

LG Chem, Ltd.

**Separate Financial Statements and
Internal Control over Financial Reporting
December 31, 2019 and 2018**

LG Chem, Ltd.
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December 31, 2019 and 2018

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Independent Auditor's Report

(English Translation of a Report Originally Issued in Korean)

To the Shareholders and Board of Directors of
LG Chem, Ltd.

Opinion

We have audited the accompanying separate financial statements of LG Chem, Ltd. (the Company), which comprise the separate statements of financial position as at December 31, 2019 and 2018, and separate statements of profit or loss, separate statements of comprehensive income, separate statements of changes in equity and separate statements of cash flows for the years then ended, and notes to the separate financial statements, including a summary of significant accounting policies and other explanatory information.

In our opinion, the accompanying separate financial statements present fairly, in all material respects, the separate financial position of LG Chem, Ltd. as at December 31, 2019 and 2018, and its separate financial performance and its separate cash flows for the years then ended in accordance with International Financial Reporting Standards as adopted by the Republic of Korea (Korean IFRS).

We also have audited, in accordance with Korean Standards on Auditing, the Company's Internal Control over Financial Reporting as of December 31, 2019, based on Conceptual Framework for Designing and Operating Internal Control over Financial Reporting, and our report dated March 9, 2020 expressed an unqualified opinion.

Basis for Opinion

We conducted our audits in accordance with Korean Standards on Auditing. Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of our report. We are independent of the Company in accordance with the ethical requirements of the Republic of Korea that are relevant to our audit of the separate financial statements and we have fulfilled our other ethical responsibilities in accordance with the ethical requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Key Audit Matters

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

(1) Goodwill impairment assessment for Life Sciences Cash Generating Unit

Why this matter was determined to be a key audit matter

We focused on goodwill impairment assessment due to the significance of size of goodwill balance (₩723,756 million as at December 31, 2019) and because the measurement of the 'recoverable amount' of the Group's Cash Generating Units (CGUs) involves management's judgements about the future results of the business, discount rate and adjustments arising from the perspective of market participants. Details are described in Note 12.

In particular, we focused our audit effort on the goodwill recognized in relation to the Life Sciences CGU (₩686,229 million as at December 31, 2019) which is the most significant element among all relevant CGUs with goodwill. The Life Sciences business was acquired by the Group in 2017 and has not recognized impairment on goodwill since then. We focused on this area due to the significance of size of goodwill balance

How this matter was addressed the in our audit

Audit procedures we performed to address this key audit matter include:

- Understanding, evaluation and testing of the design and operating effectiveness of relevant internal controls in place in connection with impairment assessment of goodwill including review and approval by management of future cash flow forecasts and assumptions applied in the assessment.
- Evaluation of valuation model used by management to estimate value-in-use.
- Comparison of future cash flow forecasts to estimate value-in-use with the budgets approved by the management except for the cash flows relating to specific fixed assets adjusted from the perspective of market participants.
- Hindsight review of the future cash flow forecasts by comparing the current year actual results with the prior year forecasts to assess whether management's forecasts included optimistic assumptions.
- Evaluation of management's assumptions used to estimate value-in-use.
 - Comparison of estimated revenue growth rate, operating margin rate and capital expenditures applied to estimate value-in-use with historical performances of the CGU and the current market condition to evaluate whether applied assumptions are consistent.
 - Evaluation of long-term growth rate by considering economic and industry forecasts
 - Comparison of the discount rate used by the management with the discount rate independently calculated by us using observable information in the market.
- Evaluation of identification of CGUs and testing of book values allocated to CGUs
- Evaluation of sensitivity analysis performed by management on the discount rate and terminal growth rate

Other Matter

Auditing standards and their application in practice vary among countries. The procedures and practices used in the Republic of Korea to audit such financial statements may differ from those generally accepted and applied in other countries.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

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

In preparing the separate financial statements, management is responsible for assessing the Company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Company or to cease operations.

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

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the separate financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Korean Standards on Auditing will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

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

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

- Evaluate the overall presentation, structure and content of the separate financial statements, including the disclosures, and whether the separate financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

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

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

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

The engagement partner on the audit resulting in this independent auditor's report is Kibok Lee, Certified Public Accountant.

Seoul, Korea

March 9, 2020

This report is effective as of March 9, 2020, the audit report date. Certain subsequent events or circumstances, which may occur between the audit report date and the time of reading this report, could have a material impact on the accompanying separate financial statements and notes thereto. Accordingly, the readers of the audit report should understand that there is a possibility that the above audit report may have to be revised to reflect the impact of such subsequent events or circumstances, if any.

LG Chem, Ltd.
Separate Statements of Financial Position
December 31, 2019 and 2018

<i>(in millions of Korean won)</i>	Notes	2019	2018
Assets			
Current assets			
Cash and cash equivalents	3, 5, 6	1,002,263	1,690,862
Trade receivables	3, 5, 7, 31	3,981,935	4,004,920
Other receivables	3, 5, 7, 31	366,141	321,866
Prepaid income taxes		110,525	-
Other current financial assets	3, 5, 8	10,879	-
Other current assets	13	207,596	156,538
Inventories	9	2,670,294	2,426,364
Assets held for sale	34	-	2,287
Total current assets		8,349,633	8,602,837
Non-current assets			
Other receivables	3, 5, 7	505,489	118,086
Other financial assets	3, 5, 8	135,922	80,575
Investments in subsidiaries	10	5,151,116	3,689,709
Investments in associates and joint ventures	10	198,967	168,230
Deferred income tax assets	28	281,828	209,487
Property, plant and equipment	11	10,621,415	9,324,774
Intangible assets	12	1,680,815	1,475,272
Investment properties	36	53,328	1,015
Other non-current assets	13	48,573	60,593
Total non-current assets		18,677,453	15,127,741
Total assets		27,027,086	23,730,578
Liabilities			
Current liabilities			
Trade payables	3, 5, 31	1,738,053	1,940,124
Other payables	3, 5, 31	2,199,997	1,471,025
Borrowings	3, 5, 14	149,126	55,000
Other financial liabilities	3, 5, 8	27,194	29,156
Provisions	15	448,662	93,339
Income tax payables		-	218,065
Other current liabilities	17	413,248	513,999
Total current liabilities		4,976,280	4,320,708
Non-current liabilities			
Other payables	3, 5	8,233	7,372
Borrowings	3, 5, 14	5,174,881	2,436,714
Other financial liabilities	3, 5, 8	930	30,384
Provisions	15	114,593	95,650
Net defined benefit liabilities	16	159,182	194,149
Other non-current liabilities	17	132,757	95,695
Total non-current liabilities		5,590,576	2,859,964
Total liabilities		10,566,856	7,180,672

LG Chem, Ltd.
Separate Statements of Financial Position
December 31, 2019 and 2018

<i>(in millions of Korean won)</i>	Notes	2019	2018
Equity			
Share capital	1, 19	391,406	391,406
Capital surplus		2,283,378	2,283,378
Other components of equity	21	(354,945)	(354,945)
Accumulated other comprehensive income		28,797	(25,525)
Retained earnings	20	14,111,594	14,255,592
Total equity		<u>16,460,230</u>	<u>16,549,906</u>
Total liabilities and equity		<u>27,027,086</u>	<u>23,730,578</u>

The above separate statements of financial position should be read in conjunction with the accompanying notes.

LG Chem, Ltd.
Separate Statements of Profit or Loss
Years Ended December 31, 2019 and 2018

<i>(in millions of Korean won, except per share amounts)</i>	Notes	2019	2018
Revenue	31	22,312,561	23,315,318
Cost of sales	23, 31	<u>(18,320,366)</u>	<u>(18,764,050)</u>
Gross profit		3,992,195	4,551,268
Selling and administrative expenses	22, 23, 31	<u>(3,409,770)</u>	<u>(2,597,650)</u>
Operating profit		582,425	1,953,618
Finance income	5, 25	328,468	291,231
Finance costs	5, 25	(275,665)	(189,088)
Other non-operating income	5, 26	401,066	267,347
Other non-operating expenses	5, 27	<u>(590,472)</u>	<u>(346,917)</u>
Profit before income tax	32	445,822	1,976,191
Income tax expense	28	<u>(79,898)</u>	<u>(395,127)</u>
Profit for the year		<u>365,924</u>	<u>1,581,064</u>
Earnings per share for profit for the year (in won)	29		
Basic earnings per ordinary share		4,771	20,632
Basic earnings per preferred share		4,821	20,682
Diluted earnings per ordinary share		4,527	20,457
Diluted earnings per preferred share		4,577	20,507

The above separate statements of profit or loss should be read in conjunction with the accompanying notes.

LG Chem, Ltd.
Separate Statements of Comprehensive Income
Years Ended December 31, 2019 and 2018

(in millions of Korean won)

	Notes	2019	2018
Profit for the year		<u>365,924</u>	<u>1,581,064</u>
Other comprehensive income			
<i>Items that will not be reclassified to profit or loss</i>			
Remeasurements of net defined benefit liability	16	(68,778)	(74,357)
Gain (loss) on valuation of financial assets at fair value through other comprehensive income		35,079	(12,865)
Income tax relating to these items		9,267	23,986
<i>Items that may be subsequently reclassified to profit or loss</i>			
Cash flow hedges		39,848	(18,477)
Income tax relating to these items		<u>(10,958)</u>	<u>5,081</u>
Other comprehensive income for the year, net of tax		<u>4,458</u>	<u>(76,632)</u>
Total comprehensive income for the year		<u><u>370,382</u></u>	<u><u>1,504,432</u></u>

The above separate statements of comprehensive income should be read in conjunction with the accompanying notes.

LG Chem, Ltd.
Separate Statements of Changes in Equity
Years Ended December 31, 2019 and 2018

<i>(in millions of Korean won)</i>	Notes	Share capital	Capital surplus	Other components of equity	Accumulated other comprehensive income	Retained earnings	Total equity
Balance at January 1, 2018		391,406	2,283,378	(354,945)	(2,802)	13,188,495	15,505,532
Comprehensive income							
Profit for the year		-	-	-	-	1,581,064	1,581,064
Remeasurements of net defined benefit liability	16	-	-	-	-	(53,909)	(53,909)
Loss on valuation of financial assets at fair value through other comprehensive income		-	-	-	(9,327)	-	(9,327)
Cash flow hedges		-	-	-	(13,396)	-	(13,396)
Total comprehensive income for the year		-	-	-	(22,723)	1,527,155	1,504,432
Transactions with owners							
Dividends	30	-	-	-	-	(460,058)	(460,058)
Total transactions with owners		-	-	-	-	(460,058)	(460,058)
Balance at December 31, 2018		391,406	2,283,378	(354,945)	(25,525)	14,255,592	16,549,906
Balance at January 1, 2019		391,406	2,283,378	(354,945)	(25,525)	14,255,592	16,549,906
Comprehensive income							
Profit for the year		-	-	-	-	365,924	365,924
Remeasurements of net defined benefit liability	16	-	-	-	-	(49,864)	(49,864)
Gain on valuation of financial assets at fair value through other comprehensive income		-	-	-	25,432	-	25,432
Cash flow hedges		-	-	-	28,890	-	28,890
Total comprehensive income for the year		-	-	-	54,322	316,060	370,382
Transactions with owners							
Dividends	30	-	-	-	-	(460,058)	(460,058)
Total transactions with owners		-	-	-	-	(460,058)	(460,058)
Balance at December 31, 2019		391,406	2,283,378	(354,945)	28,797	14,111,594	16,460,230

The above separate statements of changes in equity should be read in conjunction with the accompanying notes.

LG Chem, Ltd.
Separate Statements of Cash Flows
Years Ended December 31, 2019 and 2018

<i>(in millions of Korean won)</i>	Notes	2019	2018
Cash flows from operating activities			
Cash generated from operations	32	2,408,957	2,506,358
Interest received		26,999	38,782
Interest paid		(95,195)	(52,022)
Dividends received		84,910	115,324
Income taxes paid		(482,520)	(583,595)
Net cash inflow from operating activities		<u>1,943,151</u>	<u>2,024,847</u>
Cash flows from investing activities			
Decrease in other receivables		554	872,530
Decrease in other non-current receivables		20,555	16
Proceeds from disposal of investments in associates		16,149	19,714
Proceeds from disposal of investments in subsidiaries		12,108	-
Proceeds from disposal of financial instruments		1,116	8,463
Proceeds from disposal of property, plant and equipment		80,822	415,478
Proceeds from disposal of intangible assets		19,410	600
Government grants received		7,076	-
Increase in other receivables		-	(340,000)
Increase in other non-current receivables		(411,186)	(22,490)
Acquisition of investments in subsidiaries		(1,500,123)	(1,227,367)
Acquisition of investments in associates and joint ventures		(46,526)	(33,490)
Acquisition of financial instruments		(10,750)	(83,629)
Acquisition of property, plant and equipment		(2,800,070)	(2,515,595)
Acquisition of intangible assets		(250,894)	(107,775)
Business combination		(529)	(3,491)
Net cash outflow from investing activities		<u>(4,862,288)</u>	<u>(3,017,036)</u>
Cash flows from financing activities			
Proceeds from borrowings		2,763,638	1,640,502
Repayments of borrowings		(63,259)	(134,260)
Dividends		(460,058)	(460,058)
Net cash inflow from financing activities		<u>2,240,321</u>	<u>1,046,184</u>
Net increase (decrease) in cash and cash equivalents		(678,816)	53,995
Cash and cash equivalents at the beginning of the year		1,690,862	1,649,689
Effects of exchange rate changes on cash and cash equivalents		(9,783)	(12,822)
Cash and cash equivalents at the end of year in the separate statement of financial position		<u>1,002,263</u>	<u>1,690,862</u>

The above separate statements of cash flows should be read in conjunction with the accompanying notes.

LG Chem, Ltd.

Notes to the Separate Financial Statements

December 31, 2019 and 2018

1. General Information

LG Chem, Ltd. (the Company) was spun off on April 1, 2001, from LG Chem Investment Ltd. (now, LG Corp., formerly, LG Chemical Ltd.).

As at December 31, 2019, the Company has its manufacturing facilities in Yeosu, Daesan, Ochang, Cheongju, Ulsan, Naju, Iksan, Paju, Osong, Onsan and Gimcheon.

The Company is authorized to issue 292 million shares of ordinary shares with par value of ₩ 5,000 per share. As at December 31, 2019, the Company has issued 70,592,343 ordinary shares (₩ 352,962 million) and 7,688,800 preferred shares (₩ 38,444 million). The largest shareholder of the Company is LG Corp., which owns 33.34% of the Company's ordinary shares. Preferred shareholders have no voting rights but are entitled to receive dividends at a rate 1% more than those paid to ordinary shareholders.

2. Summary of Significant Accounting Policies

The principal accounting policies applied in the preparation of these separate financial statements are set out below. These policies have been consistently applied to all the years presented, unless otherwise stated.

2.1 Basis of Preparation

The Company maintains its accounting records in Korean won and prepares statutory financial statements in the Korean language (Hangul) in accordance with International Financial Reporting Standards as adopted by the Republic of Korea (Korean IFRS). The accompanying separate financial statements have been condensed, restructured and translated into English from the Korean language financial statements.

The separate financial statements of the Company have been prepared in accordance with Korean IFRS. These are the standards, subsequent amendments and related interpretations issued by the International Accounting Standards Board (IASB) that have been adopted by the Republic of Korea.

The financial statements have been prepared on a historical cost basis, except for the following:

- Certain financial assets and liabilities (including derivative instruments) – measured at fair value
- Assets held for sale – measured at fair value less costs to sell, and
- Defined benefit pension plans – plan assets measured at fair value.

The preparation of financial statements requires the use of critical accounting estimates. Management also needs to exercise judgement in applying the Company's accounting policies. The areas involving a higher degree of judgment or complexity, or areas where assumptions and estimates are significant to the separate financial statements are disclosed in Note 4.

2.2 Changes in Accounting Policy and Disclosures

(a) New and amended standards adopted by the Company

LG Chem, Ltd.
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The Company has applied the following standards and amendments for the first time for their annual reporting period commencing January 1, 2019.

- Enactment of Korean IFRS 1116 *Leases*

Under the new standard, with implementation of a single lease model, lessee is required to recognize assets and liabilities for all lease which lease term is over 12 months and underlying assets are not low value assets. A lessee is required to recognize a right-of-use asset and a lease liability representing its obligation to make lease payments.

With implementation of Korean IFRS 1116 Lease, the Company has changed accounting policy. The Company has adopted Korean IFRS 1116 retrospectively, as permitted under the specific transitional provisions in the standard, and recognized the cumulative impact of initially applying the standard as at January 1, 2019, the date of initial application. The Company has not restated comparatives for the 2018 reporting period. The impact of the adoption of the leasing standard and the new accounting policies are disclosed in Note 11.

- Amendment to Korean IFRS 1109 *Financial Instruments – Prepayment Features with Negative Compensation*

The narrow-scope amendments made to Korean IFRS 1109 Financial Instruments enable entities to measure certain prepayable financial assets with negative compensation at amortized cost. When a modification of a financial liability measured at amortized cost that does not result in the derecognition, a modification gain or loss shall be recognized in profit or loss. The amendment does not have a significant impact on the financial statements.

- Amendments to Korean IFRS 1019 *Employee Benefits – Amendment, Curtailment or Settlement of the Plan*

The amendments require that an entity shall calculate current service cost and net interest for the remainder of the reporting period after a plan amendment, curtailment or settlement based on updated actuarial assumptions from the date of the change. The amendments also require that a reduction in a surplus must be recognized in profit or loss even if that surplus was not previously recognized because of the impact of the asset ceiling. The amendment does not have a significant impact on the financial statements.

- Amendments to Korean IFRS 1028 *Investments in Associates and Joint Ventures – Long-term Interests in Associates and Joint Ventures*

The amendments clarify that an entity shall apply Korean IFRS 1109 to financial instruments in an associate or joint venture to which the equity method is not applied. These include long-term interests that, in substance, form part of the entity's net investment in an associate or joint venture. The amendment does not have a significant impact on the financial statements.

LG Chem, Ltd.
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- Enactment to Interpretation of Korean IFRS 2123 *Uncertainty over Income Tax Treatments*

The Interpretation explains how to recognize and measure deferred and current income tax assets and liabilities where there is uncertainty over a tax treatment, and includes guidance on how to determine whether each uncertain tax treatment is considered separately or together. It also presents examples of circumstances where a judgement or estimate is required to be reassessed. The amendment does not have a significant impact on the financial statements.

- Annual Improvements to *Korean IFRS 2015 – 2017 Cycle*:

- Amendments to Korean IFRS 1103 *Business Combination*

The amendments clarify that when a party to a joint arrangement obtains control of a business that is a joint operation, and had rights to the assets and obligations for the liabilities relating to that joint operation immediately before the acquisition date, the transaction is a business combination achieved in stages. In such cases, the acquirer shall remeasure its entire previously held interest in the joint operation. The amendment does not have a significant impact on the financial statements.

- Amendments to Korean IFRS 1111 *Joint Agreements*

The amendments clarify that when a party that participates in, but does not have joint control of, a joint operation might obtain joint control of the joint operation in which the activity of the joint operation constitutes a business. In such cases, previously held interests in the joint operation are not remeasured. The amendment does not have a significant impact on the financial statements.

- Amendments to Paragraph 57A of Korean IFRS 1012 *Income Tax*

The amendment is applied to all the income tax consequences of dividends and requires an entity to recognize the income tax consequences of dividends in profit or loss, other comprehensive income or equity according to where the entity originally recognized those past transactions or events. The amendment does not have a significant impact on the financial statements.

- Korean IFRS 1023 *Borrowing Costs*

The amendments clarify that if a specific borrowing remains outstanding after the related qualifying asset is ready for its intended use (or sale), it becomes part of general borrowings. The amendment does not have a significant impact on the financial statements.

(b) New standards and interpretations not yet adopted by the Company

The following new accounting standards and interpretations have been published that are not mandatory for December 31, 2019 reporting periods and have not been early adopted by the Company.

LG Chem, Ltd.

Notes to the Separate Financial Statements

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- Amendments to Korean IFRS 1001 *Presentation of Financial Statements and Korean IFRS 1008 Accounting policies, changes in accounting estimates and errors – Definition of Material*

The amendments clarify the explanation of the definition of material and amended Korean IFRS 1001 and Korean IFRS 1008 in accordance with the clarified definitions. Materiality is assessed by reference to omission or misstatement of material information as well as effects of immaterial information, and to the nature of the users when determining the information to be disclosed by the Company. These amendments should be applied for annual periods beginning on or after January 1, 2020, and earlier application of permitted. The Company does not expect that these amendments have a significant impact on the financial statements.

- Amendments to Korean IFRS 1103 *Business Combination – Definition of a Business*

To consider the integration of the required activities and assets as a business, the amended definition of a business requires an acquisition to include an input and a substantive process that together significantly contribute to the ability to create outputs and excludes economic benefits from the lower costs. An entity can apply a concentration test, an optional test, where substantially all of the fair value of gross assets acquired is concentrated in a single asset or a group of similar assets, the assets acquired would not represent a business. These amendments should be applied for annual periods beginning on or after January 1, 2020, and earlier application of permitted. The Company does not expect that these amendments have a significant impact on the financial statements.

2.3 Subsidiaries, Joint Ventures, and Associates

The financial statements of the Company are the separate financial statements prepared in accordance with Korean IFRS 1027 *Separate Financial Statements*. Investments in subsidiaries, joint ventures and associates are recognized at cost under the direct equity method. Management applied the carrying amounts under the previous K-GAAP at the time of transition to Korean IFRS as deemed cost of investments. The Company recognizes dividend income from subsidiaries, joint ventures and associates in profit or loss when its right to receive the dividend is established.

2.4 Foreign Currency Translation

(a) *Functional and presentation currency*

Items included in the financial statements of each of the Company are measured using the currency of the primary economic environment in which each entity operates (the “functional currency”). The financial statements are presented in Korean won, which is the Company’s functional and presentation currency.

(b) *Transactions and balances*

Foreign currency transactions are translated into the functional currency using the exchange rates at the dates of the transactions. Foreign exchange gains and losses resulting from the settlement of such transactions and from the translation of monetary assets and liabilities denominated in foreign currencies at year end exchange rates are generally recognized in profit or loss. They are recognized in other comprehensive income if they relate to qualifying cash flow hedges and qualifying effective portion of net investment hedges, or are attributable to monetary part of the net investment in a foreign operation.

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Foreign exchange gains and losses that relate to borrowings are presented in the statement of profit or loss, within finance costs. All other foreign exchange gains and losses are presented in the statement of profit or loss within 'other income or other expenses'.

Translation differences on equities held at fair value through other comprehensive income are recognized in other comprehensive income.

2.5 Cash and Cash Equivalents

Cash and cash equivalents includes cash in hand, deposits held at call with banks, other short-term highly liquid investments with original maturities of three months or less.

2.6 Financial Assets

(a) Classification

The Company classifies its financial assets in the following measurement categories:

- those to be measured subsequently at fair value (either through other comprehensive income, or through profit or loss), and
- those to be measured at amortized cost

The classification depends on the entity's business model for managing the financial assets and the contractual terms of the cash flows.

For financial assets measured at fair value, gains and losses are recorded in either profit or loss or other comprehensive income. For investments in debt instruments, this will depend on the business model in which the investment is held. The Company reclassifies debt investments only when its business model for managing those assets changes.

For investments in equity instruments that are not held for trading, this will depend on whether the Company has made an irrevocable election at the time of initial recognition to account for the equity investment at fair value through other comprehensive income.

(b) Measurement

At initial recognition, the Company measures a financial asset at its fair value plus, in the case of a financial asset not at fair value through profit or loss, transaction costs that are directly attributable to the acquisition of the financial asset. Transaction costs of financial assets carried at fair value through profit or loss are expensed in profit or loss.

Financial assets with embedded derivatives are considered in their entirety when determining whether their cash flows are solely payment of principal and interest.

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A. Debt instruments

Subsequent measurement of debt instruments depends on the Company's business model for managing the asset and the cash flow characteristics of the asset. The Company classifies its debt instruments into one of the following three measurement categories:

- Amortized cost: Assets that are held for collection of contractual cash flows where those cash flows represent solely payments of principal and interest are measured at amortized cost. A gain or loss on a debt investment that is subsequently measured at amortized cost and is not part of a hedging relationship is recognized in profit or loss when the asset is derecognized or impaired. Interest income from these financial assets is included in 'finance income' using the effective interest rate method.
- Fair value through other comprehensive income: Assets that are held for collection of contractual cash flows and for selling the financial assets, where the assets' cash flows represent solely payments of principal and interest, are measured at fair value through other comprehensive income. Movements in the carrying amount are taken through other comprehensive income, except for the recognition of impairment loss (reversal of impairment loss), interest income and foreign exchange gains and losses which are recognized in profit or loss. When the financial asset is derecognized, the cumulative gain or loss previously recognized in other comprehensive income is reclassified from equity to profit or loss. Interest income from these financial assets is included in 'finance income' using the effective interest rate method. Foreign exchange gains and losses are presented in 'finance income/costs' or 'other non-operating income/expenses' and impairment loss is presented in 'other non-operating expenses'.
- Fair value through profit or loss: Assets that do not meet the criteria for amortized cost or fair value through other comprehensive income are measured at fair value through profit or loss. A gain or loss on a debt investment that is subsequently measured at fair value through profit or loss and is not part of a hedging relationship is recognized in profit or loss and presented net in the statement of profit or loss within 'finance income/costs' or 'other non-operating income/expenses' in the period in which it arises.

B. Equity instruments

The Company subsequently measures all equity investments at fair value. Where the Company's management has elected to present fair value gains and losses on equity investments, which held for long-term investment or strategic purpose, in other comprehensive income, there is no subsequent reclassification of fair value gains and losses to profit or loss following the derecognition of the investment. Dividend income from such investments continue to be recognized in profit or loss as 'finance income' when the right to receive payments is established. Changes in the fair value of financial assets at fair value through profit or loss are recognized in 'Finance income or costs' in the statement of profit or loss as applicable. Impairment loss (reversal of impairment loss) on equity investments measured at fair value through other comprehensive income are not reported separately from other changes in fair value.

(c) Impairment

The Company assesses on a forwardlooking basis the expected credit losses associated with its debt instruments carried at amortized cost and fair value through other comprehensive income. The impairment methodology applied depends on whether there has been a significant increase in credit risk. For trade receivables and lease receivables, the Company applies the simplified approach, which requires expected lifetime credit losses to be recognized from initial recognition of the receivables.

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(d) Recognition and Derecognition

Regular way purchases and sales of financial assets are recognized or derecognized on trade-date, the date on which the Company commits to purchase or sell the asset. Financial assets are derecognized when the rights to receive cash flows from the financial assets have expired or have been transferred and the Company has transferred substantially all the risks and rewards of ownership.

If a transfer does not result in derecognition because the Company has retained substantially all the risks and rewards of ownership of the transferred asset, the Company continues to recognize the transferred asset in its entirety and recognizes a financial liability for the consideration received. The Company classified the financial liability as “borrowings” in the statement of financial position.

2.7 Derivative Financial Instruments

Derivatives are initially recognized at fair value on the date a derivative contract is entered into and are subsequently remeasured to their fair value at the end of each reporting period. The accounting for subsequent changes in fair value depends on whether the derivative is designated as a hedging instrument, and if so, the nature of the item being hedged. The Company has hedge relationships and designates certain derivatives as either:

- hedges of the fair value of recognized assets or liabilities or a firm commitment (fair value hedges)
- hedges of a particular risk associated with the cash flows of recognized assets and liabilities and highly probable forecast transactions (cash flow hedges), or
- hedges of a net investment in a foreign operation (net investment hedges)

At inception of the hedge relationship, the Company documents the economic relationship between hedging instruments and hedged items including whether changes in the cash flows of the hedging instruments are expected to offset changes in the cash flows of hedged items.

The full fair value of a hedging derivative is classified as a non-current asset or liability when the remaining maturity of the hedged item is more than 12 months; it is classified as a current asset or liability when the remaining maturity of the hedged item is less than 12 months. A non-derivative financial asset and a non-derivative financial liability is classified as a current or non-current based on its expected maturity and its settlement, respectively.

Cash flow hedge

The effective portion of changes in the fair value of derivatives that are designated and qualify as cash flow hedges is recognized in the cash flow hedge reserve within equity, limited to the cumulative change in fair value (present value) of the hedged item (the present value of the cumulative change in the future expected cash flows of the hedged item) from the inception of the hedge. The ineffective portion is recognized in ‘other non-operating income (expenses)’.

When option contracts are used to hedge forecast transactions, the Company designates only the intrinsic value of the option contract as the hedging instrument. Gains or losses relating to the effective portion of the change in intrinsic value of the option contracts are recognized in the cash flow hedge reserve within equity. The changes in the time value of the option contracts that relate to the hedged item (‘aligned time value’) are recognized within the costs of hedging in other comprehensive income within equity.

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When forward contracts are used to hedge forecast transactions, the Company generally designates only the change in fair value of the forward contract related to the spot element as the hedging instrument. Gains or losses relating to the effective portion of the change in the spot element of the forward contracts are recognized in the cash flow hedge reserve within equity. The change in the forward element of the contract that relates to the hedged item is recognized within other comprehensive income within equity. In some cases, the Company may designate the full change in fair value of the forward contract (including forward points) as the hedging instrument. In such cases, the gains or losses relating to the effective portion of the change in fair value of the entire forward contract are recognized in the cash flow hedge reserve within equity.

Amounts accumulated in equity are reclassified in the periods when the hedged item affects profit or loss, as follows:

- Where the hedged item subsequently results in the recognition of a non-financial asset (such as inventory), both the deferred hedging gains and losses and the deferred time value of the option contracts or deferred forward points, if any, are included within the initial cost of the asset. The deferred amounts are ultimately recognized in profit or loss as the hedged item affects profit or loss (for example through cost of sales).
- The gain or loss relating to the effective portion of the interest rate swaps hedging variable rate borrowings is recognized in profit or loss within 'finance cost' at the same time as the interest expense on the hedged borrowings.

When a hedging instrument expires, or is sold, terminated, exercised, or when a hedge no longer meets the criteria for hedge accounting, any accumulated cash flow hedge reserve at that time remains in equity until the forecast transaction occurs, resulting in the recognition of a non-financial asset such as inventory. When the forecast transaction is no longer expected to occur, the cash flow hedge reserve and deferred costs of hedging that were reported in equity are immediately reclassified to profit or loss.

Changes in the fair value of any derivative instrument that does not qualify for hedge accounting are recognized immediately in profit or loss within 'other non-operating income (expenses)' or 'finance income (costs)' based on the nature of transactions.

2.8 Trade Receivables

At initial recognition, trade receivables are measured at the amount of unconditional consideration, unless the trade receivables contain a significant financing component. Trade receivables are subsequently measured at amortized cost using the effective interest method, less loss allowance.

2.9 Inventories

Inventories are stated at the lower of cost and net realizable value. Cost is determined using weighted average cost method, except for goods in transit which is determined using the specific identification method.

2.10 Assets Held for sale

Assets are classified as held for sale when their carrying amount will be recovered principally through a sale transaction rather than through continuing use and a sale is considered highly probable. The assets are measured at the lower amount between their carrying amount and the fair value less costs to sell.

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2.11 Property, Plant and Equipment

Property, plant and equipment are stated at historical cost less accumulated depreciation and accumulated impairment losses. Historical cost includes expenditure that is directly attributable to the acquisition of the items. Depreciation of all property, plant and equipment, except for land, is calculated using the straight-line method to allocate their cost or revalued amounts, net of their residual values, over their estimated useful lives as follows:

	Useful lives
Buildings	25 - 50 years
Structures	15 - 50 years
Machinery	4 - 15 years
Others	1-15 years

The assets' depreciation method, residual values and useful lives are reviewed, and adjusted if appropriate, at the end of each reporting period.

2.12 Investment Property

Investment property is property held to earn rentals or for capital appreciation or both. An investment property is measured initially at its cost. An investment property is measured after initial measurement at depreciated cost (less any accumulated impairment losses.) The Company depreciates investment properties, except for land, using the straight-line method over their useful lives of 25 ~ 50 years.

2.13 Borrowing Costs

General and specific borrowing costs that are directly attributable to the acquisition, construction or production of a qualifying asset are capitalized during the period of time that is required to complete and prepare the asset for its 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. Other borrowing costs are expensed in the period in which they are incurred.

2.14 Government Grants

Grants from the government are recognized at their fair value where there is a reasonable assurance that the grant will be received and the Company will comply with all attached conditions. Government grants related to assets are presented in the statement of financial position by deducting the grant in arriving at the carrying amount of the asset, and government grants related to income are deferred and later deducted from the related expense.

2.15 Intangible Assets

The excess of consideration transferred and amount of acquisition-date fair value of any previous equity interest in the acquired entity over the fair value of the net identifiable assets acquired is recorded as goodwill. Goodwill is carried at its cost less accumulated impairment losses. Impairment losses on goodwill are not reversed.

Intangible assets, except for goodwill, are initially recognized at its historical cost, and carried at cost less accumulated amortization and accumulated impairment losses.

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Development costs that are directly attributable to internally generated by the Company are recognized when the criteria; such as, technically feasible, generate probable future economic benefits and other, are met. Membership rights that have an indefinite useful life are not subject to amortization because there is no foreseeable limit to the period over which the assets are expected to be utilized. The Company amortizes intangible assets with a limited useful life using the straight-line method over the following periods:

	Useful lives
Development costs	3 - 15 years
Industrial property rights	5 - 15 years
Other intangible assets	6 - 20 years

2.16 Research and Development

Costs associated with research are recognized as an expense as incurred. Costs that are identifiable, controllable and directly attributable to development projects are recognized as intangible assets when the following criteria are met:

- It is technically feasible to complete the development project so that it will be available for use;
- Management intends to complete the development project for its own use or selling;
- There is an ability to use or sell the development project;
- It can be demonstrated how the development project will generate probable future economic benefits;
- Adequate technical, financial resources and other resources to complete the development and to use or sell the development project are available; and
- The expenditure attributable to the development project during its development can be reliably measured.

Generally, internally generated development projects have the following stages; formulation and selection of a project, verification of idea and technology, development and testing, decision of commercialization, test of final application. Expenditures can be capitalized as intangible assets only after the decision of commercialization. Expenditures incurred in other stages are recognized as expenses on the research phase.

Internally generated development projects in the Life Sciences business have the following stages; formulation of potential candidates, preclinical research, clinical researches such as phase 1, 2 and 3 trials, approval of regulatory body and new product launch. Expenditures incurred from new drug development project are recognized as expensed on the research phase. However, expenditures incurred during clinical phase 1~3 trials from development projects for generic drugs or biosimilars are recognized as intangible assets depending on the nature of the products.

Expenditures incurred from technology license agreement with the third parties are recognized as intangible assets.

Development costs previously recognized as an expense are not recognized as an asset in a subsequent period. Capitalized development costs that are recognized as intangible assets are amortized using the straight-line method over their estimated useful lives when the assets are available for use and are tested for impairment.

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2.17 Impairment of Non-financial Assets

Goodwill and intangible assets that have an indefinite useful life are not subject to amortization and are tested annually for impairment, or more frequently if events or changes in circumstances indicate that they might be impaired. Other assets are tested for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. An impairment loss is recognized for the amount by which the asset's carrying amount exceeds its recoverable amount. The recoverable amount is the higher of an asset's fair value less costs of disposal and value in use. Non-financial assets other than goodwill that suffered an impairment are reviewed for possible reversal of the impairment at the end of each reporting period.

2.18 Trade and Other Payables

Trade and other payables represent unpaid liabilities for goods and services provided to the Group prior to the end of reporting period. Trade and other payables are presented as current liabilities, unless payment is due after 12 months from the end of reporting period. They are recognized initially at their fair value and subsequently measured at amortized cost using the effective interest method.

2.19 Financial Liabilities

(a) Classification and measurement

The Company's financial liabilities at fair value through profit or loss are financial instruments held for trading. A financial liability is held for trading if it is incurred principally for the purpose of repurchasing in the near term. A derivative that is not a designated as hedging instruments and an embedded derivative that is separated are also classified as held for trading.

The Company classifies non-derivative financial liabilities, except for financial liabilities at fair value through profit or loss, financial guarantee contracts and financial liabilities that arise when a transfer of financial assets does not qualify for derecognition, as financial liabilities carried at amortized cost and present as 'trade payables', 'borrowings', and 'other payables' in the statement of financial position.

(b) Derecognition

Financial liability is removed from the statement of financial position when, and only when, the obligation specified in the contract is discharged or cancelled or expired or when the terms of an existing financial liability are substantially modified. The difference between the carrying amount of a financial liability extinguished or transferred to another party and the consideration paid (including any non-cash assets transferred or liabilities assumed) is recognized in profit or loss.

2.20 Financial Guarantee Contracts

Financial guarantee contract is recognized as a financial liability at the time the guarantee is issued. The liability is initially measured at fair value, recognized in the statement of financial position within 'other financial liabilities' at the higher of the following.

- the amount determined in accordance with the expected credit loss model under Korean IFRS 1109 *Financial Instruments* and
- the amount initially recognized less, where appropriate, the cumulative amount of income recognized in accordance with Korean IFRS 1115 *Revenue from Contracts with Customers*

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2.21 Compound Financial Instruments

Compound financial instruments issued by the Company are convertible notes that can be converted into equity instruments at the option of the holder.

The liability component of a compound financial instrument is recognized initially at the fair value of each component. The bond component is subsequently recognized at amortized cost until extinguished on conversion or maturity of the bonds. The conversion option component is subsequently recognized at fair value through profit or loss. Any directly attributable transaction costs are allocated to the liability and equity components in proportion to their initial carrying amounts.

2.22 Current and Deferred Tax

The tax expense for the period consists of current and deferred tax. Current and deferred tax is recognized in profit or loss, except to the extent that it relates to items recognized in other comprehensive income or directly in equity. In this case, the tax is also recognized in other comprehensive income or directly in equity, respectively.

The current income tax expense is measured at the amount expected to be paid to the taxation authorities, using the tax rates (and tax laws) that have been enacted or substantively enacted by the end of the reporting period. Management periodically evaluates positions taken in tax returns with respect to situations in which applicable tax regulation is subject to interpretation. The Company recognizes current income tax on the basis of amounts expected to be paid to the tax authorities.

Deferred income tax is provided in full, using the liability method, on temporary differences arising between the tax bases of assets and liabilities and their carrying amounts in the separate financial statements. However, deferred income tax is not accounted for if it arises from initial recognition of an asset or liability in a transaction other than a business combination that at the time of the transaction affects neither accounting nor taxable profit or loss.

Deferred tax assets are recognized only if it is probable that future taxable amounts will be available to utilize those temporary differences and losses.

The Company recognizes a deferred tax liability all taxable temporary differences associated with investments in subsidiaries, associates, and interests in joint arrangements, except to the extent that the Company is able to control the timing of the reversal of the temporary difference and it is probable that the temporary difference will not reverse in the foreseeable future. In addition, The Company recognizes a deferred tax asset for all deductible temporary differences arising from such investments to the extent that it is probable the temporary difference will reverse in the foreseeable future and taxable profit will be available against which the temporary difference can be utilized.

Deferred tax assets and liabilities are offset when there is a legally enforceable right to offset current tax assets and liabilities and when the deferred tax balances relate to the same taxation authority. Current tax assets and tax liabilities are offset when the Company has a legally enforceable right to offset and intends either to settle on a net basis, or to realize the assets and settle the liability simultaneously.

2.23 Provisions

Provisions for warranties, site restorations, and legal claims are recognized when the Company has a present legal or constructive obligation as a result of past events, it is probable that an

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outflow of resources will be required to settle the obligation and the amount can be reliably estimated. Provisions are measured at the present value of management's best estimate of the expenditure required to settle the present obligation at the end of the reporting period, and the increase in the provision due to the passage of time is recognized as interest expense.

2.24 Greenhouse Gas Emissions Permits and Obligations

With enforcement of *The Act on the Allocation and Trading of Greenhouse Gas Emission Permits*, the permits that are received free of charge from the government are measured at zero while permits purchased are measured at acquisition cost and stated net of accumulated impairment loss. Emissions obligations are measured as the sum of the carrying amount of the allocated permits that will be submitted to the government and the best estimate of expenditure required to settle the obligation at the end of reporting period for any excess emission. The permits and emissions obligations are classified as intangible assets and provisions, respectively, in the statement of financial position.

2.25 Employee Benefits

(a) Post-employment benefits

The Company operates both defined contribution and defined benefit pension plans. For defined contribution plans, the Company pays contribution to publicly or privately administered pension insurance plans on mandatory, contractual or voluntary basis. The Company has no further payment obligation once the contribution have been paid. The contribution are recognized as employee benefit expense when they are due. A defined benefit plan is a pension plan that is not a defined contribution plan.

Generally, post-employment benefits are payable after the completion of employment, and the benefit amount depended on the employee's age, periods of service or salary levels. The liability recognized in the statement of financial position in respect of defined benefit pension plans is the present value of the defined benefit obligation at the end of the reporting period less the fair value of plan assets. The defined benefit obligation is calculated annually by independent actuaries using the projected unit credit method. The present value of the defined benefit obligation is determined by discounting the estimated future cash outflows using interest rates of high-quality corporate bonds that are denominated in the currency in which the benefits will be paid, and that have terms approximating to the terms of the related obligation. Remeasurement gains and losses arising from experience adjustments and changes in actuarial assumptions are recognized in the period in which they occur, directly in other comprehensive income.

Changes in the present value of the defined benefit obligation resulting from plan amendments or curtailments are recognized immediately in profit or loss as past service costs.

(b) Other long-term employee benefits

Certain entities within the Company provide long-term employee benefits that are entitled to employees with service period for ten years and above. The expected costs of these benefits are accrued over the period of employment using the same accounting methodology as used for defined benefit pension plans. The Company recognizes service cost, net interest on other long-term employee benefits and remeasurements as profit or loss for the years. These liabilities are valued annually by an independent qualified actuary.

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2.26 Revenue Recognition

(a) Identify performance obligation

With regard to the contract of selling products to the customer, the Company identifies the services provided separately to the customer as a different performance obligation. When the Company makes a sales contract with the customer, the standard warranty period for each product and customer is set up considering the legal warranty period. Even though the standard warranty period has been expired, the warranties are recognized as a revenue and is identified as a separate performance obligation when the Company provides additional warranties for the quality of product or when the customer has an option to purchase additional warranties separately.

(b) A performance obligation satisfied at a point in time

The revenue from the sale of goods is recognized at the time they are delivered to the customer. Delivery occurs when the products have been shipped to the specific location, the risks of obsolescence and loss have been transferred to the customer, and either the customer has accepted the products in accordance with the sales contract, the acceptance provisions have lapsed, or the Company has objective evidence that all criteria for acceptance have been satisfied.

The goods are often sold with volume discounts, and it is the Company's policy to sell its products to the customer with a right of return. Accumulated experience is used to estimate for the discounts and the refund, and the volume discounts is calculated based on the periodical forecast sales. The warranty provision for the sales and refund is reasonably estimated and recognized properly.

(c) Sales return

A gross contract liability for the expected refunds to customers is recognized as adjustment to revenue, and the Company has a right to recover the product from the customer where the customer exercises his right of return and recognizes an asset and a corresponding adjustment to cost of sales. A right to recover the products is measured at former carrying amount of the product less the costs to recover the products.

(d) Significant financing component

As a practical expedient, the Company need not adjust the promised amount of consideration for the effects of a significant financing component as the period between when the entity transfers a promised good or service to a customer and when the customer pays for that good or service is generally one year or less.

2.27 Lease

As explained in Note 2.2 above, the Company has changed its accounting policy for leases. The impact of the new accounting policies is disclosed in Note 11.

Lease activities and accounting policies of the Company

Lease income from operating leases where the Company is a lessor is recognized in income on a straight-line basis over the lease term. Initial direct costs incurred in obtaining an operating lease are added to the carrying amount of the underlying asset and recognized as expense over the lease term on the same basis as lease income. The respective leased assets are included in the statement of financial position based on their nature. The Company did not need to make

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any adjustments to the accounting for assets held as lessor as a result of adopting the new leasing standard.

The Company leases various machinery, real estate and cars. Lease contracts are typically made for fixed periods, but may have extension options. Lease terms are negotiated on an individual basis and contain a wide range of different terms and conditions. The lease agreements do not impose any covenants, but leased assets may not be used as security for borrowing purposes.

Contracts may contain both lease and non-lease components. The Group allocates the consideration in the contract to the lease and non-lease components based on their relative stand-alone prices. However, for leases of real estate for which the Group is lessee, the Group applies the practical expedient which has elected not to separate lease and non-lease components and instead accounts for these as a single lease component.

Until the 2018 financial year, leases of property, plant and equipment were classified as either finance or operating leases. Payments made under operating leases (net of any incentives received from the lessor) were charged to profit or loss on a straight-line basis over the period of the lease.

From January 1, 2019, leases are recognized as a right-of-use asset and a corresponding liability at the date at which the leased asset is available for use by the Company. Each lease payment is allocated between the liability and finance cost. The finance cost is charged to profit or loss over the lease period so as to produce a constant periodic rate of interest on the remaining balance of the liability for each period. The right-of-use asset is depreciated over the shorter of the asset's useful life and the lease term on a straight-line basis.

Assets and liabilities arising from a lease are initially measured on a present value basis. Lease liabilities include the net present value of the following lease payments:

- Fixed payments (including in-substance fixed payments), less any lease incentives receivable
- Variable lease payment that are based on an index or a rate, initially measured using the index or rate as at the commencement date
- Amounts expected to be payable by the Company (the lessee) under residual value guarantees
- The exercise price of a purchase option if the Company (the lessee) is reasonably certain to exercise that option, and
- Payments of penalties for terminating the lease, if the lease term reflects the Company (the lessee) exercising that option

The lease payments are discounted using the interest rate implicit in the lease. If that rate cannot be determined, the lessee's incremental borrowing rate is used, being the rate that the lessee would have to pay to borrow the funds necessary to obtain an asset of similar value in a similar economic environment with similar terms and conditions.

Right-of-use assets are measured at cost comprising the following:

- the amount of the initial measurement of lease liability
- any lease payments made at or before the commencement date less any lease incentives received

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- any initial direct costs, and
- restoration costs

Payments associated with short-term leases or leases of low-value assets are recognized on a straight-line basis as an expense in profit or loss. Short-term leases are leases with a lease term of 12 months or less. Low-value assets comprise IT-equipment and small items of office furniture.

(a) Variable lease payments

Some property leases contain variable payment terms that are linked to sales generated from a warehouse. Variable lease payments that depend on usage are recognized in profit or loss in the period in which the condition that triggers those payments occurs.

(b) Extension and termination options

Extension and termination options are included in a number of leases across the Company. These terms are used to maximize operational flexibility in terms of managing contracts. The majority of extension and termination options held are exercisable only by the Company and not by the respective lessor.

The Group determines the lease term as the non-cancellable period of a lease within the period for which the contract is enforceable, together with both (a) periods covered by an option to extend the lease if the lessee is reasonably certain to exercise that option; and (b) periods covered by an option to terminate the lease if the lessee is reasonably certain not to exercise that option. When both lessee and lessor have the right to terminate the lease without permission from the other party, the Group considers the contractual termination payments in determining the period for which the contract is enforceable.

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3. Financial Risk Management

3.1 Financial risk factors

The Company's activities expose it to a variety of financial risks: market risk, credit risk and liquidity risk. The Company's overall risk management program focuses on the unpredictability of financial markets and seeks to minimize potential adverse effects on the financial performance of the Company. The Company uses derivative financial instruments to hedge certain risk exposures.

Risk management is carried out by the Company's finance team under policies approved by the Corporate Management Committee. The finance team identifies, evaluates and hedges financial risks in close co-operation with the Company's operating units. The Corporate Management Committee reviews and approves written principles for overall risk management, as well as written policies covering specific areas, such as foreign exchange risk, interest rate risk, credit risk, use of derivative financial instruments and non-derivative financial instruments and investment of excess liquidity.

(a) Market risk

1) Foreign exchange risk

The Company operates internationally and is exposed to foreign exchange risk arising from foreign currency transactions, primarily with respect to the US dollar. Foreign exchange risk arises from future commercial transactions, recognized assets and liabilities.

Management has set up a policy to require Company companies to manage their foreign exchange risk against their functional currency. The Company manages maximum loss for currency risk exposures within acceptable range by using currency risk management model and hires employees who are exclusively responsible for currency risk management.

As at December 31, 2019 and 2018, the Company's monetary assets and liabilities denominated in currencies other than its functional currency, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
	Assets	Liabilities	Assets	Liabilities
USD	3,548,166	2,692,491	3,104,300	1,642,009
EUR	446,572	1,087,954	424,792	434,118
JPY	26,354	62,200	27,505	102,914
CNY and others	541,877	7,851	142,222	6,663

As at December 31, 2019 and 2018, if the Company's functional currency had weakened / strengthened by 10% against the US dollar with all other variables held constant, profit before income tax would have been affected as follows:

<i>(in millions of Korean won)</i>	2019		2018	
	10% Increase	10% Decrease	10% Increase	10% Decrease
USD	85,568	(85,568)	146,229	(146,229)

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The above sensitivity analysis has been performed for monetary assets and liabilities denominated in foreign currencies other than the Company's functional currency at the reporting date.

2) Price risk

The Company is exposed to equity securities price risk arises from investments held by the Company and classified in the separate statement of financial position either as available-for-sale or at fair value through profit or loss. The Company's equity investments are publicly traded and are related to the KOSDAQ, NASDAQ and HSI index.

The table below summarizes the impact of increases/decreases of the listed stock price index on the Company's equity before tax effects as at December 31, 2019 and 2018. The analysis is based on the assumption that the equity index has increased/decreased by 10% with all other variables held constant, and that all the Company's equity instruments moved in line with the index.

(in millions of Korean won)

	2019		2018	
	10% Increase	10% Decrease	10% Increase	10% Decrease
KOSDAQ	676	(676)	315	(315)
NASDAQ	819	(819)	168	(168)
HSI	7,944	(7,944)	7,798	(7,798)
	<u>9,439</u>	<u>(9,439)</u>	<u>8,281</u>	<u>(8,281)</u>

3) Interest rate risk

Interest rate risk is defined as the risk that the interest income or expenses arising from deposits and borrowings will fluctuate because of changes in future market interest rate. The interest rate risk mainly arises on floating rate deposits and borrowings. The objective of interest rate risk management lies in maximizing corporate value by minimizing uncertainty in interest rates fluctuations and net interest expense.

The Company adequately minimizes risks from interest rate fluctuations through various policies, such as sharing excess cash within the Company (internal cash sharing) to minimize external borrowings, avoiding high rate borrowings, reforming capital structure, managing an appropriate ratio of fixed rate borrowings and floating rate borrowings, monitoring a fluctuation of domestic and foreign interest rates daily, weekly and monthly, establishing alternatives, and balancing floating rate short-term borrowings with floating rate deposits.

The Company has no floating rate deposits and borrowings outstanding at the end of the reporting period.

(b) Credit risk

Credit risk arises from trade receivables that the Company holds, as well as debt instruments at amortized cost or fair value through other comprehensive income.

A. Trade receivables

The Company applies the simplified approach to measuring expected credit losses which uses a lifetime expected loss allowance for trade receivables. To measure the expected credit losses,

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trade receivables have been grouped based on shared credit risk characteristics and the days past due. The loss allowance provision as at December 31, 2019, is as follows. Expected credit losses include forward-looking information.

<i>(in millions of Korean won)</i>	Receivables not past due¹	Receivables past due but not impaired¹	Impaired receivables²	Total
December 31, 2019				
(Trade receivables)				
Gross carrying amount	3,374,960	607,497	3,524	3,985,981
Expected loss rate	0.0%	0.0%	65.0%	0.1%
Loss allowance provision	1,523	231	2,292	4,046
December 31, 2018				
(Trade receivables)				
Gross carrying amount	3,818,389	188,063	4,416	4,010,868
Expected loss rate	0.1%	0.2%	72.7%	0.1%
Loss allowance provision	2,278	460	3,210	5,948

¹ See Note 7 for aging analysis

² Impaired receivables are those for which impairment indicators have been confirmed, such as significant lack of collectability.

Movements in the loss allowance provision for trade receivables for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	Trade receivables	
	2019	2018
Beginning balance	5,948	5,531
Increase in loss allowance recognized in profit or loss during the year	(1,122)	750
Receivables written off during the year as uncollectible	(780)	(333)
Ending balance	4,046	5,948

As at December 31, 2019, the carrying amount of trade receivables representing the maximum exposure to credit risk amounts to ₩ 3,985,981 million (2018: ₩ 4,010,868 million).

B. Other financial at assets amortized cost

Movements in loss allowance provision for other financial assets at amortized cost for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Beginning balance	2,109	959
Increase in loss allowance recognized as 'other non-operating expenses' in profit or loss during the year	1,903	1,150

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Receivables written off during the year as uncollectible	(1,903)	-
Ending balance	2,109	2,109

All of the financial assets at amortized costs are considered to have low credit risk, and the loss allowance recognized during the period was, therefore, limited to 12 months expected losses.

The Company has established the following policies and procedures to manage credit risks.

To manage credit risks relating to trade receivables, the Company evaluates the credit rating of customers and determines credit limit for each customer based on the information provided by credit rating agencies and other available financial information before commencing business with customers. The credit risks relating to trade receivables are also mitigated by insurance contracts, collaterals as well as payment guarantees.

The Company has entered into export insurance contracts with Korea Trade Insurance Corporation to mitigate credit risks relating to export trade receivables to overseas customers. The Company is also provided with collaterals by customers depending on their credit rating or payment guarantees from the customers' financial institutions as necessary.

The Company has deposited its cash and cash equivalents, and other long-term deposits in several financial institutions, such as Woori Bank and others. The Company has also entered into derivative contract with several financial institutions. The Company maintains business relationship with those financial institutions with high credit ratings evaluated by independent credit rating agencies and accordingly, credit risks associated with these financial institutions are limited.

(c) Liquidity risk

The Company monitors rolling forecasts of the Company's liquidity requirements to ensure it has sufficient cash to meet operational needs while maintaining sufficient headroom on its undrawn committed borrowing facilities at all times so that the Company does not breach borrowing limits or covenants (where applicable) on any of its borrowing facilities. The Company's liquidity management policy involves projecting cash flows in major currencies and considering the level of liquid assets necessary to meet these, monitoring balance sheet liquidity ratios against internal and external regulatory requirements and maintaining debt financing plans.

1) The table below analyzes the Company's non-derivative financial liabilities into relevant maturity groupings based on the remaining period at the reporting date to the contractual maturity date. Cash flows presented below are gross cash flows before discount, and includes cash flows for interests.

(in millions of Korean won)

	2019			
	Less than 1 year	Between 1-2 years	Between 2-5 years	Over 5 years
Borrowings (excluding lease liabilities)	232,655	961,501	2,813,084	1,923,735
Lease liabilities	30,959	10,956	23,723	47,829
Trade and other payables ¹	3,938,050	8,190	43	-
Total	4,201,664	980,647	2,836,850	1,971,564

¹ Included ₩ 862,452 millions of financial liabilities due to a financial institution relating to reverse

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factoring arrangement. The Parent Company has entered into reverse factoring arrangement (interest rate: CD 91 days + 0.75~0.95%) with a financial institution whereby suppliers receive payments from the financial institution on the due date of each invoice and the Parent Company pays to the financial institution at the end of extended credit period as agreed in the reverse factoring arrangement.

(in millions of Korean won)

	2018			
	Less than 1 year	Between 1-2 years	Between 2-5 years	Over 5 years
Borrowings (excluding finance lease liabilities)	98,941	167,301	1,585,307	905,800
Finance lease liabilities	5,177	5,177	15,887	5,000
Trade and other payables	3,411,149	4,273	3,099	-
Total	3,515,267	176,751	1,604,293	910,800

2) As at December 31, 2019, the Company has entered into swap contracts for which cash flow hedge accounting is applied, to avoid market price fluctuation of raw materials.

(in millions of Korean won)

	2019				
	Purpose of the contracts	Hedged items	Financial institution	Maturity	Fair value
Merchandise (raw materials) swap ¹	Cash flow hedges	Non-ferrous metal	Citi bank	~2021.12	21,371

Details of derivative assets and liabilities as at December 31, 2019 and 2018, are as follows.

(in millions of Korean won)

	2019		2018	
	Assets	Liabilities	Assets	Liabilities
Merchandise(raw materials) swap ¹	21,371	-	-	18,477
Total	21,371	-	-	18,477

¹ Gain (loss) resulting from the contracts to avoid cash flow fluctuation risk of expected future transaction is accounted for as accumulated other comprehensive income And it is all effective to avoid cash flow fluctation risk. (Note 5).

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3) The table below analyzes the Company's financial guarantee contracts into relevant maturity groupings based on the remaining maturity as at the reporting date to the contractual maturity date.

<i>(in millions of Korean won)</i>	2019			
	Less than 1 year	Between 1-2 years	Between 2-5 years	Over 5 years
Financial guarantee contracts ¹	1,672,676	-	-	-
	2018			
	Less than 1 year	Between 1-2 years	Between 2-5 years	Over 5 years
Financial guarantee contracts ¹	622,415	-	-	-

¹ The Company has provided financial guarantee for subsidiaries. The amount represented the maximum amount of the guarantee as at December 31, 2019 and 2018, in which the guarantee could be called (Note 18).

3.2 Capital Risk Management

The Company's objectives when managing capital are to safeguard the Company's ability to continue as a going concern in order to provide returns for shareholders and benefits for other stakeholders and to maintain an optimal capital structure to reduce the cost of capital.

Consistent with others in the industry, the Company monitors capital on the basis of the gearing ratio. This ratio is calculated as net debt divided by total capital. Net debt is calculated as total borrowings less cash and cash equivalents. Total capital is calculated as 'equity' as shown in the statement of financial position plus net debt.

The gearing ratios and debt-to-equity ratios at December 31, 2019 and 2018, were as follows:

<i>(in millions of Korean won, except for ratios)</i>	2019	2018
Total borrowings (Note 14) (A)	5,324,007	2,491,714
Less: cash and cash equivalents (B)	<u>(1,002,263)</u>	<u>(1,690,862)</u>
Net debt (C=A+B)	4,321,744	800,852
Total liabilities (D)	10,566,856	7,180,672
Total equity (E)	<u>16,460,230</u>	<u>16,549,906</u>
Total capital (F=C+E)	20,781,974	17,350,758
Gearing ratio (C/F)	20.8%	4.6%
Debt-to-equity ratio (D/E)	64.2%	43.4%

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3.3 Fair Value

(a) Carrying amount and fair value of financial instruments by category as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Carrying amount	Fair value	Carrying amount	Fair value
Financial assets (current)				
Cash and cash equivalents	1,002,263	1	1,690,862	1
Trade receivables	3,981,935	1	4,004,920	1
Other receivables	366,141	1	321,866	1
Current derivative financial assets	10,879	10,879	-	-
Financial assets (non-current)				
Deposits held by financial institutions	106,621	1	63,421	1
Other receivables (excluding deposits held by financial institutions)	398,868	1	54,665	1
Other non-current financial assets (carried at fair value)				
Marketable financial assets (excluding derivative instruments)	83,172	83,172	49,212	49,212
Non-marketable financial assets ³	42,258	42,258	31,363	31,363
Non-current derivative financial assets	10,492	10,492	-	-
Financial liabilities (current)				
Trade and other payables	3,938,050	1	3,411,149	1
Current borrowings (excluding lease liabilities)	119,949	1	49,992	1
Current lease liabilities	29,177	2	5,008	1
Current derivative financial liabilities	-	-	18,477	18,477
Other current financial liabilities (excluding derivative liabilities)	27,194	1	10,679	1
Financial liabilities (non-current)				
Non-current borrowings (excluding lease liabilities)	5,109,507	5,212,400	2,413,478	2,467,921
Non-current lease liabilities	65,374	2	23,236	24,689
Other non-current payables	8,233	1	7,372	1
Other non-current financial liabilities (Conversion rights)	930	930	30,384	30,384

¹ These financial assets and liabilities are not included in the disclosure above as their carrying amount is a reasonable approximation of the fair value.

² Fair values for these financial assets and liabilities are not disclosed above in accordance with related Korean IFRS.

³ Acquisition costs of these financial assets approximate their fair values.

(b) Fair value for measurement and disclosure are determined based on the following method:

Fair values of financial liabilities (non-current) are based on cash outflows discounted using Korean won currency note yield in the same credit grade with the Company (AA+), and the

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applied discount rates as at December 31, 2019 and 2018, are as follows:

<i>(in percentage)</i>	2019	2018
Discount rate	1.63%~2.24%	2.01%~2.53%

(c) Fair Value Hierarchy

Items that are measured at fair value are categorized by the fair value hierarchy levels, and the defined levels are as follows:

- Quoted prices (unadjusted) in active markets for identical assets or liabilities that an entity can access at the measurement date (Level 1).
- All inputs other than quoted prices included in level 1 that are observable (either directly that is, prices, or indirectly that is, derived from prices) for the asset or liability (Level 2).
- Unobservable inputs for the asset or liability (Level 3).

Fair value hierarchy classifications of the financial instruments that are measured at fair value or its fair value is disclosed as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019			
	Level 1	Level 2	Level 3	Total
Financial assets/liabilities measured at fair value				
Other non-current financial assets (Marketable financial assets)	83,172	-	-	83,172
Other non-current financial assets (Non-Marketable financial assets)	-	-	42,258	42,258
Current derivative financial assets	-	10,879	-	10,879
Non-current derivative financial assets	-	10,492	-	10,492
Other non-current financial liabilities (Conversion rights)	-	-	930	930
Financial assets/liabilities not measured at fair value				
Non-current borrowings (excluding lease liabilities)	-	4,560,647	651,753	5,212,400

<i>(in millions of Korean won)</i>	2018			
	Level 1	Level 2	Level 3	Total
Financial assets/liabilities measured at fair value				
Other non-current financial assets (Marketable financial assets)	49,212	-	-	49,212
Other non-current financial assets (Non-Marketable financial assets)	-	-	31,363	31,363
Current derivative financial liabilities	-	18,477	-	18,477
Other non-current financial liabilities (Conversion rights)	-	-	30,384	30,384
Financial assets/liabilities not measured at fair value				
Non-current borrowings (excluding finance lease liabilities)	-	1,848,242	619,679	2,467,921
Non-current finance lease liabilities	-	24,689	-	24,689

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(d) Valuation Technique and the Inputs

Valuation techniques and inputs used in level 3 fair value measurements are as follows:

(in millions of Korean won)

	2019				
	Fair value	Level	Valuation Technique	Inputs	Coverage of Level 3 inputs
Financial liabilities					
- Convertible Bond					
Convertible Bond	651,753	3	Binominal option pricing model	Annual rates of credit volatility	-0.5%p ~ +0.5%p
Equity Conversion Option	930	3	Binominal option pricing model	Annual rates of credit volatility Underlying asset (equity) volatility	-0.5%p ~ +0.5%p -5% ~ +5%

(in millions of Korean won)

	2018				
	Fair value	Level	Valuation Technique	Inputs	Coverage of Level 3 inputs
Financial liabilities					
- Convertible Bond					
Convertible Bond	619,679	3	Binominal option pricing model	Annual rates of credit volatility	-0.5%p ~ +0.5%p
Equity Conversion Option	30,384	3	Binominal option pricing model	Annual rates of credit volatility Underlying asset (equity) volatility	-0.5%p ~ +0.5%p -5% ~ +5%

(e) Sensitivity analysis for Recurring Fair Value Measurements Categorized Within Level 3

Sensitivity analysis of financial instruments is performed to measure favorable and unfavorable changes in the fair value of financial instruments which are affected by the unobservable parameters, using a statistical technique. When the fair value is affected by more than two input parameters, the most favorable or most unfavorable amounts are presented.

The results of the sensitivity analysis for the effect on profit or loss from changes in inputs for convertible notes categorized as level 3 and subject to sensitivity analysis, are as follows:

(in millions of Korean won)

	2019	
	The effect on profit	The effect on loss
Financial liabilities		
- Convertible Bond		
Annual rates of credit volatility	4,130	(4,177)
Financial liabilities		
- Equity Conversion Option		
Annual rates of credit volatility	112	(107)

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Underlying asset (equity) volatility	497	(580)
<i>(in millions of Korean won)</i>	2018	
	The effect on profit	The effect on loss
Financial liabilities		
– Convertible Bond		
Annual rates of credit volatility	6,899	(7,011)
Financial liabilities		
– Equity Conversion Option		
Annual rates of credit volatility	985	(966)
Underlying asset (equity) volatility	3,237	(3,434)

4. Critical Accounting Estimates and Assumptions

The preparation of financial statements requires the Company to make estimates and assumptions concerning the future. Management also needs to exercise judgement in applying the Company's accounting policies. Estimates and assumptions are continually evaluated and are based on historical experience and other factors, including expectations of future events that are believed to be reasonable under the circumstances. The resulting accounting estimates may differ from the related actual results. The estimates and assumptions that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year are discussed below.

(a) Impairment test of goodwill

The Company tests whether goodwill has suffered any impairment on an annual basis. The recoverable amount of a cash generating unit (CGU) is determined based on value-in-use or fair value less cost of disposal calculations. (Note 12).

(b) Income taxes

The Company recorded, based on its best estimate, current taxes and deferred taxes that the Company will be liable in the future for the operating results as at the financial year end. However, the final tax outcome in the future may be different from the amounts that were initially recorded. Such differences will impact the current and deferred tax assets and liabilities in the period in which such determination is made.

(c) Provisions

The Company recognizes provisions for product warranties and estimated returns as explained in Note 15. These provisions are estimated based on past experience.

(d) Fair value of financial instruments

The fair value of financial instruments that are not traded in an active market is determined by using valuation techniques. The Company uses its judgment to select a variety of methods and make assumptions that are mainly based on market conditions existing at the end of each reporting period (Note 3.3).

(e) Impairment of financial assets

The provision for impairment for financial assets are based on assumptions about risk of default and expected loss rates. The Company uses judgement in making these assumptions and

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selecting the inputs to the impairment calculation based on the Company's past history, existing market conditions as well as forward looking estimates at the end of each reporting period (Note 3.1 (b)).

(f) Net defined benefit liability

The present value of net defined benefit liability depends on a number of factors that are determined on an actuarial basis using a number of assumptions including the discount rate (Note 16).

(g) Lease

In determining the lease term, management considers all facts and circumstances that create an economic incentive to exercise an extension option, or not exercise a termination option. Extension options (or periods after termination options) are only included in the lease term if the lease is reasonably certain to be extended (or not terminated).

When both lessee and lessor have the right to terminate the lease without permission from the other party, the Group considers the contractual termination payments in determining the period for which the contract is enforceable.

The lease term is reassessed if an option is actually exercised (or not exercised) or the Company becomes obliged to exercise (or not exercise) it. The assessment of reasonable certainty is only revised if a significant event or a significant change in circumstances occurs, which affects this assessment, and that is within the control of the lessee.

5. Financial Instruments by Category

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

Financial assets	2019				Total
	Financial assets at amortized cost	Financial assets at fair value through profit or loss	Financial assets at fair value through other comprehensive income	Other Financial Asset ¹	
Cash and cash equivalents	1,002,263	-	-	-	1,002,263
Trade receivables	3,770,420	-	211,515	-	3,981,935
Other receivables	358,794	-	7,347	-	366,141
Other non-current receivables	505,489	-	-	-	505,489
Other current financial assets	-	-	-	10,879	10,879
Other non-current financial assets	-	23,634	101,796	10,492	135,922
Total	5,636,966	23,634	320,658	21,371	6,002,629

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(in millions of Korean won)

	2019			
Financial liabilities	Financial liabilities at fair value through profit or loss	Financial liabilities at amortized cost	Other financial liabilities²	Total
Trade payables	-	1,738,053	-	1,738,053
Other payables	-	2,199,997	-	2,199,997
Borrowings (current)	-	119,949	29,177	149,126
Other current financial liabilities	-	-	27,194	27,194
Other non-current financial liabilities	930	-	-	930
Other non-current payables	-	8,233	-	8,233
Borrowings (non-current)	-	5,109,507	65,374	5,174,881
Total	930	9,175,739	121,745	9,298,414

(in millions of Korean won)

	2018			
Financial assets	Financial assets at amortized cost	Financial assets at fair value through profit or loss	Financial assets at fair value through other comprehensive income	Total
Cash and cash equivalents	1,690,862	-	-	1,690,862
Trade receivables	3,669,892	-	335,028	4,004,920
Other receivables	262,370	-	59,496	321,866
Other non-current receivables	118,086	-	-	118,086
Other non-current financial assets	-	15,677	64,898	80,575
Total	5,741,210	15,677	459,422	6,216,309

(in millions of Korean won)

	2018			
Financial liabilities	Financial liabilities at fair value through profit or loss	Financial liabilities at amortized cost	Other financial liabilities²	Total
Trade payables	-	1,940,124	-	1,940,124
Other payables	-	1,471,025	-	1,471,025
Borrowings (current)	-	49,992	5,008	55,000
Other current financial liabilities	-	-	29,156	29,156
Other non-current financial liabilities	30,384	-	-	30,384

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Other non-current payables	-	7,372	-	7,372
Borrowings (non-current)	-	2,413,478	23,236	2,436,714
Total	30,384	5,881,991	57,400	5,969,775

¹ Other financial assets include derivative assets that are not subject to the categorizations.

² Other financial liabilities include lease liabilities and derivatives liabilities that are not subject to the categorizations.

Net gains or losses on each category of financial instruments for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Dividend income		
Financial assets at fair value through other comprehensive income	1,512	123
Interest income		
Financial assets at amortized cost	34,614	36,073
Interest expense		
Financial liabilities at amortized cost	(116,361)	(59,729)
Financial assets at amortized cost ¹	(2,527)	(3,373)
Financial assets at fair value through other comprehensive income ¹	(3,019)	(1,473)
Other financial liabilities	(2,142)	(993)
Gain (loss) on valuation		
Financial assets at fair value through profit or loss	0	73
Derivative instruments	35,079	(11,807)
Financial assets at fair value through other comprehensive income	69,303	(15,721)
Loss on disposal		
Financial assets at fair value through other comprehensive income	-	(1,542)
Exchange differences		
Financial assets at amortized cost	80,416	93,007
Financial liabilities at amortized cost	(77,831)	(60,896)
Other financial liabilities	187	(739)

¹ Fees paid to financial institutions for factoring

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6. Cash and Cash Equivalents

Details of cash and cash equivalents as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Bank deposits and cash on hand	81,494	102,911
Deposits held by financial institutions and others	920,769	1,587,951
Total	<u>1,002,263</u>	<u>1,690,862</u>

As at December 31, 2019, cash and cash equivalents include ₩ 1,599 million which is subject to a restriction on the use in association with the national R&D projects.

7. Trade and Other Receivables

Trade and other receivables and its provisions for impairment as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		
	Gross amount	Provision for impairment	Carrying amount
Trade receivables	3,985,981	(4,046)	3,981,935
Other current receivables	368,250	(2,109)	366,141
Other non-current receivables ¹	505,489	-	505,489
Total	<u>4,859,720</u>	<u>(6,155)</u>	<u>4,853,565</u>

<i>(in millions of Korean won)</i>	2018		
	Gross amount	Provision for impairment	Carrying amount
Trade receivables	4,010,868	(5,948)	4,004,920
Other current receivables	323,975	(2,109)	321,866
Other non-current receivables ¹	118,086	-	118,086
Total	<u>4,452,929</u>	<u>(8,057)</u>	<u>4,444,872</u>

Details of other receivables as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Current		
Non-trade receivables	329,151	294,993
Accrued income	8,702	1,152
Loans	-	554
Guarantee deposits provided	28,288	25,167
	<u>366,141</u>	<u>321,866</u>
Non-current		
Non-trade receivables	18,339	7,029

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Deposits held by financial institutions ¹	106,621	63,421
Loans	331,480	-
Guarantee deposits provided	49,049	47,636
	<u>505,489</u>	<u>118,086</u>
Total	<u>871,630</u>	<u>439,952</u>

¹ As at December 31, 2019, ₩ 106,600 million (2018: ₩ 63,400 million) is restricted from being withdrawn in relation to large, small and medium-sized companies cooperation agreement and others. In addition, ₩ 21 million is restricted from withdrawal in connection with maintaining checking accounts (2018: ₩ 21 million).

The aging analysis of trade and other receivables as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019		2018	
	Trade receivables	Other receivables	Trade receivables	Other receivables
Receivables not past due	<u>3,374,960</u>	<u>861,254</u>	<u>3,818,389</u>	<u>436,842</u>
Past due but not impaired				
Up to 3 months	464,382	6,772	169,063	2,683
Between 3-6 months	123,132	2,838	4,067	393
Over 6 months	19,983	766	14,933	34
	<u>607,497</u>	<u>10,376</u>	<u>188,063</u>	<u>3,110</u>
Impaired receivables	<u>3,524</u>	<u>2,109</u>	<u>4,416</u>	<u>2,109</u>
	<u>3,985,981</u>	<u>873,739</u>	<u>4,010,868</u>	<u>442,061</u>

Movements on the provision for impairment of trade and other receivables for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019			
	Trade receivables		Other receivables	
	Current	Non-current	Current	Non-current
Beginning balance	5,948	-	2,109	-
Additions(reversal)	(1,122)	-	1,903	-
Write-off	(780)	-	(1,903)	-
Ending balance	<u>4,046</u>	<u>-</u>	<u>2,109</u>	<u>-</u>
<i>(in millions of Korean won)</i>	2018			
	Trade receivables		Other receivables	
	Current	Non-current	Current	Non-current
Beginning balance	5,531	-	959	-
Additions	750	-	1,150	-
Write-off	(333)	-	-	-
Ending balance	<u>5,948</u>	<u>-</u>	<u>2,109</u>	<u>-</u>

As at December 31, 2019 and 2018, the carrying amounts of trade and other receivables are

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approximation of their fair values.

The Company transferred trade and other receivables to financial institutions for ₩ 407,463 million at December 31, 2019, and derecognized the trade and other receivables from the financial statements at the date of disposal, as substantial all the risks and rewards were transferred.

8. Other Financial Assets and Liabilities

(a) Details of other financial assets and liabilities as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Other financial assets		
Derivative financial assets (futures contract) (current)	10,879	-
Financial assets at fair value through other comprehensive income (excluding futures contract) (non-current)	101,796	64,898
Derivative financial assets (futures contract) (non-current)	10,492	-
Financial assets at fair value through profit or loss (excluding futures contract) (non-current)	23,634	15,677
	<u>146,801</u>	<u>80,575</u>
Other financial liabilities		
Financial guarantee contracts	27,194	10,679
Derivative financial liabilities (futures contracts) (current)	-	18,477
Financial liabilities at fair value through profit or loss (conversion rights) (non-current)	930	30,384
	<u>28,124</u>	<u>59,540</u>

(b) Changes in available-for-sale financial assets for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Beginning balance	80,575	18,683
Acquisitions / Transfer	10,892	83,631
Disposals	(1,116)	(10,005)
Gain (loss) on valuation (before income tax effects), through other comprehensive income	35,079	(11,807)
Gain on valuation (before income tax effects), through profit or loss	-	73
Less: Current portion	-	-
Ending balance	<u>125,430</u>	<u>80,575</u>

No impairment losses on other financial assets were recognized for the years ended December 31, 2019 and 2018.

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9. Inventories

Details of inventories as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		
	Gross amount	Valuation allowance	Carrying amount
Merchandise	48,566	(794)	47,772
Finished / Semi-finished products	1,574,003	(79,788)	1,494,215
Work-in-process	9,771	-	9,771
Raw materials	653,671	(13,872)	639,799
Supplies	126,387	-	126,387
Materials-in-transit	352,350	-	352,350
Total	2,764,748	(94,454)	2,670,294

(in millions of Korean won)

	2018		
	Gross amount	Valuation allowance	Carrying amount
Merchandise	42,192	(249)	41,943
Finished / Semi-finished products	1,473,560	(78,626)	1,394,934
Work-in-process	14,390	-	14,390
Raw materials	669,876	(10,092)	659,784
Supplies	109,359	-	109,359
Materials-in-transit	205,954	-	205,954
Total	2,515,331	(88,967)	2,426,364

During the year, the cost of inventories recognized as expense and included in 'cost of sales' amounted to ₩ 14,169,212 million (2018: ₩ 14,779,646 million).

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10. Investments in Subsidiaries, Associates and Joint ventures

Changes in investments in subsidiaries, associates and joint ventures for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Beginning balance	3,857,939	2,655,613
Additions / Transfer	1,546,649	1,260,857
Impairment ^{1,2,3}	(21,158)	(58,406)
Others ^{4,5,6}	(33,347)	(125)
Ending balance	<u>5,350,083</u>	<u>3,857,939</u>

¹ The Company reviews whether there are any events or changes in circumstances indicate that assets might be impaired at the end of each reporting period. If the indications are present, the recoverable amount of that asset is estimated by future cashflow discount method or other method. If the recoverable amount is less than its carrying amount, the carrying amount of the asset shall be reduced and the impairment loss shall be recognized.

² During 2018, LG Fuel Cell Systems Inc. was determined to be liquidated and the entire carrying amount was recognized as impairment loss.

³ During 2019, the amount of impairment loss recognized as other non-operating expenses and key assumptions used for calculation of value in use are as follows:

<i>(in millions of Korean won and in percentage)</i>	<u>2019</u>
	Ugimag Korea Co., Ltd
Impaired amount	21,158
Pre-tax discount rate	6.56%
Growth rate for subsequent years after five years	0%

⁴ The carrying amount of Sarangnuri Ltd. was reduced due to the merger into HAENGBOKNURI CO., LTD., a subsidiary of the Company, during 2018.

⁵ During 2019, LG Holdings (HK) Ltd. has completed its equal capital reduction for ₩ 15,788million.

⁶ During 2019, LG Chem HK Ltd. and NanoH2O (Jiangsu) Water Processing Technology Co. Ltd. were liquidated.

Details of investments in subsidiaries, associates and joint ventures as at December 31, 2019 and 2018, are as follows:

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<i>(in millions of Korean won and in percentage)</i>	Location	Percentage of ownership (%)		Carrying amount	
		2019	2018	2019	2018
Subsidiaries					
Ningbo LG Yongxing Chemical Co.,Ltd.	China	75	75	135,908	135,908
LG Chem HK Ltd. ¹	Hong Kong	-	100	-	11,159
LG Chemical India Pvt. Ltd.	India	100	100	54,929	54,929
LG Chemical (Guangzhou) Engineering Plastics Co.,Ltd.	China	100	100	21,911	21,911
LG Chem (Nanjing) Information & Electronics Materials Co.,Ltd. ²	China	81	81	1,138,401	850,348
LG Chem (Taiwan), Ltd.	Taiwan	100	100	18	18
LG Chem Display Materials (Beijing) Co.,Ltd.	China	90	90	13,444	13,444
Tianjin LG Bohai Chemical Co.,Ltd.	China	68	68	77,871	77,871
Tianjin LG BOTIAN Chemical Co.,Ltd.	China	58	58	10,423	10,423
LG Chem (China) Investment Co.,Ltd. ³	China	100	100	264,233	195,642
LG Chem (Tianjin) Engineering Plastics Co.,Ltd.	China	90	90	14,733	14,733
LG Chem Europe GmbH	Germany	100	100	3,085	3,085
LG Chem Poland Sp. z o.o.	Poland	100	100	26,948	26,948
LG Chem Michigan Inc. ⁴	USA	100	100	377,337	376,209
LGC Petrochemical India Private Ltd.	India	100	100	299	299
HAENGBOKNURI CO.,LTD.	Korea	100	100	600	600
LG CHEM TK Kimya SANAYI VE TIC. Ltd. STI.	Turkey	100	100	174	174
LG Chem Japan Co.,Ltd.	Japan	100	100	1,406	1,406
NanoH2O (Jiangsu) Water Processing Technology Co. Ltd. ⁵	China	-	100	-	6,400
Nanjing LG Chem New Energy Battery Co., Ltd. ⁶	China	50	50	88,706	88,706
LG Chem (Chongqing) Engineering Plastics Co., Ltd.	China	100	100	37,410	37,410
LG Chem Wroclaw Energy sp. z o.o. ⁷	Poland	100	100	1,396,269	595,469
LG Chem(HUIZHOU) Petrochemical Co., Ltd.	China	70	70	99,001	99,001
LG Chem Hai Phong Veitnam Co.,Ltd.	Vietnam	100	100	3,079	3,079
LG Chem Australia Pty Ltd.	Australia	100	100	429	429
LG Chem Mexico S.A. de C.V.	Mexico	100	100	394	394
LG Chem Hai Phong Engineering Plastics Co.,Ltd.	Vietnam	100	100	15,344	15,344
LG Chem (Guangzhou) Information & Electronics Materials Co.,Ltd. ⁸	China	100	100	184,491	127,752
FarmHannong Co.,Ltd.	Korea	100	100	724,500	724,500
LG Life Sciences India Pvt. Ltd.	India	100	100	2,170	2,170
LG Life Sciences (Beijing) Co., Ltd.	China	100	100	1,233	1,233
LG Life Sciences (Thailand) Ltd.	Thailand	100	100	431	431
LG CHEM FUND I LLC ⁹	USA	100	100	24,068	7,886
LEYOU NEW ENERGY MATERIALS(WUXI)CO.,LTD ¹⁰	China	51	51	151,474	48,808
Ugimag Korea Co., Ltd. ¹¹	Korea	100	100	6,362	23,020
LG Chem Nanjing Energy Solution ¹²	China	100	100	274,035	112,570
				<u>5,151,116</u>	<u>3,689,709</u>
Associates					

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LG Holdings (HK) Ltd. ¹³	Hong Kong	26	26	42,248	58,036
TECWIN Co.,Ltd.	Korea	21	21	2,861	2,861
LG Chem BRASIL INTERMEDICAO DE NEGOCIOS DO SETOR QUIMICO LTDA. ¹⁴	Brazil	100	100	579	579
LG Chem Malaysia SDN.BHD. ¹⁴	Malaysia	100	100	150	150
LG Fuel Cell Systems Inc. ¹⁵	USA	-	23	-	-
FJ Composite Material Co., Ltd.	Japan	33	33	3,016	3,016
WUXI CL New Energy Technology Ltd.	China	30	30	1,737	1,737
LG Chem Life Sciences Poland Ltd. ¹⁴	Poland	100	100	17	17
HUAJIN NEW ENERGY MATERIALS(QUZHOU)CO.,LTD ¹⁶	China	49	49	67,330	26,128
VINFAST LITHIUM BATTERY PACK LLC. ¹⁷	Vietnam	35	-	5,323	-
				<u>123,261</u>	<u>92,524</u>
Joint ventures					
LG Vina chemical Co.,Ltd.	Vietnam	50	50	3,080	3,080
HL Greenpower Co.,Ltd.	Korea	49	49	14,210	14,210
SEETEC Co.,Ltd.	Korea	50	50	58,416	58,416
				<u>75,706</u>	<u>75,706</u>
Total				<u>198,967</u>	<u>168,230</u>

¹ LG Chem HK Ltd. was liquidated in 2019

² During the year, the Company acquired additional shares of LG Chem (Nanjing) Information & Electronics Materials Co.,Ltd. for ₩ 288,053 million.

³ During the year, the Company acquired additional shares of LG Chem (China) Investment Co.,Ltd. for ₩ 68,591 million.

⁴ During the year, the Company acquired additional shares of LG Chem Michigan Inc. for ₩ 1,128 million.

⁵ During the year, NanoH2O (Jiangsu) Water Processing Technology Co. Ltd. was liquidated.

⁶ Although the Company owns less than 50% of the voting rights of Nanjing LG Chem New Energy Battery Co., Ltd., the Company is considered to have control over the investee as the Company can exercise the majority voting rights in its decision-making process in accordance with the shareholders' agreement.

⁷ During the year, the Company acquired additional shares of LG Chem Wroclaw Energy sp. z o.o. for ₩ 800,800 million.

⁸ During the year, the Company acquired additional shares of LG Chem (Guangzhou) Information & Electronics Materials Co.,Ltd. for ₩ 56,739 million.

⁹ During the year, the Company acquired additional shares of LG CHEM FUND I LLC for ₩ 16,182 million.

¹⁰ During the year, the Company acquired additional shares of LEYOU NEW ENERGY MATERIALS(WUXI)CO.,LTD for ₩ 102,666 million.

¹¹ During the year, the Company acquired additional shares of Ugimag Korea Co., Ltd. for ₩ 4,500 million, and recognized impairment loss of ₩ 21,158 million.

¹² During the year, the Company acquired additional shares of LG Chem Nanjing Energy Solution for ₩ 161,465 million.

¹³ During the year, LG Holdings (HK) Ltd. has completed its equal capital reduction for ₩ 15,788million.

¹⁴ Classified as an investment in associate due to its small size.

¹⁵ During the year, LG Fuel Cell Systems Inc. was liquidated.

¹⁶ During the year, the Company acquired additional shares of HUAJIN NEW ENERGY MATERIALS(QUZHOU)CO.,LTD for ₩ 41,202 million.

¹⁷ VINFAST LITHIUM BATTERY PACK LLC. was established during the year, and the Company newly acquired 35% shares of VINFAST LITHIUM BATTERY PACK LLC. for ₩ 5,323 million.

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11. Property, Plant and Equipment

Changes in property, plant and equipment for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)	2019											
	Land	Buildings	Structures	Machinery	Vehicles	Tools	Equipment	Others	Right-of- use assets	Construction -in-progress	Machinery -in-transit	Total
Beginning balance	1,123,590	2,311,548	720,774	3,043,583	11,015	340,661	114,223	115,903	-	1,369,361	174,116	9,324,774
Cost	1,160,542	2,863,091	1,216,503	10,775,322	36,473	992,866	331,043	315,051	-	1,416,372	174,116	19,281,379
Accumulated depreciation	-	(529,521)	(490,109)	(7,605,723)	(25,353)	(640,512)	(214,792)	(196,996)	-	-	-	(9,703,006)
Accumulated impairment	(36,952)	(22,022)	(5,620)	(126,016)	(105)	(11,693)	(2,028)	(2,152)	-	(47,011)	-	(253,599)
Changes in accounting policies	-	-	(17,697)	(9,668)	-	-	-	-	82,582	-	-	55,217
Restated beginning balance	<u>1,123,590</u>	<u>2,311,548</u>	<u>703,077</u>	<u>3,033,915</u>	<u>11,015</u>	<u>340,661</u>	<u>114,223</u>	<u>115,903</u>	<u>82,582</u>	<u>1,369,361</u>	<u>174,116</u>	<u>9,379,991</u>
Acquisitions/ Transfer	128,058	307,095	147,189	1,338,598	4,364	178,913	34,095	144,767	26,411	2,452,813	195,797	4,958,100
Disposals/ Transfer	(3,882)	(37,140)	(390)	(96,900)	(10,087)	(4,714)	(875)	(174)	(319)	(2,202,062)	(208,708)	(2,565,251)
Depreciation	-	(63,127)	(44,865)	(674,547)	(1,860)	(116,027)	(32,340)	(81,802)	(15,882)	-	-	(1,030,450)
Impairment	-	(3,139)	(2,298)	(70,600)	-	(824)	(429)	(3,571)	(75)	(39,077)	(1,177)	(121,190)
Reversal of impairment	-	12	12	181	2	-	8	-	-	-	-	215
Ending balance	<u>1,247,766</u>	<u>2,515,249</u>	<u>802,725</u>	<u>3,530,647</u>	<u>3,434</u>	<u>398,009</u>	<u>114,682</u>	<u>175,123</u>	<u>92,717</u>	<u>1,581,035</u>	<u>160,028</u>	<u>10,621,415</u>
Cost	1,284,718	3,120,778	1,331,742	11,860,563	26,424	1,124,510	357,401	378,824	126,123	1,666,659	160,028	21,437,770
Accumulated depreciation	-	(580,822)	(521,145)	(8,151,131)	(22,893)	(714,723)	(240,363)	(197,978)	(33,331)	-	-	(10,462,386)
Accumulated impairment	(36,952)	(24,707)	(7,872)	(178,785)	(97)	(11,778)	(2,356)	(5,723)	(75)	(85,624)	-	(353,969)
(in millions of Korean won)	2018											
	Land	Buildings	Structures	Machinery	Vehicles	Tools	Equipment	Others	Construction- in-progress	Machinery -in-transit	Total	
Beginning balance	1,082,438	2,190,414	555,425	2,999,040	12,221	312,887	75,232	73,397	904,748	142,286	8,348,088	
Cost	1,119,390	2,683,007	1,013,720	10,243,349	35,764	895,714	271,536	211,584	942,202	142,286	17,558,552	
Accumulated depreciation	-	(470,547)	(452,658)	(7,127,238)	(23,422)	(569,981)	(194,332)	(136,035)	-	-	(8,974,213)	
Accumulated impairment	(36,952)	(22,046)	(5,637)	(117,071)	(121)	(12,846)	(1,972)	(2,152)	(37,454)	-	(236,251)	
Acquisitions/ Transfer	41,176	182,963	203,741	1,439,662	1,434	138,400	67,813	113,758	2,531,804	181,833	4,902,584	
Disposals/ Transfer	(24)	(1,281)	(206)	(726,019)	(44)	(6,023)	(171)	(3,485)	(2,057,634)	(150,003)	(2,944,890)	
Depreciation	-	(59,324)	(37,975)	(643,152)	(2,598)	(103,749)	(28,573)	(67,767)	-	-	(943,138)	
Impairment	-	(1,248)	(253)	(26,313)	(3)	(855)	(93)	-	(9,557)	-	(38,322)	
Reversal of impairment	-	24	42	365	5	1	15	-	-	-	452	
Ending balance	<u>1,123,590</u>	<u>2,311,548</u>	<u>720,774</u>	<u>3,043,583</u>	<u>11,015</u>	<u>340,661</u>	<u>114,223</u>	<u>115,903</u>	<u>1,369,361</u>	<u>174,116</u>	<u>9,324,774</u>	
Cost	1,160,542	2,863,091	1,216,503	10,775,322	36,473	992,866	331,043	315,051	1,416,372	174,116	19,281,379	
Accumulated depreciation	-	(529,521)	(490,109)	(7,605,723)	(25,353)	(640,512)	(214,792)	(196,996)	-	-	(9,703,006)	
Accumulated impairment	(36,952)	(22,022)	(5,620)	(126,016)	(105)	(11,693)	(2,028)	(2,152)	(47,011)	-	(253,599)	

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During the year, the Company capitalized ₩ 22,865 million of borrowing costs (2018: ₩ 16,554 million) in relation to acquisition of property, plant and equipment, on property, plant and equipment. The capitalization rate of borrowings used to determine the amount of borrowing costs eligible for capitalization is 2.48% (2018: 2.59%).

Line items including depreciation in the separate statements of profit or loss for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Cost of sales	900,888	838,217
Selling and administrative expenses	127,204	102,263
Others	2,358	2,658
Total	1,030,450	943,138

Lease

The Company has applied Korean IFRS 1116 retrospectively with the cumulative effect of initially applying the new lease standard recognized at the date of initial application, as permitted under the specific transitional provisions in the standard. Accordingly, reclassifications and adjustments arising from the new lease standard were recognized in the statement of financial position as at January 1, 2019.

- Adjustments recognized on adoption of Korean IFRS 1116 Lease

On adoption of Korean IFRS 1116, the Company recognized lease liabilities in relation to leases which had previously been classified as 'operating leases' under the principles of Korean IFRS 1017. These liabilities were measured at the present value of the remaining lease payments, discounted using the lessee's incremental borrowing rate as at January 1, 2019. The weighted average lessee's incremental borrowing rate applied to the lease liabilities on January 1, 2019 was 2.01%.

The Group has also elected not to reassess whether a contract is, or contains a lease at the date of initial application. Instead, for contracts entered into before the transition date, the Group relied on its assessment made applying Korean IFRS 1017 and Interpretation 2104 Determining whether an Arrangement contains a Lease.

For leases previously classified as 'finance leases', the Company recognized the carrying amount of the lease asset and lease liability immediately before the initial application as the carrying amount of the right-of-use asset and the lease liability at the date of initial application.

<i>(in millions of Korean won)</i>	January 1, 2019
Operating lease commitments recognized as at December 31, 2018	47,691
Discounted using the lessee's incremental borrowing rate of at the date of initial application	47,174
Add: finance lease liabilities recognized as at December 31, 2018	28,244
Less: short-term leases not recognized as a liability	(19,141)
Less: low-value leases not recognized as a liability	(9,284)
Add: adjustments resulting from accounting differences between an option to extend the lease and an option to terminate the lease	36,468
Lease liabilities recognized as at January 1, 2019	83,461

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Current lease liabilities	12,727
Non-current lease liabilities	70,734
	<u>83,461</u>

Right-of use assets were measured at the amount equal to the lease liability, adjusted by the amount of any prepaid or accrued lease payments relating to that lease recognized in the statement of financial position as at December 31, 2018. There were no onerous lease contracts that would have required an adjustment to the right-of-use assets at the date of initial application.

(i) Amounts recognized in the statement of financial position

The statement of financial position shows the following amounts relating to leases:

<i>(in millions of Korean won)</i>	December 31, 2019	January 1, 2019
Right-of-use assets ¹		
Real-estate	75,184	61,545
Machinery	11,850	14,893
Vehicles	5,683	6,144
	<u>92,717</u>	<u>82,582</u>

¹ Included in the line item 'Property, plant and equipment' in the statements of financial position.

<i>(in millions of Korean won)</i>	December 31, 2019	January 1, 2019
Lease liabilities ¹		
Current	29,177	12,727
Non-current	65,374	70,734
	<u>94,551</u>	<u>83,461</u>

¹ Included in the line item 'borrowings' in the statements of financial position. In the previous year, the Company only recognized lease liabilities for 'finance leases' under Korean IFRS 1017 Leases. These were presented as part of the Company's borrowings.

(ii) Amounts recognized in the statement of profit or loss

The statement of profit or loss shows the following amounts relating to leases:

<i>(in millions of Korean won)</i>	2019
Depreciation of right-of-use assets	
Real-estate	9,337
Machinery	2,962
Vehicles	3,583
	<u>15,882</u>
Interest expense relating to lease liabilities (included in finance cost)	2,142
Expense relating to short-term leases (included in cost of goods sold and administrative expenses)	30,941
Expense relating to leases of low-value assets that are not short-term leases (included in cost of goods sold and administrative expenses)	9,578

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Expense relating to variable lease payments not included in lease liabilities (included in cost of goods sold and administrative expenses)	22
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The total cash outflow for leases during year ended December 31, 2019 was ₩ 51,002 million.

Financial line items affected by the initial application of Korea IFRS 1116 in the statement of financial position as at January 1, 2019, are as follows:

- Property, plant and equipment: decreased by ₩ 27,365 million
- Right-of-use assets: increased by ₩ 82,582 million
- Lease liabilities: increased by ₩ 55,217 million

(iii) Finance lease - 2018

Details of property, plant and equipment classified as a finance lease as at December 31, 2018, are as follows:

<i>(in millions of Korean won)</i>	2018
	Machinery
Cost- capitalized finance leases	45,025
Accumulated depreciation	<u>(17,660)</u>
Net book amount	<u>27,365</u>

The Company has entered into non-cancellable finance lease agreements with terms of three to ten years. The ownership of the assets will be transferred to the Company at the end of the lease term.

The total of future minimum lease payments to the lessor at the end of the reporting period are as follows:

<i>(in millions of Korean won)</i>	2018
Total minimum lease payments	
Within one year	5,177
Later than one year but not later than five years	20,710
Later than five years	<u>5,000</u>
	<u>30,887</u>
Unearned finance income	<u>(2,997)</u>
Net minimum lease payments	
Within one year	5,019
Later than one year but not later than five years	18,686
Later than five years	<u>4,185</u>
	<u>27,890</u>

(iv) Operating lease - 2018

The Company leases real-estate, machinery, vehicle, etc. under non-cancellable operating leases with terms of one to five years for the year ended December 31, 2018. The leases have various terms, escalation clauses and renewal rights. On renewal, the terms of the leases are renegotiated.

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From January 1, 2019, the Company has recognized right-of-use assets for these leases, except for short-term and low-value leases.

Commitments for minimum lease payments in relation to non-cancellable operating leases are payable as follows:

<i>(in millions of Korean won)</i>	2018
Operating lease payments	
Within one year	37,764
Later than one year but not later than five years	9,927
Total	<u>47,691</u>
	<u>47,691</u>

(v) Practical expedients applied

In applying Korean IFRS 1116 for the first time, the Company has used the following practical expedients permitted by the standard:

- the use of a single discount rate to a portfolio of leases with reasonably similar characteristics
- reliance on previous assessments on whether leases are onerous
- the accounting for operating leases with a remaining lease term of less than 12 months as at January 1, 2019, as short-term leases
- the exclusion of initial direct costs for the measurement of the right-of-use asset at the date of initial application, and
- the use of hindsight in determining the lease term where the contract contains options to extend or terminate the lease

The Company reviews annually whether there is any indication that an asset may be impaired. In 2019, the Company has performed impairment test for Glass substrate business division, a CGU in Advanced materials segment as the future economic performance was expected not to reach the planned target and recognized ₩ 68,243 million of impairment losses. In addition, the Company has also recognized ₩ 24,974 million of impairment losses for Polio vaccine project in Life Sciences segment as the future economic performance was expected not to reach planned target.

The amount of impairment loss (reversal) recognized as other non-operating (income) expense and key assumptions used for calculation of value in use for the year ended December 31, 2019, are as follows:

<i>(in millions of Korean won)</i>	2019	
	Glass Substrate¹	Polio Vaccine¹
Property, plant and equipment Impaired amount	68,243	24,974

¹ The recoverable amount is calculated based on fair value less cost of disposal that is a nonrecurring fair value measured using an observable transaction price. It is categorized as level 2 of the fair value hierarchy.

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12. Intangible Assets

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

(in millions of Korean won)

	2019					
	Development costs	Industrial property rights	Goodwill	Memberships	Others	Total
Beginning balance	199,223	270,419	723,756	50,234	231,640	1,475,272
Separate acquisitions/ Transfer ¹	108,839	215,116	-	67	60,909	384,931
Additions – internal development	16,870	-	-	-	-	16,870
Disposals/ Transfer	(18,189)	(4,455)	-	(3,459)	(12,284)	(38,387)
Amortization	(42,519)	(35,304)	-	-	(33,154)	(110,977)
Impairment	(28,903)	(3,589)	-	-	(14,402)	(46,894)
Ending balance	235,321	442,187	723,756	46,842	232,709	1,680,815

¹ Intangible assets acquired from Dupont related to S-OLED are included.

(in millions of Korean won)

	2018					
	Development costs	Industrial property rights	Goodwill	Memberships	Others	Total
Beginning balance	164,136	229,943	723,756	50,156	250,197	1,418,188
Separate acquisitions/ Transfer	69,572	62,688	-	701	34,178	167,139
Additions – internal development	15,353	-	-	-	-	15,353
Disposals/ Transfer	(12,829)	(49)	-	(623)	(23,102)	(36,603)
Amortization	(35,348)	(22,163)	-	-	(29,583)	(87,094)
Impairment	(1,661)	-	-	-	(50)	(1,711)
Ending balance	199,223	270,419	723,756	50,234	231,640	1,475,272

(b) Line items including amortization of intangible assets for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019	2018
Cost of sales	20,585	18,111
Selling and administrative expenses	90,392	68,983
Total	110,977	87,094

(c) The Company recognized total research and development costs of ₩ 1,003,225 million (2018: ₩ 920,652 million) as expenses.

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- (d) Goodwill is allocated to the Company's CGUs identified for each operating segment. The carrying amounts of goodwill allocation by CGUs as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

CGUs	2019				Total
	Merger of LG Petrochemical Co., Ltd	Acquisition of SAP business	Acquisition of PSAA business	Acquisition of LG Life Sciences, Ltd,	
Petrochemicals					
NCC	2,639	-	-	-	2,639
ABS	1,472	-	-	-	1,472
PO	1,054	-	-	-	1,054
PVC	808	-	-	-	808
Acrylic	350	25,222	-	-	25,572
Plasticizer	53	-	-	-	53
BPA	467	-	-	-	467
Others	1,350	-	-	-	1,350
Advanced Materials					
PSAA	-	-	4,112	-	4,112
Life Sciences					
Life sciences	-	-	-	686,229	686,229
Total	8,193	25,222	4,112	686,229	723,756

(in millions of Korean won)

CGUs	2018				Total
	Merger of LG Petrochemical Co., Ltd	Acquisition of SAP business	Acquisition of PSAA business	Acquisition of LG Life Sciences, Ltd,	
Basic materials& Chemicals					
NCC	2,639	-	-	-	2,639
ABS	1,472	-	-	-	1,472
PO	1,054	-	-	-	1,054
PVC	808	-	-	-	808
Acrylic	350	25,222	-	-	25,572
Plasticizer	53	-	-	-	53
BPA	467	-	-	-	467
Others	1,350	-	-	-	1,350
IT & Electronic materials and Advanced materials					
PSAA	-	-	4,112	-	4,112
Life Sciences					
Life sciences	-	-	-	686,229	686,229
Total	8,193	25,222	4,112	686,229	723,756

The recoverable amounts of CGUs have been determined based on value-in-use or fair value less cost of disposal calculations. Value-in-use calculations use pre-tax cash flow projections based on financial budgets approved by management covering a five-year period. Fair value less cost of disposal reflects expectation of future business and usage pattern of assets from the perspective of market participants. Management determined the estimated pre-tax cash flow based on past performance and its expectations of market development. Discount rates applied by the management are the pre-tax discount rates reflecting specific risks relating to the relevant operating segments.

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During 2019, key assumptions used for calculation of value in use and fair value less cost of disposal are as follows:

<i>(in millions of Korean won)</i>	2019	
	Pre-tax discount rate	Growth rate for subsequent years after five years
Acquisition of LG Petrochemical Co., Ltd.	8.3%	0.0%
Acquisition of SAP business	8.2%	0.0%
Acquisition of PSAA business	8.0%	0.0%
Acquisition of LG Life Sciences	11%	3.0%

The results of the sensitivity analysis for the fair value less cost of disposal calculation of Life Sciences CGU are as follows:

<i>(in millions of Korean won)</i>	0.5% Increase	0.5% Decrease
Discount rate		
Increase(decrease) in fair value	(137,900)	162,001
Growth rate		
Increase(decrease) in fair value	122,908	(104,683)

Had the discount rate been 0.5% higher than the management's estimate, the Company should have recognized impairment loss of ₩ 115,689 million for the carrying value of goodwill. Also, had the discount rate been 0.5% lower than the management's estimate, the Company should have recognized impairment loss of ₩ 82,472 million for the carrying value of goodwill.

(e) Impairment test on intangible assets other than goodwill

The impairment losses for intangible assets other than goodwill that the Company recognized during the year are as follows:

<i>(in millions of Korean won)</i>	2019			
	Development costs	Industrial property rights	Other intangible assets	Total
Glass substrate ¹	91	867	12	970
Pneumonia vaccine ²	-	-	13,056	13,056
Humira ³	28,676	-	1,335	30,011
Polio vaccine ³	135	-	-	135
Other	-	2,722	-	2,722
	<u>28,902</u>	<u>3,589</u>	<u>14,403</u>	<u>46,894</u>

¹ During 2019, the Company has performed impairment test for Glass substrate business division, a CGU in Advanced materials segment as the future economic performance was expected not to reach the planned target expectation, and recognized ₩ 970 of impairment losses for intangible assets in the CGU.

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² In 2019, the Company decided to discontinue Pneumonia vaccine development project since it is not economically visible. Accordingly, the Group recognized ₩ 13,056 million of impairment loss for development costs capitalized for this project.

³ As a result of impairment test for development costs and other intangible assets related to Humira and Polio vaccine, the recoverable amounts are estimated to be ₩ 7,356 million and ₩ 9,268 million, respectively. Accordingly, the Group recognized ₩ 30,011 million and ₩ 135 million of impairment losses, respectively for the differences between related development costs(include other intangible assets) and carrying amounts of ₩ 37,367 million and ₩ 9,403 million, respectively.

Estimation of recoverable amount

The fair values of the development costs (including other intangible assets) related to Humira and Polio vaccines were measured by market approach method using cash flow forecasts for the next 20 years based on the past 10-year life span of each product group and financial budgets approved by management.

Discount rate used for fair value measurement is 13.5% which is an adjusted weighted average cost of capital with adjustment to reflect asset specific risk.

(f) Changes in greenhouse gas emission permits for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of tons and millions of Korean won)</i>	2019			
	2018		2019	
	Quantity	Amount	Quantity	Amount
Beginning balance	7,809	7,359	7,479	-
Allocation with nil consideration	65	-	-	-
Purchase/Sale	100	2,790	130	4,375
Borrowings/Carry forwards between years	26	-	(26)	-
Surrendered to the government	(8,000)	(10,149)	-	-
Ending balance	-	-	7,583	4,375

<i>(in thousands of tons and millions of Korean won)</i>	2018					
	2017		2018		2019	
	Quantity	Amount	Quantity	Amount	Quantity	Amount
Beginning balance	7,366	18,635	6,588	-	-	-
Allocation with nil consideration	159	-	891	-	7,479	-
Purchase/Sale	531	11,826	-	-	-	-
Borrowings/Carry forwards between years	(330)	(7,359)	330	7,359	-	-
Surrendered to the government	(7,726)	(23,102)	-	-	-	-
Ending balance	-	-	7,809	7,359	7,479	-

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13. Other Current and Non-current Assets

Details of other current and non-current assets as at December 31, 2019 and 2018, consist of:

<i>(in millions of Korean won)</i>	2019	2018
Current		
Prepayments to suppliers and prepaid expense	30,543	50,399
Prepaid value added tax	76,151	88,525
Others	100,902	17,614
Total	<u>207,596</u>	<u>156,538</u>
Non-current		
Long-term prepayments and prepaid expenses	48,543	60,593
Others	30	-
Total	<u>48,573</u>	<u>60,593</u>

14. Borrowings

Borrowings as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Current		
Current-portion of debentures	119,949	49,992
Current-portion of lease liabilities	29,177	5,008
	<u>149,126</u>	<u>55,000</u>
Non-current		
Debentures	5,109,507	2,413,478
Lease liabilities	65,374	23,236
	<u>5,174,881</u>	<u>2,436,714</u>
Total	<u>5,324,007</u>	<u>2,491,714</u>

Details of debentures as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>		2019				
Financial institution		Annual interest rate (%)	Latest maturity date	Amount in Korean won	Current	Non-current
50-1st Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	1.95	2020.05.19	120,000	120,000	-
50-2nd Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	2.28	2022.05.19	400,000	-	400,000
50-3rd Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	2.53	2024.05.19	280,000	-	280,000
51-1st Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	2.56	2021.02.20	190,000	-	190,000
51-2nd Debenture (non-	NH Investment & Securities	2.88	2023.02.20	240,000	-	240,000

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guaranteed/public)	Co., Ltd. and others						
51-3rd Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	3.07	2025.02.20	270,000	-	270,000	
51-4th Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	3.29	2028.02.20	300,000	-	300,000	
52-1st Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	2.02	2022.03.13	160,000	-	160,000	
52-2nd Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	2.11	2024.03.13	240,000	-	240,000	
52-3rd Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	2.21	2026.03.13	200,000	-	200,000	
52-4th Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	2.40	2029.03.13	400,000	-	400,000	
1-1st USD Overseas Convertible bonds¹	Credit Suisse	-	2021.04.16	254,716	-	254,716	
1-2nd EUR Overseas Convertible bonds²	Credit Suisse	-	2021.04.16	408,950	-	408,950	
USD foreign currency debenture with maturity in 2024	CITI and others	3.25	2024.10.15	578,900	-	578,900	
USD foreign currency debenture with maturity in 2029	CITI and others	3.63	2029.04.15	578,900	-	578,900	
EUR foreign currency debenture with maturity in 2023	CITI and others	0.50	2023.04.15	648,715	-	648,715	
Less: discount on debentures				(40,725)	(51)	(40,674)	
Total				5,229,456	119,949	5,109,507	

(in millions of Korean won)

		2018				
	Financial institution	Annual interest rate (%)	Latest maturity date	Amount in Korean won	Current	Non-current
48th Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	3.77	2019.02.21	50,000	50,000	-
50-1st Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	1.95	2020.05.19	120,000	-	120,000
50-2nd Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	2.28	2022.05.19	400,000	-	400,000
50-3rd Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	2.53	2024.05.19	280,000	-	280,000
51-1st Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	2.56	2021.02.20	190,000	-	190,000
51-2nd Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	2.88	2023.02.20	240,000	-	240,000
51-3rd Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	3.07	2025.02.20	270,000	-	270,000
51-4th Debenture (non-guaranteed/public)	NH Investment & Securities Co., Ltd. and others	3.29	2028.02.20	300,000	-	300,000
1-1st USD Overseas Convertible bonds¹	Credit Suisse	-	2021.04.16	245,982	-	245,982
1-2nd EUR Overseas Convertible bonds²	Credit Suisse	-	2021.04.16	403,191	-	403,191

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Less: discount on debentures	(35,703)	(8)	(35,695)
Total	<u>2,463,470</u>	<u>49,992</u>	<u>2,413,478</u>

¹ Details of 1-1st USD overseas convertible bonds are as follows:

	Details
Aggregate principal amount	USD 220,000,000
Issue price	USD 220,000,000
Coupon rate (%)	0.00
Issue date	April 16, 2018
Maturity date	April 16, 2021
Redemption	- Redemption at maturity: Outstanding bond principal, which is not repaid early or which call option is not exercised on, is repaid at maturity as a lump sum. - Prepayment: The issuer has a call option.
Underlying shares	509,606 registered ordinary shares (treasury shares)
Conversion price (Korean won/shares)	460,000
Conversion period	From May 27, 2018 to April 06, 2021
Call option by the issuer	- Share price (based on closing price) is higher than 130% of conversion price for more than 20 trading days during 30 consecutive trading days in a row, after 1 year from the closing date. - The amount of outstanding bonds is less than 10% in aggregate principal amount of the bonds originally issued (clean up call). - As a result of changes relating to tax laws in Korea, the issuer becomes obliged to pay any additional amounts.
Call option by bondholders	- The shares cease to be listed or admitted to trading or are suspended for a period equal to or exceeding 30 consecutive trading days. - The occurrence of a change of control

² Details of 1-2nd EUR overseas convertible bonds are as follows:

	Details
Aggregate principal amount	EUR 315,200,000
Issue price	EUR 315,200,000
Coupon rate (%)	0.00
Issue date	April 16, 2018
Maturity date	April 16, 2021
Redemption	- Redemption at maturity: Outstanding bond principal, which is not repaid early or which call option is not exercised on, is repaid at maturity as a lump sum. - Prepayment: The issuer has a call option.
Underlying shares	775,128 registered ordinary shares (treasury shares)
Conversion price (Korean won/shares)	533,600
Conversion period	From May 27, 2018 to April 06, 2021
Call option by the issuer	- Share price (based on closing price) is higher than 130% of conversion price for more than 20 trading days during 30 consecutive trading days in a row, after 1 year from the closing date.

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- Call option by bondholders**
- The amount of outstanding bonds is less than 10% in aggregate principal amount of the bonds originally issued (clean up call).
 - As a result of changes relating to tax laws in Korea, the issuer becomes obliged to pay any additional amounts.
 - The shares cease to be listed or admitted to trading or are suspended for a period equal to or exceeding 30 consecutive trading days.
 - The occurrence of a change of control

Details of finance lease liabilities as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

Leaser	2019				
	Annual interest rate (%)	Latest maturity date	Total amount	Current	Non-current
Hyundai Oil Bank and others	1.98 ~ 4.13	2068.12.31	94,551	29,177	65,374

(in millions of Korean won)

Leaser	2018				
	Annual interest rate (%)	Latest maturity date	Total amount	Current	Non-current
Hyundai Oil Bank	3.12	2024.12.31	27,168	4,886	22,282
CHUNGBUK TECHNOPARK	4.13	2023.12.31	1,076	122	954
Total			28,244	5,008	23,236

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15. Provisions

Changes in the carrying amount of provisions for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019				
	Warranty ¹	Greenhouse gas emission ²	Legal claims ³	Restoration ⁴	Total
Beginning balance	173,193	11,700	358	3,738	188,989
Additions	610,732	23,606	12	85	634,435
Used	(249,574)	(10,149)	-	(446)	(260,169)
Ending balance	534,351	25,157	370	3,377	563,255
Less : current portion	(423,505)	(25,157)	-	-	(448,662)
Total	110,846	-	370	3,377	114,593

(in millions of Korean won)

	2018				
	Warranty ¹	Greenhouse gas emission ²	Legal claims ³	Restoration ⁴	Total
Beginning balance	81,105	23,069	18,806	2,858	125,838
Additions	191,959	11,733	6,718	1,513	211,923
Used	(99,871)	(23,102)	(25,166)	(633)	(148,772)
Ending balance	173,193	11,700	358	3,738	188,989
Less : current portion	(81,639)	(11,700)	-	-	(93,339)
Total	91,554	-	358	3,738	95,650

¹ Warranty provisions have been accrued for the estimated warranty costs to be incurred due to quality control, exchange, refunds with regard to products based on historical experience. In addition, provisions related to downtime loss compensation for ESS fire accidents are included.

² Greenhouse gas emission provisions have been accrued for estimated expenditures to be obligated for any excess emission. The estimated emission for the year ended December 31, 2019, amounts to 7,905 thousand tons (2018: 7,758 thousand tons).

³ Lawsuit provisions have been accrued for certain pending cases.

⁴ Restoration provisions have been accrued based on the estimated expenses to restore land pollutions.

16. Net Defined Benefit Liability

Details of net defined benefit liabilities recognized in the statements of financial position as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019	2018
Present value of defined benefit obligations ¹	1,285,980	1,108,144
Fair value of plan assets	(1,126,798)	(913,995)
Liability in the separate statement of financial position	159,182	194,149

¹ The present value of retirement benefit obligations is net of existing contributions to the National Pension Plan of ₩ 732 million as at December 31, 2019 (2018: ₩ 785 million).

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The amounts recognized in the separate statements of profit or loss for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Current service cost ¹	154,249	137,257
Interest cost	5,203	4,694
Total, included in employee benefit expenses	<u>159,452</u>	<u>141,951</u>

¹ The above amounts excluded ₩ 1,719 million (2018: ₩ 1,095 million) of expenses capitalized to construction in progress and development costs.

Post-employment benefits recognized for defined contribution plan for the year ended December 31, 2019, amounted to ₩ 6,218 million (2018: ₩ 4,580 million).

Post-employment benefits recognized in the separate statements of profit or loss for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Cost of sales	109,782	98,500
Selling and administrative expenses	55,888	48,031
Total	<u>165,670</u>	<u>146,531</u>

Movements in the present value of defined benefit obligations for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Beginning balance	1,108,144	994,826
Transfer in	20,715	11,153
Transfer out	(5,445)	(8,411)
Current service cost	155,968	138,352
Interest expense	29,194	30,811
Remeasurements:		
Actuarial loss from change in demographic assumptions	6,124	2,553
Actuarial loss from change in financial assumptions	74,680	61,088
Actuarial loss(gain) from experience adjustments	(21,594)	2,139
Others	2,917	(91)
Payments from plans	(84,723)	(124,276)
Ending balance	<u>1,285,980</u>	<u>1,108,144</u>

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Movements in the fair value of plan assets for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Beginning balance	913,995	846,272
Transfer in	-	1,546
Transfer out	(185)	(628)
Interest income	23,991	26,117
Remeasurements:		
Return on plan assets (excluding amounts included in interest income)	(6,651)	(8,668)
Contributions:		
Employers	270,000	150,000
Payments from plans	(73,262)	(99,717)
Administrative costs	(1,090)	(927)
Ending balance	<u>1,126,798</u>	<u>913,995</u>

The actual return on plan assets for the year ended December 31, 2019, was ₩ 17,340 million (2018: ₩ 17,449 million).

The significant actuarial assumptions as at December 31, 2019 and 2018, are as follows:

	2019	2018
Discount rate	2.4%	2.7%
Salary growth rate	5.0%	5.0%

The sensitivity analysis for changes in key actuarial assumptions as at December 31, 2019, is as follows:

<i>(in millions of Korean won)</i>	Increase by 0.5%	Decrease by 0.5%
Discount rate:		
Increase (decrease) in defined benefit obligations	(75,900)	83,503
Salary growth rate:		
Increase (decrease) in defined benefit obligations	80,951	(74,463)

A decrease in corporate bond yields may lead most significantly to an increase in defined benefit liabilities.

The above sensitivity analyses are based on a change in an assumption while holding all other assumptions constant. In practice, this is unlikely to occur, and changes in some of the assumptions may be correlated. The sensitivity of the defined benefit obligation to changes in principal actuarial assumptions is calculated using the projected unit credit method, the same method applied when calculating the defined benefit obligations recognized on the statement of financial position.

The methods and types of assumptions used in preparing the sensitivity analysis did not change compared to the prior period.

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Plan assets as at December 31, 2019 and 2018, consist of:

<i>(in millions of Korean won)</i>	2019		2018	
	Amount	Composition	Amount	Composition
Insurance contracts with guaranteed yield	1,126,798	100%	913,995	100%

Plan assets consist of various debt instruments with principal and interest protection and others which have no quoted market prices in an active market.

As at December 31, 2019, the weighted average duration of defined benefit obligation is 13.01 years.

The Company reviews the funding level on an annual basis and has a policy of eliminating deficit from the fund. Expected contributions to post-employment benefit plans for the year ending December 31, 2020 are ₩ 345,863 million.

17. Other Current and Non-current Liabilities

Details of other current and non-current liabilities as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Current		
Advances from customers	150,141	149,075
Withholding	92,050	102,302
Unearned revenues	32,182	9,193
Accrued expenses	138,875	253,429
Total	413,248	513,999
Non-current		
Long-term accrued expenses	58,786	51,635
Long-term unearned revenues	15,272	15,272
Long-term advances from customers	58,699	28,788
Total	132,757	95,695

18. Commitments and Contingencies

- (1) As at December 31, 2019, the Company has been guaranteed from the Seoul Guarantee Insurance Company for the execution of contracts and others.
- (2) As at December 31, 2019, the Company has bank overdraft agreements with several banks for up to ₩ 59,100 million, and has entered into contracts with several financial institutions, , and for letters of credit for up to ₩ 32,000 million and US\$ 397 million, foreign currency purchase agreement for up to US\$ 784 million, and for the guaranteed payments in foreign currency for up to US\$ 132 million. The Company also has comprehensive credit line of credit agreements with several financial institutions for up to ₩ 20,000 million (including bank overdraft of 5,000 million) and US\$ 55 million (relating to trade finance and import/export).
- (3) As at December 31, 2019, the Company has B2B purchase arrangements with several financial institutions amounting to ₩ 450,000 million, as well as enterprise general fund arrangement with limit of ₩ 350,000 million.

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- (4) As at December 31, 2019, in relation to price fixing of mobile batteries, the consumers in Canada and Israel have filed two class actions against the Company. However, the ultimate outcome of these cases cannot be determined at the reporting date.
- (5) In addition, as at December 31, 2019, the Company have been named as a plaintiff in 23 legal actions involving ₩ 21,917 million, and as a defendant in 136 legal actions with ₩ 8,169 million. The ultimate outcome of these cases cannot be determined at the reporting date.
- (6) As at December 31, 2019, the Company is under investigation by the related authorities in relation to the manipulation of the emission of fine dust-causing substance in the Yeosu Industrial Complex, and the final outcome of these investigations cannot be determined at the reporting date. As at December 31, 2019, the Company shut down the relevant production facilities.
- (7) The Company has entered into manufacture and production technical contracts with ExxonMobile and others.
- (8) The Company has entered into a license agreement with LG Corp. to use trademarks on the products that the Company manufactures and sells, and on the services the Company provides in relation to its business.
- (9) As at December 31, 2019, the Company has contracts of US\$ 6 million, EUR 6 million and ₩ 5,373 million in guarantees with financial institutions in regard to warranty for certain products.
- (10) In June 2019, the Group had entered into an agreement with SMGA(Shanghai maple guorun), a subsidiary company of Geely Auto Group, to establish a joint venture of electric-car battery with 50:50 shares. The committed amount of investment is ₩ 103,400 million
- (11) As at December 31, 2019, the Company has guaranteed the repayment of various obligations of its subsidiaries. The outstanding balance of such guarantees as at December 31, 2019, amounts to ₩ 1,672,676 million (2018: ₩ 622,415 million). Details of guarantees provided as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

Guarantee beneficiary	Financial institution	Guarantee period	Amount of guarantee		Outstanding loan amount	
			2019	2018	2019	2018
LG Chem Wroclaw Energy sp. z o.o.	Citibank	2017.07.31 ~ 2020.04.06	38,949	38,356	38,949	38,356
LG Chem Wroclaw Energy sp. z o.o.	Citibank	2017.07.28 ~ 2020.07.27	25,966	25,570	25,966	-
LG Chem Wroclaw Energy sp. z o.o.	Citibank	2018.11.02 ~ 2023.10.31	64,914	63,926	64,914	63,926
LG Chem Wroclaw Energy sp. z o.o.	Citibank	2019.07.28 ~ 2020.07.27	32,457	31,963	13,606	-
LG Chem Wroclaw Energy sp. z o.o.	BNP	2017.09.27 ~ 2019.12.13	-	19,178	-	19,178
LG Chem Wroclaw Energy sp. z o.o.	ING	2017.09.01 ~ 2022.09.01	64,914	63,926	64,914	63,926
LG Chem Wroclaw Energy sp. z o.o.	ING	2018.11.23 ~ 2023.11.23	64,914	63,926	64,914	63,926
LG Chem Wroclaw Energy sp. z o.o.	ING	2018.11.23 ~ 2023.11.23	25,966	25,570	25,966	25,570
LG Chem Wroclaw Energy sp. z o.o.	MUFG	2019.01.18 ~ 2024.01.18	64,914	-	64,914	-
LG Chem Wroclaw Energy sp. z o.o.	MUFG	2019.01.18 ~ 2022.01.18	64,914	-	64,914	-

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LG Chem Wroclaw Energy sp. z o.o.	SMBC	2019.02.01 ~ 2022.02.28	25,966	-	25,966	-
LG Chem Wroclaw Energy sp. z o.o.	Hana	2019.02.15 ~ 2024.02.15	259,658	-	259,658	-
LG Chem Wroclaw Energy sp. z o.o.	Citibank	2019.03.25 ~ 2024.03.22	64,914	-	64,914	-
LG Chem Wroclaw Energy sp. z o.o.	SMBC	2019.09.25 ~ 2020.09.24	129,829	-	129,829	-
LG Chem Wroclaw Energy sp. z o.o.	Citibank	2019.08.20 ~ 2024.08.20	64,914	-	64,914	-
LG Chem Wroclaw Energy sp. z o.o.	EBRD	2019.09.25 ~ 2026.09.24	129,829	-	129,829	-
LG Chem Wroclaw Energy sp. z o.o.	HSBC	2019.11.25 ~ 2020.11.23	129,829	-	129,829	-
LG Chem Wroclaw Energy sp. z o.o.	KB Kookmin	2019.11.29 ~ 2020.11.28	129,829	-	12,983	-
FarmHannong Co.,Ltd.	Creditors	2017.02.16 ~ 2020.02.16	100,000	100,000	100,000	100,000
FarmHannong Co.,Ltd.	Creditors	2017.02.16 ~ 2022.02.16	100,000	100,000	100,000	100,000
FarmHannong Co.,Ltd.	Creditors	2018.03.02 ~ 2021.03.02	50,000	50,000	50,000	50,000
FarmHannong Co.,Ltd.	Creditors	2018.03.02 ~ 2023.03.02	40,000	40,000	40,000	40,000
Total			1,672,676	622,415	1,536,979	564,882

In addition, the Company provides Letters of Comfort (LOC) in relation to certain borrowings of subsidiaries.

Further, as at December 31, 2019, the Company provided no financial guarantee to its associates in relation to their borrowings.

(12) Capital expenditure arrangement that has not incur at the end of the reporting period are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Property, plant and equipment	922,832	1,374,031

19. Share Capital

Changes in share capital and share premium for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won and in shares)</i>	Ordinary shares		Preferred shares		Share premium
	Number of shares	Share capital	Number of shares	Share capital	
January 1, 2018	70,592,343	352,962	7,688,800	38,444	2,014,454
December 31, 2018	70,592,343	352,962	7,688,800	38,444	2,014,454
December 31, 2019	70,592,343	352,962	7,688,800	38,444	2,014,454

Changes in treasury shares for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	Number of shares	Carrying	Gain on
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	Ordinary shares	Preferred shares	amount	disposal of treasury shares
January 1, 2018	1,652,416	16,367	354,945	13,855
Odd-lot stock acquisition	1	-	-	-
December 31, 2018	<u>1,652,417</u>	<u>16,367</u>	<u>354,945</u>	<u>13,855</u>
December 31, 2019	<u>1,652,417</u>	<u>16,367</u>	<u>354,945</u>	<u>13,855</u>

20. Retained Earnings

Retained earnings as at December 31, 2019 and 2018, consist of:

<i>(in millions of Korean won)</i>	2019	2018
Legal reserve ¹	195,703	195,703
Discretionary reserve ²	13,599,831	12,532,734
Retained earnings before appropriation	<u>316,060</u>	<u>1,527,155</u>
Total	<u>14,111,594</u>	<u>14,255,592</u>

¹ The Commercial Code of the Republic of Korea requires the Company to appropriate for each financial period, as a legal reserve, an amount equal to a minimum of 10% of cash dividends paid until such reserve equals 50% of its issued share capital. The reserve is not available for cash dividends payment, but may be transferred to share capital or used to reduce accumulated deficit. When the accumulated legal reserves (the sum of capital reserves and earned profit reserves) are greater than 1.5 times the paid-in capital amount, the excess legal reserves may be distributed in accordance with a resolution of the shareholders' meeting.

² The Company separately accumulates a discretionary reserve for research and human resource development through appropriation of retained earnings, which has been included as deductible expense for the corporate income tax return according to the Special Tax Treatment Law. The reserve could be paid as a dividend in accordance with the terms of related tax laws.

21. Other Components of Equity

Details of other components of equity as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Treasury shares (Note 19)	(354,945)	(354,945)

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22. Selling and Administrative Expenses

Selling and administrative expenses for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Wages and salaries	694,070	655,698
Post-employment benefits (Note 16)	55,888	48,031
Employee benefits	141,512	109,866
Travel expense	62,070	46,136
Water & utilities	51,111	42,714
Packaging expenses	9,282	6,998
Rental expenses	99,983	94,939
Commission expenses	626,955	469,289
Depreciation	128,430	102,263
Advertising expense	31,500	27,436
Freight expenses	433,640	420,491
Training expense	23,198	21,138
Amortization (Note 12)	90,392	68,982
Sample expense	14,779	12,447
Development costs	238,653	187,660
Others	708,307	283,562
Total	3,409,770	2,597,650

23. Breakdown of Expenses by Nature

Cost of sales, and selling and administrative expenses by nature for the years ended December 31, 2019 and 2018, consist of:

<i>(in millions of Korean won)</i>	2019	2018
Changes in inventories of merchandise, finished goods, semi-finished goods and work in process	(100,491)	(172,048)
Raw materials and consumables used	13,266,975	13,698,788
Purchase of merchandise	1,002,728	1,252,906
Employee benefit expenses (Note 24)	1,988,085	1,903,689
Advertising expenses	32,801	28,903
Freight expenses	460,533	445,800
Commission expenses	826,227	653,185
Depreciation and amortization	1,140,295	1,027,585
Rentals and fees	47,358	53,799
Other expenses	3,065,625	2,469,093
Total	21,730,136	21,361,700

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24. Employee Benefit Expenses

Details of employee benefit expenses for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Salaries	1,654,333	1,612,708
Post-employment benefits – Defined benefit plan (Note 16)	159,452	141,951
Post-employment benefits – Defined contribution plan (Note 16)	6,218	4,580
Others	168,082	144,450
Total	<u>1,988,085</u>	<u>1,903,689</u>

25. Finance Income and Costs

Details of finance income and costs for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Finance income		
Interest income ¹	34,614	36,073
Dividend income	100,374	116,134
Exchange differences	163,881	136,169
Gain on valuation of derivative instruments	29,599	2,855
Total	<u>328,468</u>	<u>291,231</u>
Finance costs		
Interest expense ²	101,183	49,014
Exchange differences	174,209	139,975
Loss on valuation of derivative instruments	273	99
Total	<u>275,665</u>	<u>189,088</u>

¹ Details of interest income for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Deposits held by financial institutions	25,938	35,983
Other loans and receivables	8,676	90
Total	<u>34,614</u>	<u>36,073</u>

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² Details of interest expense for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Interest related to financial institutions	5,545	4,846
Interest on finance lease liabilities	2,142	993
Interest on debentures	114,759	59,729
Other interest expenses	1,602	-
Capitalized interest for qualifying assets	(22,865)	(16,554)
Total	<u>101,183</u>	<u>49,014</u>

26. Other Non-Operating Income

Details of other non-operating income for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Exchange differences	357,903	239,362
Gain on disposal of property, plant and equipment	8,715	6,521
Gain on disposal of intangible assets	72	2
Reversal of impairment loss on property, plant and equipment (Note 11)	215	452
Others	34,161	21,010
Total	<u>401,066</u>	<u>267,347</u>

27. Other Non-Operating Expenses

Details of other non-operating expenses for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Exchange differences	344,803	204,184
Loss on disposal of property, plant and equipment	22,824	12,572
Loss on disposal of intangible assets	1,663	180
Impairment loss on property, plant and equipment (Note 11)	121,190	38,322
Impairment loss on intangible assets (Note 12)	46,894	1,711
Donations	14,152	13,836
Others	38,946	76,112
Total	<u>590,472</u>	<u>346,917</u>

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28. Tax Expense and Deferred Tax

(a) Income tax expense for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Current tax on profit for the year	102,141	430,296
Adjustments in respect of prior years	51,789	(2,380)
Deferred tax movement in temporary differences	(77,019)	(59,576)
Deferred tax - credit carryforwards	4,678	(2,280)
	<u>81,589</u>	<u>366,060</u>
Deferred tax charged directly to equity	(20,605)	8,619
Current tax charged directly to equity	18,914	20,448
Income tax expense	<u>79,898</u>	<u>395,127</u>

(b) The aggregate current and deferred tax charged directly to equity (other comprehensive income) for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Current tax		
Remeasurements of net defined benefits liabilities	18,914	20,448
Deferred tax		
Gain on disposal of financial assets at fair value through other comprehensive income	-	424
Gain on valuation of financial assets at fair value through other comprehensive income	(9,647)	3,114
Loss on valuation of derivative instruments	(10,958)	5,081
Total	<u>(1,691)</u>	<u>29,067</u>

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(c) Movements in deferred tax assets (liabilities) for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019			
	Beginning balance	Increase (decrease)		Ending balance
		Profit (loss) for the year	Other comprehensive income	
Defined benefit liability	299,565	47,806	-	347,371
Plan assets	(251,348)	(58,521)	-	(309,869)
Provision for impairment on receivables	254	(19)	-	235
Property, plant and equipment	40,671	6,552	-	47,223
Investments in subsidiaries, associates and joint ventures	15,142	(21,392)	-	(6,250)
Accrued income	(308)	288	-	(20)
Others	94,355	122,910	(20,605)	196,660
	<u>198,331</u>	<u>97,624</u>	<u>(20,605)</u>	<u>275,350</u>
Tax credit carryforwards	11,156	(4,678)	-	6,478
Deferred income tax assets	<u>209,487</u>	<u>92,946</u>	<u>(20,605)</u>	<u>281,828</u>

(in millions of Korean won)

	2018			
	Beginning balance	Increase (decrease)		Ending balance
		Profit (loss) for the year	Other comprehensive income	
Defined benefit liability	262,576	36,989	-	299,565
Plan assets	(232,724)	(18,624)	-	(251,348)
Reserve for research and human resources development	(18,334)	18,334	-	-
Provision for impairment on receivables	254	-	-	254
Property, plant and equipment	56,227	(15,556)	-	40,671
Investments in subsidiaries, associates and joint ventures	(1,046)	16,188	-	15,142
Accrued income	(1,062)	754	-	(308)
Others	72,864	12,872	8,619	94,355
	<u>138,755</u>	<u>50,957</u>	<u>8,619</u>	<u>198,331</u>
Tax credit carryforwards	8,876	2,280	-	11,156
Deferred income tax assets	<u>147,631</u>	<u>53,237</u>	<u>8,619</u>	<u>209,487</u>

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(d) The reconciliations between income tax expense and accounting profit for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Profit before income tax expense	445,822	1,976,191
Tax at domestic tax rates applicable	112,239	533,090
Tax effects of:		
Income not subject to tax	(19,851)	(31,410)
Expenses not deductible for tax purposes	29,654	12,952
Unrecognized deferred income tax for temporary differences in the current year	5,285	(62,217)
Tax credit	(88,472)	(95,367)
Others	41,043	38,079
Income tax expense	79,898	395,127
Effective tax rate (income tax expense/ profit before income tax)	17.92%	19.99%

(e) Realization of deferred tax assets is dependent on the Company's ability to generate future taxable profits in excess of the profits arising from the reversal of taxable temporary differences, and economic and industry outlooks. Management periodically reviews on these factors.

(f) Details of deductible (taxable) temporary differences unrecognized as deferred tax assets (liabilities) as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Investment in subsidiaries, associates and joint ventures	62,795	2,076
Land	488	488
Goodwill	(694,422)	(694,422)
Total	(631,139)	(691,858)

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29. Earnings per Share

Basic earnings per share is calculated by dividing the profit attributable to ordinary shares by the weighted average number of shares in issue excluding shares purchased by the Company and held as treasury shares. As at the reporting date, the Company has no potential ordinary shares. Preferred shares have a right to participate in the profits of the Company. These participation rights have been considered in presenting the EPS for ordinary shares and preferred shares.

(a) Basic earnings per share for the years ended December 31, 2019 and 2018, are computed as follows:

Basic earnings per ordinary share

*(in millions of Korean won and
in number of shares)*

	2019	2018
Profit attributable to ordinary shares ¹	328,933	1,422,381
Weighted average number of ordinary shares outstanding ²	68,939,926	68,939,926
Basic earnings per ordinary share (in won)	<u>4,771</u>	<u>20,632</u>

Basic earnings per preferred share

*(in millions of Korean won and
in number of shares)*

	2019	2018
Profit attributable to preferred shares ¹	36,991	158,683
Weighted average number of preferred shares outstanding ²	7,672,433	7,672,433
Basic earnings per preferred share (in won)	<u>4,821</u>	<u>20,682</u>

¹ Profit attributable to ordinary and preferred shares are as follows:

(in millions of Korean won)

	2019	2018
Profit attributable to the equity holders of the Parent Company	365,924	1,581,064
Ordinary shares dividends (A)	137,880	413,640
Preferred shares dividends (B)	15,728	46,418
Undistributed earnings for the year	212,316	1,121,006
Undistributed earnings available for ordinary shares (C)	191,053	1,008,741
Undistributed earnings available for preferred shares (D)	21,263	112,265
Profit for the year attributable to ordinary shares (A+C)	328,933	1,422,381
Profit for the year attributable to preferred shares (B+D)	36,991	158,683

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² Weighted average numbers of shares are calculated as follows:

Ordinary shares outstanding	Period	2019		
		Number of shares	Number of days	Number of shares x days
Beginning balance	2019. 1. 1 - 2019. 12. 31	68,939,926	365	<u>25,163,072,990</u>
Total				<u>25,163,072,990</u>

Weighted average number of ordinary shares outstanding: 25,163,072,990 / 365 = 68,939,926 shares

Preferred shares outstanding	Period	2019		
		Number of shares	Number of days	Number of shares x days
Beginning balance	2019. 1. 1 - 2019. 12. 31	7,672,433	365	<u>2,800,438,045</u>
Total				<u>2,800,438,045</u>

Weighted average number of preferred shares outstanding: 2,800,438,045 / 365 = 7,672,433 shares

Ordinary shares outstanding	Period	2018		
		Number of shares	Number of days	Number of shares x days
Beginning balance	2018. 1. 1 - 2018. 12. 31	68,939,926	365	<u>25,163,072,990</u>
Total				<u>25,163,072,990</u>

Weighted average number of ordinary shares outstanding: 25,163,072,990 / 365 = 68,939,926 shares

Preferred shares outstanding	Period	2018		
		Number of shares	Number of days	Number of shares x days
Beginning balance	2018. 1. 1 - 2018. 12. 31	7,672,433	365	<u>2,800,438,045</u>
Total				<u>2,800,438,045</u>

Weighted average number of preferred shares outstanding: 2,800,438,045 / 365 = 7,672,433 shares

(b) Diluted earnings per share is calculated based on the weighted average number of ordinary shares outstanding, adjusted for the assumption that all of dilutive potential ordinary shares to be converted. The Company has one category of dilutive potential ordinary shares: convertible bonds, which were issued during the year ended December 31, 2018. Convertible bonds are considered to be converted into potential ordinary shares and the amount, subtracting income tax effect from related gain and loss such as interest expense on convertible bonds, is added to profit for the period attributable to ordinary shares and preferred shares.

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<i>(in millions of Korean won and in number of shares)</i>	2019	2018
Diluted earnings per ordinary shares		
Profit for the year attributable to the ordinary shares	328,933	1,422,381
Gain and loss on convertible bonds (after tax effects)	(11,058)	6,675
Profit used in calculating diluted earnings per share	317,875	1,429,056
Weighted average number of ordinary shares outstanding	68,939,926	68,939,926
Adjustments for calculation of diluted earnings per share:		
Assumed conversion of convertible bonds	1,284,734	915,153
Weighted average number of ordinary shares and potential ordinary shares used as the denominator in calculating diluted earnings per share	70,224,660	69,855,079
Diluted earnings per share attributable to the ordinary shares <i>(in Korean won)</i>	4,527	20,457

<i>(in millions of Korean won and in number of shares)</i>	2019	2018
Diluted earnings per preferred shares		
Profit for the year attributable to preferred shares	36,991	158,683
Gain and loss on convertible bonds	(1,878)	(1,341)
Profit used in calculating diluted earnings per share	35,113	157,342
Weighted average number of preferred shares outstanding	7,672,433	7,672,433
Adjustments for calculation of diluted earnings per share:		
Assumed conversion of convertible bonds	-	-
Weighted average number of preferred shares and potential preferred shares used as the denominator in calculating diluted earnings per share	7,672,433	7,672,433
Diluted earnings per share attributable to the preferred shares <i>(in Korean won)</i>	4,577	20,507

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30. Dividends

Details of dividends for the years ended December 31, 2019 and 2018, are as follows:

	2019	2018
Number of shares entitled to dividends: shares issued and outstanding (par value per share: ₩ 5,000)		
Ordinary shares	68,939,926	68,939,926
Preferred shares	7,672,433	7,672,433
Dividend per share (<i>in Korean won, %</i>)		
Ordinary shares: cash	2,000 (40%)	6,000 (120%)
Preferred shares: cash	2,050 (41%)	6,050 (121%)
Cash dividends to distribute (<i>in millions of Korean won</i>)		
Ordinary shares	137,880	413,640
Preferred shares	15,728	46,418
	<u>153,608</u>	<u>460,058</u>

Dividend payout ratios for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Dividends (A)	153,608	460,058
Profit attributable to the ordinary equity holders of the Parent Company (B)	365,924	1,581,064
Dividend payout ratio (A/B)	<u>41.98%</u>	<u>29.10%</u>

Dividend yield ratios for the years ended December 31, 2019 and 2018, are as follows:

<i>(in Korean won)</i>	2019		2018	
	Ordinary shares	Preferred Shares	Ordinary shares	Preferred Shares
Dividend per share (A)	2,000	2,050	6,000	6,050
Market value at the end of year (B) ¹	312,000	171,500	353,250	198,125
Dividend yield ratio (A/B)	<u>0.64%</u>	<u>1.20%</u>	<u>1.70%</u>	<u>3.05%</u>

¹ Average price in the stock market during one week preceding two business days before shareholder list closing date for the general shareholders' meeting.

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31. Related Party Transactions

(a) As at December 31, 2019 and 2018, LG Corp. is an entity exercising a significant influence over the Company as it owns 33.34% of the Company's ordinary shares.

(b) Details of other related parties that have sales and other transactions with the Company or have receivables and payables balances, other than consolidated subsidiaries, associates and joint ventures (Note 10), as at December 31, 2019 and 2018, are as follows:

Related party	Related party's subsidiary (Domestic)	Related party's subsidiary (Overseas)	Details
S&I corp.	S&I CM	-	Subsidiary of LG Corp.
LG CNS Co., Ltd.	Biz Tech Partners Co., Ltd. and others	LG CNS America Inc. and others	Subsidiary of LG Corp.
LG Management Development Institute	-	-	Subsidiary of LG Corp.
LG Sports Ltd.	-	-	Subsidiary of LG Corp.
LG Holdings Japan	-	-	Subsidiary of LG Corp.
LG MMA Corporation ¹	-	-	Joint venture of LG Corp.
LG Display Co., Ltd.	-	LG Display (China) Co., Ltd. and others	LG Enterprise group ¹
LG Electronics, Inc.	LG Innotek Co., Ltd. and others	Inspur LG Digital Mobile Communications Co., Ltd. and others	LG Enterprise group ¹
LG International Corp.	Pantos Logistics Co., Ltd. and others	LG International (Japan) Ltd. and others	LG Enterprise group ¹
LG Hausys, Ltd.	-	LG Hausys Tianjin Co., Ltd. and others	LG Enterprise group ¹
LG Household & Health Care Ltd.	Coca-Cola Beverage Co. and others	LG Household & Health Care trading (Shanghai) Co.,Ltd.	LG Enterprise group ¹
LG Uplus Corp.	-	-	LG Enterprise group ¹
G II R Inc.	HS AD Inc.	GIIR Rus LLC	LG Enterprise group ¹
Silicon Works Co., Ltd.	-	-	LG Enterprise group ¹
SERVEONE ²	-	Serveone(Nanjing).Co.,Ltd. and others	LG Enterprise group ¹

¹ Although these entities are not the related parties of the Company in accordance with Korean IFRS 1024, the entities belong to a large enterprise group in accordance with the Monopoly Regulation and Fair Trade Act.

² During 2019, SERVEONE has been excluded from other related parties as S&I corp. has sold its shares of SERVEONE.

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(c) Sales and purchases with related parties for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019			
	Sales and others	Purchase and others		
		Purchase of raw materials /merchandises	Acquisition of property, plant and equipment and intangible assets	Others
Entity with a significant influence over the Company				
LG Corp.	2,666	-	-	73,171
Subsidiaries				
Ningbo LG Yongxing Chemical Co.,Ltd.	100,552	1,638	-	18
LG Chem HK Ltd.	10,724	-	-	-
LG Chem America, Inc.	776,665	-	-	3,449
LG Chem (Nanjing) Information & Electronics Materials Co.,Ltd.	1,072,223	2,092,284	-	3,816
LG Chemical (Guangzhou) Engineering Plastics Co.,Ltd.	55,737	10,548	-	-
LG Chem (Taiwan), Ltd.	69,094	-	-	7,656
LG Chem Display Materials (Beijing) Co.,Ltd.	70	-	-	10,371
Tianjin LG Bohai Chemical Co.,Ltd.	2,357	483	-	-
LG Chem (China) Investment Co.,Ltd.	44	-	-	49,085
LG Chem (Tianjin) Engineering Plastics Co.,Ltd.	16,691	122	-	19
LG Chem Europe GmbH	730,074	-	-	62,473
LG Chem Poland Sp. z o.o.	25,681	-	-	1,947
LG NanoH2O, Inc.	15,062	-	-	12,085
LG Chem Michigan Inc.	90,987	6,091	-	45,036
Nanjing LG Chem New Energy Battery Co.,Ltd.	61,085	905,867	-	-
LG Chem Wroclaw Energy sp. z o.o.	1,084,587	2,649	-	6,015
LG Chem (Guangzhou) I&E Materials Co., Ltd.	122,771	199	-	-
LG Chem Nanjing Energy Solution Co., Ltd.	19,010	561	-	-
Others	185,004	1,150	1	28,633
Associates and joint ventures				
SEETEC Co.,Ltd.	59,774	197,503	343	90,611
TECWIN Co.,Ltd.	3	55	4,727	220
HL Greenpower Co.,Ltd.	834,289	-	-	1,148
Others	196	-	1	2,937
Other related parties				
LG MMA Corporation ¹	108,831	189,066	-	6,087
S&I Corporation ²	10,815	438,423	379,947	109,092
LG CNS Co., Ltd. and its subsidiaries	18,258	3,862	212,279	75,623
Others	5	-	-	17,321

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Others				
LG Display Co., Ltd. and its subsidiaries	646,317	148	-	-
LG Electronics Inc. and its subsidiaries	776,900	217,026	68,292	50,308
LG International Corp. and its subsidiaries	185,120	242,463	779	349,611
LG Hausys, Ltd. and its subsidiaries	185,489	7,633	4,483	7,079
Others	14,474	23,486	1,041	11,789
Total	7,281,555	4,341,257	671,893	1,025,600

(in millions of Korean won)

	2018			
	Sales and others	Purchase and others		
		Purchase of raw materials /merchandises	Acquisition of property, plant and equipment and intangible assets	Others
Entity with a significant influence over the Company				
LG Corp.	10	-	-	69,969
Subsidiaries				
Ningbo LG Yongxing Chemical Co.,Ltd.	166,861	1,158	-	67
LG Chem HK Ltd.	180,905	-	-	523
LG Chem America, Inc.	827,832	-	-	2,732
LG Chem (Nanjing) Information & Electronics Materials Co.,Ltd.	1,130,249	1,760,428	-	1,169
LG Chemical (Guangzhou) Engineering Plastics Co.,Ltd.	82,934	19,156	-	-
LG Chem (Taiwan), Ltd.	104,673	-	-	7,650
LG Chem Display Materials (Beijing) Co.,Ltd.	1,690	-	-	10,531
Tianjin LG Bohai Chemical Co.,Ltd.	484	-	-	871
LG Chem (China) Investment Co.,Ltd.	-	-	-	44,975
LG Chem (Tianjin) Engineering Plastics Co.,Ltd.	37,878	17	-	246
LG Chem Europe GmbH	693,817	-	-	30,195
LG Chem Poland Sp. z o.o.	31,038	-	-	8,635
LG NanoH2O, Inc.	12,957	-	-	11,952
LG Chem Michigan Inc.	46,819	8,010	-	29,639
Nanjing LG Chem New Energy Battery Co.,Ltd.	115,864	505,478	-	4,949
LG Chem Wroclaw Energy sp. z o.o.	435,398	2,983	-	1,438
Others	162,029	1,012	1,189	19,817
Associates and joint ventures				
SEETEC Co.,Ltd.	39,019	133,005	4,665	84,759
TECWIN Co.,Ltd.	-	224	3,383	286
HL Greenpower Co.,Ltd.	523,822	-	-	790
Others	837	-	-	2,586
Other related parties				
LG MMA Corporation ¹	114,096	262,888	-	6,743

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S&I Corporation	15,327	465,162	278,229	210,602
LG CNS Co., Ltd. and its subsidiaries	65,622	2,665	213,133	57,291
Others	6	-	-	13,338
Others				
LG Display Co., Ltd. and its subsidiaries	817,731	80	1,564	5
LG Electronics Inc. and its subsidiaries	964,692	219,294	526,462	48,237
LG International Corp. and its subsidiaries	288,561	239,175	1,699	324,413
LG Hausys, Ltd. and its subsidiaries	202,981	3,312	1,545	7,069
Others	16,240	26,826	2,341	9,107
Total	7,080,372	3,650,873	1,034,210	1,010,584

¹ Net sales and purchase amounts after offsetting for Raffinate transactions with LG MMA.

² SERVEONE has been excluded from the related parties at December 31, 2019 since S&I corporation sold its shares of SERVEONE in 2019. Transactions with SERVEONE until the sale of shares have been included in the above information.

(d) Balances of receivables and payables arising from sales and purchases of goods and services as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019			
	Receivables			
	Trade receivables and others	Loan receivables	Other receivables	Total
Entity with a significant influence over the Company				
LG Corp.	-	-	12,391	12,391
Subsidiaries				
Ningbo LG Yongxing Chemical Co.,Ltd.	9,735	-	18,823	28,558
LG Chem HK Ltd.	-	-	-	-
LG Chem America, Inc.	265,291	-	-	265,291
LG Chem (Nanjing) Information & Electronics Materials Co.,Ltd.	274,781	331,495	42,361	648,637
LG Chemical (Guangzhou) Engineering Plastics Co.,Ltd.	10,400	-	3,211	13,611
LG Chem (Taiwan), Ltd.	20,104	-	20	20,124
LG Chem Display Materials (Beijing) Co.,Ltd.	33	-	1,214	1,247
Tianjin LG Bohai Chemical Co.,Ltd.	-	-	275	275
LG Chem (China) Investment Co.,Ltd.	-	-	-	-
LG Chem (Tianjin) Engineering Plastics Co.,Ltd.	2,764	-	803	3,567
LG Chem Europe GmbH	267,117	-	325	267,442
LG Chem Poland Sp. z o.o.	7,812	-	1,628	9,440
LG NanoH2O Inc.	4,020	-	-	4,020
LG Chem Michigan Inc.	44,017	-	9,889	53,906
Nanjing LG Chem New Energy Battery Co.,Ltd.	8,565	-	120	8,685
LG Chem Wroclaw Energy sp. z	593,266	-	115,402	708,668

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o.o.				
LG Chem (Guangzhou) I&E Materials Co., Ltd.	80,768	-	36	80,804
LG Chem Nanjing Energy Solution Co., Ltd.	16,742	-	8	16,750
Others	57,627	-	6,796	64,423
Associates and joint ventures				
SEETEC Co.,Ltd.	4,140	-	636	4,776
TECWIN Co.,Ltd.	-	-	-	-
HL Greenpower Co.,Ltd.	54,908	-	-	54,908
Others	-	-	10	10
Other related parties				
LG MMA Corporation	8,425	-	823	9,248
S&I Corporation ¹	-	-	24,274	24,274
LG CNS Co., Ltd. and its subsidiaries	7,650	-	-	7,650
Others	-	-	4,356	4,356
Others				
LG Display Co., Ltd. and its subsidiaries	59,096	-	-	59,096
LG Electronics Inc. and its subsidiaries	214,183	-	21,092	235,275
LG International Corp. and its subsidiaries	13,215	-	-	13,215
LG Hausys, Ltd. and its subsidiaries	17,789	-	49	17,838
Others	40	-	1,096	1,136
Total	2,042,488	331,495	265,638	2,639,621

(in millions of Korean won)

	2019			
	Payables			
	Trade payables	Borrowings	Other payables	Total
Entity with a significant influence over the Company				
LG Corp.	-	-	1,360	1,360
Subsidiaries				
Ningbo LG Yongxing Chemical Co.,Ltd.	122	-	10	132
LG Chem HK Ltd.	-	-	-	-
LG Chem America, Inc.	-	-	2,866	2,866
LG Chem (Nanjing) Information & Electronics Materials Co.,Ltd.	337,059	-	41,083	378,142
LG Chemical (Guangzhou) Engineering Plastics Co.,Ltd.	198	-	9	207
LG Chem (Taiwan), Ltd.	-	-	2,292	2,292
LG Chem Display Materials (Beijing) Co.,Ltd.	-	-	690	690
Tianjin LG Bohai Chemical Co.,Ltd.	187	-	-	187
LG Chem (China) Investment Co.,Ltd.	-	-	5,378	5,378
LG Chem (Tianjin) Engineering Plastics Co.,Ltd.	88	-	3	91
LG Chem Europe GmbH	-	-	12,006	12,006

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LG Chem Poland Sp. z o.o.	-	-	4	4
LG NanoH2O Inc.	-	-	6,533	6,533
LG Chem Michigan Inc.	1,486	-	7,297	8,783
Nanjing LG Chem New Energy Battery Co.,Ltd.	82,594	-	31	82,625
LG Chem Wroclaw Energy sp. z o.o.	1,661	-	14,530	16,191
LG Chem (Guangzhou) I&E Materials Co., Ltd.	195	-	62	257
LG Chem Nanjing Energy Solution Co., Ltd.	539	-	2	541
Others	203	-	3557	3,760
Associates and joint ventures				
SEETEC Co.,Ltd.	15,781	-	11,375	27,156
TECWIN Co.,Ltd.	-	-	1,633	1,633
HL Greenpower Co.,Ltd.	-	-	65	65
Others	-	-	258	258
Other related parties				
LG MMA Corporation	13,234	-	-	13,234
S&I Corporation ¹	-	-	161,372	161,372
LG CNS Co., Ltd. and its subsidiaries	-	-	88,877	88,877
Others	-	-	403	403
Others				
LG Display Co., Ltd. and its subsidiaries	17	-	-	17
LG Electronics Inc. and its subsidiaries	58,184	-	39,673	97,857
LG International Corp. and its subsidiaries	5,736	-	47,044	52,780
LG Hausys, Ltd. and its subsidiaries	512	-	5,621	6,133
Others	1,593	-	3,829	5,422
Total	519,389	-	457,863	977,253

(in millions of Korean won)

	2018			
	Receivables			
	Trade receivables and others	Loan receivables	Other receivables	Total
Entity with a significant influence over the Company				
LG Corp.	-	-	11,286	11,286
Subsidiaries				
Ningbo LG Yongxing Chemical Co.,Ltd.	4,032	-	7,707	11,739
LG Chem HK Ltd.	-	-	-	-
LG Chem America, Inc.	197,055	-	-	197,055
LG Chem (Nanjing) Information & Electronics Materials Co.,Ltd.	246,640	-	34,434	281,074
LG Chemical (Guangzhou) Engineering Plastics Co.,Ltd.	9,821	-	3,535	13,356
LG Chem (Taiwan), Ltd.	39,876	-	69	39,945
LG Chem Display Materials	220	-	11	231

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(Beijing) Co.,Ltd.				
Tianjin LG Bohai Chemical Co.,Ltd.	-	-	252	252
LG Chem (China) Investment Co.,Ltd.	-	-	1,441	1,441
LG Chem (Tianjin) Engineering Plastics Co.,Ltd.	3,714	-	1,202	4,916
LG Chem Europe GmbH	301,855	-	-	301,855
LG Chem Poland Sp. z o.o.	13,229	-	1,657	14,886
LG NanoH2O Inc.	5,109	-	2	5,111
LG Chem Michigan Inc.	5,101	-	7,705	12,806
Nanjing LG Chem New Energy Battery Co.,Ltd.	34,556	-	355	34,911
LG Chem Wroclaw Energy sp. z o.o.	256,464	-	7,425	263,889
Others	50,866	559	10,761	62,186
Associates and joint ventures				
SEETEC Co.,Ltd.	4,520	-	300	4,820
TECWIN Co.,Ltd.	-	-	-	-
HL Greenpower Co.,Ltd.	89,122	-	-	89,122
Others	-	-	837	837
Other related parties				
LG MMA Corporation	12,402	-	593	12,995
S&I Corporation	2,859	-	27,649	30,508
LG CNS Co., Ltd. and its subsidiaries	13,155	-	-	13,155
Others	-	-	4,357	4,357
Others				
LG Display Co., Ltd. and its subsidiaries	100,921	-	1,978	102,899
LG Electronics Inc. and its subsidiaries	205,325	-	61,263	266,588
LG International Corp. and its subsidiaries	43,122	-	711	43,833
LG Hausys, Ltd. and its subsidiaries	13,939	-	47	13,986
Others	60	-	721	781
Total	1,653,963	559	186,298	1,840,820

(in millions of Korean won)

	2018			
	Payables			
	Trade payables	Borrowings	Other payables	Total
Entity with a significant influence over the Company				
LG Corp.	-	-	5,102	5,102
Subsidiaries				
Ningbo LG Yongxing Chemical Co.,Ltd.	108	-	8	116
LG Chem HK Ltd.	-	-	24	24
LG Chem America, Inc.	-	-	469	469
LG Chem (Nanjing) Information & Electronics Materials Co.,Ltd.	489,799	-	51,318	541,117
LG Chemical (Guangzhou) Engineering Plastics Co.,Ltd.	1,047	-	14	1,061

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LG Chem (Taiwan), Ltd.	-	-	13,441	13,441
LG Chem Display Materials (Beijing) Co.,Ltd.	-	-	960	960
Tianjin LG Bohai Chemical Co.,Ltd.	-	-	-	-
LG Chem (China) Investment Co.,Ltd.	-	-	3,596	3,596
LG Chem (Tianjin) Engineering Plastics Co.,Ltd.	5	-	5	10
LG Chem Europe GmbH	-	-	7,259	7,259
LG Chem Poland Sp. z o.o.	178	-	1,581	1,759
LG NanoH2O Inc.	-	-	5,564	5,564
LG Chem Michigan Inc.	1,930	-	1,940	3,870
Nanjing LG Chem New Energy Battery Co.,Ltd.	123,297	-	167	123,464
LG Chem Wroclaw Energy sp. z o.o.	1,649	-	1,848	3,497
Others	106	-	2,224	2,330
Associates and joint ventures				
SEETEC Co.,Ltd.	17,384	-	10,727	28,111
TECWIN Co.,Ltd.	-	-	871	871
HL Greenpower Co.,Ltd.	-	-	225	225
Others	-	-	250	250
Other related parties				
LG MMA Corporation	19,588	-	-	19,588
S&I Corporation	1,439	-	309,757	311,196
LG CNS Co., Ltd. and its subsidiaries	-	-	109,482	109,482
Others	-	-	652	652
Others				
LG Display Co., Ltd. and its subsidiaries	14	-	-	14
LG Electronics Inc. and its subsidiaries	69,575	-	40,320	109,895
LG International Corp. and its subsidiaries	9,151	-	41,534	50,685
LG Hausys, Ltd. and its subsidiaries	439	-	2,228	2,667
Others	1,600	-	3,856	5,456
Total	737,309	-	615,422	1,352,731

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(e) Fund transactions with related parties for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019		2018	
	Equity contributions in cash	Loan (repayment)	Equity contributions in cash	Loan (repayment)
Subsidiaries				
LG Chem (Nanjing) Information & Electronics Materials Co.,Ltd.	288,053	331,495	232,462	-
Nanjing LG Chem New Energy Battery Co., Ltd	161,465	-	112,570	-
LG Chem Wroclaw Energy Sp. z o.o.	800,800	-	456,894	-
LG Chem Michigan Inc.	1,128	-	146,419	-
LEYOU NEW MATERIALS(WUXI)CO.,Ltd	102,666	-	48,808	-
LG Chem (China) Investment Co.,Ltd.	68,591	-	54,946	-
LG Chem Haiphong Engineering plastics co., Ltd.	-	-	15,344	-
LG Chem Mexico S.A. de C.V.	-	-	394	-
LG Chem (Guangzhou) Information & Electronics Materials Co.,Ltd.	56,739	-	127,752	-
LG CHEM FUND I LLC	16,182	-	7,886	-
Ugimag Korea Co., Ltd.	4,500	-	-	-
LG Chem Life Sciences (Thailand) Ltd.	-	(554)	-	-
LG Chem HK Ltd. ¹	(7,586)	-	-	-
NanoH2O (Jiangsu) Water Processing Technology Co., Ltd	(4,521)	-	-	-
Associates and joint ventures				
LG Fuel Cell Systems Inc.	-	-	5,036	-
HUAJIN NEW ENERGY MATERIALS(QUZHOU) CO.,Ltd	41,202	-	26,129	-
LG VINA Chemical Co.,Ltd.	-	-	1,767	-
VINFAST LITHIUM BATTERY PACK LLC	5,323	-	-	-
LG Holdings (HK) Ltd	(15,788)	-	-	-
WUXI CL NEW Energy Technology Ltd	-	-	559	-
Total	1,518,754	330,941	1,236,966	-

¹ LG Chem HK Ltd. liquidated during the year ended December 31, 2019 and the Company collected ₩ 7,586 million.

² NanoH2O (Jiangsu) Water Processing Technology Co. Ltd. liquidated during the year ended December 31, 2019 and the Company collected ₩ 4,521 million.

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(f) Dividends received from related parties for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Subsidiaries		
LG Chem HK Ltd.	10,724	-
Ningbo LG Yongxing Chemical Co.,Ltd	71,557	101,467
LG Chem (Taiwan), Ltd.	5,384	2,570
LG Chem Display Materials (Beijing) Co.,Ltd.	1,198	1,164
Associates and joint ventures		
SEETEC Co.,Ltd.	10,000	10,000
LG VINA Chemical Co.,Ltd.	-	810
Total	<u>98,863</u>	<u>116,011</u>

(g) Dividends paid to related party for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Entity with a significant influence over the Company		
LG Corp.	<u>141,205</u>	<u>141,205</u>
Total	<u>141,205</u>	<u>141,205</u>

(h) Compensation for key management of the Company for the years ended December 31, 2019 and 2018, consists of:

<i>(in millions of Korean won)</i>	2019	2018
Short-term employee benefits	77,651	57,698
Post-employment benefits	<u>4,344</u>	<u>7,781</u>
Total	<u>81,995</u>	<u>65,479</u>

Key management includes directors and audit committee members having duties and responsibilities over planning, operations and controlling of the Company's business activities.

There are no provision recognized for receivables of related parties as at December 31, 2019 and no impairment loss on receivables for related parties are recognized for the years ended December 31, 2019 and 2018.

Details of the guarantees manufactured by the Company for related parties at the reporting date are disclosed in Note 18.

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32. Cash generated from operations

Reconciliation between profit before income tax and cash generated from operations for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Profit before income tax	445,822	1,976,191
Adjustments for:		
Depreciation	1,029,318	940,492
Amortization	110,977	87,093
Post-employment benefits	159,452	141,951
Finance income	(184,089)	(180,703)
Finance costs	220,755	101,659
Foreign exchange differences	(59)	(898)
Loss on valuation of inventories	5,487	11,161
Gain on disposal of property, plant and equipment	(8,715)	(6,521)
Loss on disposal of property, plant and equipment	22,824	12,572
Gain on disposal of intangible assets	(72)	(2)
Loss on disposal of intangible assets	1,663	180
Impairment loss on property, plant and equipment	121,190	38,322
Impairment loss on intangible assets	46,894	1,710
Reversal of impairment loss on property, plant and equipment	(215)	(452)
Impairment loss on investments in joint ventures	-	58,406
Impairment loss on investments in subsidiaries	21,158	-
Gain on disposal of investments in associates	(599)	-
Gain on disposal of investments in subsidiaries	-	(89)
Loss on disposal of investments in subsidiaries	5,421	-
Additions to provisions	634,435	211,923
Other expenses	3,639	2,462
Increase in inventories	(241,641)	(348,071)
Increase in trade receivables	(31,801)	(247,449)
Increase in other receivables	(32,196)	(123,657)
Increase in other current assets	(52,888)	(7,494)
Increase (decrease) in trade payables	(187,775)	549,710
Increase (decrease) in other payables	855,569	(477,847)
Increase (decrease) in other current liabilities	(39,166)	55,988
Decrease in net defined benefit liabilities	(264,916)	(171,775)
Decrease in provisions	(260,169)	(148,772)
Other cash flows from operations	28,654	30,268
Cash generated from operations	2,408,957	2,506,358

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Changes in liabilities arising from financial activities for the year ended December 31, 2019, are as follows:

(in millions of Korean won)

	2019						At December 31, 2019
	At January 1, 2019	Cash flows from financing activities	Reclassifica tion of current portion	Amortization (transfer)	Lease liabilities	Exchange differences	
Short-term borrowings	5,008	(13,200)	39,307	-	-	(1,938)	29,177
Long-term borrowings	23,236	-	(39,307)	-	81,560	(115)	65,374
Debentures	2,463,470	2,713,579	-	17,119	-	35,288	5,229,456
Conversion rights	30,384	-	-	-	-	(29,454)	930
Total	2,522,098	2,700,379	-	17,119	81,560	3,781	5,324,937

The significant non-cash transactions for the years ended December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019	2018
Transfer of construction-in-progress	2,202,062	2,057,634
Transfer of machinery-in-transit	208,708	150,003
Reclassification of long-term borrowings into current maturities	159,189	55,115
Reclassification of other payables under the reverse factoring arrangement	862,452	-
Other payables related to acquisitions of property, plant and equipment and intangible assets	719,040	860,019

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33. Appropriation of Retained Earnings

The appropriation of retained earnings for the year ended December 31, 2019, is expected to be appropriated at the shareholders' meeting on March 20, 2020. The appropriation date for the year ended December 31, 2018, was March 15, 2019.

The appropriation of retained earnings for the years ended December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Unappropriated retained earnings carried over from prior year	-	-
Profit for the year	365,924	1,581,064
Remeasurements of net defined benefit liabilities	(49,864)	(53,909)
Retained earnings available for appropriation	<u>316,060</u>	<u>1,527,155</u>
Transfer from other reserves		
Reserve for technology development	-	66,667
Appropriation of retained earnings		
Legal reserve	-	-
Dividends	153,608	460,058
Reserve for technology development	162,452	1,133,764
	<u>316,060</u>	<u>1,593,822</u>
Unappropriated retained earnings to be carried forward	<u>-</u>	<u>-</u>

34. Assets Held for Sale

The Company decided to dispose of 2CCL business and others, with the approval of management in January 2017. The related assets were reclassified as assets held for sale. The disposal was completed in September 2019.

(a) Details of assets of disposal group classified as assets held for sale as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Assets of disposal group		
Property, plant and equipment	-	1,929
Intangible assets	-	358
Total	<u>-</u>	<u>2,287</u>

(b) Assets held for sale were measured at net fair value immediately before the initial classification as assets as held for sale and there are no other non-operating expenses (income) recognized from the measurement for the years ended December 31, 2019 and 2018.

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35. Assets and Liabilities related to Contracts with Customers

(a) Assets and liabilities related to contracts with customers as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Contract assets		
Total contract assets	-	-
Contract liabilities		
Advances in relation to revenue from the Company's main business activities	148,291	23,691
Expected services to be transferred	3,500	34,823
Expected customer incentives	6,818	5,019
Unearned revenue	34,247	16,781
Expected refunds	2,634	2,252
Total contract liabilities	<u>195,490</u>	<u>82,566</u>

Revenue recognized in relation to contract liabilities

(b) Revenue recognized in the current year that was included in the contract liability balance at the beginning of the year, and revenue recognized in the current year from performance obligations satisfied (or partially satisfied) in previous years are as follows.

<i>(in millions of Korean won)</i>	2019
Revenue recognized in the current year from the contract liability balance at the beginning of the year	31,267
Advances in relation to revenue from the Company's main business activities	22,758
Unearned revenue	2,474
Expected services to be transferred	6,035
Revenue recognized from performance obligations satisfied in previous periods	-

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36. Investment Properties

(a) Details of investment properties as at December 31, 2019 and 2018, are as follows:

(in millions of Korean won)

	2019			2018				
	Cost	Accumulated depreciation	Accumulated impairment	Book amount	Cost	Accumulated depreciation	Accumulated impairment	Book amount
Land	4,368	-	-	4,368	486	-	-	486
Buildings	61,242	(12,202)	(80)	48,960	556	(27)	-	529
	<u>65,610</u>	<u>(12,202)</u>	<u>(80)</u>	<u>53,328</u>	<u>1,042</u>	<u>(27)</u>	<u>-</u>	<u>1,015</u>

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

(in millions of Korean won)

	2019			2018		
	Land	Building	Total	Land	Building	Total
Beginning balance	486	529	1,015	486	541	1,027
Subsequent payments	3,882	49,657	53,539	-	-	-
Depreciation	-	(1,226)	(1,226)	-	(12)	(12)
Ending balance	<u>4,368</u>	<u>48,960</u>	<u>53,328</u>	<u>486</u>	<u>529</u>	<u>1,015</u>

(c) The fair value of investment properties is measured either by independent professional appraisers with certified qualification or measured based on official appraised value of land and available information from recent transactions of similar properties, and it is classified as 'level 3' of the fair value hierarchy. The fair value of investment properties as of December 31, 2019, is ₩ 53,083 million.

Rental income from investment properties under operating lease is ₩ 7,723 million, and operating expenses incurred for investment properties that generated rental income (including maintenance and repair expenses) are ₩ 1,214 million. Operating expenses incurred for investment properties that do not generate rental income (including maintenance and repair expenses) are ₩ 12 million.

(d) *Operating lease*

Investment properties are leased to tenants under operating leases with monthly rent payments. Where considered necessary to reduce credit risk, the Group may obtain bank guarantees for the term of the lease.

Although the Group is exposed to changes in the residual value at the end of the current leases, the Group typically enters into new operating leases and therefore will not immediately realize any reduction in residual value at the end of these leases. Expectations about the future residual values are reflected in the fair value of investment properties.

LG Chem, Ltd.
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The future minimum lease payments expected to be received in relation to the above operating lease agreement for investment properties as at December 31, 2019 and 2018, are as follows:

<i>(in millions of Korean won)</i>	2019	2018
Within one year	6,848	-
	6,848	-

37. Events after the Reporting Period

On January 31, 2020, the Board of Directors resolved to sell shares of LG Holdings(HK) LTD. to secure Group's liquidity for future investment.

On January 31, 2020, the Board of directors resolved to discontinue Glass substrate business due to the rapid increase in production facilities in China and resulting adverse impact on domestic market.

On January 31, 2020, the Board of Directors resolved to issue public debentures. On February 19, 2020, the Group issued the public debentures amounting to ₩ 900 million as following.

<i>(in millions of Korean won)</i>	Latest maturity date	Amount in Korean won
53-1st Debenture (non-guaranteed/public)	2023.02.19	350,000
53-2nd Debenture (non-guaranteed/public)	2025.02.19	250,000
53-3rd Debenture (non-guaranteed/public)	2027.02.19	50,000
53-4th Debenture (non-guaranteed/public)	2030.02.19	250,000

38. Approval of Issuance of the Financial Statements

The separate financial statements 2019 were approved for issue by the Board of Directors on January 31, 2020 and are subject to change with approval of shareholders at their Annual General Meeting.

Report on Independent Auditor's Audit of Internal Control over Financial Reporting

(English Translation of a Report Originally Issued in Korean)

To the Board of Directors and Shareholders of
LG Chem, Ltd.

Opinion on Internal Control over Financial Reporting

We have audited LG Chem, Ltd.(the Company) Internal Control over Financial Reporting as of December 31, 2019, based on *Conceptual Framework for Designing and Operating Internal Control over Financial Reporting*.

In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on *Conceptual Framework for Designing and Operating Internal Control over Financial Reporting*.

We also have audited, in accordance with Korean Standards on Auditing, the separate financial statements of the Company, which comprise the separate statements of financial position as at December 31, 2019 and 2018, and the separate statements of profit or loss, separate statements of comprehensive income, separate statements of changes in equity and separate statements of cash flow for the years then ended, and notes to the separate financial statements including a summary of significant accounting policies, and our report dated on March 9, 2020, expressed unqualified opinion.

Basis for Opinion on Internal Control over Financial Reporting

We conducted our audit in accordance with Korean Standards on Auditing. Our responsibility under these standards are further described in the *Auditor's Responsibilities for the Audit of the Internal Control over Financial Reporting* section of our report. We are independent of the Company in accordance with the ethical requirements of the Republic of Korea that are relevant to our audit of internal control over financial reporting and we have fulfilled our other ethical responsibilities in accordance with the ethical requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of Management and Those Charged with Governance for Internal Control over Financial Reporting

Management is responsible for designing, implementing and maintaining effective internal control over financial reporting, and for its assessment about the effectiveness of internal control over financial reporting, included in the accompanying *Report on the Effectiveness of Internal Control over Financial Reporting*.

Those charged with governance have the responsibilities for overseeing internal control over financial reporting.

Auditor's Responsibilities for the Audit of Internal Control over Financial Reporting

Our responsibility is to express opinion on the Company's internal control over financial reporting based on our audit. We conducted the audit in accordance with Korean Standards on Auditing. Those

standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

An audit of internal control over financial reporting involves performing procedures to obtain audit evidence about whether a material weakness exists. The procedures selected depend on the auditor's judgment, including the assessment of the risks that a material weakness exists. An audit includes obtaining an understanding of internal control over financial reporting and testing and evaluating the design and operating effectiveness of internal control over financial reporting based on the assessed risk.

Definition and Inherent Limitations of Internal Control over Financial Reporting

An entity's internal control over financial reporting is a process effected by those charged with governance, management, and other personnel, designed to provide reasonable assurance regarding the preparation of reliable separate financial statements in accordance with International Financial Reporting Standards as adopted by the Republic of Korea. An entity's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the entity; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of separate financial statements in accordance with International Financial Reporting Standards as adopted by the Republic of Korea, and that receipts and expenditures of the entity are being made only in accordance with authorizations of management and those charged with governance; and (3) provide reasonable assurance regarding prevention, or timely detection and correction of unauthorized acquisition, use, or disposition of the entity's assets that could have a material effect on the separate financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent, or detect and correct, misstatements. Also, projections of any assessment of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

The engagement partner on the audit resulting in this independent auditor's report is Kibok Lee, Certified Public Accountant.

Seoul, Korea

March 9, 2020

This report is effective as of March 9, 2020, the audit report date. Certain subsequent events or circumstances, which may occur between the audit report date and the time of reading this report, could have a material impact on the Company's internal control over financial reporting thereto. Accordingly, the readers of the audit report should understand that there is a possibility that the above audit report may have to be revised to reflect the impact of such subsequent events or circumstances, if any.

Report on the Effectiveness of Internal Control over Financial Reporting

(English Translation of a Report Originally Issued in Korean)

To the Shareholders, Board of Directors and Audit Committee of
LG Chem, Ltd.

We, as the Chief Executive Officer (“CEO”) and the Internal Control over Financial Reporting (“ICFR”) Officer of LG Chem, Ltd. (“the Company”), assessed the effectiveness of the design and operation of the Company’s Internal Control over Financial Reporting for the year ended December 31, 2019.

The Company’s management, including ourselves, is responsible for designing and operating ICFR. We assessed the design and operating effectiveness of the ICFR in the prevention and detection of an error or fraud which may cause material misstatements in the preparation and disclosure of reliable separate financial statements.

We designed and operated ICFR in accordance with *Conceptual Framework for Designing and Operating Internal Control over Financial Reporting* established by the Operating Committee of Internal Control over Financial Reporting in Korea (the ICFR Committee). And, we conducted an evaluation of ICFR based on *Management Guideline for Evaluating and Reporting Effectiveness of Internal Control over Financial Reporting* established by the ICFR Committee.

Based on the assessment results, we believe that the Company’s ICFR, as at December 31, 2019, is designed and operating effectively, in all material respects, in accordance with *Conceptual Framework for Designing and Operating Internal Control over Financial Reporting*.

We certify that this report does not contain any untrue statement of a fact or omit to state a fact necessary to be presented herein. We also certify that this report does not contain or present any statement which cause material misunderstandings, and we have reviewed and verified this report with sufficient due care.

January 31, 2020

Hak -Cheol Shin, Chief Executive Officer

Dong-Seok Cha, Internal Control over Financial Reporting Officer