SAMSUNG SDI CO., LTD. AND SUBSIDIARIES

Consolidated Financial Statements

December 31, 2018 and 2017

(With Independent Auditors' Report Thereon)

Contents

Independent Auditors' Report

Based on a report originally issued in Korean

To the Shareholders and Board of Directors of
Samsung SDI Co., Ltd.:

Report on the Audit of the Consolidated Financial Statements

Opinion

We have audited the consolidated financial statements of Samsung SDI Co., Ltd. and its subsidiaries ("the Group"), which comprise the consolidated statements of financial position as of December 31, 2018 and 2017, the consolidated statements of comprehensive income , changes in equity and cash flows for the years then ended, and notes, comprising significant accounting policies and other explanatory information.

In our opinion, the accompanying consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Group as of December 31, 2018 and 2017, and its consolidated financial performance and its consolidated cash flows for the years then ended in accordance with Korean International Financial Reporting Standards ("K-IFRS").

Basis for Opinion

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

Key Audit Matters

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements as of and for the year ended December 31, 2018. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

Impairment of CGU including goodwill

1) Risks

The Group allocated goodwill to two of its cash-generating units ("CGUs"), electronic material segment and Novaled. As of December 31, 2018, carrying amount of tangible and intangible assets in such CGUs is KRW 1,465,230 million and represents 7.6% of the Group's total assets.

In view of the size of the balance, the inherent uncertainties and the level of judgment required by us in evaluating the Group's assumptions included within the cash flow model and given the uncertainties in economic environment faced at the Group's markets, including geopolitical situation, impairment of goodwill and intangible assets is a key audit matter.

The Group conducted an impairment assessment on all its cash-generating units ("CGUs") to identify if the recoverable amount is less than the carrying amount, indicating that the goodwill and intangible assets may be impaired. The Group determined the recoverable amount of CGUs using value in use model involving five-year projections with a terminal value. Key assumptions within this model include revenue growth, operational profit, long-term growth rates and discount rates.

2) How the matter was addressed in our audit

We performed the following audit procedures, among others:

• We assessed the appropriateness of using value in use (“VIU”) as the basis for determining the CGUs’ recoverable amount and checked the mathematical accuracy of the cash flow used to estimate VIU.

• We evaluated the Group’s future cash flow model by performing retrospective assessment of the accuracy of the projections, disaggregating and understanding the underlying business units’ cash flows projections, including comparing the inputs to the business’ own forecast, including revenue growth and operational margin, to the latest internal board approved budget and plan, external market data and our understanding of the future prospects of the business or investment.

• We worked with our internal valuation specialists to challenge the discount rates and long-term growth rates, and comparing these assumptions to external market data.

• We performed our own sensitivity of the impairment calculation to changes in the key assumptions used by the Group.

• We also assessed the adequacy of key assumptions disclosure in the Group’s financial statements.

Investments in associates

1) Risk

As of December 31, 2018, carrying amount of the Group’s investments in associates is KRW 6,554,634 million, representing 34% of the Group’s total assets. The Group also recognized KRW 342,182 million as its share in profit of equity-method accounted associates, which represents 33% of the Group’s profit before tax.

Considering the significance of its carrying amount in the Group’s consolidated financial position and profit, the Group’s investment in associates is a key audit matter.

2) How the matter was addressed in our audit

We performed the following audit procedures, among others:

• We assessed reliability of the investees’ financial statements used in equity-method accounting.

• We evaluated appropriateness of assumptions and data used to calculate unrealized gain or loss from transactions between the Group and affiliates.

• We checked mathematical accuracy of equity-method accounting performed by the Group.

• We also assessed the adequacy of disclosures in the Group’s financial statements.

Other Matter

The procedures and practices utilized in the Republic of Korea to audit such consolidated financial statements may differ from those generally accepted and applied in other countries.

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

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

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

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

Auditors' Responsibilities for the Audit of the Consolidated Financial Statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' 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 KSAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

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

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

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

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

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditors' 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.

Report on Other Legal and Regulatory Requirements

The engagement partner on the audit resulting in this independent auditors' report is Kim, Ik-Chan.

KPMG Samjong Accounting Corp.

Seoul, Korea
February 28, 2019

This report is effective as of February 28, 2019, 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 consolidated financial statements and notes thereto. Accordingly, the readers of the audit report should understand that the above audit report has not been updated to reflect the impact of such subsequent events or circumstances, if any.

As of December 31, 2018 and 2017

(In thousands of won)	***Note***		**2018**	**2017**
Assets				
Cash and cash equivalents	*4,6*	₩	1,516,585,547	1,209,015,664
Trade and other receivables, net	*4,7,30*		1,851,185,859	1,230,256,403
Inventories, net	*8*		1,745,650,833	966,571,644
Other investments	*4,9*		150,531,068	113,795,180
Other assets	*10*		198,560,107	64,937,187
Non-current assets held for sale	*33*		56,828,796	-
Total current assets			**5,519,342,210**	**3,584,576,078**
Long-term trade and other receivables, net	*4,7,30*		23,168,939	3,379,614
Investments in equity-accounted investees	*11*		6,554,633,768	6,219,349,912
Property, plant and equipment, net	*5,12*		4,608,333,986	2,930,339,326
Intangible assets, net	*5,13*		866,271,119	897,447,248
Investment property	*5,14*		149,725,014	149,914,778
Deferred tax assets	*28*		51,799,609	41,407,873
Other non-current investments, including derivatives	*4,9,19*		1,495,631,279	1,785,846,776
Other non-current assets	*10*		80,815,260	129,443,773
Total non-current assets			**13,830,378,974**	**12,157,129,301**
Total assets		₩	**19,349,721,184**	**15,741,705,378**
Liabilities				
Trade and other payables	*4,15,17,19,30*	₩	2,145,075,054	1,485,918,600
Income taxes payable	*28*		35,623,226	20,807,948
Advance received			69,598,589	44,172,530
Unearned revenue			6,304,690	33,857,200
Short-term borrowings	*4,16*		1,739,389,710	1,079,305,198
Derivative liabilities	*4,19*		15,202,782	-
Liabilities held-for-sale	*33*		1,628,447	-
Total current liabilities			**4,012,822,498**	**2,664,061,476**
Trade and other payables	*4,15,17,19,30*		291,312,664	181,119,004
Long-term unearned revenue			27,083,907	44,139,748
Long-term borrowings	*4,16*		1,514,282,001	345,303,351
Employee benefit liabilities, net	*18*		70,146,754	25,621,629
Derivative liabilities	*4,19*		29,866,610	20,220,578
Deferred tax liabilities	*28*		1,178,987,534	1,009,240,095
Total non-current liabilities			**3,111,679,470**	**1,625,644,405**
Total liabilities			**7,124,501,968**	**4,289,705,881**
Capital stock	*1,20*		356,712,130	356,712,130
Capital surplus	*20*		5,037,936,784	5,042,698,139
Other capital	*21*		(345,131,584)	(345,131,584)
Accumulated other comprehensive income	*22*		271,989,660	602,435,775
Retained earnings	*23*		6,612,515,754	5,600,587,220
Equity attributable to owners of the Parent Company			**11,934,022,744**	**11,257,301,680**
Non-controlling interests	*31*		**291,196,472**	**194,697,817**
Total equity			**12,225,219,216**	**11,451,999,497**
Total liabilities and equity		₩	**19,349,721,184**	**15,741,705,378**

See accompanying note to the consolidated financial statements.

For the years ended December 31, 2018 and 2017

(In thousands of won, except per share information)

	Note		2018	2017
Revenue	*5,30*	₩	**9,158,272,455**	**6,346,606,593**
Cost of sales	*8,18,25,30*		(7,118,188,528)	(5,180,761,473)
Gross profit			**2,040,083,927**	**1,165,845,120**
Selling, general and administrative expenses	*13,18,24,25,30*		(1,325,113,320)	(1,048,950,334)
Operating income (loss)	*5*		**714,970,606**	**116,894,787**
Other income	*26,30,33*		129,512,317	196,226,647
Other expenses	*26,30*		(193,470,665)	(183,023,147)
Finance income	*27*		381,754,697	250,012,082
Finance costs	*27*		(338,715,141)	(251,450,264)
Share of profit of equity accounted investees	*11*		342,181,824	695,404,774
Profit(loss) before income taxes			**1,036,233,637**	**824,064,879**
Income tax expense(income)	*28*		291,184,452	180,871,016
Profit (loss) for the year		₩	**745,049,185**	**643,193,863**
Other comprehensive income (loss)				
Items that will never be reclassified to profit or loss:				
Defined benefit plan actuarial losses	*18*		(29,815,081)	21,529,602
Unrealized net changes in fair value of FVOCI financial assets	*9*		77,282,457	-
Related tax	*28*		(11,443,794)	(5,108,488)
Items that are or may be reclassified to profit or loss:				
Effective portion of unrealized changes in fair values of cash flow hedges	19		(25,658,004)	-
Unrealized net changes in fair value of available-for-sale financial assets	*9*		-	171,461,576
Change in equity of equity-method accounted investees	*11*		(6,897,968)	(1,625,771)
Change in gain (loss) on translation of foreign operations			39,557,924	(156,923,295)
Related tax			8,252,786	(35,488,074)
Other comprehensive income (loss) for the year, net of tax			**51,278,320**	**(6,154,450)**
Total comprehensive income (loss)		₩	**796,327,505**	**637,039,413**
Profit(loss) attributable to:				
Owners of the Parent Company	*29*	₩	701,166,337	657,236,341
Non-controlling interests	*31*		43,882,848	(14,042,478)
Total comprehensive income (loss) attributable to:				
Owners of the Parent Company			748,427,028	685,105,834
Non-controlling interests	*31*		47,900,477	(48,066,421)
Earnings per share	*29*			
Basic earnings per share (won) - Ordinary share		₩	10,484	9,824
Basic earnings per share (won) - Preferred share			10,534	9,874

See accompanying note to the consolidated financial statements.

For the years ended December 31, 2018 and 2017

(In thousands of won)		Capital stock	Capital surplus	Other capital	Accumulated other comprehensive income	Retained earnings	Non-controlling interests	Total equity
Balance at January 1, 2017	₩	**356,712,130**	**5,031,244,206**	**(251,530,118)**	**590,987,396**	**4,994,717,278**	**241,979,335**	**10,964,110,227**
Comprehensive income								
Profit (loss) for the year		-	-	-	-	657,236,341	(14,042,478)	643,193,863
Defined benefit plan actuarial gain		-	-	-	-	16,421,114	-	16,421,114
Changes in fair values of available-for-sale financial assets		-	-	-	131,892,876	-	82,974	131,975,850
Change in equity of equity-accounted investees		-	-	-	(1,283,622)	-	-	(1,283,622)
Change in gain (loss) on translation of foreign operations		-	-	-	(119,160,875)	-	(34,106,917)	(153,267,792)
Total comprehensive income (loss)		**-**	**-**	**-**	**11,448,379**	**673,657,455**	**(48,066,421)**	**637,039,413**
Transactions with shareholders directly recognized in equity								
Dividends to owners of the Company		-	-	-	-	(67,787,513)	(2,239,923)	(70,027,436)
Capital contribution from non-controlling interests		-	-	-	-	-	3,094,550	3,094,550
Capital reduction to non-controlling interests		-	-	-	-	-	(4,260)	(4,260)
Liquidation of subsidiary		-	-	-	-	-	(49,297)	(49,297)
Acquisition of non-controlling interest		-	(14,010)	-	-	-	(16,167)	(30,177)
Acquisition of treasury stock		-	-	(94,056,523)			-	(94,056,523)
Disposal of treasury stock		-	120,689	455,057	-	-	-	575,746
Others		-	11,347,254	-	-	-	-	11,347,254
Balance at December 31, 2017	₩	**356,712,130**	**5,042,698,139**	**(345,131,584)**	**602,435,775**	**5,600,587,220**	**194,697,817**	**11,451,999,497**

See accompanying notes to the consolidated financial statements.

For the years ended December 31, 2018 and 2017

(In thousands of won)		Capital stock	Capital surplus	Other capital	Accumulated other comprehensive income	Retained earnings	Non-controlling interests	Total equity
Balance at January 1, 2018	₩	**356,712,130**	**5,042,698,139**	**(345,131,584)**	**602,435,775**	**5,600,587,220**	**194,697,817**	**11,451,999,497**
Change in accounting policies		-	-	-	(400,263,326)	400,263,326	-	-
Restated balance at January 1, 2018		**356,712,130**	**5,042,698,139**	**(345,131,584)**	**202,172,449**	**6,000,850,546**	**194,697,817**	**11,451,999,497**
Comprehensive income								
Profit (loss) for the year		-	-	-	-	701,166,337	43,882,848	745,049,185
Defined benefit plan actuarial gain		-	-	-	-	(22,556,520)		(22,556,520)
Effective portion of unrealized changes in fair values of cash flow hedges		-	-	-	(19,439,526)	-	-	(19,439,526)
Changes in fair values of FVOCI financial assets		-	-	-	58,580,102	-	-	58,580,102
Change in equity of equity-accounted investees		-	-	-	(5,585,884)	-	-	(5,585,884)
Change in gain (loss) on translation of foreign operations		-	-	-	36,262,519	-	4,017,629	40,280,148
Total comprehensive income (loss)		**-**	**-**	**-**	**69,817,211**	**678,609,817**	**47,900,477**	**796,327,505**
Transactions with shareholders directly recognized in equity		-	-	-	-	-	-	-
Dividends to owners of the Company		-	-	-	-	(66,944,609)	(4,781,908)	(71,726,517)
Capital contribution from non-controlling interests		-	-	-	-	-	56,321,980	56,321,980
Capital reduction to non-controlling interests		-	-	-	-	-	(107,500)	(107,500)
Acquisition of non-controlling interest		-	(3,154,855)	-	-	-	(2,834,394)	(5,989,249)
Others		-	(1,606,500)	-	-	-	-	(1,606,500)
Balance at December 31, 2018	₩	**356,712,130**	**5,037,936,784**	**(345,131,584)**	**271,989,660**	**6,612,515,754**	**291,196,472**	**12,225,219,216**

See accompanying notes to the consolidated financial statement.

For the years ended December 31, 2018 and 2017

(In thousands of won)	***Note***		**2018**	**2017**
Cash flows from operating activities				
Profit for the year		₩	745,049,185	643,193,863
Adjustments for expense (benefit)	*33*		629,720,089	28,551,061
Changes in assets and liabilities	*33*		(979,201,821)	(841,269,492)
Interest received			17,250,052	24,795,842
Interest paid			(48,904,350)	(17,222,347)
Dividends received			25,532,902	7,792,823
Income taxes paid			(128,836,322)	(95,956,087)
Net cash provided by (used in) operating activities		₩	**260,609,735**	**(250,114,337)**
Cash flows from investing activities				
Sale of other investments		₩	576,569,660	859,175,556
Disposal of non-current assets held for sale			-	126,950,296
Proceeds from sale of property, plant and equipment			3,742,953	34,385,213
Proceeds from sale of intangible assets			500,292	18,704,303
Proceeds from sale of investment property			83,410	304,383
Government grants received			41,074,938	58,107,104
Acquisition of other investment assets			(147,385,243)	(12,990,584)
Acquisition of other non-current assets			-	(1,130)
Acquisition of property, plant and equipment			(2,146,134,809)	(991,466,936)
Acquisition of intangible assets			(13,186,617)	(3,618,464)
Acquisition of investment property			-	(224,470)
Increase of loan receivables			(19,993,781)	-
Net cash from investing activities		₩	**(1,704,729,197)**	**89,325,271**
Cash flows from financing activities				
Proceeds from short-term borrowings		₩	1,080,084,321	708,535,313
Proceeds from long-term borrowings			793,007,292	197,870,436
Issuance of debentures			588,240,960	-
Capital contribution from non-controlling interest			56,321,980	3,094,551
Dividends paid			(71,719,718)	(70,027,436)
Repayment of short-term borrowings			(393,049,640)	(92,724,839)
Repayment of current portion of long-term borrowings			-	(200,000,000)
Repayment of long-term borrowings			(249,580,360)	(99,909,005)
Capital reduction from non-controlling interest			(107,500)	(4,260)
Acquisition of treasury stock			-	(94,056,523)
Sale of treasury stock			-	614,277
Acquisition of non-controlling interest			(47,071,471)	-
Net cash used in financing activities		₩	**1,756,125,864**	**353,392,514**
Net increase (decrease) in cash and cash equivalents		₩	**312,006,402**	**192,603,449**
Cash and cash equivalents at January 1			1,209,015,664	1,011,701,875
Effect of exchange rate fluctuations on cash held			(4,436,519)	4,710,340
Cash and cash equivalents at December 31		₩	**1,516,585,547**	**1,209,015,664**

See accompanying notes to the consolidated financial statements.

For the years ended December 31, 2018 and 2017

1. Reporting Entity

Samsung SDI Co., Ltd. (the "Parent Company" or the "Company") was incorporated on January 20, 1970 under the laws of the Republic of Korea with paid-in capital of ₩200 million. The consolidated financial statements comprise the Company and its subsidiaries (together referred to as the "Group" and individually as "Group entities") and the Group's interests in associates. In 1979, the Parent Company was listed on the Korean Stock Exchange and its head office is located in Gi-heung, Gyeong-gi Do.

The major business segments and locations of domestic production facilities of the Parent Company are as follows.

Business	Major product lines	Domestic Locations
Energy solutions	Small-sized li-on battery, Automotive battery, ESS (Energy Storage System)	Cheon-an, Ulsan
Electronic materials	Semi-conductor and display materials	Cheong-ju, Gumi

In addition to these local business locations, the Parent Company also has 22 subsidiaries operating in the United States, China, Germany, Hungary, and so on.

Under its Articles of Incorporation, the Parent Company is authorized to issue 200,000 thousand shares of capital stock with a par value of ₩5,000 per share. As of December 31, 2018, 70,382,426 shares of capital stock (including 1,617,896 shares of preferred stock) have been issued and are outstanding, and the Parent Company's paid-in-capital amounts to ₩356,712 million. The major shareholder of the Parent Company is Samsung Electronics Co., Ltd. (ownership: 19.13%). The Parent Company is allowed to retire its stock through a board resolution within its profit available for dividends to its shareholders. Pursuant to the resolution made by the board of directors on October 18, 2004, the Parent Company retired 930,000 shares of ordinary stock and 30,000 shares of preferred stock, which were acquired at ₩99,333 million on December 8, 2004 by appropriating retained earnings. The par value of outstanding shares is ₩351,912 million (₩343,823 million for common stock and ₩8,089 million for preferred stock, excluding the retired shares) and it differs from the Group's paid-in-capital due to the share retirement.

Under its Articles of Incorporation, the Parent Company is authorized to issue 30,000 thousand shares of non-voting preferred stock. Holders of preferred shares issued before February 28, 1997 are entitled to receiving additional dividends of 1% of its par value per annum. As of December 31, 2018, 1,617,896 shares of non-cumulative and non-voting preferred stocks are eligible for these additional dividends.

2. Basis of Preparation

The consolidated financial statements have been prepared in accordance with Korean International Financial Reporting Standards ("K-IFRS"), as prescribed in the Act on External Audits of Corporations in the Republic of Korea. The consolidated financial statements were authorized for issue by the Board of Directors on January 25, 2019 and will be submitted for approval to general shareholders meeting to be held on March 20, 2019.

(1) Basis of measurement

The consolidated financial statements have been prepared on the historical cost basis except for the following material items in the statement of financial position:

- Financial instruments measured at fair value.

- Liabilities for defined benefit plans recognized at the net of the total present value of defined benefit obligations less the fair value of plan assets.

(2) Functional and presentation currency

These consolidated financial statements are presented in Korean won, which is the Parent Company's functional currency and the currency of the primary economic environment in which the Group operates.

(3) Use of estimates and judgments

The preparation of the consolidated financial statements in conformity with K-IFRS requires management to make judgments, estimates and assumptions that affect the application of accounting policies and the reported amounts of assets, liabilities, income and expenses. Actual results may differ from these estimates.

Estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognized in the period in which the estimates are revised and in any future periods affected.

Information about critical judgments in applying accounting policies that have the most significant effect on the amounts recognized in the consolidated financial statements is included in the following notes:

- Note 3: consolidation: whether the Group has de facto control over an investee

Information about assumptions and estimation uncertainties that have a significant risk of resulting in a material adjustment within the next financial year are included in the following notes:

- Notes 12 and 13: impairment test - key assumptions underlying recoverable amounts, including the recoverability of development costs;

- Notes 17 and 19: recognition and measurement of provisions and contingencies - key assumptions about likelihood and magnitude of an outflow of resources;

- Note 18: measurement of defined benefit obligations: key actuarial assumptions; and

- Note 28: recognition of deferred tax assets: availability of future taxable profit against which carry-forward tax losses can be used, cash reserve taxation

2. Basis of Preparation, Continued

(4) Fair value measurement

A number of the Group's accounting policies and disclosures require the measurement of fair values, for both financial and non-financial assets and liabilities. The Group has an established control framework with respect to the measurement of fair values. This includes a valuation team that has overall responsibility for overseeing all significant fair value measurements, including Level 3 fair values, and reports directly to the CFO.

The valuation team regularly reviews significant unobservable inputs and valuation adjustments. If third party information, such as broker quotes or pricing services, is used to measure fair values, then the valuation team measures the evidence obtained from the third parties to support the conclusion that such valuations meet the requirements of K-IFRS, including the level in the fair value hierarchy in which such valuations should be classified.

Significant valuation issues are reported to the Group's Audit Committee.

When measuring the fair value of an asset or a liability, the Group uses market observable data as far as possible. Fair values are categorized into different levels in a fair value hierarchy based on the inputs used in the valuation techniques as follows.

- Level 1: quoted prices (unadjusted) in active markets for identical assets or liabilities
- Level 2: inputs other than quoted prices included in Level 1 that are observable for the asset or liability, either directly (i.e. as prices) or indirectly (i.e. derived from price)
- Level 3: inputs for the asset or liability that fare not based on observable market data (unobservable inputs)

If the inputs used to measure the fair value of an asset or a liability might be categorized in different levels of the fair value hierarchy, then the fair value measurement is categorized in its entirety in the same level of the fair value hierarchy as the lowest level input that is significant to the entire measurement. The Group recognized transfers between levels of the fair value hierarchy at the end of the reporting period during which the change has occurred.

Further information about the assumptions made in measuring fair values is included in following note:

- Note 4: Financial Risk Management

3. Significant Accounting Policies

The significant accounting policies applied by the Group in preparation of its consolidated financial statements are included below. The accounting policies set out below have been applied consistently to all periods presented in these consolidated financial statements except as disclosed in Note 2.

Certain comparative amounts in the statement of comprehensive income have been reclassified as a result of an operation discontinued during the previous year (see Note 32).

(1) Basis of consolidation

1) Business combination

A business combination is accounted for by applying the acquisition method, unless it is a combination for entities or businesses under common control.

The consideration transferred in the acquisition is generally measured at fair value, as are the identifiable net assets acquired. Any goodwill that arises is tested annually for impairment. Any gain on a bargain purchase is recognized in profit or loss immediately. Acquisition-related costs, other than those associated with the issue of debt or equity securities recognized in accordance with K-IFRS No. 1032 and No. 1109, are expensed in the periods in which the costs are incurred and the services are received.

The consideration transferred does not include amounts related to the settlement of pre-existing relationships. Such amount are generally recognized in profit or loss.

Any contingent consideration payable is measured at fair value at the acquisition date. If the contingent consideration is classified as equity, then it is not re-measured and settlement is accounted for within equity. Otherwise, subsequent changes in the fair value of the contingent consideration are recognized in profit or loss.

If share-based payment awards (replacement awards) are required to be exchanged for awards held by the acquiree's replacement (acquiree's awards), then all or a portion of the amount of the acquirer's replacement awards is included in measuring the consideration transferred in the business combination. This determination is based on the market-based measure of the replacement awards compared with the market-based measure of the acquiree's awards and the extent to which the replacement awards relate to pre-combination service.

2) Non-controlling interests

Non-controlling interests ("NCI") are measured at their proportionate share of the acquiree's identifiable net assets at the acquisition date. Changes in the Group's interest in subsidiaries that do not result in a loss of control are accounted for as equity transactions.

3) Subsidiaries

Subsidiaries are entities controlled by the Group. The Group controls an entity when it is exposed, or has right to, variable returns from its involvement with the entity and has the ability to affect those returns through its power over the entity. The financial statements of subsidiaries are included in the consolidated financial statements from the date on which control commences until the date on which control ceases.

If a member of the Group uses accounting policies other than those adopted in the consolidated financial statements for like transactions and events in similar circumstances, appropriate adjustments are made to its financial statements in preparing the consolidated financial statements.

3. Significant Accounting Policies, Continued

(1) Consolidation, continued

3) Subsidiaries, continued

(i) The list of subsidiaries as of December 31, 2018 and 2017 are as follows: All subsidiaries' fiscal year-end is December 31.

(In thousands of won, except number of shares and percentage of ownership)

Subsidiaries	Location	Primary business	Percentage of ownership (*1) 2018	2017
Samsung SDI Japan Co., Ltd. ("SDIJ")	Japan	Supporting sales and purchase in Japan	100.0%	100.0%
Samsung SDI America, Inc. ("SDIA")	U.S.A.	Manufacturing automotive batteries Supporting sales of automotive and ESS batteries Market research of small-sized rechargeable battery	91.7%	91.7%
Samsung SDI Hungary Rt. ("SDIHU")	Hungary	Manufacturing and sales of automotive battery	100.0%	100.0%
Samsung SDI Europe GmbH ("SDIEU")	Germany	Supporting sales and purchase in Europe	100.0%	100.0%
Samsung SDI Battery Systems GmbH ("SDIBS")	Austria	Manufacturing and sales of automotive battery	100.0%	100.0%
Samsung SDI (Malaysia) Sdn, Bhd. ("SDI(M)")(*2)	Malaysia	-	-	68.6%
Samsung SDI Vietnam Co., Ltd. ("SDIV")	Vietnam	Manufacturing and sales of rechargeable battery and electronic materials	100.0%	100.0%
Samsung SDI Energy Malaysia Sdn, Bhd. ("SDIEM")	Malaysia	Manufacturing and sales of rechargeable battery	100.0%	100.0%
Samsung SDI (Hong Kong) Ltd. ("SDIHK")	Hong Kong	Supporting sales of rechargeable batteries	97.6%	97.6%
Subsidiary of SDIHK				
Tianjin Samsung SDI Co., Ltd. ("TSDI")	China	Manufacturing and sales of rechargeable battery	78.0%	78.0%
Samsung SDI China Co., Ltd. ("SDIC")	China	Supporting sales and purchase in China	100.0%	100.0%
Samsung SDI-ARN (Xi'An) Power Battery Co., Ltd. ("SAPB")(*4)	China	Manufacturing and sales of automotive battery	50.0%	50.0%
Samsung SDI-Sungrow Energy Storage Battery Co., Ltd. ("SSEB")(*3)	China	Manufacturing and sales of ESS products	65.0%	65.0%
Samsung SDI (Changchun) Power Battery Co., Ltd. ("SCPB")(*4)	China	Manufacturing and sales of automotive battery	50.0%	50.0%
Samsung SDI (Tianjin) Battery Co., Ltd. ("SDITB')(*5)	China	Manufacturing and sales of rechargeable battery	80.0%	50.0%
Samsung SDI (Wuxi) Battery Systems Co., Ltd.("SWBS")(*4)	China	Manufacturing and sales of automotive battery	50.0%	50.0%
Samsung SDI Brazil Ltda. ("SDIB")	Brazil	-	96.3%	96.3%
STM Co., Ltd. ("STM")	Korea	Manufacturing and sales of cathode active material for rechargeable battery	100.0%	100.0%
Samsung Chemical Electronic Materials (SuZhou) Co., Ltd. ("SCES")	China	Manufacturing and sales of electronic materials products	100.0%	100.0%
Samsung SDI Wuxi Co., Ltd. ("SDIW")	U.S.A.	Manufacturing and sales of electronic materials products	100.0%	100.0%
SVIC 15 Fund ("SVIC 15")	Korea	Investments in new technology venture business	99.0%	99.0%
SVIC 24 Fund ("SVIC24")	China	Investments in new technology venture business	99.0%	99.0%

3. Significant Accounting Policies, Continued

(1) Consolidation, continued

3) Subsidiaries, continued

(i) The list of subsidiaries as of December 31, 2018 and 2017 are as follows: All subsidiaries' fiscal year end is December 31, continued

(*1) Effective ownership interest has been measured based on ownership of the Parent Company and its subsidiaries considering the control structure. In accordance with the local laws and regulations, no shares have been issued and ownership interest has been measured based on investments.

(*2) The Group has completed liquidation process of SDI(M), and recognized loss of KRW 21,113 million.

(*3) The Group reclassified SSEB's assets and liabilities as held-for-sale as the Group agreed to sell portion of its ownership to non-controlling interest.

(*4) Although the Group's ownership in SAPB, SCPB, and SWBS does not exceed 50%, the Group has determined that the Group controls the entities based on the terms of the shareholders' agreement.

(*5) The Group acquired additional 30% ownership of SDITB, resulting in 80% ownership as of December 31, 2018. Consolidated capital surplus and non-controlling interest decreased by KRW 3,155 million and KRW 2,834 million respectively as a result of this transaction.

(ii) Summarized financial information of subsidiaries as of and for the year ended December 31, 2018 are as follows:

(In thousands of won)

Subsidiaries	Assets	Liabilities	Equity	Revenue	Net profit (loss)	Total comprehensive income (loss)
STM	95,312,165	17,194,469	78,117,696	154,165,447	584,402	451,134
SVIC24	39,326,008	330,160	38,995,848	-	17,854,856	17,854,856
SVIC15	19,673,396	86,077	19,587,319	-	(764,180)	(764,180)
SDIJ	7,081,751	861,628	6,220,123	22,728,891	492,072	908,948
SDIA	100,355,887	61,263,108	39,092,779	94,605,950	(2,975,624)	(884,964)
NOVALED	396,688,507	36,631,477	360,057,030	135,765,102	57,178,433	56,587,614
SDIHU	1,390,885,664	1,258,090,665	132,794,999	62,704,748	(102,222,881)	(102,480,174)
SDIEU	12,752,180	8,695,213	4,056,967	24,852,190	2,819,018	2,809,044
SDIBS	243,090,323	180,993,507	62,096,816	382,094,510	9,241,689	9,212,349
SDIV	515,951,147	347,323,219	168,627,928	1,507,999,127	79,001,817	85,557,725
SDIEM	563,425,025	284,791,805	278,633,220	934,631,621	32,887,619	46,215,283
SDI(M)	-	-	-	-	(9,841)	28,505
SDIW	530,338,285	242,237,344	288,100,941	903,048,582	31,451,870	29,636,240
SCES	3,217,320	125,331	3,091,989	442,660	180,667	162,551
TSDI	708,134,102	375,432,797	332,701,305	750,526,592	48,354,627	46,137,774
SDIHK	567,976,888	52,151,919	515,824,969	2,819,447	25,262,423	40,556,672
SDIC	10,173,107	5,393,658	4,779,449	16,320,451	2,191,267	2,296,996
SAPB	781,715,116	744,275,823	37,439,293	610,162,640	(58,597,281)	(57,940,471)
SSEB	52,169,871	29,047,678	23,122,193	54,761,538	1,847,868	1,669,134
SCPB	23,904,894	17,040,794	6,864,100	26,073,416	936,604	887,057
SDITB	446,434,604	137,370,656	309,063,948	337,919,163	20,754,400	17,504,514
SWBS	7,143,082	1,882,372	5,260,710	-	221,950	187,988
SDIB	35,126,633	1,433,740	33,692,893	-	13,420,931	10,351,746

3. Significant Accounting Policies, Continued

(1) Consolidation, continued

4) Loss of control

If the controlling company loses control of subsidiaries, the controlling company derecognizes the assets and liabilities of the former subsidiaries from the consolidated statement of financial position and recognizes the gain or loss associated with the loss of control attributable to the former controlling interest. Meanwhile, the controlling company recognizes any investment retained in the former subsidiaries at its fair value when control is lost.

5) Interest in equity – accounted investees

The Group's interests in equity-accounted investees comprise interests in associates and joint venture.

Associates are those entities in which the Group has significant influence, but not control or joint control, over the financial and operating policies. A joint venture is an arrangement in which the Group has joint control, whereby the Group has rights to the net assets of the arrangement, rather than rights to its assets and obligations for its liabilities.

Interests in associates and the joint venture are accounted for using the equity method. They are initially recognized at cost, which includes transaction costs. Subsequent to initial recognition, the consolidated financial statements include the Group's share of the profit or loss and OCI of equity-accounted investees, until the date on which significant influence or joint control ceases.

6) Transactions eliminated on consolidation

Intra-group balances and transactions, including income and expenses and any unrealized income and expenses arising from intra-group transactions, are eliminated. Meanwhile, unrealized gains arising from transactions with equity-accounted investees are eliminated against the investment to the extent of the Group's interest in the investee. Unrealized losses are eliminated in the same way as unrealized gains, but only to the extent that there is no evidence of impairment.

7) Business combination under common control

Combination of entities and business under common control recognizes the acquired assets and liabilities obtained at book values of consolidated financial statements of ultimate controlling company. The Group recognizes the differences between the net book value acquired and consideration transferred in capital surplus.

3. Significant Accounting Policies, Continued

(2) Foreign currency transactions

Transactions in foreign currencies are translated to the respective functional currencies of Group entities at exchange rates at the dates of the transactions. Monetary assets and liabilities denominated in foreign currencies are retranslated to the functional currency using the reporting date's exchange rate. Non-monetary assets and liabilities denominated in foreign currencies that are measured at fair value are retranslated to the functional currency at the exchange rate at the date that the fair value was determined. Non-monetary items that are measured in terms of historical cost in a foreign currency are translated using the exchange rate at the date of the original transaction.

Exchange differences arising on the settlement of monetary items or on translating monetary items, except for translation differences from net investment in foreign operation and from financial liabilities designated to cash flow hedges, are recognized in profit or loss in the period in which they arise. If profit or loss from non-monetary items is regarded as other comprehensive income then the exchange rate change effects are treated as other comprehensive income, where regarded as current profit or loss then treated as current profit or loss.

(3) Cash and cash equivalents

Cash and cash equivalents comprise cash balances and call deposits with maturities of three months or less from the acquisition date that are subject to an insignificant risk of changes in their fair value, and are used by the Group in the management of its short-term commitments. Equity investments are excluded from cash equivalents unless they are, in substance, cash equivalents, for example in the case of preferred shares when it has a short maturity with a specified redemption date.

(4) Financial instruments

1) Recognition and initial measurement

Trade receivables and debt securities issued are initially recognized when they are originated. All other financial assets and financial liabilities are initially recognized when the Group becomes a party to the contractual provisions of the instrument.

A financial asset (unless it is a trade receivable without a significant financing component) or financial liability is initially measured at fair value plus, for an item not at FVTPL, transaction costs that are directly attributable to its acquisition or issue. A trade receivable without a significant financing component is initially measured at the transaction price.

2) Classification and subsequent measurement

On initial recognition, a financial asset is classified as measured at: amortized cost; FVOCI – debt investment; FVOCI – equity investment; or FVTPL. Financial assets are not reclassified subsequent to their initial recognition unless the Group changes its business model for managing financial assets, in which case all affected financial assets are reclassified on the first day of the first reporting period following the change in the business model.

A financial asset is measured at amortized cost if it meets both of the following conditions and is not designated as at FVTPL:

- it is held within a business model whose objective is to hold assets to collect contractual cash flows; and
- its contractual terms give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding

3. Significant Accounting Policies, Continued

2) Classification and subsequent measurement, Continued

A debt investment is measured at FVOCI if it meets both of the following conditions and is not designated as at FVTPL:

- it is held within a business model whose objective is achieved by both collecting contractual cash flows and selling financial assets; and
- its contractual terms give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding.

On initial recognition of an equity investment that is not held for trading, the Group may irrevocably elect to present subsequent changes in the investment's fair value in OCI. This election is made on an investment-by-investment basis.

All financial assets not classified as measured at amortized cost or FVOCI as described above are measured at FVTPL. This includes all derivative financial assets. On initial recognition, the Group may irrevocably designate a financial asset that otherwise meets the requirements to be measured at amortized cost or at FVOCI as at FVTPL if doing so eliminates or significantly reduces an accounting mismatch that would otherwise arise.

3) Business model assessment

The Group makes an assessment of the objective of the business model in which a financial asset is held at a portfolio level because this best reflects the way the business is managed and information is provided to management. The information considered includes:

- the stated policies and objectives for the portfolio and the operation of those policies in practice. These include whether management's strategy focuses on earning contractual interest income, maintaining a particular interest rate profile, matching the duration of the financial assets to the duration of any related liabilities or expected cash outflows or realizing cash flows through the sale of the assets;
- how the performance of the portfolio is evaluated and reported to the Group's management;
- the risks that affect the performance of the business model (and the financial assets held within that business model) and how those risks are managed;
- how managers of the business are compensated – e.g. whether compensation is based on the fair value of the assets managed or the contractual cash flows collected; and
- the frequency, volume and timing of sales of financial assets in prior periods, the reasons for such sales and expectations about future sales activity.

Transfers of financial assets to third parties in transactions that do not qualify for derecognition are not considered sales for this purpose, consistent with the Group's continuing recognition of the assets.

Financial assets that are held for trading or are managed and whose performance is evaluated on a fair value basis are measured at FVTPL.

4) Assessment whether contractual cash flows are solely payments of principal and interest

For the purposes of this assessment, 'principal' is defined as the fair value of the financial asset on initial recognition. 'Interest' is defined as consideration for the time value of money and for the credit risk associated with the principal amount outstanding during a particular period of time and for other basic lending risks and costs (e.g. liquidity risk and administrative costs), as well as a profit margin.

3. Significant Accounting Policies, Continued

4) Assessment whether contractual cash flows are solely payments of principal and interest, Continued

In assessing whether the contractual cash flows are solely payments of principal and interest, the Group considers the contractual terms of the instrument. This includes assessing whether the financial asset contains a contractual term that could change the timing or amount of contractual cash flows such that it would not meet this condition. In making this assessment, the Group considers:

- contingent events that would change the amount or timing of cash flows;
- terms that may adjust the contractual coupon rate, including variable-rate features;
- prepayment and extension features; and
- terms that limit the Group's claim to cash flows from specified assets (e.g. non-recourse features).

A prepayment feature is consistent with the solely payments of principal and interest criterion if the prepayment amount substantially represents unpaid amounts of principal and interest on the principal amount outstanding, which may include reasonable additional compensation for early termination of the contract. Additionally, for a financial asset acquired at a discount or premium to its contractual par amount, a feature that permits or requires prepayment at an amount that substantially represents the contractual par amount plus accrued (but unpaid) contractual interest (which may also include reasonable additional compensation for early termination) is treated as consistent with this criterion if the fair value of the prepayment feature is insignificant at initial recognition.

5) Subsequent measurement and gains and losses

Financial assets at FVTPL	These assets are subsequently measured at fair value. Net gains and losses, including any interest or dividend income, are recognized in profit or loss.
Financial assets at amortized cost	These assets are subsequently measured at amortized cost using the effective interest method. The amortized cost is reduced by impairment losses. Interest income, foreign exchange gains and losses and impairment are recognized in profit or loss. Any gain or loss on derecognition is recognized in profit or loss.
Debt investments at FVOCI	These assets are subsequently measured at fair value. Interest income calculated using the effective interest method, foreign exchange gains and losses and impairment are recognized in profit or loss. Other net gains and losses are recognized in OCI. On derecognition, gains and losses accumulated in OCI are reclassified to profit or loss.
Equity investments at FVOCI	These assets are subsequently measured at fair value. Dividends are recognized as income in profit or loss unless the dividend clearly represents a recovery of part of the cost of the investment. Other net gains and losses are recognized in OCI and are never reclassified to profit or loss.

3. Significant Accounting Policies, Continued

6) Derecognition

The Group derecognizes a financial asset when the contractual rights to the cash flows from the financial asset expire, or it transfers the rights to receive the contractual cash flows in a transaction in which substantially all of the risks and rewards of ownership of the financial asset are transferred or in which the Group neither transfers nor retains substantially all of the risks and rewards of ownership and it does not retain control of the financial asset.

The Group enters into transactions whereby it transfers assets recognized in its statement of financial position, but retains either all or substantially all of the risks and rewards of the transferred assets. In these cases, the transferred assets are not derecognized.

7) Offsetting

Financial assets and financial liabilities are offset and the net amount presented in the statement of financial position when, and only when, the Group currently has a legally enforceable right to set off the amounts and it intends either to settle them on a net basis or to realize the asset and settle the liability simultaneously.

(5) Derivatives

1) Derivative financial instruments and hedge accounting

The Group holds derivative financial instruments to hedge its foreign currency and interest rate risk exposures. Embedded derivatives are separated from the host contract and accounted for separately if the host contract is not a financial asset and certain criteria are met.

Derivatives are initially measured at fair value. Subsequent to initial recognition, derivatives are measured at fair value, and changes therein are generally recognized in profit or loss.

The Group designates certain derivatives as hedging instruments to hedge the variability in cash flows associated with highly probable forecast transactions arising from changes in foreign exchange rates and interest rates and certain derivatives and non-derivative financial liabilities as hedges of foreign exchange risk on a net investment in a foreign operation.

At inception of designated hedging relationships, the Group documents the risk management objective and strategy for undertaking the hedge. The Group also documents the economic relationship between the hedged item and the hedging instrument, including whether the changes in cash flows of the hedged item and hedging instrument are expected to offset each other.

2) Cash flow hedges

When a derivative is designated as a cash flow hedging instrument, the effective portion of changes in the fair value of the derivative is recognized in OCI and accumulated in the hedging reserve. The effective portion of changes in the fair value of the derivative that is recognized in OCI is limited to the cumulative change in fair value of the hedged item, determined on a present value basis, from inception of the hedge. Any ineffective portion of changes in the fair value of the derivative is recognized immediately in profit or loss.

The Group designates only the change in fair value of the spot element of forward exchange contracts as the hedging instrument in cash flow hedging relationships. The change in fair value of the forward element of forward exchange contracts (‘forward points’) is separately accounted for as a cost of hedging and recognized in a costs of hedging reserve within equity.

3. Significant Accounting Policies, Continued

2) Cash flow hedges, Continued

When the hedged forecast transaction subsequently results in the recognition of a non-financial item such as inventory, the amount accumulated in the hedging reserve and the cost of hedging reserve is included directly in the initial cost of the non-financial item when it is recognized.
For all other hedged forecast transactions, the amount accumulated in the hedging reserve and the cost of hedging reserve is reclassified to profit or loss in the same period or periods during which the hedged expected future cash flows affect profit or loss.

If the hedge no longer meets the criteria for hedge accounting or the hedging instrument is sold, expires, is terminated or is exercised, then hedge accounting is discontinued prospectively. When hedge accounting for cash flow hedges is discontinued, the amount that has been accumulated in the hedging reserve remains in equity until, for a hedge of a transaction resulting in the recognition of a non-financial item, it is included in the non-financial item's cost on its initial recognition or, for other cash flow hedges, it is reclassified to profit or loss in the same period or periods as the hedged expected future cash flows affect profit or loss.

If the hedged future cash flows are no longer expected to occur, then the amounts that have been accumulated in the hedging reserve and the cost of hedging reserve are immediately reclassified to profit or loss.

(6) Non-derivative financial liabilities

Financial liabilities are classified as measured at amortized cost or FVTPL. A financial liability is classified as at FVTPL if it is classified as held-for-trading, it is a derivative or it is designated as such on initial recognition. Financial liabilities at FVTPL are measured at fair value and net gains and losses, including any interest expense, are recognized in profit or loss. Other financial liabilities are subsequently measured at amortized cost using the effective interest method. Interest expense and foreign exchange gains and losses are recognized in profit or loss.

The Group derecognizes a financial liability when its contractual obligations are discharged or cancelled, or expire. The Group also derecognizes a financial liability when its terms are modified and the cash flows of the modified liability are substantially different, in which case a new financial liability based on the modified terms is recognized at fair value.

On derecognition of a financial liability, the difference between the carrying amount extinguished and the consideration paid (including any non-cash assets transferred or liabilities assumed) is recognized in profit or loss.

(7) Share capital

Ordinary shares are classified as equity. Incremental costs directly attributable to the capital transactions are recognized as a deduction from equity, net of any tax effects.

Preference shares are classified as equity if it is non-redeemable, or redeemable only at the Group's option, and any dividends are discretionary. Dividends thereon are recognized as distributions within equity upon approval by the Group's shareholders.

When the Group repurchases its share capital, the amount of the consideration paid is recognized as a deduction from equity and classified as treasury shares. The profits or losses from the purchase, disposal, reissue, or retirement of treasury shares are not recognized as current profit or loss.

3. Significant Accounting Policies, Continued

(8) Property, plant and equipment

1) Recognition and measurement

Items of property, plant and equipment are measured at cost, which includes capitalized borrowing costs, less accumulated depreciation and any accumulated impairment losses. The cost of certain items of property, plant and equipment at 1 January 2005, the Group's date of transition to IFRS, was determined with reference to its fair value at that date.

If significant parts of an item of property, plant and equipment have different useful lives, then they are accounted for as separate items (major components) of property, plant and equipment.

Any gain or loss on disposal of an item of property, plant and equipment is recognized in profit or loss.

2) Subsequent costs

Subsequent costs are recognized in the carrying amount of property, plant and equipment at cost or, if appropriate, as separate items if it is probable that future economic benefits associated with the item will flow to the Group and the cost of the item can be measured reliably

3) Depreciation

Property, plant and equipment, except for land, are depreciated on a straight-line basis over estimated useful lives that appropriately reflect the pattern in which the asset's future economic benefits are expected to be consumed.

If the cost of a part of property, plant and equipment is significant compared to the cost of property, plant and equipment as a whole, and has a different useful life, that part of the cost should be accounted for as a separate item and is depreciated over its separate useful life.

The estimated useful lives of the Group's property, plant and equipment are as follows:

	Useful lives (years)
Buildings	10 ~ 60
Structures	10 ~ 40
Machineries	5 ~ 10
Tools, furniture and fixtures	4 ~ 5
Vehicles	4 ~ 5

Depreciation methods, useful lives and residual values are reviewed at the end of each reporting date and adjusted, if appropriate. The change is accounted for as a change in an accounting estimate.

3. Significant Accounting Policies, Continued

(9) Borrowing costs

The Group capitalizes borrowing costs directly attributable to the acquisition, construction or production of a qualifying asset as part of the cost of that asset. Other borrowing costs are recognized in expense as incurred. A qualifying asset is an asset that requires a substantial period of time to get ready for its intended use or sale. Financial assets and inventories that are manufactured or otherwise produced over a short period of time are not qualifying assets. Assets that are ready for their intended use or sale when acquired are not qualifying assets.

To the extent that the Group borrows funds specifically for the purpose of obtaining a qualifying asset, the Group determines the amount of borrowing costs eligible for capitalization as the actual borrowing costs incurred on that borrowing during the period less any investment income on the temporary investment of those borrowings. To the extent that the Group borrows funds generally and uses them for the purpose of obtaining a qualifying asset, the Group shall determine the amount of borrowing costs eligible for capitalization by applying a capitalization rate to the expenditures on that asset. The capitalization rate shall be the weighted average of the borrowing costs applicable to the borrowings of the Group that are outstanding during the period, other than borrowings made specifically for the purpose of obtaining a qualifying asset. The amount of borrowing costs that the Group capitalizes during a period shall not exceed the amount of borrowing costs incurred during that period.

(10) Intangible asset

Intangible assets are measured initially at cost and, subsequently, are carried at cost less accumulated amortization and accumulated impairment losses.

Amortization of intangible assets except for goodwill is calculated on a straight-line basis over the estimated useful lives of intangible assets from the date that they are available for use. The residual value of intangible assets is zero.

The estimated useful lives of the group's assets are as follows:

	Useful lives (years)
Industrial property rights	5 ~10
Development costs	8 ~11
Others intangible assets	4 ~20

Amortization periods and the amortization methods for intangible assets with finite useful lives are reviewed at each end of reporting period. If appropriate, the changes are accounted for as changes in accounting estimates.

Expenditures on research activities, undertaken with the prospect of gaining new scientific or technical knowledge and understanding, is recognized in profit or loss as incurred. Development expenditures are capitalized only if development costs can be measured reliably, the product or process is technically and commercially feasible, future economic benefits are probable, and the Group intends to and has sufficient resources to complete development and to use or sell the asset. Other development expenditures are recognized in profit or loss as incurred.

Subsequent expenditure is capitalized only when it increases the future economic benefits embodied in the specific asset to which it relates. All other expenditure, including expenditure on internally generated goodwill and brands, is recognized in profit or loss as incurred.

3. Significant Accounting Policies, Continued

(11) Investment property

Property held for the purpose of earning rentals or benefiting from capital appreciation is classified as investment property. Investment property is measured initially at its cost and transaction costs are included in the initial measurement. Subsequently, investment property is carried at depreciated cost less any accumulated impairment losses.

Subsequent costs are recognized in the carrying amount of investment property at cost or, if appropriate, as separate items if it is probable that future economic benefits associated with the item will flow to the Group and the cost of the item can be measured reliably. The carrying amount of the replaced part is derecognized. The costs of the day-to-day servicing are recognized in profit or loss as incurred.

Investment property, except for land, are depreciated on a straight-line basis over estimated useful lives that appropriately reflect the pattern in which the asset's future economic benefits are expected to be consumed.

Depreciation methods, useful lives and residual values are reviewed at the end of each reporting date and adjusted, if appropriate. The change is accounted for as a change in an accounting estimate.

(12) Inventories

The cost of inventories is based on specific method for materials in transit, moving average method for raw materials and sub-materials and gross average method (monthly moving average method) for all the other inventories, and includes expenditures for acquiring the inventories, production or conversion costs and other costs incurred in bringing them to their existing location and condition. In the case of manufactured inventories and work in progress, cost includes an appropriate share of production overheads based on normal operating capacity.

Inventories are measured at the lower of cost and net realizable value. Net realizable value is the estimated selling price in the ordinary course of business, less the estimated costs of completion and selling expenses. The amount of any write-down of inventories to net realizable value and all losses of inventories are recognized as an expense in the period the write-down or loss occurs. The amount of any reversal of any write-down of inventories, arising from an increase in net realizable value, are recognized as a reduction in the amount of inventories recognized as an expense in the period in which the reversal occurs.

(13) Impairment

1) Impairment of financial assets

The Group recognizes loss allowances for ECLs on:
- financial assets measured at amortized cost;
- debt investments measured at FVOCI; and
- contract assets.

The Group measures loss allowances at an amount equal to lifetime ECLs, except for the following, which are measured at 12-month ECLs:
- debt securities that are determined to have low credit risk at the reporting date; and
- other debt securities and bank balances for which credit risk (i.e. the risk of default occurring over the expected life of the financial instrument) has not increased significantly since initial recognition.

Loss allowances for trade receivables and contract assets are always measured at an amount equal to lifetime ECLs.

3. Significant Accounting Policies, Continued

(13) Impairment, Continued

1) Impairment of financial assets*, Continued*

When determining whether the credit risk of a financial asset has increased significantly since initial recognition and when estimating ECLs, the Group considers reasonable and supportable information that is relevant and available without undue cost or effort. This includes both quantitative and qualitative information and analysis, based on the Group's historical experience and informed credit assessment and including forward-looking information.

The Group assumes that the credit risk on a financial asset has increased significantly if it is more than 30 days past due.

The Group considers a financial asset to be in default when:
- the borrower is unlikely to pay its credit obligations to the Group in full, without recourse by the Group to actions such as realising security (if any is held); or
- the financial asset is more than 90 days past due.

Lifetime ECLs are the ECLs that result from all possible default events over the expected life of a financial instrument. 12-month ECLs are the portion of ECLs that result from default events that are possible within the 12 months after the reporting date (or a shorter period if the expected life of the instrument is less than 12 months). The maximum period considered when estimating ECLs is the maximum contractual period over which the Group is exposed to credit risk.

① Measurement of ECLs
ECLs are a probability-weighted estimate of credit losses. Credit losses are measured as the present value of all cash shortfalls (i.e. the difference between the cash flows due to the entity in accordance with the contract and the cash flows that the Group expects to receive).
ECLs are discounted at the effective interest rate of the financial asset.

② Credit-impaired financial assets

At each reporting date, the Group assesses whether financial assets carried at amortized cost and debt securities at FVOCI are credit-impaired. A financial asset is 'credit-impaired' when one or more events that have a detrimental impact on the estimated future cash flows of the financial asset have occurred.
Evidence that a financial asset is credit-impaired includes the following observable data:
- significant financial difficulty of the borrower or issuer;
- a breach of contract such as a default or being more than 90 days past due;
- the restructuring of a loan or advance by the Group on terms that the Group would not consider otherwise;
- it is probable that the borrower will enter bankruptcy or other financial reorganisation; or
- the disappearance of an active market for a security because of financial difficulties.

③ Presentation of allowance for ECL in the statement of financial position

Loss allowances for financial assets measured at amortized cost are deducted from the gross carrying amount of the assets.

For debt securities at FVOCI, the loss allowance is charged to profit or loss and is recognized in OCI.

3. Significant Accounting Policies, Continued

(13) Impairment, continued

1) Impairment of financial assets, *Continued*

④ Write-off

The gross carrying amount of a financial asset is written off when the Group has no reasonable expectations of recovering a financial asset in its entirety or a portion thereof. For individual customers, the Group has a policy of writing off the gross carrying amount when the financial asset is 180 days past due based on historical experience of recoveries of similar assets. For corporate customers, the Group individually makes an assessment with respect to the timing and amount of write-off based on whether there is a reasonable expectation of recovery. The Group expects no significant recovery from the amount written off. However, financial assets that are written off could still be subject to enforcement activities in order to comply with the Group's procedures for recovery of amounts due.

2) Impairment of non-financial assets

The carrying amounts of the Group's non-financial assets, other than assets arising from employee benefits, inventories, deferred tax assets and non-current assets held for sale are reviewed at each reporting date to determine whether there is any indication of impairment. If any such indication exists, then the asset's recoverable amount is estimated. Goodwill and intangible assets that have indefinite useful lives or that are not yet available for use, irrespective of whether there is any indication of impairment, are tested for impairment annually by comparing their recoverable amount to their carrying amount.

The Group estimates the recoverable amount of an individual asset, if it is impossible to measure the individual recoverable amount of an asset, then the Group estimates the recoverable amount of cash-generating unit ("CGU"). A CGU is the smallest identifiable group of assets that generates cash inflows that are largely independent of the cash inflows from other assets or groups of assets. The recoverable amount of an asset or CGU is the greater of its value in use and its fair value less costs to sell. The value in use is estimated by applying a pre-tax discount rate that reflect current market assessments of the time value of money and the risks specific to the asset or CGU for which estimated future cash flows have not been adjusted, to the estimated future cash flows expected to be generated by the asset or CGU.

An impairment loss is recognized if the carrying amount of an asset or its CGU exceeds its estimated recoverable amount. Impairment losses are recognized in profit or loss.

Goodwill acquired in a business combination is allocated to each CGU that is expected to benefit from the synergies arising from the goodwill acquired. Any impairment identified at the CGU level will first reduce the carrying value of goodwill and then be used to reduce the carrying amount of the other assets in the CGU on a pro rata basis. Except for impairment losses in respect of goodwill which are never reversed, an impairment loss is reversed if there has been a change in the estimates used to determine the recoverable amount. An impairment loss is reversed only to the extent that the asset's carrying amount does not exceed the carrying amount that would have been determined, net of depreciation or amortization, if no impairment loss had been recognized.

3. Significant Accounting Policies, Continued

(14) Employee benefits

1) Short-term employee benefits

Short-term employee benefits are employee benefits that are due to be settled within 12 months after the end of the period in which the employees render the related service. When an employee has rendered service to the Group during an accounting period, the Group recognizes the undiscounted amount of short-term employee benefits expected to be paid in exchange for that service.

2) Other long-term employee benefits

Other long-term employee benefits include employee benefits that are settled beyond 12 months after the end of the period in which the employees render the related service, and are calculated at the present value of the amount of future benefit that employees have earned in return for their service in the current and prior periods, less the fair value of any related assets. The present value is determined by discounting the expected future cash flows using the interest rate of high-quality corporate bonds that have maturity dates approximating the terms of the Group's obligations and that are denominated in the same currency in which the benefits are expected to be paid. Any actuarial gains and losses are recognized in profit or loss in the period in which they arise.

3) Defined contribution plans

When an employee has rendered service to the Group during a period, the Group recognizes the contribution payable to a defined contribution plan in exchange for that service as a liability (accrued expense), after deducting any contribution already paid. If the contribution already paid exceeds the contribution due for service before the end of the reporting period, the Group recognizes that excess as an asset (prepaid expense) to the extent that the prepayment will lead to a reduction in future payments or a cash refund.

4) Defined benefit plans

The Group's net obligation in respect of defined benefit plans is calculated by estimating the amount of future benefit and that benefit is discounted to determine its present value deducted by the fair value of plan assets.

The calculation is performed annually by an independent actuary using the projected unit credit method. When the fair value of plan assets exceeds the present value of the defined benefit obligation, the Group recognizes an asset, to the extent of the present value of any economic benefits available in the form of refunds from the plan or reduction in the future contributions to the plan.

Re-measurement of the net defined benefit liability comprise actuarial gains and losses, the return on plan assets excluding amounts included in net interest on the net defined benefit liability, and any change in the effect of the asset ceiling, excluding amounts included in net interest on the net defined benefit liability and recognized in other comprehensive income. The Group determines net interests on net defined benefit liability (asset) by multiplying discount rate determined at the beginning of the annual reporting period and considers changes in net defined benefit liability (asset) from contributions and benefit payments. Net interest costs and other costs relating to the defined benefit plan are recognized through profit or loss.

When the plan amendment or curtailment occurs, gains or losses on amendment or curtailment in benefits for the past service provided are recognized through profit or loss. The Group recognizes gain or loss on a settlement when the settlement of defined benefit plan occurs.

3. Significant Accounting Policies, Continued

(14) Employee benefits, Continued

5) Termination benefits

The Group recognizes a liability and expense for termination benefits at the earlier of the period when the Group can no longer withdraw the offer of those benefits and the period when the Group recognizes costs for a restructuring. If benefits are payable more than 12 months after the reporting period, then they are discounted to their present value.

(15) Provisions

Provisions are recognized when the Group has a present legal or constructive obligation as a result of a past event, it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation and a reliable estimate can be made of the amount of the obligation.

The risks and uncertainties that inevitably surround many events and circumstances are taken into account in reaching the best estimate of a provision. Where the effect of the time value of money is material, provisions are determined at the present value of the expected future cash flows.

Where some or all of the expenditures required to settle a provision are expected to be reimbursed by another party, the reimbursement shall be recognized when, and only when, it is virtually certain that reimbursement will be received if the entity settles the obligation. The reimbursement shall be treated as a separate asset.

Provisions are reviewed at the end of each reporting period and adjusted to reflect the current best estimates. If it is no longer probable that an outflow of resources embodying economic benefits will be required to settle the obligation, the provision is reversed.

A provision shall be used only for expenditures for which the provision was originally recognized.

(16) Revenue from contracts with customers

The Group has initially applied K-IFRS 1115 from January 1, 2018. Information about the Group's accounting policies relating to contracts with customers and the effect of initially applying K-IFRS 1115 are described in Note 4(24)

(17) Government grants

Government grants are not recognized unless there is reasonable assurance that the Group will comply with the grant's conditions and that the grant will be received. Government grants which are intended to compensate the Group for expenses incurred are recognized as other income (government grants) in profit or loss over the periods in which the Group recognizes the related costs as expenses. If the Group has received government grants whose primary condition is that the Group purchase, construct or otherwise acquire long-term assets, the amounts are deducted in calculating the carrying amount of the asset. The grant is recognized in profit or loss over the life of a depreciable asset as a reduction to depreciation expense.

3. Significant Accounting Policies, Continued

(18) Finance income and costs

Finance income comprises interest income on funds invested (including available-for-sale financial assets),

The Group's finance income and finance costs include:
- interest income;
- interest expense;
- dividend income;
- the net gain or loss on financial assets at FVTPL;
- the foreign currency gain or loss on financial assets and financial liabilities;
- impairment losses (and reversals) on investments in debt securities carried at amortized cost or FVOCI;
- hedge ineffectiveness recognized in profit or loss; and

Interest income or expense is recognized using the effective interest method. Dividend income is recognized in profit or loss on the date on which the Group's right to receive payment is established.
The 'effective interest rate' is the rate that exactly discounts estimated future cash payments or receipts through the expected life of the financial instrument to:
- the gross carrying amount of the financial asset; or
- the amortized cost of the financial liability.

In calculating interest income and expense, the effective interest rate is applied to the gross carrying amount of the asset (when the asset is not credit-impaired) or to the amortized cost of the liability. However, for financial assets that have become credit-impaired subsequent to initial recognition, interest income is calculated by applying the effective interest rate to the amortized cost of the financial asset. If the asset is no longer credit-impaired, then the calculation of interest income reverts to the gross basis.

(19) Income taxes

Income tax expense comprises current and deferred tax. It is recognized in profit or loss except to the extent that it relates to a business combination, or items recognized directly in equity or in OCI.

1) Current tax

Current tax comprises the expected tax payable or receivable on the taxable income or loss for the year and any adjustment to the tax payable or receivable in respect of previous years. The amount of current tax payable or receivable is the best estimate of the tax amount expected to be paid or received that reflects uncertainty related to income taxes, if any. It is measured using tax rates enacted or substantively enacted at the reporting date. Current tax also includes any tax arising from dividends.

Current tax assets and liabilities are offset only if certain criteria are met.

3. Significant Accounting Policies, Continued

(19) Income taxes, continued

2) Deferred tax

Deferred tax is recognized in respect of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for taxation purposes. Deferred tax is not recognized for:

– temporary differences on the initial recognition of assets or liabilities in a transaction that is not a business combination and that affects neither accounting nor taxable profit or loss;
– temporary differences related to investments in subsidiaries, associates and joint arrangements to the extent that the Group is able to control the timing of the reversal of the temporary differences and it is probable that they will not reverse in the foreseeable future; and
– taxable temporary differences arising on the initial recognition of goodwill.

Deferred tax assets are recognized for unused tax losses, unused tax credits and deductible temporary differences to the extent that it is probable that future taxable profits will be available against which they can be used. Future taxable profits are determined based on the reversal of relevant taxable temporary differences. If the amount of taxable temporary differences is insufficient to recognize a deferred tax asset in full, then future taxable profits, adjusted for reversals of existing temporary differences, are considered, based on the business plans for individual subsidiaries in the Group. Deferred tax assets are reviewed at each reporting date and are reduced to the extent that it is no longer probable that the related tax benefit will be realized; such reductions are reversed when the probability of future taxable profits improves.

Unrecognized deferred tax assets are reassessed at each reporting date and recognized to the extent that it has become probable that future taxable profits will be available against which they can be used.

Deferred tax is measured at the tax rates that are expected to be applied to temporary differences when they reverse, using tax rates enacted or substantively enacted at the reporting date.

The measurement of deferred tax reflects the tax consequences that would follow from the manner in which the Group expects, at the reporting date, to recover or settle the carrying amount of its assets and liabilities. For this purpose, the carrying amount of investment property measured at fair value is presumed to be recovered through sale, and the Group has not rebutted this presumption.

Deferred tax assets and liabilities are offset only if certain criteria are met.

(20) Earnings per share

The Group presents basic and diluted earnings per share (the "EPS") data for its ordinary shares. Basic EPS is calculated by dividing the profit or loss attributable to ordinary shareholders of the Parent Company by the weighted average number of ordinary shares outstanding during the period, adjusted for own shares held. Diluted EPS is determined by adjusting the profit or loss attributable to ordinary shareholders and the weighted average number of ordinary shares outstanding, adjusted for the effects of all dilutive potential ordinary shares, which comprise share options granted to employees.

3. Significant Accounting Policies, Continued

(21) Operating segment

The Group has three reportable segments: the chemicals business segment, electronic materials business segment and energy and other business segment. Strategic operations are operated separately because each segment is manufacturing different products respectively and requires different technologies and marketing strategies.

The performance of the operating segment is assessed based on profit attributable to owners of the Parent Company of each segment, which is considered to be useful for the management to compare the Group's performance in a specific segment with other companies in the same industry.

(22) Non-current assets held-for-sale and discontinued operations

If the carrying amount of non-current assets held for sale or disposal group is highly probable to be recovered through sale other than from continuing operation, those assets are classified as non-current assets held for sale. The asset (or, disposal group) must be available for immediate sale and the sale is highly probable to be classified as held for sale. Immediately before the initial classification of the asset (or, disposal group) as held for sale, the carrying amount of the asset will be measured at the lower of carrying amount and fair value less costs to sell.

Any subsequent decrease in fair value less costs to sell of an asset, recognized impairment loss at the time of classification as held for sale, may result in an immediate charge to profit or loss and gain for any subsequent increase in fair value less costs to sell of an asset can be recognized in the profit or loss to the extent that it is not in excess of the cumulative impairment loss that has been recognized previously.

Non-current assets or disposal groups that are classified as held for sale are not depreciated.

A discontinued operation is a component of the Group's business that represents a separate major line of business or geographical area of operations that has been disposed of or is held for sale, or is a subsidiary acquired exclusively with a view to resale. When an operation is classified as a discontinued operation, the comparative consolidated statement of comprehensive income is re-presented as if the operation had been discontinued from the start of the comparative year.

(23) Emissions Rights

The Company accounts for greenhouse gases emission right and the relevant liability as below pursuant to the Act on Allocation and Trading of Greenhouse Gas Emission which became effective in 2015.

1) Greenhouse Gases Emission Right

Greenhouse Gases Emission Right consists of emission allowances which are allocated from the government free of charge or purchased from the market. The cost includes any directly attributable costs incurred during the normal course of business.

Emission rights held for the purpose of performing the obligation is classified as intangible asset and is initially measured at cost and after initial recognition, are carried at cost less accumulated impairment losses. Emission rights held for short-swing profits are classified as current asset and are measured at fair value with any changes in fair value recognized as profit or loss in the respective reporting period.

The Company derecognizes an emission right asset when the emission allowance is unusable, disposed or submitted to government in which the future economic benefits are no longer expected to be probable.

3. Significant Accounting Policies, Continued

(23) Emissions Rights, Continued

2) Emission liability

Emission liability is a present obligation of submitting emission rights to the government with regard to emission of greenhouse gas. Emission liability is recognized when it is probable that outflows of resources will be required to settle the obligation and the costs required to perform the obligation are reliably estimable. Emission liability is an amount of estimated obligations for emission rights to be submitted to the government for the performing period. The emission liability is measured based on the expected quantity of emission for the performing period in excess of emission allowance in possession and the unit price for such emission rights in the market at the end of the reporting period.

The Group expects that the emission of greenhouse gas will be approximately 510 thousand ton which is less than the emission allowance in possession. Also, the Group does not hold any emission allowances held for sale.

(24) Changes in accounting policies

The Group has initially applied K-IFRS 1115 and K-IFRS 1109 from January 1, 2018. A number of other new standards are also effective from January 1, 2018 but they do not have a material effect on the Group's financial statements

1) K-IFRS 1109 Financial Instruments, Continued

K-IFRS 1109 sets out requirements for recognizing and measuring financial assets, financial liabilities and some contracts to buy or sell non-financial items. This standard replaces K-IFRS 1039 Financial Instruments: Recognition and Measurement.

The following table summarizes the impact, net of tax, of transition to K-IFRS 1109 on the opening balance of retained earnings.

(In thousands of won)		**Opening**
Retained earnings		
Cumulative net fair value changes of available-for-sale equity securities classified as FVTPL equity securities under K-IFRS 1109	₩	163,456,342
Cumulative impairment losses of available-for-sale equity securities classified as FVOCI equity securities under K-IFRS 1109		362,268,096
Related tax		(125,461,112)
Impact at January 1, 2018	₩	400,263,326

3. Significant Accounting Policies, Continued

(24) Changes in accounting policies, Continued

1) K-IFRS 1109 Financial Instruments, Continued

There is no effect of adopting K-IFRS 1109 on the carrying amounts of financial assets at January 1, 2018. The following table and the accompanying notes below explain the original measurement categories under K-IFRS 1039 and the new measurement categories under K-IFRS 1109 for each class of the Group's financial assets and financial liabilities as at January 1, 2018.

(In thousands of won)	Classification under K-IFRS 1039	Classification under K-IFRS 1109		Carrying amount under K-IFRS 1039	Carrying amount under K- IFRS 1109
Financial assets					
Equity securities	Available-for-sale	FVOCI–equity instrument(*1)	₩	784,950,975	784,950,975
	Available-for-sale	Mandatorily at FVTPL		639,586,024	639,586,024
	Designated as at FVTPL	Mandatorily at FVTPL(*2)		251,270,000	251,270,000
Trade and other receivables	Loans and receivables	Amortized cost(*3)		1,233,636,018	1,233,636,018
Cash and cash equivalents	Loans and Receivables	Amortized cost		1,209,015,664	1,209,015,664
Fixed term bank deposits	Loans and Receivables	Amortized cost		52,436,080	52,436,080
Guarantee Deposits	Loans and Receivables	Amortized cost		141,155,912	141,155,912
Government debt securities	Held-for-trading	Amortized cost(*3)		1,081,965	1,081,965
Derivatives	Designated as at FVTPL	Mandatorily at FVTPL		29,160,000	29,160,000
Total financial assets			₩	**4,342,293,638**	**4,342,293,638**

(*1) Investments in equity securities that the Group intends to hold for the long term for strategic purposes. As permitted by K-IFRS 1109, the Group has designated these investments at the date of initial application as measured at FVOCI. Unlike K-IFRS 1039, the accumulated fair value reserve related to these investments will never be reclassified to profit or loss.

(*2) Under K-IFRS 1039, these equity securities were designated as at FVTPL to resolve accounting mismatch. These assets have been classified as mandatorily measured at FVTPL under K-IFRS 1109.

(*3) Trade and other receivables that were classified as loans and receivables under K-IFRS 1039 are classified at amortized cost. Government debt securities that were previously classified as held-to-maturity are classified at amortized cost. The Group intends to hold the assets to maturity to collect contractual cash flows and these cash flows consist solely of payments of principal and interest on the principal amount outstanding.

2) K-IFRS 1115 Revenue from contracts with customers
K-IFRS 1115 establishes a comprehensive framework for determining whether, how much and when revenue is recognized. It replaced K-IFRS 1018 Revenue, K-IFRS 1011 Construction Contracts and related interpretations. Under K-IFRS 1115, revenue is recognized when a customer obtains control of the goods or services. Determining the timing of the transfer of control – at a point in time or over time – requires judgment.

3. Significant Accounting Policies, Continued

(24) Changes in accounting policies, Continued

2) K-IFRS 1115 Revenue from contracts with customers, Continued

The Group has adopted K-IFRS 1115 using the retrospective method, with the effect of initially applying this standard recognized at the beginning of comparative year (i.e. January 1, 2017). There was no effect to the retained earnings of the Group as of January 1, 2017 due to adoption of K-IFRS 1115.

The following table summarizes the impacts of adopting K-IFRS 1115 on the Group's comparative statement of financial position as at 31 December 2017 and its statement of profit or loss for the year then ended. There was no material impact on the Group's statement of cash flows for the year ended December 31, 2017

December 31, 2017 *(In thousands of won)*		**Amounts under K-IFRS 1018**	**Adjustments**	**As reported**
Assets				
Current Assets	₩	**3,605,075,720**	**(20,499,643)**	**3,584,576,077**
Trade and other receivables		1,218,252,689	12,003,714	1,230,256,403
Other current assets		97,440,543	(32,503,357)	64,937,186
Others		2,289,382,488	-	2,289,382,488
Non-current assets		**12,146,400,609**	**10,728,692**	**12,157,129,301**
Other non-current assets		118,715,081	10,728,692	129,443,773
Others		12,027,685,528	-	12,027,685,528
Total assets	₩	**15,751,476,329**	**(9,770,951)**	**15,741,705,378**
Liabilities				
Current Liabilities	₩	**2,670,359,532**	**(6,269,056)**	**2,664,061,476**
Trade and other payables		1,485,918,600	-	1,485,918,600
Advanced receipts		50,470,586	(6,298,056)	44,172,530
Others		1,133,970,346	-	1,133,970,346
Non-current Liabilities		**1,629,117,300**	**(3,472,895)**	**1,625,644,405**
Long-tern unearned revenue		47,612,643	(3,472,895)	44,139,748
Others		1,581,504,657	-	1,581,504,657
Total liabilities	₩	**4,299,476,832**	**(9,770,951)**	**4,289,705,881**
Equity				
Equity attributable to owners of the Parent	₩	11,257,301,680	-	11,257,301,680
Non-controlling interests		194,697,817	-	194,697,817
Total equity	₩	**11,451,999,497**	**-**	**11,451,999,497**
Total equity and liabilities	₩	**15,751,476,329**	**(9,770,951)**	**15,741,705,378**

3. Significant Accounting Policies, Continued

(24) Changes in accounting policies, Continued

2) K-IFRS 1115 Revenue from contracts with customers, Continued

December 31, 2017 *(In thousands of won)*		**Amounts under K-IFRS 1018**	**Adjustments**	**As reported**
Revenue	₩	6,321,560,922	25,045,671	6,346,606,593
Cost of sales		(5,152,472,076)	(28,289,397)	(5,180,761,473)
Gross profit		1,169,088,846	(3,243,726)	1,165,845,120
Sales, general, and administrative expenses		(1,052,194,059)	3,243,726	(1,048,950,333)
Operating profit		116,894,787	-	116,894,787
Profit before tax		824,064,879	-	824,064,879
Income tax expenses		180,871,016	-	180,871,016
Net income		643,193,863	-	643,193,863
Total comprehensive income	₩	**637,039,413**	**-**	**637,039,413**

The Group’s new accounting policy for each revenue streams under K-IFRS 1115 are as follows:

① Product sales

Control is transferred at the time product is delivered and is taken over by the customer. Revenue is recognized when control is transferred and invoices are issued.

Under K-IFRS 1115, revenue is recognized only to the extent that it is highly probable that no significant reduction in cumulative revenue will occur. Some customers provide price discounts such as sales incentives based on their sales volume. Revenue is recognized as the amount of estimated price discount based on contract

K-IFRS 1115 does not have a significant effect on the Group's accounting policies.

② Royalties

The Group provides licenses to its customers, such as patented technology, and receives royalties on a monthly or quarterly basis, depending on the volume of production (or volume) of products using the technology.

Under K-IFRS 1115, royalties based on sales volume or usage are recognized when subsequent sales or production activities occur after granting licenses.

K-IFRS 1115 does not have a significant effect on the Group's accounting policies.

③ Development service

The Group is engaged in the development of products that meet customer requirements. The internal and external deliverables created in accordance with these development services are transferred to the customer at the time of final approval by the customer and therefore the revenue and related costs arising from the customer and the contract are recognized at the time the deliverables promised to the customer are delivered.

3. Significant Accounting Policies, Continued

(24) Changes in accounting policies, Continued

2) K-IFRS 1115 Revenue from contracts with customers, Continued

Under K-IFRS 1018, the Group recognized the consideration received from the customer as a deduction of expenses, without distinguishing the sale of the sample products paid for the customer as a separate contractual product. Under K-IFRS 1115, however, the Group has determined that it is a separate obligation to perform the sale of the samples produced during the development process and recognize the consideration received from the customers as revenue.

In addition, K-IFRS 1018 does not classify the development services provided to customers as separate performance obligations, but recognizes revenue for development services as revenue in proportion to product production. Under K-IFRS 1115, development services are considered as separate performance obligation, and revenue is recognized at the point in time the delivery of the deliverables is completed.

3) K-IFRS 2022 Foreign Currency Transactions and Advance Consideration

K-IFRS 2022 clarifies that the transaction date is the date on which the company initially recognizes the prepayment or deferred income arising from the advance consideration. For transactions involving multiple payments or receipts, each payment or receipt gives rise to a separate transaction date.

4) Others
The following amended standards and interpretations are not expected to have a significant impact on the Group's consolidated financial statements.

–K-IFRS 2123: Uncertainty over Tax Treatments.
–K-IFRS 1109: Prepayment Features with Negative Compensation.
–K-IFRS 1028: Long-term Interests in Associates and Joint Ventures
–K-IFRS 1019: Plan Amendment, Curtailment or Settlement
–Annual Improvements to K-IFRS Standards 2015–2017 Cycle – various standards.
–Amendments to References to Conceptual Framework in K-IFRS Standards.
–K-IFRS 1117: Insurance Contracts.

(25) New standards and interpretations not yet adopted

K-IFRS 1116 Leases

K-IFRS 1116 replaces existing leases guidance, including K-IFRS 1017 Leases, K-IFRS 2104 Determining whether an Arrangement contains a Lease, K-IFRS 2015 Operating Leases – Incentives and K-IFRS 2027 Evaluating the Substance of Transactions Involving the Legal Form of a Lease.

The Group is required to adopt K-IFRS 1116 Leases from 1 January 2019.

K-IFRS 1116 introduces a single, on-balance sheet lease accounting model for lessees. A lessee recognizes a right-of-use asset representing its right to use the underlying asset and a lease liability representing its obligation to make lease payments. There are recognition exemptions for short-term leases and leases of low-value items. Lessor accounting remains similar to the current standard – i.e. lessors continue to classify leases as finance or operating leases.

3. Significant Accounting Policies, Continued

(25) New standards and interpretations not yet adopted, Continued

The Group has assessed the estimated impact that initial application of IFRS 16 will have on its consolidated financial statements, as described below. The actual impacts of adopting the standard on 1 January 2019 may change because the new accounting policies are subject to change until the Group presents its first financial statements that include the date of initial application.

The Group will recognize new assets and liabilities for its operating leases. The nature of expenses related to those leases will change because the Group will recognize a depreciation charge for right-of-use assets and interest expense on lease liabilities. Previously, the Group recognized operating lease expense on a straight-line basis over the term of the lease, and recognized assets and liabilities only to the extent that there was a timing difference between actual lease payments and the expense recognized.

No significant impact is expected for the Group's finance leases.

1) Whether an arrangement is or contain a lease

Previously, the Group determined at contract inception whether an arrangement is or contains a lease under K-IFRS 2104. Under K-IFRS 1116, the Group assesses whether a contract is or contains a lease based on the definition of a lease.

On transition to K-IFRS 1116, the Group elected to apply the practical expedient to grandfather the assessment of which transactions are leases. It applied IFRS 16 only to contracts that were previously identified as leases. Contracts that were not identified as leases under K-IFRS 1017 and K-IFRS 2104 were not reassessed for whether there is a lease. Therefore, the definition of a lease under K-IFRS 1116 was applied only to contracts entered into or changed on or after January 2019.

2) Transition

The Group plans to apply K-IFRS 1116 initially on January 1, 2019, using the modified retrospective approach. Therefore, the cumulative effect of adopting K-IFRS 1116 will be recognized as an adjustment to the opening balance of retained earnings at January 1, 2019, with no restatement of comparative information.

The Group plans to apply the practical expedient to grandfather the definition of a lease on transition. This means that it will apply IFRS 16 to all contracts entered into before 1 January 2019 and identified as leases in accordance with K-IFRS 1017 and K-IFRS 2104. The Group is currently assessing potential impact of the practical expedients.

4. Financial Risk Management

The Group has exposure to the credit risk, liquidity risk and market risk. This note presents information about the Group's exposure to each of the above risks, the Group's objectives, policies and processes for measuring and managing risk, and the Group's management of capital. Further quantitative disclosures are included throughout these consolidated financial statements.

(1) Credit risk

Credit risk is the risk of financial loss to the Group if a customer or counterparty to a financial instrument fails to meet its contractual obligations. The Group's exposure to credit risk is influenced mainly by the individual characteristics of each customer. Most customers have been transacting with the Group for many years and impairment loss has not occurred very often. In addition, the Group reviews credit rating of new customers prior to the determination of payment terms and also re-examines the credit rating of customers on a regular basis.

The Group sets allowances for estimated losses from accounts receivable and investment assets. In addition, the Group reports present conditions and countermeasures of delayed recovery for the financial assets and takes reasonable steps depending on the reasons for delay in order to manage the credit risk.

1) Exposure to credit risk

The carrying amount of financial assets represents the maximum credit exposure. The Group limits its exposure to credit risk by depositing cash and cash equivalents in financial institutions that have a high credit rate. The maximum exposure to credit risk at the reporting date as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Cash and cash equivalents	₩	1,516,585,547	1,209,015,664
Trade and other receivables, net		1,874,354,797	1,233,636,017
Government bonds		1,113,525	1,081,965
Non-derivative financial instruments		95,239,953	52,436,080
Guarantee deposits		142,247,800	141,155,912
Total	₩	3,629,541,622	2,637,325,638

The maximum exposure to credit risk for trade and other receivables at the reporting date by geographic region as of December 31, 2018 and 2017 are as follows:

(In thousands of won)		2018	2017
Domestic	₩	463,723,234	290,551,892
North America		94,748,793	67,222,160
Europe		374,837,958	179,555,215
China		530,542,155	459,582,350
Other		410,502,657	236,724,400
Total	₩	1,874,354,797	1,233,636,017

4. Financial Risk Management, Continued

(1) Credit risk, continued

2) Impairment loss

The aging of trade and other receivables and respective impaired amounts as of December 31, 2018 and 2017 are as follows:

		2018		2017	
(In thousands of won)		**Gross**	**Impairment**	**Gross**	**Impairment**
Not past due	₩	1,820,132,950	-	1,204,177,556	-
Past due 1-30 days		44,077,618	-	25,044,432	-
Past due 31-60 days		1,647,922	-	1,662,369	-
Past due over 61 days		8,496,307	1,805,208	12,405,458	9,653,798
Total	₩	1,874,354,797	1,805,208	1,243,289,815	9,653,798

3) Financial assets that are past due but not impaired

Financial assets that are past due but not impaired as of December 31, 2018 are as follows:

(In thousands of won)		Carrying amount	Less than 6 months	Over 6 months
Trade and other receivables	₩	52,416,639	45,729,865	6,686,774

Financial assets that are past due but not impaired as of December 31, 2017 are as follows:

(In thousands of won)		Carrying amount	Less than 6 months	Over 6 months
Trade and other receivables	₩	29,458,461	17,170,033	12,288,428

(2) Liquidity risk

Liquidity risk is the risk that the Group will encounter difficulty in meeting the obligations associated with its financial liabilities that are settled by delivering cash or another financial asset. The Group's approach to managing liquidity is to ensure, as far as possible, that it will always have sufficient liquidity to meet its liabilities when due, under both normal and stressed conditions, without incurring unacceptable losses or risking damage to the Group's reputation.

The Group monitors its cash flows through long-term and short-term management strategies and ensures it has sufficient cash on demand to meet expected operational expenses. This excludes the potential impact of extreme circumstances that cannot reasonably be predicted.

The Group establishes short-term and long-term cash management plans to manage liquidity risk. The Group matches maturity structures of financial assets and liabilities through analyzing and reviewing cash flow budget and actual cash flow. Management believes that the Group is able to redeem its financial liabilities through operating cash flows and cash inflows of financial assets.

4. Financial Risk Management, Continued

(2) Liquidity risk, continued

Maturity analysis of financial liabilities as of December 31, 2018 is as follows:

(In thousands of won)		Carrying amount	Contractual Cash flow	1 Year or less	More than 1 year and less than 5 years
Trade and other payable	₩	2,067,458,942	2,067,458,942	1,859,335,445	208,123,497
Short-term borrowings		1,739,389,710	1,757,426,260	1,757,426,260	-
Long-term borrowings		1,514,282,001	1,588,048,209	20,724,706	1,567,323,503
Forward exchange(*)		9,720,923	8,001,867	1,608,264	6,393,603
Total	₩	5,330,851,576	5,420,935,278	3,639,094,675	1,781,840,603

(*) Cash flow for forward exchange is net of inflow and outflow of contractual cash flow.

(3) Market risk

Market risk is the risk that changes in market prices, such as foreign exchange rates, interest rates and equity prices will affect the Group's income or the value of its holdings of financial instruments. The objective of market risk management is to manage and control market risk exposures within acceptable parameters, while optimizing the return.

1) Exchange rate risk

The Group has exposure to the exchange rate risk for the sale, purchase, and borrowing of currencies not denominated in functional currency. Main currencies used for these transactions are EUR, USD, JPY and etc. The Group manages the exchange rate risk through currency forward transactions as considered necessary in order to hedge the exchange risk.

Carrying amounts of monetary assets and liabilities expressed as other than functional currency as of December 31, 2018 and 2017 are as follows:

(In thousands of won)	2018			2017		
	USD	EUR	JPY, etc.	USD	EUR	JPY, etc.
Monetary assets :						
Cash and cash equivalents	₩ 346,810,889	179,220	40,956,898	101,391,616	1,026,655	41,168,572
Trade and other receivables	1,896,589,808	77,587,973	190,180,757	1,119,591,426	50,064,198	9,736,891
Other investments	782,788	-	487,023	207,170	2,898	499,201
Total	₩ 2,244,183,485	77,767,193	231,624,678	1,221,190,212	51,093,751	51,404,664
Monetary liabilities:						
Trade and other payables	₩ 1,188,851,513	77,587,973	190,180,757	766,392,605	13,603,429	73,794,212
Borrowings	1,259,179,438	50,719,391	162,945,687	703,806,331	25,451,617	-
Total	₩ 2,448,030,951	128,307,364	353,126,444	1,470,198,936	39,055,046	73,794,212

4. Financial Risk Management, Continued

(3) Market risk, continued

1) Exchange rate risk, continued

The following exchange rates were applied during the years ended December 31, 2018 and 2017:

(In Won)	Average rate		Reporting date spot rate	
Currency	**2018**	**2017**	**2018**	**2017**
USD	1,100.1	1,131.1	1,118.1	1,071.4
EUR	1,298.8	1,276.6	1,279.2	1,279.3
JPY	9.96	10.09	10.13	9.49

Effects on income (loss) after income taxes as a result of change in exchange rate as of December 31, 2018 and 2017 are as follows:

(In thousands of won)	2018		2017	
Currency	**If increased by 5%**	**If decreased by 5%**	**If increased by 5%**	**If decreased by 5%**
USD	(7,725,819)	7,725,819	(9,437,431)	9,437,431
EUR	(1,915,472)	1,915,472	456,267	(456,267)
JPY, etc.	(4,604,917)	4,604,917	(848,564)	848,564

4. Financial Risk Management, Continued

(3) Market risk, continued

2) Interest rate risk

The Group entered into interest rate swaps contracts in order to hedge the interest rate fluctuation risk for certain borrowings.

(i) The interest rate profile of the Group's interest-bearing financial instruments as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Fixed interest rate:			
Short-term borrowings	₩	72,102,877	211,071,350
Long-term borrowings		689,097,586	99,778,128
Sub-total	₩	761,200,463	310,849,478
Floating interest rate:			
Short-term borrowings	₩	1,667,286,833	868,233,848
Long-term borrowings		825,184,415	245,525,223
Sub-total		2,492,471,248	1,113,759,071
Total	₩	3,253,671,711	1,424,608,549

(ii) Fair value sensitivity analysis for fixed rate instruments

Debentures and borrowings at amortized cost bear fixed interest rates. Therefore, change in interest rates at the reporting date would not affect the Group's profit or loss.

(iii) Cash flow sensitivity analysis for variable rate instruments

Under assumption that all other variables remain constant, change of one percent point in interest rate would have increased (decreased) equity and income after income taxes by the amounts shown below as of December 31, 2018 and 2017.

(In thousands of won)		Equity		Profit after income taxes	
		If increased by 1%	If decreased by 1%	If increased by 1%	If decreased by 1%
2018	₩	(18,892,932)	18,892,932	(18,892,932)	18,892,932
2017		(8,442,294)	8,442,294	(8,442,294)	8,442,294

4. Financial Risk Management, Continued

(3) Market risk, continued

3) Other market price risk

Market price risk arises from the listed equity instruments that the Group possess. Major investments within the portfolio are managed separately and the approval of the Board of Directors is necessary for significant acquisition or sale decisions.

The effect on other comprehensive income (gains/losses on valuation of FVOCI equity instruments, when the price of listed equity financial assets that the Group possess, changed by five percent points as of December 31, 2018 is as follows:

(In thousands of won)		**December 31, 2018**	
		If increased by 5%	**If decreased by 5%**
Total comprehensive income, net of tax effect	₩	33,772,467	(33,772,467)

(4) Capital management

The Group's capital management is to maintain a sound capital structure and to maximize shareholders' profit. The Group uses financial ratios such as debt ratio and net borrowings ratio as a capital management indicator to achieve the optimum capital structure. Debt to equity ratio is calculated as total debt divided by total equity and net borrowings to equity ratio is calculated as net borrowings divided by total equity.

(In thousands of won)		**2018**	**2017**
Debt to equity ratio:			
Total liabilities	₩	7,124,501,968	4,289,705,881
Total equity		12,225,219,216	11,451,999,497
Debt to equity ratio		58.3%	37.5%
Net borrowings to equity ratio:			
Borrowings	₩	3,253,671,711	1,424,608,549
Less : Cash and cash equivalents		(1,516,585,547)	(1,209,015,664)
Less : Short-term financial instruments		(95,216,453)	(51,901,636)
Net borrowings	₩	1,641,869,711	163,691,249
Net borrowings to equity ratio		13.4%	1.4%

4. Financial Risk Management, Continued

(5) Fair values

1) Fair value versus carrying amounts

The fair values of financial assets and liabilities, together with the carrying amounts shown in the statement of financial position, as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018		2017	
		Carrying amount	**Fair value**	**Carrying amount**	**Fair value**
Financial assets:					
Assets carried at fair value					
Equity Instruments	₩	1,364,002,758	1,364,002,758	1,650,333,235	1,650,333,235
Derivative financial assets		43,558,311	43,558,311	29,160,000	29,160,000
Subtotal	₩	1,407,561,069	1,407,561,069	1,679,493,235	1,679,493,235
Assets carried at amortized cost					
Cash and cash equivalents	₩	1,516,585,547	1,516,585,547	1,209,015,664	1,209,015,664
Trade receivables and other receivables		1,874,354,797	1,874,354,797	1,233,636,017	1,233,636,017
Available-for-sale financial assets		-	-	25,474,764	25,474,764
Government bonds		1,113,525	1,113,525	1,081,965	1,081,965
Financial instruments		95,239,953	95,239,953	52,436,080	52,436,080
Guarantee deposits		142,247,800	142,247,800	141,155,912	141,155,912
Subtotal	₩	3,629,541,622	3,629,541,622	2,662,800,402	2,662,800,402
Total financial assets	₩	5,037,102,691	5,037,102,691	4,342,293,637	4,342,293,637
Financial liabilities:					
Liabilities carried at fair value					
Derivative financial liabilities	₩	45,069,392	45,069,392	20,220,578	20,220,578
Liabilities carried at amortized cost					
Borrowings	₩	3,253,671,711	3,240,875,268	1,424,608,549	1,417,437,972
Trade and other payables		2,067,458,942	2,067,458,942	1,049,572,027	1,049,572,027
Subtotal		5,321,130,653	5,308,334,210	2,474,180,576	2,467,009,999
Total financial liabilities	₩	5,366,200,045	5,353,403,602	2,494,401,154	2,487,230,577

4. Financial Risk Management, Continued

(5) Fair values, Continued

2) Interest rates used for determining fair value

The interest rates used to discount estimated cash flows, when applicable, are based on the treasury bond yield curve at the reporting date plus an adequate credit spread, and were as follows:

	2018	2017
Borrowings	2.23%	2.51%

3) Fair value hierarchy

The Group classifies financial instruments carried at fair value in the statement of financial position according to fair value hierarchy which reflects significance of input variables used. The different levels of fair value hierarchy have been defined as follows:

"Level 1" indicates quoted prices in active markets for identical assets or liabilities. Instruments included in "Level 1" are composed of listed equity securities that are classified as available-for-sale financial assets.

The Group uses a valuation technique to estimate fair values of financial instruments which are not traded in an active market. If the significant inputs which are required for a fair value measurement are observable directly or indirectly in a market, the fair value input is classed as "Level 2". "Level 2" consists of currency swap agreement which is classified as derivatives. On the other hand, if the significant inputs are not based on observable market data, the fair value input for that instrument is classed as "Level 3".

Among unlisted equity securities, the fair value of Hanwha Total Petrochemicals Co., Ltd., Samsung Venture Investment Corporation, and iMarket Asia Co., Ltd. are estimated in accordance with estimated price per share calculated by the free cash flows to equity method. The Korea Economic Daily are estimated by the continuous probability distribution of value per share in accordance with estimated price per share calculated by the discounted cash flow valuation model and Comparable company valuation multiples.

The Group estimated fair value of equity securities of Lotte Advanced Materials Co., Ltd. by discounted cash flow method in income approach. The Group also evaluated the fair value of put and call option that underlies on the price of Lotte Advanced Materials Co., Ltd.'s shares, by binomial tree model.

These unlisted equity securities and derivatives are classed as "Level 3".

4. Financial Risk Management, Continued

(5) Fair values, Continued

3) Fair value hierarchy, Continued

The fair values of financial instruments based on the fair value hierarchy as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		Level 1	Level 2	Level 3	Total
December 31, 2018:					
Financial assets					
Equity instruments	₩	891,094,121	-	472,908,637	1,364,002,758
Derivative assets		-	11,889,311	31,669,000	43,558,311
Financial liabilities					
Derivative liabilities		-	27,826,392	17,243,000	45,069,392
December 31, 2017:					
Equity Instruments	₩	1,260,515,592	-	389,817,643	1,650,333,235
Derivative assets		-	-	29,160,000	29,160,000
Financial liabilities					
Derivative liabilities		-	9,131,578	11,089,000	20,220,578

(6) Transfer of financial assets and others

The list of transferred financial assets which are not derecognized in the statement of financial position as of December 31, 2018 and 2017 are as follows:

(In thousands of won)		Trade receivables	
		2018	2017
Carrying amount of assets	₩	1,068,876,667	519,546,534
Carrying amount of associated liabilities		1,068,876,667	519,546,534

5. Segments Information

(1) Operating segments

1) The Group has three reportable segments, which are summarized as follows:

Segment	Main business
Energy solutions	Rechargeable lithium-ion batteries and other businesses
Electronic material	Semi-conductor and display materials

2) The operating segments of the consolidated group are decided by management, which is established for strategic decision making. Management reviews the operating income for each operating segment in order to allocate resources to each segment and assess the segments' performance. The Group has two reportable segments which offer different products and services. The following table provides information for each reportable segment for the years ended December 31, 2018 and 2017.

(i) 2018

(In thousands of won)		Revenues	Depreciation	Amortization	Operating profit (loss)
Energy solutions	₩	6,954,167,609	408,352,680	41,620,101	397,377,836
Electronic material		2,204,104,846	82,807,864	49,459,338	317,592,770
Total	₩	9,158,272,455	491,160,544	91,079,439	714,970,606

(ii) 2017

(In thousands of won)		Revenues	Depreciation	Amortization	Operating profit (loss)
Energy solutions	₩	4,332,376,316	276,383,717	40,124,331	(108,576,865)
Electronic material		2,014,230,278	92,888,549	50,486,272	225,471,651
Total	₩	6,346,606,594	369,272,266	90,610,603	116,894,786

(*) The Group recognized impairment loss for non-financial assets of energy segment during the years ended December 31, 2018 and 2017.

Total assets and total liabilities of each segment is not presented since the information is not provided to management on a regular basis.

5. Segments Information, Continued

(2) Geographical information

The Group operates in global markets such as Korea (the Parent Company's domicile), North America, Europe, South America, China, South-eastern Asia, and so on. The following table provides information for each geographical region as of and for the years ended December 31, 2018 and 2017.

(In thousands of won)

		2018		2017	
		Revenue(*1)	**Non-current Assets(*2)**	**Revenue(*1)**	**Non- current assets**
Korea	₩	1,697,356,639	3,145,837,438	1,167,422,203	2,382,741,372
North America		563,023,579	17,864,563	350,798,877	17,807,602
Europe and South America		2,029,858,904	1,031,782,491	1,296,301,978	426,488,607
China		2,318,196,002	1,211,399,452	1,431,566,976	872,459,909
South-eastern Asia and etc.		2,549,837,331	346,491,148	2,100,516,560	305,050,254
Consolidation adjustments		-	(129,044,973)	-	(26,846,393)
Total	₩	9,158,272,455	5,624,330,119	6,346,606,594	3,977,701,351

(*1) As described in Note 30, the Group's related party transactions comprise more than 10% of the Group's consolidated revenue.

(*2) Non-current assets include carrying amount of property, plant and equipment, intangible assets and investment property.

6. Cash and Cash Equivalents

Cash and cash equivalents as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		**2018**	**2017**
Cash on hand	₩	1,873,305	1,346,724
Demand deposits		1,447,542,173	1,173,335,866
Short-term investments		67,170,069	34,333,074
Total	₩	1,516,585,547	1,209,015,664

7. Trade and Other Receivables

(1) Trade and other receivables as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018		2017	
		Current	Non-current	Current	Non-current
Loans	₩	882,756	23,293,958	1,540,989	3,629,111
Present value discount		-	(198,983)	-	(251,091)
Other account receivables		88,811,808	67,839	60,505,081	-
Allowance		-	-	(157)	-
Accrued income		30,335,443	-	55,509,665	-
VAT receivables		234,774,885	-	112,955,678	-
Trade account receivable		1,498,186,175	6,125	1,009,398,788	1,594
Allowance		(1,805,208)	-	(9,653,641)	-
Total	₩	1,851,185,859	23,168,939	1,230,256,403	3,379,614

(2) Changes in allowance for trade and other receivables for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
		Current	Current
Balance at beginning	₩	9,653,798	162,915
Write off		-	(11,750)
(Reversal of) Bad debt expense		(7,615,518)	9,514,503
Exchange rate fluctuation		(233,072)	(11,870)
Balance at ending	₩	1,805,208	9,653,798

8. Inventories

(1) Inventories as of December 31, 2018 and 2017 are summarized as follows:

1) 2018

(In thousands of won)		Acquisition cost	Allowance for valuation	Carrying amount
Merchandize	₩	704,860	-	704,860
Finished goods		448,050,974	(42,702,683)	405,348,291
Semi-finished goods		524,016,606	(62,382,552)	461,634,054
Raw materials		647,143,259	(7,207,065)	639,936,194
Supplies		26,041,729	-	26,041,729
Materials-in-transit		210,624,963	-	210,624,963
Other inventories		1,360,742	-	1,360,742
Total	₩	1,857,943,133	(112,292,300)	1,745,650,833

8. Inventories, Continued

(1) Inventories as of December 31, 2018 and 2017 are summarized as follows: Continued,

2) 2017

(In thousands of won)		Acquisition cost	Allowance for valuation	Book value
Merchandize	₩	569,633	-	569,633
Finished goods		300,171,122	(41,899,832)	258,271,290
Semi-finished goods		357,531,139	(46,570,019)	310,961,120
Raw materials		290,648,685	(7,132,733)	283,515,952
Supplies		17,521,793	-	17,521,793
Materials-in-transit		95,437,068	-	95,437,068
Other inventories		294,788	-	294,788
Total	₩	1,062,174,228	(95,602,584)	966,571,644

(2) The amount of inventories expensed as cost of sales and loss on valuation of inventories for the years ended December 31, 2018 and 2017 are as follows:

(In thousands of won)		2018	2017
Inventories recognized as cost of sales	₩	7,101,571,677	5,153,519,269
Loss on valuation of inventories		16,616,851	27,242,204
Total	₩	7,118,188,528	5,180,761,473

9. Other Investments

(1) Other investments as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018		2017	
		Current	Non-current	Current	Non-current
Government bonds	₩	-	1,113,525	-	1,081,965
Equity instruments		-	1,364,002,758	-	1,675,807,999
Financial instruments		95,216,453	23,500	51,901,636	534,444
Guarantee deposits		47,948,360	94,299,440	61,893,544	79,262,368
Derivatives financial assets		7,366,255	36,192,056	-	29,160,000
Total	₩	150,531,068	1,495,631,279	113,795,180	1,785,846,776

9. Other Investments, Continued

(2) Available-for-sale financial assets as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)

			Unrealized gain (loss)				
		Acquisition cost	**Beginning balance**	**Changes in unrealized gain or loss**	**Ending balance**	**Allowances for impairment**	**Carrying amount**
December 31, 2018							
FVOCI							
Listed equity instruments	₩	728,380,978	84,930,711	77,782,432	162,713,143	-	891,094,121
Unlisted equity instruments		18,690,255	15,125,137	(499,975)	14,625,162	-	33,315,417
Tax effect			(24,213,515)	(18,702,355)	(42,915,870)		
FVTPL							
Unlisted equity instruments	₩	374,839,887	17,545,393	47,207,940	64,753,333	-	439,593,220
Total	₩	1,121,911,120	117,601,241	124,490,397	242,091,638	-	1,364,002,758
December 31, 2017							
Available-for-sale financial instruments							
Listed equity securities	₩	1,025,363,499	467,353,509	130,066,679	597,420,188	(362,268,096)	1,260,515,591
Unlisted equity securities		135,587,673	(12,961,162)	41,394,897	28,433,735	-	164,021,408
Tax effect			(110,188,901)	(39,485,726)	(149,674,627)		
Financial assets at fair value through profit and loss		258,500,000	(8,491,000)	1,262,000	(7,229,000)		251,271,000
Total	₩	1,419,451,172	445,901,347	172,723,576	618,624,923	(362,268,096)	1,675,807,999

1) The Group estimates fair values of certain unlisted equity securities as follows:

① The fair value of Hanwha General Chemical Co., Ltd. is estimated using the discounted cash flow method in income approach. The acquisition cost and the carrying value of the unlisted security are ₩ 78,672 million and ₩ 121,508 million, respectively, as of December 31, 2018. As mentioned in note 19, the Group entered into a contract with third party regarding this equity instrument.

② The fair value of Samsung Venture Investment Corporation is estimated using the free cash flows to equity method. The acquisition cost and the carrying value of the unlisted security are ₩4,900 million and ₩7,313 million, respectively, as of December 31, 2018.

③ The fair value of The Korea Economic Daily is estimated using the discounted cash flow model and comparable company valuation multiples. The acquisition cost and the carrying value of the unlisted security are ₩9,073 million and ₩15,744 million, respectively, as of December 31, 2018.

④ The fair value of iMarket Asia Co., Ltd. is estimated using the free cash flows to equity method. The acquisition cost and the carrying value of the unlisted security are ₩4,028 million and ₩9,570 million, respectively, as of December 31, 2018.

9. Other Investments, Continued

2) The Group has disposed portion of its shares of Hanwha General Chemical Co., Ltd. during the period ended December 31, 2015. The Group received contingent considerations dependent to operation result of Hanwha Total Petrochemical Co., Ltd during the year ended December 31, 2018.

3) During the year ended December 31, 2018, the Group disposed its shares of Samsung C&T Co., Ltd. Gain from fair value valuation of KRW 56,599 million and loss from disposal of financial instruments of KRW 10,544 million was recognized by the point of disposal.

(3) The fair value of Lotte Advanced Materials Co., Ltd, was evaluated by discounted cash-flow model in income approach. The acquisition cost and carrying amount of the shares as of December 31, 2018 are ₩ 258,500 million and ₩ 261,779 million, respectively.

10. Other Current Assets and Non-current Assets

Other current and non-current assets as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018		2017	
		Current	Non-current	Current	Non-current
Advance payments	₩	123,935,188	4,877,247	37,496,449	18,520,724
Prepaid expenses		58,483,957	75,938,013	14,087,109	110,923,049
Prepaid income tax		16,140,962	-	13,353,629	-
Total	₩	198,560,107	80,815,260	64,937,187	129,443,773

11. Equity-method-accounted Investees

(1) The equity-method accounted investees of the Group as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)			2018		2017	
Associates:	Country	Primary business	Percentage of ownership	Carrying amount	Percentage of ownership	Carrying amount
Samsung Display Ltd.("SDC") (*)	Korea	Manufacturing and sale of LCD, OLED	15.2%	₩ 6,505,550,522	15.2%	₩ 6,175,255,630
Samsung Economic Research Institute Ltd. ("SERI")	Korea	Management advisory consulting	29.6%	25,503,411	29.6%	23,130,678
Intellectual Keystone Technology ("IKT")	U.S.A	Investing in new technology	41.0%	12,389,611	41.0%	11,619,735
Sungrow-Samsung SDI Energy Storage Power Supply Co., Ltd. ("SSEP")	China	Manufacturing ESS products	35.0%	1,866,870	35.0%	-
SD Flex Co., Ltd.	Korea	Manufacturing printed-circuit board	50.0%	9,323,354	50.0%	9,343,869
Total				₩ 6,554,633,768		₩ 6,219,349,912

(*) Although the Group owns less than 20% of its shares and voting rights, the Group has classified the shares equity-accounted investees due to the fact that the Group has representations in the board of directors of SDC.

Fiscal year of equity-method accounted investees ended on December 31, 2018.

11. Equity-accounted Investees, Continued

(2) The summarized financial information of equity-accounted investees as of and for the years ended December 31, 2018 and 2017 are summarized as follows:

1) 2018

(In thousands of won)	SDC	SERI	IKT	SSEP	SDFLEX
Current assets	₩ 20,137,873,075	77,638,726	6,698,978	67,609,408	15,731,053
Non-current assets	34,344,307,576	59,720,495	23,519,847	11,535,025	4,697,949
Current liabilities	5,960,610,855	32,168,129	263	72,150,369	1,772,868
Non-current liabilities	5,265,107,910	19,030,919	-	1,660,152	9,426
Revenue	32,316,000,634	175,168,616	6,875,380	61,394,893	7,776,611
Operating profit (loss)	2,522,064,806	194,912	816,296	3,240,371	(340,838)
Net income (loss)	2,238,291,215	312,489	632,066	3,239,620	(52,379)
Other comprehensive income (loss)	(57,236,007)	7,813,202	1,245,680	(1,125,467)	-
Total comprehensive income (loss)	2,181,055,208	8,125,691	1,877,746	2,114,153	(52,379)

2) 2017

(In thousands of won)	SDC	SERI	IKT	SSEP	SDFLEX
Current assets	₩ 21,316,244,224	71,981,435	5,686,916	26,084,837	16,195,903
Non-current assets	37,884,399,241	47,612,842	27,867,611	11,872,624	4,625,561
Current liabilities	12,145,376,928	26,587,211	5,213,709	32,859,818	2,133,726
Non-current liabilities	5,962,475,945	14,862,881	-	1,877,884	-
Revenue	34,293,154,971	167,682,467	7,069,449	9,991,534	10,476,913
Operating profit (loss)	5,268,395,104	484,233	561,998	(4,570,216)	761,351
Net income (loss)	4,645,694,815	225,571	386,731	(3,741,563)	738,443
Other comprehensive income	(25,170,872)	-	(618,774)	(2,353,751)	-
Total comprehensive income (loss)	4,620,523,943	225,571	(232,043)	(6,095,315)	738,443

11. Equity-accounted Investees, Continued

(3) The comparison between carrying amount of the investments and the investees' net assets based on the Group's percentage of ownership as of December 31, 2018 and 2017 are summarized as follows:

1) 2018

(In thousands of won)	SDC	SERI	IKT	SSEP	SDFLEX
Net assets (a)(*)	₩42,736,122,658	86,160,173	30,218,562	5,333,912	18,646,708
Percentage of ownership(b)	15.20%	29.60%	41.00%	35.00%	50.00%
Equity to net assets(axb)	6,505,550,522	25,503,411	12,389,611	1,866,870	9,323,354
Carrying amount	6,505,550,522	25,503,411	12,389,611	1,866,870	9,323,354

2) 2017

(In thousands of won)	SDC	SERI	IKT	SSEP	SDFLEX
Net assets(a)(*)	₩40,573,072,061	78,144,185	28,340,817	3,219,759	18,687,738
Percentage of ownership(b)	15.2%	29.6%	41.0%	35.0%	50.0%
Equity to net assets(axb)	6,176,277,906	23,130,678	11,619,735	1,126,916	9,343,869
Unrealized gains(losses)	(1,022,276)	-	-	(1,126,916)	-
Carrying amount	6,175,255,630	23,130,678	11,619,735	-	9,343,869

(*) Net asset of equity-accounted investees owned by the controlling interests

(4) Changes in investments in equity-accounted investees for the years ended December 31, 2018 and 2017 are as follows:

1) 2018

(In thousands of won)

Company		January 1, 2018	Share of profits(loss)	Other capital movements	December 31, 2018
SDC	₩	6,175,255,630	339,622,384	(9,327,492)	6,505,550,522
SERI		23,130,678	60,025	2,312,708	25,503,411
IKT		11,619,735	259,147	510,729	12,389,611
SSEP		-	2,260,783	(393,913)	1,866,870
SDFLEX		9,343,869	(20,515)	-	9,323,354
Total	₩	6,219,349,912	342,181,824	(6,897,968)	6,554,633,768

11. Equity-accounted Investees, Continued

(4) Changes in investments in equity-accounted investees for the years ended December 31, 2018 and 2017 are as follows: continued

2) 2017

(In thousands of won)

Company		January 1, 2017	Share of profits(loss)	Other capital movements	December 31, 2017
SDC	₩	5,477,456,629	697,944,768	(145,767)	6,175,255,630
SERI		22,905,607	17,653	207,418	23,130,678
IKT		12,937,228	158,000	(1,475,493)	11,619,735
SSEP (*)		3,296,794	(3,084,864)	(211,930)	-
SDFLEX		8,974,652	369,217	-	9,343,869
Total	₩	5,525,570,910	695,404,774	(1,625,772)	6,219,349,912

(*) Loss of ₩ 576 million from equity-method accounting of SSEP was not recognized as of December 31, 2017, as the Group's share in the equity-accounted investee's net asset ws less than zero.

(5) None of the equity-accounted investees is a listed company as of December 31, 2018.

(6) No significant restriction exists on the Group's ability to transfer money from equity-accounted investees and redemption of borrowings or advances to equity-accounted investees.

(7) No contingent liability related to equity-accounted investees exists as of December 31, 2018.

12. Property, Plant and Equipment

Changes in property, plant and equipment for the years ended December 31, 2018 and 2017 are summarized as follows:

(1) 2018

(In thousands of won)

		Land	Buildings and structures	Machinery	Tools, furniture and fixtures	Construction in progress	Total
Beginning balance	₩	277,183,588	1,200,577,455	810,624,946	126,610,988	515,342,349	2,930,339,326
Acquisition cost		277,183,588	2,701,066,541	2,732,963,107	490,386,136	515,342,349	6,716,941,721
Accumulated depreciation		-	(1,500,489,086)	(1,922,338,161)	(363,775,148)	-	(3,786,602,395)
Acquisitions and capital expenditure		7,090	37,418,801	291,141,096	54,581,287	1,897,468,318	2,280,616,592
Depreciation		-	(88,142,929)	(318,619,330)	(84,212,635)	-	(490,974,894)
Disposals		(786,528)	(6,840,215)	(36,893,807)	(3,443,023)	(1,214,161)	(49,177,734)
Impairment losses		-	(1,981,358)	(12,342,943)	(4,149,975)	-	(18,474,276)
Government grant		-	(1,298,000)	(40,611,396)	-	-	(41,909,396)
Reclassification to held-for-sale assets		-	(6,797,953)	(2,937,725)	(550,068)	-	(10,285,746)
Other		28,941,031	85,078,254	645,595,093	86,036,784	(834,539,437)	11,111,725
Exchange rate fluctuation		441,612	(252,897)	12,076,219	1,117,488	(16,294,030)	(2,911,608)
Ending balance	₩	305,786,793	1,217,761,158	1,348,032,153	175,990,846	1,560,763,039	4,608,333,989
Acquisition cost		305,786,793	2,756,931,139	3,514,583,785	589,544,011	1,560,763,039	8,727,608,767
Accumulated depreciation		-	(1,539,169,981)	(2,166,551,632)	(413,553,165)	-	(4,119,274,778)

Other amounts include reclassification of construction-in-progress to appropriate accounts such as investment property, property, plant and equipment, and expense accounts.

The Group recognized impairment loss as the estimated recoverable amount of assets in certain business segments is less than the carrying amount.

12. Property, Plant and Equipment, Continued

(2) 2017

(In thousands of won)

		Land	Buildings and structures	Machinery	Tools, furniture and fixtures	Construction in progress	Total
Beginning balance	₩	277,122,900	992,139,520	671,578,882	122,180,291	440,773,356	2,503,794,949
Acquisition cost		277,122,900	2,472,541,590	2,533,733,211	449,960,401	440,773,356	6,174,131,458
Accumulated depreciation		-	(1,480,402,070)	(1,862,154,329)	(327,780,110)	-	(3,670,336,509)
Acquisitions and capital expenditure		1,496,875	171,316,555	30,735,731	31,902,654	824,237,454	1,059,689,269
Depreciation		-	(71,308,030)	(226,598,142)	(71,180,914)	-	(369,087,086)
Disposals		(519,294)	(13,184,334)	(31,072,189)	(4,485,355)	(1,501,784)	(50,762,956)
Impairment losses		-	(2,935,164)	(27,805,562)	(5,468,708)	-	(36,209,434)
Government grant		-	(609,260)	(57,474,199)	(269,690)	-	(58,353,149)
Other		264,949	161,796,060	488,919,797	61,642,883	(745,224,560)	(32,600,871)
Exchange rate fluctuation		(1,181,842)	(36,637,892)	(37,659,372)	(7,710,173)	(2,942,117)	(86,131,396)
Ending balance	₩	277,183,588	1,200,577,455	810,624,946	126,610,988	515,342,349	2,930,339,326
Acquisition cost		277,183,588	2,701,066,541	2,732,963,107	490,386,136	515,342,349	6,716,941,721
Accumulated depreciation		-	(1,500,489,086)	(1,922,338,161)	(363,775,148)	-	(3,786,602,395)

Other amounts include reclassification of construction-in-progress to appropriate accounts such as investment property, property, plant and equipment, and expense accounts.

The Group recognized impairment loss as the estimated recoverable amount of assets in certain business segments is less than the carrying amount.

13. Intangible Assets

Changes in intangible assets for the years ended December 31, 2018 and 2017 are summarized as follows:

(1) 2018

(In thousands of won)		Industrial property	Development costs	Others	Goodwill	Total
Beginning balance	₩	55,743,792	1,326,148	236,181,041	604,196,267	897,447,248
Acquisition cost		112,222,676	6,310,265	701,458,536	633,519,248	1,453,510,725
Accumulated depreciation		(56,478,884)	(4,984,117)	(465,277,495)	(29,322,981)	(556,063,477)
Acquisitions		856,690	-	11,151,622	-	12,008,312
Amortization		(9,133,123)	(448,789)	(81,497,527)	-	(91,079,439)
Disposals		(306,017)	-	(2,456,351)	-	(2,762,368)
Impairment losses		-	-	(234,159)	-	(234,159)
Other		13,997,451	-	40,503,299	-	54,500,750
Exchange rate fluctuation		(277,606)	6,678	(3,330,992)	(7,304)	(3,609,224)
Ending balance	₩	60,881,187	884,037	200,316,933	604,188,963	866,271,120
Acquisition cost		126,493,194	6,316,943	747,326,114	633,511,944	1,513,648,195
Accumulated depreciation		(65,612,007)	(5,432,906)	(547,009,181)	(29,322,981)	(647,377,075)

Other amounts include reclassification of long-term prepaid expenses to industrial property rights and of construction-in-progress to other intangible assets.

13. Intangible Assets, Continued

Changes in intangible assets for the years ended December 31, 2018 and 2017 are summarized as follows:, continued

(2) 2017

(In thousands of won)		Industrial property	Development costs	Others	Goodwill	Total
Beginning balance	₩	52,091,199	1,752,095	283,981,696	603,861,040	941,686,030
Acquisition cost		100,183,382	6,401,326	667,370,176	633,184,021	1,407,138,905
Accumulated depreciation		(48,092,183)	(4,649,231)	(383,388,480)	(29,322,981)	(465,452,875)
Acquisitions		390,186	-	3,739,290	-	4,129,476
Amortization		(8,386,701)	(334,886)	(81,889,016)	-	(90,610,603)
Disposals		(2,910,082)	-	(149,680)	-	(3,059,762)
Impairment losses		-	-	(5,719,043)	-	(5,719,043)
Other		14,788,668	-	38,004,548	-	52,793,216
Exchange rate fluctuation		(229,478)	(91,061)	(1,786,754)	335,227	(1,772,066)
Ending balance	₩	55,743,792	1,326,148	236,181,041	604,196,267	897,447,248
Acquisition cost		112,222,676	6,310,265	701,458,536	633,519,248	1,453,510,725
Accumulated depreciation		(56,478,884)	(4,984,117)	(465,277,495)	(29,322,981)	(556,063,477)

Other amounts include reclassification of long-term prepaid expenses to exclusive industrial property rights and of construction-in-progress to other intangible assets.

For the year ended December 31, 2018, the Group has recognized impairment loss since the recoverable amount of intangible assets of some divisions is expected to be lower than the carrying amount.

(3) Amortization expenses

Amortization expenses are classified as manufacturing cost and selling, general and administrative expenses, and the Group recognizes the manufacturing cost as cost of sales when the inventory is sold.

(4) Research and development expenses

Research and development expenses recognized as selling, general and administrative expenses for the years ended December 31, 2018 and 2017 are ₩ 603,952 million and ₩ 525,934 million, respectively.

13. Intangible Assets, Continued

(5) Impairment of CGU including goodwill

The Group performed impairment test on the goodwill allocated to electronic material business, and Novaled, a cash generating unit ("CGU") respectively.

The Group estimated recoverable amount of electronic material business and Novaled, based on its projections on 5 years' cash flow of each CGU, under assumption of terminal growth rate at 1% for both CGUs, and discount rate of 11.7% and 9.9% for electronic material business and Novaled, respectively. The Group did not recognize impairment losses as the estimated recoverable amount exceeded its carrying amount.

As of December 31, 2018, the Group has allocated ₩ 500,381 million of its goodwill to its electronic material business, and ₩ 103,808 million to Novaled.

14. Investment Property

Changes in investment property for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)	2018			2017		
	Land	**Buildings**	**Total**	**Land**	**Buildings**	**Total**
Beginning balance	₩ 146,201,787	3,712,991	149,914,778	145,628,515	55,461	145,683,976
Acquisition	-	-	-	106,759	117,711	224,470
Reclassification	-	-	-	-	3,725,000	3,725,000
Disposal	(4,115)	-	(4,115)	(78,372)	-	(78,372)
Depreciation	-	(185,649)	(185,649)	-	(185,181)	(185,181)
Exchange rate fluctuations	-	-	-	544,885	-	544,885
Ending balance	₩ 146,197,672	3,527,342	149,725,014	146,201,787	3,712,991	149,914,778

Investment property consists of land and buildings, leased to Samsung Electronics Co., Ltd. and etc.

15. Trade Payables and Other Liabilities

Trade payables and other liabilities as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018		2017	
		Current	**Non-current**	**Current**	**Non-current**
Trade payables	₩	638,586,622	-	461,279,987	-
Accounts payable		695,709,155	406,967	309,780,664	523,396
Accrued expenses		342,473,090	2,023,308	276,035,751	1,952,229
Other		468,306,187	288,882,389	438,822,198	178,643,379
Total	₩	2,145,075,054	291,312,664	1,485,918,600	181,119,004

Other liabilities include provisions, withholdings, guarantee deposits received, etc.

16. Borrowings

(1) Borrowings of the Group as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Short-term borrowings			
Current portion of debentures in Korean won	₩	-	199,813,649
Current portion of long-term borrowings in foreign currency		249,649,393	111,353,116
Disposals of trade receivable		1,068,876,667	519,546,534
Short-term borrowings in foreign currency		420,863,650	248,591,899
Sub total	₩	1,739,389,710	1,079,305,198
Long-term borrowings			
Debentures	₩	688,244,816	99,778,128
Long-term borrowings in foreign currency		826,037,185	245,525,223
Sub total		1,514,282,001	345,303,351
Total	₩	3,253,671,711	1,424,608,549

16. Borrowings, Continued

(2) Debentures issued by the Parent company as of December 31, 2018 and 2017 are as follows:

(In thousands of won)

Type	Classification	Date of maturity	Annual Interest rate (%)		2018	2017
Corporate Bonds	Unsecured	2018.09.14	1.96		-	200,000,000
		2020.09.14	2.20		100,000,000	100,000,000
		2021.09.10	2.20		370,000,000	-
		2023.09.11	2.41		220,000,000	-
Sub total				₩	690,000,000	300,000,000
Less discount on debentures					(1,755,184)	(408,223)
Less current portion of long-term borrowings					-	(199,813,649)
Total				₩	688,244,816	99,778,128

(3) Long-term borrowings as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)

Borrower	Description	Financial institution	Date of maturity	Annual interest rate (%)		2018	2017
SDIBS	Facility loan	Sumitomo Mitsui Banking Corp. Europe Limited	2021.04.30	EURIBOR 3M+0.78		67,795,480	67,800,250
SAPB	Facility loan	Bank of China	2018.04.10	LIBOR 3M+1.45		-	26,369,366
SDITB	Facility loan	Bank of Communication	2019.02.04	PBOC*0.95		-	17,100,373
NOVALED	Energy saving loan	Ostsachsische Sparkasse Dresden	2020.12.30	1.00		1,065,964	-
TSDI	Facility loan	UNITED OVERSEAS BANK	2020.09.17	LIBOR 3M+0.95		111,705,444	-
	Facility loan	MIZUHO BANK CHINA, LTD.	2020.12.17	LIBOR 3M+0.95		44,478,290	-
SDIHU	Facility loan	Unicredit Bank	2020.07.16	EURIBOR 3M+0.80		249,436,200	245,608,350
			2021.05.29	EURIBOR 6M+0.65		383,748,000	-
	Facility loan	ING	2020.11.18	EURIBOR 6M+0.65		217,457,200	-
Sub total						1,075,686,578	356,878,339
Less current portion of long-term borrowings						(249,649,393)	(111,353,116)
Total					₩	826,037,185	245,525,223

17. Provisions

Changes in provisions for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)

		Current			Non-current				
		Quality assurance	**Onerous contract**	**Others**	**Incentives**	**Quality assurance**	**Onerous contract**	**Others**	**Total**
Balance at Jan. 1, 2017	₩	127,169,818	40,940,002	12,912,538	34,377,180	9,298,107	39,586,698	1,152,012	265,436,355
Provisions made		28,841,291	29,589,407	695	9,160,318	4,000,275	-	7,707,930	79,299,916
Provisions used		(27,209,040)	(40,820,878)	(11,403,024)	(33,802,828)	(4,220,470)	(29,589,407)	-	(147,045,647)
Balance at Dec. 31,2017	₩	128,802,069	29,708,531	1,510,209	9,734,670	9,077,912	9,997,291	8,854,942	197,690,624
Balance at Jan. 1, 2018	₩	128,802,069	29,708,531	1,510,209	9,734,670	9,077,912	9,997,291	8,859,942	197,690,624
Provisions made		135,535,778	25,391,055	1,240,679	23,531,655	-	15,393,764	184,132	201,277,063
Provisions used		(114,871,842)	(44,230,829)	-	-	(251,570)	(25,391,055)	(8,712,691)	(193,457,987)
Balance at Dec. 31,2018	₩	149,466,005	10,868,757	2,750,888	33,266,325	8,826,342	-	331,383	205,509,700

The Group recognizes a warranty provision (quality assurance) for the estimated costs of future repairs and recalls as accrued expenses, based on past experience. The Group also recognizes estimated costs in case of its customers' product recall from its end-users.

The Group has long-term incentive plans for its executives based on three-year performance criteria and made a provision for the estimated incentive.

The Group recognized provision for estimated net loss from onerous contract, as unavoidable incremental cost regarding non-cancellable long-term contracts with customers are expected to exceed their economic benefit.

Other than provisions stated above, the Group recognized provision for litigations and restructuring expenses. As stated in Note 19 to the consolidation financial statements, details of provisions for litigations and restructuring are not disclosed as it may affect the result of pending litigations and further proceedings of restructuring process.

18. Employee Benefits

(1) Employee benefit liabilities as of December 31, 2018 and 2017 are summarized as follows:

1) Present value of defined obligations

(In thousands of won)		2018	2017
Defined Benefit Obligations:			
Beginning balance	₩	505,016,399	489,035,175
Current service cost		60,786,053	64,661,532
Interest cost		17,870,995	15,226,250
Obligations transferred from(to) related parties		(252,864)	7,665,739
Gross benefit payments		(16,228,491)	(27,542,064)
Actuarial loss (gain) arising from assumptions		21,061,106	(29,295,757)
Contribution to the defined contribution plan		(16,122,900)	(14,889,477)
Exchange rate fluctuations		26,012	155,001
Ending balance	₩	572,156,310	505,016,399
Plan Assets		(502,009,556)	(479,394,771)
Net defined benefit liability(asset)		70,146,754	25,621,628

2) Fair value of plan assets

(In thousands of won)		2018	2017
Beginning balance	₩	479,394,771	504,767,478
Contributions paid into plan		40,279,967	303,921
Obligations paid by the plan		(10,151,633)	(18,571,600)
Plan assets transferred from(to) related parties		(34,584)	(96,447)
Contribution to the defined contribution plan		(16,122,900)	(14,889,477)
Interest income		17,238,899	15,703,282
Actuarial gain (loss) arising from assumptions		(8,753,975)	(7,766,156)
Exchange rate fluctuations		159,011	(56,230)
Ending balance	₩	502,009,556	479,394,771

3) Other liabilities for employee benefits as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Liabilities for paid absence	₩	48,083,997	39,486,720
Long-term incentive provisions		32,397,700	9,025,100
Other long-term employee benefits		41,633,742	39,626,277
Total	₩	122,115,439	88,138,097

18. Employee Benefits, Continued

(2) Expenses for employee benefits for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Current service costs	₩	60,786,053	64,661,532
Interest cost		17,870,995	15,226,250
Interest income		(17,238,899)	(15,703,282)
Payment on defined contribution plans		3,274,971	1,810,247
Total	₩	64,693,120	65,994,747

(3) Fair value of plan assets as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Severance insurance bonds (*)	₩	501,726,826	479,108,786
National pension fund		282,730	285,985
Total	₩	502,009,556	479,394,771

(*) Plan assets include bank deposits, investment in government securities and corporate bond, etc.

(4) The Group determined the discount rate based on market returns of high quality corporate bonds consistent with currencies and estimated payment terms of defined benefit obligations as of the reporting date in order to calculate present value of the defined benefit obligations. Principal actuarial assumptions for the years ended December 31, 2018 and 2017 are summarized as follows:

	2018	2017
Expected rate of salary increase	4.85%	4.81%
Discount rate for defined benefit obligations	3.20%	3.70%

Assumptions regarding future mortality have been based on published statistics and mortality tables from Korea Insurance Development Institute. .

(5) Sensitivity analysis

Reasonably possible changes at the reporting date to one of the relevant actuarial assumptions as of December 31, 2018, holding other assumptions constant, would have affected the defined benefit obligation by the amounts shown below.

(In thousands of won)		Present value of Defined benefit obligations	
		If increased by 1%	If decreased by 1%
Expected rate of salary increase	₩	59,742,557	(52,258,766)
Discount rate		(51,425,008)	59,876,887

19. Commitment and Contingencies

(1) As of December 31, 2018, the Group has been provided a guarantee of ₩67,279 million by Seoul Guarantee Insurance Co., Ltd. in relation to a court deposit and licensing procedures.

(2) The Group is defending several claims in North America and Europe related to price fixing of CRT and lithium-ion batteries. The Group has estimated its potential loss, but the actual compensation may differ significantly from the Group's estimation. The Group does not disclose details of on-going litigations considering the disclosure may have effect to outcome of pending litigations.

(3) Other than cases described in (2) and (3) of this note to the consolidated financial statements, the Group is defendant of 51 pending litigations in local and foreign jurisdictions. The Group does not disclose details of the on-going litigations, as the disclosure may affect the result of the pending litigations. Effect of pending litigations on the Group's consolidated financial statements cannot be estimated reliably, as timing and amount of compensations is uncertain.

(4) The Group has following borrowing commitments as of December 31, 2018.

(In thousands of USD and hundred millions of won)

	Currency	Credit limit	Name of financial institution
Bank overdrafts	KRW	55	Woori and 1 other
General purpose loans	KRW	8,235	KEB Hana and 12 others
Trade financing(Local L/C)	KRW	513	Shinhan and 2 others
A/S, Usance	USD	77,900	Woori and 3 others
Loans for Import trade	USD	30,000	DBS
Guarantee payments for foreign currency	USD	160,000	Woori and 3 others
D/A, D/P, O/A	USD	1,460,000	Woori and 7 others
Secured loan of credit sales	KRW	1,400	Woori and 5 others
Total	KRW	10,203	
	USD	1,727,900	

(5) In accordance with technical license agreements, the Group recorded royalty expenses of ₩1,344 million and ₩10,627 million for the years ended December 31, 2018 and 2017, respectively.

(6) As of December 31, 2018, the Group provides a guarantee of ₩8,868 million for its employees' borrowings for house rental.

(7) In accordance with the Share Purchase Agreement between Hanwha Chemical Corporation, Hanwha Energy Corporation (together referred as "the Buyer") and the Group, dated November 26, 2014, if Hanwha General Chemical Corporation ("HGC") does not complete its public offerings within 6 years period beginning June 29, 2015, the Group and the Buyer owns put option and call option on the Group's 1,721,156 shares of HGC respectively. The exercise period of the options may be extended to 7 years, upon request of the Group. In case of the Group's decision to sell its HGC shares, the Buyer has pre-emptive right to purchase the Group's shares. The Group has sympathetic selling right when the Buyer decides to sell its HGC shares, while the Buyer has right to request the Group for sympathetic sale of the shares.

The Group did not measure the fair value of the options, as basis for fair value evaluation is unreliable and it may result in distortion of the fair value.

19. Commitment and Contingencies, Continued

(8) In accordance with the Share Purchase Agreement, dated October 30, 2015, between the Group and Lotte Chemical Corporation, each party own a put option and a call option underlying the Group's 1,000,000 shares of Lotte Advanced Materials Co., Ltd.. Detailed information of these options are as follows:

Type	**Owner**	**Exercisable Period**	**Exercise Price**
Call Option	Lotte Chemical Corporation	From April 29th, 2016 to April 29th, 2020	Stock purchasing price with additional 3% of interest per annum, calculated on daily basis
Put Option	Samsung SDI	Earlier of : (1) From April 29th, 2019 to April 29th, 2020 (2) From the day BOD of spin-off company approves merger with Lotte Chemical Corporation to the day the merger is completed.	Stock purchasing price with additional 2% of interest per annum, calculated on daily basis

The Group evaluated fair value of put and call options using binomial trees. As of December 31, 2018, carrying amount of put option (derivative assets) and call option (derivative liabilities) are ₩ 31,669 million and ₩ 17,243 million, respectively.

(9) The Group entered into 4 foreign exchange forwards contracts to hedge the currency risk of SAPB's repayment of long-term borrowings. Details of the Group's foreign exchange forwards are as follows:

(In CNY, USD)

Subsidiaries	Selling Currency	Selling Amount	Buying Currency	Buying Amount	Forward Rate
SAPB	CNY	138,300,000	USD	20,000,000	6.915
	CNY	517,680,000	USD	80,000,000	6.471
	CNY	130,000,000	USD	20,000,000	6.500
	CNY	195,300,000	USD	30,000,000	6.510

As of December 31, 2018, the net carrying amount of the foreign exchange forwards is ₩ 9,721 million, and the Group recognized gain and loss on valuation of derivatives amounting ₩ 1,312 million and ₩ 1,441 million, respectively. The Group also recognized loss from settlement of foreign exchange forward amounting ₩ 17,965 million

(9) The Group entered into commercial swap contracts to hedge the purchase price fluctuation of raw materials. Details of the Group's commercial swap contracts are as follows:

Expiry	Remaining Quantity	Contract Price
2019-01-31	100 ton	USD 13,000/ton
2019-06-30	3,000 ton	USD 13,750/ton
2020-08-31	2,500 ton	USD 12,800/ton
2020-08-31	2,500 ton	USD 12,800/ton
2019-06-30	2,580 ton	USD 6,800/ton

As of December 31, 2018, the net carrying amount of the commercial swap is ₩ 25,658 million, and the Group recognized effective portion of loss on valuation of derivatives amounting ₩ 19,439 million as other comprehensive income, net of tax.

20. Capital Stock and Capital Surplus

(1) Capital stock

Ordinary shares and preferred shares issued and outstanding as of December 31, 2018 and 2017 are summarized as follows:

1) 2018

(In shares)	Shares issued	Treasury shares	Shares outstanding
Ordinary shares	68,764,530	(3,331,391)	65,433,139
Preferred shares	1,617,896	(178,400)	1,439,496

2) 2017

(In shares)	Shares issued	Treasury shares	Shares outstanding
Ordinary shares	68,764,530	(3,331,391)	65,433,139
Preferred shares	1,617,896	(178,400)	1,439,496

(2) Capital surplus as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Additional paid-in-capital	₩	4,838,550,738	4,838,550,738
Other capital surpluses		199,386,046	204,147,401
Total	₩	5,037,936,784	5,042,698,139

(3) Dividends by the Parent Company for the reporting periods ending December 31, 2018 and 2017 are summarized as follows. Dividends for the year ended December 31, 2018 will be presented to the general shareholders' meeting of the Parent Company.

(In thousands of won)		2018	2017
Ordinary shares (2018: ₩1,000 per share, 2017: ₩1,000 per share)	₩	65,433,139	65,433,139
Preferred shares (2018: ₩1,050 per share, 2017: ₩1,050 per share)		1,511,471	1,511,471
	₩	66,944,610	66,944,610

21. Other capital

Other capital comprise treasury shares of the Parent Company, which were acquired to raise value of its shareholders. Number of treasury shares and its carrying amount as of December 31, 2018 and 2017 are as follows:

(In thousands of won)	2018			2017		
	Ordinary shares	Preferred shares	Total	Ordinary shares	Preferred shares	Total
Number of shares	3,331,391	178,400	3,509,791	3,331,391	178,400	3,509,791
Carrying amount	₩ 336,813,481	8,318,103	345,131,584	336,813,481	8,318,103	345,131,584

22. OCI accumulated in reserves

OCI accumulated in reserves, net of tax, as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Available-for-sale financial assets – net change in fair value	₩	-	476,105,659
Equity instruments at FVOCI – net change in fair value		134,422,435	-
Cash flow hedges – effective portion of changes in fair value		(19,439,526)	-
Unrealized gain on equity method investments		598,594,263	587,810,606
Unrealized loss on equity method investments		(288,737,798)	(272,368,257)
Loss on translation of foreign operations		(151,370,959)	(189,112,233)
Loss on translation of foreign operations – Held for sale		(1,478,755)	-
Total	₩	271,989,660	602,435,775

23. Retained earnings

Retained earnings as of December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Legal reserve	₩	152,012,652	144,729,813
Discretionary reserve		4,578,728,000	4,536,828,000
Unappropriated retained earnings		1,881,775,102	919,029,407
Total	₩	6,612,515,754	5,600,587,220

24. Selling, General, and Administrative Expenses

Details of selling, general and administrative expenses for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Salaries and wages	₩	238,118,363	135,494,580
Severance and retirement benefits		12,704,728	14,331,298
Employee fringe benefits		69,725,845	70,197,888
Depreciation		92,089,503	87,800,316
Research and development expenses		603,952,111	525,933,696
Selling and distribution cost		71,635,677	59,645,552
Fees and commissions		91,313,845	70,767,792
Bad debt expenses		(7,670,218)	9,580,406
Others		153,243,466	75,198,806
Total	₩	1,325,113,320	1,048,950,334

25. The Nature of Expenses

The nature of expenses for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Salaries and wages	₩	977,764,132	759,356,050
Severance and retirement benefits		64,182,933	65,489,044
Employee benefits		297,369,417	255,012,918
Depreciation		491,160,544	369,272,266
Amortization		91,079,439	90,610,603
Total	₩	1,921,556,465	1,539,740,881

26. Other Income and Other Expenses

(1) Other income for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Dividends income	₩	25,532,902	7,792,823
Commission income		-	10,751
Rental income		-	2,187
Reversal of other bad debt expenses		20,590	97,836
Gain on sale of available-for-sale assets		2,409,619	1,801,570
Gain on sale of property, plant and equipment		1,046,035	3,693,894
Gain on sale of intangible assets		155,930	18,596,376
Gain on sale of investment property		79,295	226,011
Gain on sale of non-current assets held-for-sale		-	47,605,322
Gain on disposal of trade receivables		-	75
Miscellaneous income		100,267,946	116,399,802
Total	₩	129,512,317	196,226,647

(2) Other expenses for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Other bad debt expenses	₩	-	31,934
Loss on sale of available-for-sale assets		-	152
Loss on impairment of available-for-sale assets		-	1,666,879
Loss on disposal of subsidiaries		21,112,944	4,737,900
Donations		3,170,710	2,683,073
Loss on sale of property, plant and equipment		52,142,372	29,678,647
Loss on impairment of property, plant and equipment		18,474,276	36,209,434
Loss on sale of intangible assets		379,703	2,970,481
Loss on impairment of intangible assets		234,159	5,719,043
Loss on sale of non-current assets held-for-sale		11,329,145	-
Legal expenses and other miscellaneous expenses		86,627,356	99,325,604
Total	₩	193,470,665	183,023,147

27. Financial Income and Financial Cost

Finance income and costs for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Financial income			
Interest income	₩	18,136,500	17,845,715
- Bank deposit		14,450,578	13,331,485
- Other		3,685,922	4,514,230
Gain on foreign currency transaction		196,700,664	150,241,321
Gain on foreign currency translation		20,529,087	78,985,936
Gain on valuation of derivatives		21,874,134	1,677,111
Gaion on transaction of derivatives		1,311,824	-
Gain on valuation of financial assets at fair value through profit or loss		123,202,488	1,262,000
Subtotal	₩	381,754,697	250,012,083
Financial expense			
Interest expense	₩	51,759,499	22,777,478
- Borrowing		39,597,670	12,127,758
- Debentures		9,475,129	8,922,905
- Other		2,686,700	1,726,815
Loss on foreign currency transactions		202,525,820	170,380,494
Loss on foreign currency translation		59,190,930	43,674,988
Loss on valuation of derivatives		5,086,462	14,617,304
Loss on transaction of derivatives		17,965,411	-
Loss on valuation of financial assets at fair value through profit or loss		2,100,493	-
Guarantee expenses		86,526	-
Subtotal	₩	338,715,141	251,450,264
Net financial expense	₩	(43,039,556)	1,438,181

28. Income Tax Expense

(1) Income tax expense for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Current income taxes	₩	130,789,876	63,449,721
Deferred income taxes from changes in temporary differences		80,693,772	216,925,211
Deferred income taxes from changes in unused tax losses		33,242,216	(33,242,216)
Deferred income taxes from changes in tax credit carry forward		46,754,955	(66,034,805)
Deferred income taxes recognized directly in equity		-	(38,531)
Others		(296,366)	(188,364)
Income tax expense	₩	291,184,453	180,871,016

(2) Deferred tax assets and liabilities recognized at stockholders' equity as of December 31, 2018 and 2017 are summarized as follows:

1) 2018

(In thousands of won)		Before tax	Deferred tax assets (liabilities)	After tax
Capital surplus of equity-accounted investees	₩	23,237,831	8,939,396	32,177,227
Actuarial gain (losses) from defined benefit plan		(132,272,040)	32,009,834	(100,262,206)
Change in equity of equity-accounted investees		390,656,085	(106,843,498)	283,812,587
Cash flow hedges – effective portion of changes in fair value		(25,658,004)	6,218,478	(19,439,526)
Equity instruments at FVOCI – net change in fair value		177,338,305	(42,915,870)	134,422,435
Total	₩	433,302,177	(102,591,660)	330,710,517

2) 2017

(In thousands of won)		Before tax	Deferred tax assets (liabilities)	After tax
Capital surplus of equity-accounted investees	₩	23,237,831	10,545,896	33,783,727
Actuarial gain (losses) from defined benefit plan		(101,780,848)	24,737,749	(77,043,099)
Change in equity of equity-accounted investees		329,928,289	(99,938,409)	229,989,880
Gain on valuation of available-for-sale securities		625,780,286	(149,674,627)	476,105,659
Total	₩	877,165,558	(214,329,391)	662,836,167

28. Income Tax Expense, Continued

(3) Reconciliation of effective tax rate for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018	2017
Profit (loss) before income tax	₩	1,036,233,637	824,064,879
Income tax using the Group's statutory tax rate		250,768,540	199,423,701
Adjustments			
Foreign withholding tax		11,385,776	(2,709,605)
Permanent differences		2,376,476	(3,428,991)
Unrecognized temporary differences		88,710,555	57,615,675
Tax credits		(59,523,177)	(73,688,531)
Difference in tax rate		(456,807)	3,612,303
Consolidation adjustments, and others		(2,076,910)	46,464
Income tax expense (income)	₩	291,184,453	180,871,016
Average effective tax rate		28.1%	21.9%

(4) As of December 31, 2018, the tax effects of temporary differences were calculated by using expected tax rate for the year when the temporary differences are expected to be reversed. Applied tax rate is 24.2% for the realized portion after year of 2018.

(5) Change in deferred tax assets (liabilities) for the years ended December 31, 2018 and 2017 are summarized as follows:

(In thousands of won)		2018			2017		
		Beginning balance	Changes	Ending balance	Beginning balance	Changes	Ending balance
Tangible/Intangible assets	₩	123,079,786	(35,398,132)	87,681,654	102,503,469	20,576,317	123,079,786
Investment in subsidiaries and associates		(1,169,588,984)	(67,860,641)	(1,237,449,625)	(1,004,491,951)	(165,097,033)	(1,169,588,984)
Inventories		11,676,113	(2,295,831)	9,380,282	15,346,761	(3,670,648)	11,676,113
Accrued expenses		137,469,021	(37,975,744)	99,493,277	251,889,536	(114,420,515)	137,469,022
Available-for-sale financial assets		(136,265,640)	(31,614,317)	(167,879,957)	(135,631,616)	(634,024)	(136,265,640)
Others		24,478,222	(31,986,519)	(7,508,297)	13,729,693	10,748,528	24,478,221
Sub total	₩	(1,009,151,482)	(207,131,184)	(1,216,282,666)	(756,654,108)	(252,497,374)	(1,009,151,482)
Deferred tax added to capital		(214,329,392)	111,737,733	(102,591,659)	(188,314,973)	(26,014,418)	(214,329,391)
Loss carry forwards		33,242,216	(33,242,216)	-	-	33,242,216	33,242,216
Tax credit		200,920,192	(46,754,955)	154,165,237	134,885,387	66,034,805	200,920,192
Temporary differences of subsidiaries		21,486,244	16,034,919	37,521,163	(1,930,186)	23,416,430	21,486,244
Total	₩			(1,127,187,925)			(967,832,221)

(6) The Group did not recognize deferred tax liabilities for temporary difference of ₩ 147,572 million and deferred tax liabilities of ₩ 35,712 million, which are related to investment in subsidiaries, as the Group has control over the reversal of the temporary differences and it is probable that these temporary differences will not reverse in the foreseeable future.

29. Earning per Share

(1) Basic earnings per share

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

(i) Ordinary Shares

(In thousands of won, except earnings per share)		2018	2017
Profit (loss) attributable to the owners of the Company	₩	701,166,337	657,236,341
Profit (loss) attributable to ordinary shares		686,002,650	643,017,943
Weighted average number of ordinary shares (basic)		65,433,139	65,456,683
Basic earnings per share (won)		10,484	9,824

(ii) Preferred Shares

(In thousands of won, except earnings per share)		2018	2017
Profit (loss) attributable to the owners of the Company	₩	701,166,337	657,236,341
Profit (loss) attributable to preferred shares		15,163,687	14,218,398
Weighted average number of preferred shares (basic)		1,439,496	1,440,054
Basic earnings per share (won)		10,534	9,874

2) Weighted average number of shares for the years ended December 31, 2018 and 2017 are calculated as follows:

(i) Ordinary Shares

(In shares)	2018	2017
Issued ordinary shares at January 1	68,764,530	68,764,530
Treasury stock	(3,331,391)	(3,307,847)
Weighted-average number of common shares outstanding (basic)	65,433,139	65,456,683

(ii) Preferred Shares

(In shares)	2018	2017
Issued preferred shares at January 1	1,617,896	1,617,896
Treasury stock	(178,400)	(177,842)
Weighted-average number of common shares outstanding (basic)	1,439,496	1,440,054

The preferred shares are not entitled for priority rights other than additional dividend of 1% per annum, compared to ordinary shares, the Group considers the preferred shares as ordinary shares with different dividend ratio.

(2) Diluted earnings per share

Diluted earnings per share are same as basic earnings per share as there are no diluted effects for the years ended December 31, 2018 and 2017.

30. Related Parties

(1) List of the Group's related parties are as follows:

Associates	Samsung Display Co., Ltd. ("SDC") and subsidiaries
	Samsung Economic Research Institute ("SERI")
	SD FLEX CO., LTD. ("SDFLEX")
	Intellectual Keystone Technology LLC ("IKT")
	Sungrow-Samsung SDI Energy Storage Power Supply Co., Ltd. ("SSEP")
Conglomerate entities	Samsung Electronics Co., Ltd.("SEC"), Samsung C&T Corporation, and etc.

(2) Significant transactions with related parties for the years ended December 31, 2018 and 2017 are summarized as follows:

1) 2018

(In thousands of won)		Revenues	Disposal of property plant and equipment	Other Income	Inventory purchase	Purchase of property plant and equipment	Other expenses
Associates							
SDC	₩	667,150,217	-	35,568,078	642,345	-	4,316,651
SERI		-	-	-	-	-	6,506,487
SD FLEX CO., LTD.		137,232	-	871,461	7,405,081	-	47,323
SSEP		57,768,113	-	-	-	-	-
Conglomerate entities							
SEC		1,544,697,637	452,242	9,499,527	88,737	7,457,242	40,209,353
Others		23,940,419	-	14,665,388	87,888,094	417,704,240	226,814,632
Total	₩	2,293,693,618	452,242	60,604,454	96,024,257	425,161,482	277,894,446

2) 2017

(In thousands of won)		Revenues	Other Income	Inventory purchase	Purchase of property plant and equipment	Other expenses
Associates						
SDC	₩	670,009,459	39,052,120	328,343	1,599,800	4,545,329
SERI		-	-	-	-	4,476,966
SD FLEX CO., LTD.		137,232	867,541	9,164,312	-	61,503
SSEP		18,655,157	101,256	-	-	-
Conglomerate entities						
SEC		1,265,429,327	6,905,243	1,223,382	6,921,050	37,582,489
Others		12,770,258	11,425,520	680,697	90,059,776	173,958,164
Total	₩	1,967,001,433	58,351,680	11,396,734	98,580,626	220,624,451

30. Related Parties, Continued

(3) Details of significant account balances with related parties as of December 31, 2018 and 2017 are summarized as follows:

1) 2018

(In thousands of won)		Account receivable	Other receivable, etc	Account payable	Other payable, etc
Associates					
SDC	₩	87,788,869	335	16,869	16,015
SERI		-	-	-	1,422,625
SDFLEX		-	104,774	599,887	3,814
SSEP		31,418,073	-	-	-
Conglomerate entities					
SEC		108,485,951	24,301,063	-	157,472,602
Others		3,733,679	55,200,077	225,030	307,748,305
Total	₩	231,426,572	79,606,249	841,786	466,663,361

2) 2017

(In thousands of won)		Account receivable	Other receivable, etc	Account payable	Other payable, etc.
Associates					
SDC	₩	63,239,847	42,004	-	910,830
SERI		-	-	-	759,489
SDFLEX		-	107,319	2,210,243	3,443
SSEP		12,540,099	-	-	-
Conglomerate entities					
SEC		129,643,904	7,320,156	135,469	90,076,843
Others		1,693,493	27,471,699	199,279	41,639,744
Total	₩	207,117,343	34,941,178	2,544,991	133,390,349

(4) Personnel compensation to registered officers (the "key management") who have the authority and responsibility in planning, directing, and control of the Group are ₩5,268 million and ₩3,245 million, for the years ended December 31, 2018 and 2017, respectively.

As of December 31, 2018 and 2017, liabilities related to long-term employee benefits for key management are ₩4,055 million and ₩1,670 million, respectively. In addition, liabilities related to retirement benefits for key management as of December 31, 2018 and 2017 are ₩7,652 million and ₩6,128 million, respectively.

31. Non-controlling Interest

Non-controlling interests as of and for the years ended December 31, 2018 and 2017 are summarized as follows:

(1) 2018

(In millions of won)

		NOVALED	America (SDIA and 2 others)	China (TSDI and 7 others)	Others	Total
Current assets	₩	95,052	73,070	1,222,727	34,631	1,425,480
Non-current assets		301,636	27,286	1,364,752	59,495	1,753,169
Current liabilities		(21,321)	52,701	982,802	1,850	1,016,032
Non-current liabilities		(15,311)	8,562	374,400	-	367,651
Net assets		(360,057)	39,093	1,230,277	92,276	1,001,589
Carrying amount of non-controlling interest		118,296	3,476	168,173	1,251	291,196
Sales		(135,765)	94,606	1,782,263	-	1,741,104
Net income (loss)		57,178	(2,976)	38,781	30,512	123,495
Total comprehensive income		56,588	(885)	49,003	20,079	124,785
Net income (loss) distributed to non-controlling interest		28,534	(248)	(12,647)	28,244	43,883
Cash flow from operating activities		32,089	(24,008)	73,813	92,300	174,194
Cash flow from investing activities		(29,867)	(1,708)	(258,191)	(15,802)	(305,568)
Cash flow from financing activities before payment of dividends to non-controlling interest		3,192	18,546	420,077	(2,485)	439,330
Dividends attributed to non-controlling interest		-	-	(4,488)	-	(4,488)
Exchange rate changes		379	286	(7,443)	3,245	(3,533)
Changes in cash and cash equivalents	₩	5,793	(6,884)	223,768	77,258	299,935

The condensed information on cash flows is translated to Korean Won based on the cash flow of subsidiaries before consolidation adjustments.

31. Non-controlling Interest, Continued

Non-controlling interests as of and for the years ended December 31, 2018 and 2017 are summarized as follows: Continued

(2) 2017

(In millions of won)

		NOVALED	America (SDIA and 2 others)	China (TSDI and 7 others)	Others	Total
Current assets	₩	68,766	47,517	989,790	18,706	1,124,779
Non-current assets		191,401	24,225	826,299	58,297	1,100,222
Current liabilities		13,430	23,458	840,873	1,480	879,241
Non-current liabilities		19,916	8,004	53,051	230	81,201
Net assets		226,821	40,280	922,164	75,292	1,264,557
Carrying amount of non-controlling interests		54,704	3,552	132,167	4,275	194,698
Sales		107,522	51,718	1,302,732	-	1,461,972
Net income (loss)		39,673	(10,114)	(29,049)	635	1,145
Total comprehensive income		38,573	(16,330)	(84,897)	5,478	(57,176)
Net income (loss) distributed to non-controlling interests		19,854	(906)	(24,182)	(8,808)	(14,042)
Cash flow from operating activities		(20,979)	(9,106)	48,016	(2,546)	15,385
Cash flow from investing activities		(15,587)	5,810	(234,471)	(5,225)	(249,473)
Cash flow from financing activities before payment of dividends to non-controlling interest		6,889	(676)	53,899	9,979	67,851
Dividends attributed to non-controlling interest		-	-	(2,240)	-	(2,240)
Exchange rate changes		289	(1,527)	(19,971)	(1,642)	(22,851)
Changes in cash and cash equivalents	₩	(29,388)	(5,499)	(154,767)	566	(189,088)

The condensed information on cash flows is translated to Korean Won based on the cash flow of subsidiaries before consolidation adjustments.

32. Non-current Assets Held for Sale

The Group reclassified SSEB's assets and liabilities as a disposal group of assets and liabilities as the group agreed to sell their 30% of ownership in SSEB. Details of assets and liabilities reclassified as held-for-sale are as follows:

(In thousands of won)		**2018**
Assets		
Cash and cash equivalents	₩	10,428,202
Trade and other receivables		24,133,153
Other current assets		394,874
Other non-current assets		2,898,057
Plant, property, and equipment		10,285,746
Inventories		3,530,006
Other investments		5,158,759
Total asset	₩	56,828,797
Liabilities		
Trade and other payables	₩	1,077,166
Other current liabilities		12,212
Provision		539,069
Total liabilities	₩	1,628,447

33. Statement of Cash Flows

Adjustment and changes in assets and liabilities for cash flows from operating activities for the years ended December 31, 2018 and 2017 are summarized as follows:

(1) Adjustment for cash flows from operating activities

(In thousands of won)		2018	2017
Severance & retirement benefits	₩	61,497,014	64,184,501
Loss on valuation of inventories		16,616,851	27,242,204
Depreciation		491,160,544	369,272,266
Amortization		91,079,439	90,610,603
Bad debt expense		(7,615,518)	9,580,406
Reversal of other bad debt expense		-	(65,903)
Fees and Commissions		-	604,858
Share of profit of equity accounted investees		(342,181,824)	(695,404,774)
Loss on disposal of subsidiary		21,112,944	4,737,900
Gain on sale of available-for-sale financial assets		-	(1,801,570)
Impairment losses on available-for-sale financial assets		-	1,666,879
Gain on sale of investment property		(79,295)	(226,011)
Loss (gain) on foreign currency translations, net		38,661,842	(35,310,948)
Loss (gain) on valuation of derivatives, net		(134,085)	12,940,193
Loss (gain) on sale of property, plant and equipment, net		51,096,335	25,984,753
Impairment losses on property, plant and equipment		18,474,276	36,209,434
Loss (gain) on sale of intangible assets		223,774	(15,625,895)
Impairment losses on intangible assets		234,159	5,719,043
Gain on valuation of financial assets designated at fair value through profit or loss		-	(1,262,000)
Gain on sale of non-current assets held-for-sale		-	(47,605,322)
Equity instruments at FVTPL – net change in fair value		(121,101,995)	-
Loss on sale of equity instruments at FVTPL		8,919,526	-
Loss (gain) on disposal of trade receivables, net		-	77
Miscellaneous income		(57,344)	(982,550)
Miscellaneous expense		2,538,897	72,961
Income tax expense		291,184,452	180,871,016
Interest expense		51,759,500	22,777,478
Interest income		(18,136,500)	(17,845,715)
Dividend income		(25,532,902)	(7,792,823)
Total	₩	629,720,090	28,551,061

33. Statement of Cash Flows, Continued

(2) Changes in assets and liabilities for Cash Flows from Operating Activities

(In thousands of won)		2018	2017
Changes in assets and liabilities:			
Trade receivables	₩	(616,091,037)	(301,692,626)
Other receivables		180,430,236	88,683,399
Other current assets		(40,901,464)	648,537
Inventories		(504,481,018)	(116,306,199)
Non-current other receivables		(169,736,092)	(1,064,168)
Non-current other assets		53,793,479	(14,244,815)
Trade payables		147,498,086	177,184,801
Other payables		(44,645,746)	(624,708,911)
Advance received		(61,320,113)	(29,022,453)
Unearned revenue		(16,172,695)	(12,771,843)
Other current liabilities		(20,170,976)	-
Other non-current payables		171,430,067	(4,478,151)
Settlement of derivative instruments		(16,071,998)	-
Payment of retirement and employee benefits		(28,358,889)	(34,585,298)
Plan assets		(18,293,739)	33,009,015
Long-term unearned revenue		3,890,078	(1,920,780)
Total	₩	(979,201,821)	(841,269,492)

(3) Significant non-cash transactions for the years ended December 31, 2018 and 2017 are as follows:

(In thousands of won)		2018	2017
Increase (decrease) of payables related to acquisition of plant, property, and equipment	₩	149,699,544	68,222,333
Prepayment to acquire non-controlling interest		41,082,222	-

33. Statement of Cash Flows, Continued

(4) Reconciliation of movements of liabilities to cash flows arising from financing activities are as follows:

① 2018

(In thousands of won)

				Non-cash changes			
		2017	Cash flow from financing activities	Interest expense	Reclassify current portion	Changes in foreign exchange rates	2018
Current portion of long-term liabilities	₩	199,813,649	(200,000,000)	186,351	-	-	-
Short-term borrowings		879,491,549	687,034,682	-	249,649,394	(76,785,915)	1,739,389,710
Debentures		99,778,128	588,240,960	225,728	-	-	688,244,816
Long-term borrowings		245,525,223	743,426,932	-	(249,649,394)	86,734,424	826,037,185
Total	₩	1,424,608,549	1,818,702,574	412,079	-	9,948,509	3,253,671,711

② 2017

				Non-cash changes			
		2016	Cash flow from financing activities	Interest expense	Reclassify current portion	Changes in foreign exchange rates	2017
Current portion of long-term liabilities	₩	199,948,098	(200,000,000)	51,902	199,813,649	-	199,813,649
Short-term borrowings		184,012,722	613,328,588	-	111,353,116	(29,202,877)	879,491,549
Debentures		299,252,552	-	339,225	(199,813,649)	-	99,778,128
Long-term borrowings		267,333,070	100,431,881	-	(111,353,116)	(10,886,612)	245,525,223
Total	₩	950,546,442	513,760,469	391,127	-	(40,089,489)	1,424,608,549