current year (see Note 36).

(*2) In connection with this, as of December 31, 2019, equity share of ₩83 million is provided as collateral.

31.7 Ordinary wages

If the salary items that were not included in the ordinary wages, such as the regular bonus, which the Company paid in the past, are included in the ordinary wages, the Company may have to pay additional past wages in the future.

31.8 Agreement with shareholders

For the year ended December 31, 2019, the Company entered into an agreement with the preferred shares investor regarding the issuance of the redeemable convertible preferred shares of the following subsidiaries.

	Doosan Cuvex Co., Ltd.	DLI Corporation
Put option	On October 24, 2021, the investor may make a purchase request to Doosan Cuvex Co., Ltd. or a third party designated by it for the whole or a part of the redeemable convertible preferred shares held by the investor, an amount equal to the amount of the issuance plus a certain amount of accrual.	On June 26, 2020, the investor may make a purchase request to DLI Corporation or a third party designated by it for the whole or a part of the redeemable convertible preferred shares held by the investor, an amount equal to the amount of the issuance plus a certain amount of accrual.
Early put option	The investor may request the Doosan Cuvex Co., Ltd. to make a purchase before a redemption date in the event of a certain reason, and the calculation method of the settled amount is the same as above.	The investor may request the DLI Corporation to make a purchase before a redemption date in the event of a certain reason, and the calculation method of the settled amount is the same as above.
Call option	On October 24, 2021, the investor may sell all or part of the redeemable convertible preferred share to a third party designated by Doosan Cuvex Co., Ltd. or itself in an amount equal to the amount of the issuance plus a certain amount of accrual.	On June 26, 2020, the investor may sell all or part of the redeemable convertible preferred share to a third party designated by DLI Corporation or itself in an amount equal to the amount of the issuance plus a certain amount of accrual.

31.9 Other agreements

The Company has signed a lease contract with its subsidiary, DBC Co., Ltd., for 15 years from the commencement date of lease.

32. Pledged assets

The Company pledged certain assets as collateral for its financial liabilities as of December 31, 2019, which are as follows (Korean won in millions and foreign currency in thousands):

Institution	Pledged asset	Related accounts	Financial liabilities		Pledged amount	
KDB	Fixed deposit, Jeung-pyeong, Ik-san plant, Chang-won plant and others	Short-term financial instruments, Property, plant and equipment and investment properties	KRW	50,000	KRW	218,740
			KRW	-	USD	58,471
Woori Bank	Anmyeondo land and others		KRW	33,000	KRW	132,000
Shinhan Bank	Incheon plant		KRW	-	KRW	40,000
KDB and others	Doosan Tower		KRW	289,980	KRW	347,976
Shinyoung securities and others	Invested Securities	Financial assets (designated) at fair value through OCI	KRW	90,000	KRW	190,026

As of December 31, 2019, the Company has established the real estate beneficiary certificates (maximum pledge amount of ₩24,700 million) of land and buildings (pledged amount of ₩14,413 million) for the loan arrangement of the subsidiary, DLI Corporation with KDB Capital Corporation and others. As of December 31, 2019, the remaining balance of the borrowings is ₩19,000 million.

In addition, at the end of the current period, the Company provided 578,760 shares (pledged amount ₩29,114 million) of DBC Co., Ltd. as collateral for a PF loan contract worth ₩375,000 million signed with Korea Securities Finance Co., Ltd. for the construction of Doosan Bundang Center. At the end of the current period, the balance of the loan is ₩ 218,500 million.

33. Related party transactions

Relationship with the Company	2019	2018
Subsidiaries	Doosan Heavy Industries & Construction Co., Ltd. (“DHC”)(*1)	Doosan Heavy Industries & Construction Co., Ltd. (“DHC”) (*1)
	Doosan Infracore Co., Ltd. (“DI”) and its subsidiaries	Doosan Infracore Co., Ltd. (“DI”) and its subsidiaries
	Doosan Engineering & Construction Co., Ltd. (“DEC”)	Doosan Engineering & Construction Co., Ltd. (“DEC”)
	Doosan Engine Co., Ltd. (“DE”) and its subsidiaries	Doosan Engine Co., Ltd. (“DE”) and its subsidiaries
	Oricom Inc	Oricom Inc
	Doosanbears Inc.	Doosanbears Inc.
	DLI Corporation	DLI Corporation
	Doosan Cuvex Co., Ltd.	Doosan Cuvex Co., Ltd.
	DBC Co., Ltd	DBC Co., Ltd
	Doosan Robotics Inc.	Doosan Robotics Inc.
	Doosan Mobility Innovation Inc	Doosan Mobility Innovation Inc
	Doosan Mecatec Co., Ltd.	Doosan Mecatec Co., Ltd.
	Neoplux Co., Ltd.	Neoplux Co., Ltd.
	D-Pay 1st Co., Ltd.	-
	Doosan Digital Innovation America, LLC(*3)	Doosan Digital Innovation America, LLC(*3)
	Doosan Digital Innovation China Co., Ltd.(*3)	Doosan Digital Innovation China Co., Ltd. (*3)
	Doosan Digital Innovation Europe Ltd.(*3)	Doosan Digital Innovation Europe Ltd. (*3)
	Doosan Mottrol (Jiangyin) Co., Ltd.	Doosan Mottrol (Jiangyin) Co., Ltd.
	Doosan (Hong Kong) Ltd. and its subsidiaries	Doosan (Hong Kong) Ltd. and its subsidiaries
	Doosan Electro-Materials Singapore Pte. Ltd.	Doosan Electro-Materials Singapore Pte. Ltd.
	Doosan (Shanghai) Chemical Materials Co., Ltd.	Doosan (Shanghai) Chemical Materials Co., Ltd.
	Doosan Electro-Materials (Changshu) Co., Ltd.	Doosan Electro-Materials (Changshu) Co., Ltd.
	Doosan Electro-Materials America, LLC	Doosan Electro-Materials America, LLC
	-	Doosan Electro-Materials Luxembourg Sarl and its subsidiaries(*5)
	-	Doosan Corporation Europe Kft. and its subsidiaries(*5)
	Doosan Industrial Vehicle Europe N.A.	Doosan Industrial Vehicle Europe N.A.
	Doosan Industrial Vehicle U.K. Ltd. and its subsidiaries	Doosan Industrial Vehicle U.K. Ltd. and its subsidiaries
	Doosan Logistics Europe GmbH	Doosan Logistics Europe GmbH
	Doosan Industrial Vehicle America Corp. and its subsidiaries	Doosan Industrial Vehicle America Corp. and its subsidiaries
	Doosan Industrial Vehicle Yantai Co., Ltd.	Doosan Industrial Vehicle Yantai Co., Ltd.
	Doosan Fuel Cell America, Inc.	Doosan Fuel Cell America, Inc.
	Doosan Logistics Solution Co., Ltd.	-
	Doosan Energy Solutions America, Inc.	Doosan Energy Solutions America, Inc.

33. Related party transactions (cont'd)

Relationship with the Company	2019	2018
Associates	PRESTOLITE ASIA LTD.,	PRESTOLITE ASIA LTD.,
	-	Daesan Green Energy Co. Ltd(*6)
	KDDI KOREA Co., Ltd	KDDI KOREA Co., Ltd
	Wise Fasion Co., Ltd.	-
Joint ventures	Sichuan Kelun-Doosan Biotechnology Company Limited	Sichuan Kelun-Doosan Biotechnology Company Limited
Other related parties(*2)	Doosan fuelcell Co., Ltd.(*4)	-
	Dosan solus Co., Ltd(*4)	-
	Doosan Electro-Materials Luxembourg Sarl and its subsidiaries(*5)	-
	Doosan Corporation Europe Kft. and its subsidiaries(*5)	-
	Neo Trans Co., Ltd.	Neo Trans Co., Ltd.
	Yeongang Foundation	Yeongang Foundation
	Dongdaemun Future Foundation	Dongdaemun Future Foundation
	Chung-Ang University and others	Chung-Ang University and others

(*1) DI and its subsidiaries, as well as DEC and their subsidiaries are excluded.

(*2) It is not included in the scope of related parties of KIFRS 1024 but includes companies belonging to the same large-scale enterprise group under the *Monopoly Regulation and Fair Trade Act.*

(*3) The name of the company has been changed during the current year.

(*4) Newly established according to personnel division during the current year (see Note 36)

(*5) It is a subsidiary of Doosan Solus Co., Ltd. that was newly established according to the spin off during the current year.

(*6) It is an associate of Doosan Fuel Cell Co., Ltd., which was newly established according to the spin off during the current year.

33. Related party transactions (cont'd)

Significant transactions for the years ended December 31, 2019 and 2018, between the Company and related parties are as follows (Korean won in millions):

	2019						
	Related parties	Sales	Other income	Others (Disposal of assets and others)	Purchases	Other expenses	Others (Purchase of assets and others)(*2)
Subsidiaries	DHC and its subsidiaries	₩ 58,898	₩ 673	₩ -	₩ 6,070	₩ 9,751	₩ 24,145
	DI and its subsidiaries	141,472	50	46,350	65,382	5,185	8
	DEC and its subsidiaries	6,561	57	-	466	-	7,445
	DE and its subsidiaries	-	-	-	-	-	-
	Overseas subsidiaries for industrial vehicles (*1)	325,678	837	-	46,582	1,503	-
	Others	305,556	3,856	3	125,714	23,317	210
		838,165	5,473	46,353	244,214	39,756	31,808
Associates		105,987	-	-	-	-	-
Other related parties		20,858	708	7	17,179	3,366	-
		₩ 965,010	₩ 6,181	₩ 46,360	₩ 261,393	₩ 43,122	₩ 31,808

(*1) Doosan Industrial Vehicle UK, Ltd., Doosan Industrial Vehicle America Corp. and Doosan Industrial Vehicle Yantai Co., Ltd. Etc.

(*2) Contains the transaction amount of the DBC Co., Ltd stock from Doosan Heavy Industries Co., Ltd and Doosan Engineering & Construction Co., Ltd. (see Note 11).

	2018						
	Related parties	Sales	Other income	Others (Disposal of assets and others)	Purchases	Other expenses	Others (Purchase of assets and others)
Subsidiaries	DHC and its subsidiaries	₩ 64,237	₩ 2,635	₩ -	₩ 4,963	₩ 9,810	₩ 799
	DI and its subsidiaries	140,838	117	900	59,275	2,609	70
	DEC and its subsidiaries	19,228	103	-	9	-	2,034
	DE and its subsidiaries	3,450	-	-	-	1,110	-
	Overseas subsidiaries for industrial vehicles (*1)	281,012	618	-	52,139	624	-
	Others	317,887	3,366	245	210,116	19,551	40
		826,652	6,839	1,145	326,502	33,704	2,943
Associates		25,881	-	-	4,474	-	-
Other related parties		3,429	-	-	2,287	3,077	-
		₩ 855,962	₩ 6,839	₩ 1,145	₩ 333,263	₩ 36,781	₩ 2,943

(*1) Doosan Industrial Vehicle UK, Ltd., Doosan Industrial Vehicle America Corp. and Doosan Industrial Vehicle Yantai Co., Ltd. Etc.

The above transaction details include amounts classified as discontinued operating profit or loss in the current and previous income statements.

33. Related party transactions (cont'd)

As of December 31, 2019 and 2018, significant balances related to the transactions between the Company and related parties are as follows (Korean won in millions):

	December 31, 2019					
	Related parties	Trade receivables	Other receivables	Trade payables	Other payables	Asset-backed loan
Subsidiaries	DHC and its subsidiaries	₩ 9,999	₩ 5,477	₩ 678	₩ 226	₩ -
	DI and its subsidiaries	14,991	2,431	10,931	4,913	-
	DEC and its subsidiaries	3,304	4,383	7	105	-
	DE and its subsidiaries	-	-	-	-	-
	Overseas subsidiaries for industrial vehicles (*1)	123,763	1,879	13,012	398	-
	Others	60,810	51,273	3,121	4,202	150,000
		212,867	65,443	27,749	9,844	150,000
Associates		-	-	-	-	-
Other related parties		18,027	4,888	7,603	5,093	-
		₩ 230,894	₩ 70,331	₩ 35,352	₩ 14,937	₩ 150,000

	December 31, 2018				
	Related parties	Trade receivables	Other receivables	Trade payables	Other payables
Subsidiaries	DHC and its subsidiaries	₩ 9,145	₩ 44,925	₩ 105	₩ 2,454
	DI and its subsidiaries	12,149	3,547	4,375	4,514
	DEC and its subsidiaries	16,874	5,590	741	234
	DE and its subsidiaries	-	1,620	-	-
	Overseas subsidiaries for industrial vehicles (*1)	98,803	917	15,063	1,169
	Others	76,352	75,306	41,843	11,400
		213,323	131,905	62,127	19,771
Associates		-	-	-	969
Other related parties		334	1,426	-	429
		₩ 213,657	₩ 133,331	₩ 62,127	₩ 21,169

(*1) Doosan Industrial Vehicle UK, Ltd., Doosan Industrial Vehicle America Corp. and Doosan Industrial Vehicle Yantai Co., Ltd. Etc.

33. Related party transactions (cont'd)

Fund and equity transactions for the years ended December 31, 2019 and 2018 between the Company and related parties are as follows (Korean won in millions):

	2019							
	Borrowing		Contribution		Dividend		Loan	
Related parties	Borrowings	Repayment	Received	Provided	Income	Paid	Loans	Repayment
Subsidiaries								
DHC and its subsidiaries	₩ -	₩ -	₩ -	₩ 141,586	₩ -	₩ -	₩ -	₩ -
Others(*1)	150,000	-	-	130,525	21,514	-	-	-
	150,000	-	-	272,111	21,514	-	-	-
Associates	-	-	-	3,000	91	-	-	-
Joint ventures	-	-	-	-	603	-	-	-
Others	-	-	-	11,275	10,887	9,426	12,013	12,013
	₩ 150,000	₩ -	₩ -	₩ 286,386	₩ 33,095	₩ 9,426	₩ 12,013	₩ 12,013

	2018							
	Borrowing		Contribution		Dividend		Loan	
Related parties	Borrowings	Repayment	Received	Provided	Income	Paid	Loans	Repayment
Subsidiaries								
DIP Holdings Co., Ltd.	₩ -	₩ -	₩ -	₩ -	₩ 65,000	₩ -	₩ -	₩ -
DOOSAN TOWER	-	-	-	-	13,000	-	-	-
Others	-	-	-	55,017	17,707	-	-	-
	-	-	-	55,017	95,707	-	-	-
Associates	-	-	-	5,100	1,545	-	-	-
Others	-	-	-	-	-	16,287	-	-
	₩ -	₩ -	₩ -	₩ 60,117	₩ 97,252	₩ 16,287	₩ -	₩ -

(*1) Contains the transaction amount of DBC Co., Ltd. shares from DHC and DEC (see Note 11).

The above transactions include amounts classified as discontinued operating profit or loss in the current and previous income statements.

33. Related party transactions (cont'd)

The Company provided guarantees of payment and others to related parties as of December 31, 2019 (see Note 31).

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

	2019	2018
Employee benefits	₩ 36,525	₩ 34,808
Pension costs	1,933	2,391
	₩ 38,458	₩ 37,199

34. Cash generated from (used in) operations

The adjustments and changes in cash generated from operating activities in the separate statements of cash flows for the years ended December 31, 2019 and 2018 is as follows (Korean won in millions):

		2019		2018
Adjustments for:				
Interest expense	₩	77,787	₩	56,633
Income tax expenses		14,019		24,073
Loss on foreign currency translation		7,233		5,885
Loss on valuation of derivatives		168		1,738
Loss on derivative transactions		634		23
Loss on disposal of trade receivables		2,495		5,732
Loss on disposal of short-term financial assets		160		-
Loss on disposal of long-term financial assets		-		5,064
Loss on repayment of asset-backed loan		669		-
Loss on repayment of bonds		202		294
Depreciation		71,252		58,122
Amortization		9,597		10,187
Loss on disposal of property, plant and equipment		3,976		924
Impairment loss on property, plant and equipment		5,607		2,819
Loss on disposal of intangible assets		58		108
Impairment loss on intangible assets		10,576		371
Loss on disposal of investment properties		1,188		1,273
Loss on valuation of investment properties		4,867		3,801
Pension costs		22,282		21,587
(Reversal of) bad debt expenses		(1,769)		744
Other bad debt expenses		4,856		570
Increase in provisions		5,053		1,681
Write-down of inventories		5,646		1,247
Interest income		(5,009)		(5,759)
Dividend income		(33,105)		(97,257)
Gain on foreign currency translation		(11,019)		(6,527)
Gain on disposal of discontinued operations		(619,843)		-
Gain on disposal of property, plant and equipment		(2,465)		(380)
Reversal of impairment loss on property, plant and equipment		(1)		-
Gain on disposal of intangible assets		-		(233)
Gain on valuation of investment properties		(11,434)		(5,360)
Financial guarantee income		(1,740)		(1,691)
Gain on transfer of business		-		(3,766)
	₩	(438,060)	₩	81,903

34. Cash generated from (used in) operations (cont'd)

	2019	2018
Changes in operating assets and liabilities:		
Decrease (increase) in trade receivables	₩ 8,492	₩ (38,612)
Increase in other receivables	(58,088)	(32,589)
Decrease (increase) in inventories	10,079	(78,968)
Increase in derivative assets	(634)	(20)
Increase in other current assets	(6,956)	(29,916)
Decrease (increase) in long-term other receivables	(1,762)	184
Decrease (increase) in other non-current assets	(1,645)	246
Increase in trade payables	26,594	57,571
Increase in other payables	33,132	11,888
Decrease in provisions	(2,207)	-
Increase in other current liabilities	49,189	1,735
Increase (decrease) in long-term other payables	1,887	(1,909)
Retirement benefits paid	(3,904)	(8,555)
Defined benefit liabilities transferred from affiliated companies	1,402	1,213
Increase in plan assets	(39,250)	(24,723)
	₩ 16,329	₩ (142,455)

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

	2019	2018
Reclassification of construction in progress to property, plant and equipment and others	₩ 26,242	₩ 25,939
Reclassification of bonds	169,891	319,460
Reclassification of long-term borrowings	173,315	182,858
Reclassification of long-term asset-backed loan	150,000	-
Increases of lease liabilities	12,216	-
Decreases of assets and liabilities due to spin off(see Note 36)	186,664	-
Retirement of treasury stocks	-	58,409
Investment in kind	-	4,421

34. Cash generated from (used in) operations (cont'd)

Changes in liabilities arising from financial activities for the year ended December 31, 2019 are as follows (Korean won in millions):

	Beginning balance	Cash flows from financing activities	Fluctuation of foreign exchange rate	Reclassification	Spin off	Others (*1)	Ending
Short-term borrowings	₩ 104,645	₩ 413,355	₩ -	₩ -	₩ (10,000)	₩ -	₩ 508,000
Current portion of long-term borrowings	82,858	(82,858)	-	173,315	(30,000)	-	143,315
Current portion of bonds	299,664	(300,000)	-	169,891	-	336	169,891
Current portion of long-term asset-backed loan	-	-	-	150,000	-	-	150,000
Current lease liabilities(*1)	-	(11,835)	-	10,524	(700)	10,936	8,925
Long-term borrowings	413,198	70,000	913	(173,315)	-	572	311,368
Bonds	447,269	107,186	-	(169,891)	(98,732)	1,166	286,998
Long-term asset-backed loan	-	149,092	-	(150,000)	-	908	-
Non-current lease debt(*1)	-	-	-	(10,524)	(850)	19,958	8,584
Finance lease liabilities(*1)	12,448	-	-	-	-	(12,448)	-
	₩ 1,360,082	₩ 344,940	₩ 913	₩ -	₩ (140,282)	₩ 21,428	₩ 1,587,081

(*1) The effects of accounting policy changes and reclassification of accounts upon the initial introduction of KIFRS 1116 Leases are included.

Changes in liabilities arising from financial activities for the year ended December 31, 2018 are as follows (Korean won in millions):

	Beginning balance	Cash flows from financing activities	Fluctuation of foreign exchange rate	Reclassification	Others	Ending balance
Short-term borrowings	₩ 135,436	₩ (201,211)	₩ (80)	₩ -	₩ 170,500	₩ 104,645
Current portion of long-term borrowings	177,321	(284,001)	-	182,858	6,680	82,858
Current portion of bonds	274,620	(315,162)	-	299,477	40,729	299,664
Long-term borrowings	66,923	523,908	1,611	(182,858)	3,614	413,198
Bonds	299,130	427,030	-	(299,477)	20,586	447,269
Finance lease liabilities	17,221	(11,503)	-	-	6,730	12,448
	₩ 970,651	₩ 139,061	₩ 1,531	₩ -	₩ 248,839	₩ 1,360,082

35. Merger

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

	2018	
Merged corporation	DIP Holdings Co., Ltd	DOOSANTOWER
Purpose	Improve management efficiency	Improve management efficiency
Main operating activities	Other financial services	Rental of real estate
Date of merger (date of acquisition)	March 1, 2018	June 1, 2018
Merger method	Merger of a wholly owned subsidiary	Merger of a wholly owned subsidiary

Assets acquired (inherited) and liabilities assumed due to merger are as follows (Korean won in millions):

	DIP Holdings Co., Ltd	DOOSANTOWER
Current assets	₩ 19,833	₩ 10,018
Cash and cash equivalents	19,643	347
Others	190	9,671
Non-current assets	289,900	732,491
Investments in subsidiaries and associates	287,400	-
Property, plant and equipment	-	322,799
Investment properties	-	406,287
Others	2,500	3,405
Total assets	309,733	742,509
Current liabilities	398	269,129
Non-current liabilities	23	252,377
Total liabilities	421	521,506
Net assets	₩ 309,312	₩ 221,003

Capital surplus and accumulated other comprehensive loss arising from the merger are as follows (Korean won in millions):

	DIP Holdings Co., Ltd	DOOSANTOWER
Book value of investments in subsidiaries	₩ 164,169	₩ 231,551
Acquired net asset amount	(309,312)	(221,003)
Accumulated other comprehensive loss	-	(87,005)
Capital surplus	(145,143)	97,553

The acquired net asset amount was determined as the carrying amount in the consolidated financial statements as of the acquisition date by applying the accounting for combinations of entities under common control, and the difference between the acquired net asset amount and carrying amount of investments in subsidiaries is adjusted in capital surplus.

36. Spin off

In accordance with the resolution of the shareholders' meeting dated August 13, 2019, the Company completed the division of the company by dividing the fuel cell business unit into Doosan Fuel Cell Co., Ltd. and the electro-material business unit to establish Doosan Solus Co., Ltd.

The details of the split ratio are as follows.

	Division company	Newly incorporated company	
Company name	Doosan corporation	Doosan fuel cell Co., Ltd	Doosan Solus Co., Ltd
Split ratio	0.9060062	0.0605940	0.0333998

The details of the assets and liabilities of the fuel cell and material business units carried over to the newly incorporated company are as follows (Korean won in millions):

Assets	Book amount	Liabilities	Book amount
Cash and cash equivalents	₩ 59,047	Trade payables	₩ 65,312
Trade receivables	75,356	Other debt	32,725
Other receivables	57,588	Short-term borrowings	10,000
Inventory	187,110	Current portion of long-term borrowings	30,000
Other Current Assets	31,870	Other Current Liabilities	92,152
Investment in subsidiaries, associates and joint ventures	55,183	Bond	98,732
Tangible assets	64,702	Net defined benefit liability	4,141
intangible assets	31,164	Other Non-current Liabilities	936
Investment property	5,136		
Other long-term receivables	1,223		
Deposit	2,382		
Deferred income tax assets	2,560		
Other Non-current Assets	6,388		
	₩ 579,709		₩ 333,998

On the other hand, in accordance with KIFRS 2117 *Distribution of Non-Cash Assets to Owners*, if all owners with the same kind of equity instruments are treated equally in distributing non-cash assets free of charge, before and after the distribution, and are not ultimately controlled by the same party or parties, the Company shall declare the distribution and shall recognize a non-cash dividend (when approved by the shareholders' meeting).

The Company measured the dividend payable at the date of settlement at ₩865,554 million, the fair value of the above assets and liabilities, and recognized ₩619,843 million, a difference from the carrying amount of ₩245,711 million, as profit from the disposal of discontinued operations in the statement of profit or loss (see Note 37).

36. Spin off (cont'd)

The discount and permanent growth rates used to measure the fair value of the assets and liabilities above are as follows:

	Doosan Fuel Cell Co., Ltd	Doosan Solus Co., Ltd
Discount rate	10.97%	9.51%~13.40%
Permanent growth rate	0.00%	0.00%

According to the spin off, the shares held by the company before the division were removed from the other capital items in the company's financial statement and long-term investment was recognized. The long-term investment was classified as a fair value through other comprehensive income financial asset and measured at the fair value of ₩145,260 million at the split date (see Note 6). In addition, ₩126,126 million, which is the difference from the carrying amount of ₩19,134 million, was recognized as other capital surplus in the statement of financial position as of the end of the current year.

Under Article 530-9 paragraph 1 of the Commercial Act, succeeding company after division or newly incorporated company shall be responsible for jointly repaying the company's debts before the split.

The performance of the fuel cell and material business carried forward to the newly incorporated company is indicated as a discontinued operation, and the comparative statement of profit and loss for the prior year has been restated (see Note 37).

37. Discontinued operations

Details of discontinued operations as of December 31, 2019 are as follows:

	2019		
	Fuel cell business unit	Material business unit	Duty-free business unit
Main business	Manufacturing and sales of fuel cell and others	Manufacturing and sales of OLED and others	Sales of duty-free goods
Method	Spin off (see Note 36)	Spin off (see Note 36)	Transfer of business (*1)

(*1) The Company has decided to suspend the duty-free business at its board meeting on October 29, 2019. On December 30, 2019, the Company signed a contract with Hyundai Department Store Duty Free Co. to transfer part of its inventory and tangible and intangible assets in its duty-free business and were sold as of February 13, 2020 (transferring price: ₩35.9 billion). As of the end of the current term, the assets of the duty-free business units subject to the transfer of water were classified as held for sale in the statement of financial position.

The operating results of the above business units are marked as discontinued operations, and the comparative income statement has been restated.

Details of profit or loss from discontinued operations for the year ended December 31, 2019 are as follows (Korean won in millions):

	2019			
	Fuel cell business unit	Material business unit	Duty-free business unit	Total
Sales	₩ 276,911	₩ 82,737	₩ 454,985	₩ 814,633
Costs of goods sold	267,628	38,548	285,535	591,711
Selling and administrative expenses	13,666	18,511	219,187	251,364
Operating profit(loss)	(4,383)	25,678	(49,737)	(28,442)
Non-operating profit(loss)	(8,369)	(659)	(10,436)	(19,464)
Proft(loss) before income tax expenses	(12,752)	25,019	(60,173)	(47,906)
Income tax expenses(benefits)	(3,086)	6,054	(14,561)	(11,593)
	(9,666)	18,965	(45,612)	(36,313)
Gain on disposal of discontinued operations before income tax expenses	158,447	461,396	-	619,843
Tax expenses related to disposal of discontinued operations	-	13,310	-	13,310
	158,447	448,086	-	606,533
Impairment loss before income tax recognized as a measure of net fair value	-	-	(20,201)	(20,201)
Tax profits related to disposal of discontinued operations	-	-	(4,889)	(4,889)
	-	-	(15,312)	(15,312)
Profit or loss from discontinued operations	₩ 148,781	₩ 467,051	₩ (60,924)	₩ 554,908

37. Discontinued operations (cont'd)

Details of profit or loss from discontinued operations for the year ended December 31, 2019 are as follows (Korean won in millions):

	2018							
	Fuel cell business unit		Material business unit		Duty-free business unit		Total	
Sales	₩	324,277	₩	92,631	₩	405,850	₩	822,758
Costs of goods sold		304,106		46,008		207,275		557,389
Selling and administrative expenses		9,737		19,475		197,665		226,877
Operating profit(loss)		10,434		27,148		910		38,492
Non-operating profit(loss)		(5,876)		1,119		(12,718)		(17,475)
Proft(loss) before income tax expenses		4,558		28,267		(11,808)		21,017
Income tax expenses(benefits)		1,103		6,841		(2,857)		5,087
		3,455		21,426		(8,951)		15,930
Profit or loss from discontinued operations	₩	3,455	₩	21,426	₩	(8,951)	₩	15,930

Cash flows from discontinued operations for the year ended December 31, 2019 are as follows (Korean won in millions):

	2019							
	Fuel cell business unit		Material business unit		Duty-free business unit		Total	
Net Cash Flows from Operating Activities	₩	(9,442)	₩	12,581	₩	(38,587)	₩	(35,448)
Net Cash Flows from Investing Activities		(3,434)		(14,650)		(4,763)		(22,847)
Net cash flow from financing activities		-		-		-		-
	₩	(12,876)	₩	(2,069)	₩	(43,350)	₩	(58,295)

Cash flows from discontinued operations for the year ended December 31, 2018 are as follows (Korean won in millions):

	2018							
	Fuel cell business unit		Material business unit		Duty-free business unit		Total	
Net Cash Flows from Operating Activities	₩	1,041	₩	18,617	₩	(12,075)	₩	7,583
Net Cash Flows from Investing Activities		(11,250)		(15,006)		(2,784)		(29,040)
Net cash flow from financing activities		-		-		-		-
	₩	(10,209)	₩	3,611	₩	(14,859)	₩	(21,457)

38. Assets held for sale

As described in Note 37 on the financial statements, as of the end of the current year, the Company classifies some assets of the tax-free business units that are to be sold as held for sale in the financial statements. The details of assets held for sale as of the end of the current year are as follows (Korean won in millions):

	December 31, 2019					
	Book value before impairment		Impairment loss(*1)		Fair value less costs to sell	
Advanced payments	₩	7,265	₩	(4,400)	₩	2,865
Inventory		26,793		(5,932)		20,861
Tangible assets		11,671		(2,750)		8,921
Intangible Assets		9,793		(7,119)		2,674
	₩	55,522	₩	(20,201)	₩	35,321

(*1) It is classified as discontinued operating profit or loss in the current year income statement.

39. Events after the reporting period

In accordance with the Board of Directors' resolution of December 5, 2019, the Company decided to make a spot investment in 100 percent of the common shares of Doosan Mecatec Co., Ltd., which the Company hold in Doosan Heavy Industries & Construction Co. Details are as follows:

	Details
Investment due date	Feb 5, 2020
Investment object	44,102,845 common shares of Doosan Heavy Industries & Construction Co.,
The amount of investment	₩238,199 million