

Hanwha Corporation

**Separate Financial Statements
December 31, 2019**

Hanwha Corporation
Index
December 31, 2019 and 2018

	Page(s)
Independent Auditor's Report	1 - 4
Separate Financial Statements	
Separate Statements of Financial Position	5
Separate Statements of Comprehensive Income	6
Separate Statements of Changes in Equity	7
Separate Statements of Cash Flows	8
Notes to the Separate Financial Statements.....	9 - 128



Independent Auditor's Report

(English Translation of a Report Originally Issued in Korean)

To the Board of Directors and Shareholders of
Hanwha Corporation

Opinion

We have audited the accompanying separate financial statements of Hanwha Corporation (the Company), which comprise the separate statement of financial position as at December 31, 2019, and the separate statement of comprehensive income, separate statement of changes in equity and separate statement of cash flows for the year then ended, and notes to the separate financial statements, including a summary of significant accounting policies.

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

Basis for Opinion

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

Key Audit Matters

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

Impairment Test of Investment in Hanwha Life Insurance Co., Ltd.

Why it is determined to be a key matter

The size of investment in Hanwha Life Insurance Co., Ltd. amounting to ₩ 913,983 million as at December 31, 2019 is significant and total market price of investment in Hanwha Life Insurance Co., Ltd. is less than the carrying amounts of net assets. Therefore, the Company determined that there are indications of impairment and conducted an impairment test in accordance with Korean IFRS 1036. The contract value assessment and adjusted net asset valuation included in the assessment of the 'value in use' of investment in Hanwha Life Insurance Co., Ltd. involve management's judgements about the future cash flows, actuarial assumptions and economic assumptions.

We decided to test the impairment of investment in Hanwha Life Insurance Co., Ltd. as a key audit matter, taking into account uncertainties in these judgements and estimates made by management and significant impact on the separate financial statements.

How our audit addressed the key audit matter

We performed following audit procedures to address the key audit matter.

- We evaluated the adequacy of valuation model used by management to estimate value-in-use.
- We understood and evaluated procedures and controls related to contract value assessment and adjusted net asset valuation performed by management.
- We compared Annualized Premium Equivalent (APE) and reserves used in the contract value assessment with the underlying data.
- We evaluated the reasonableness of the major assumptions used in the contract value assessment and adjusted net asset valuation.
- We compared the current year actual results with the prior year forecast to consider whether any forecasts included assumptions that, with hindsight, had been optimistic.
- We compared the discount rates that are independently calculated using an observable information with the discount rates applied by management.
- We evaluated the results of sensitivity analysis on the discount rates, payment rate of premium insurance, surrender and lapse rate and interest rate performed by management to assess the impact of changes in key assumptions on the impairment tests.
- We tested mathematical accuracy of calculation used in the valuation and evaluated appropriateness of value-in-use through sensitivity analysis.

Other Matters

The separate financial statements of the Company for the year ended December 31, 2018, were audited by Deloitte Anjin LLC who expressed an unqualified opinion on those statements on March 20, 2019.

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

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

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

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

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

Auditor's Responsibilities for the Audit of the Financial Statements

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

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

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.

- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Company to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

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

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

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

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

Seoul, Korea
March 17, 2020

This report is effective as of March 17, 2020, the audit report date. Certain subsequent events or circumstances, which may occur between the audit report date and the time of reading this report, could have a material impact on the accompanying separate financial statements and notes thereto. Accordingly, the readers of the audit report should understand that there is a possibility that the above audit report may have to be revised to reflect the impact of such subsequent events or circumstances, if any.

Hanwha Corporation
Separate Statements of Financial Position
December 31, 2019 and 2018

(in Korean won)	Notes	2019	2018
Assets			
Current assets			
Cash and cash equivalents	6,737,38,40	₩ 322,520,991,298	₩ 355,313,528,972
Trade and other receivables	7,824,36,40	582,099,344,137	698,527,641,457
Other financial assets	5,7,10,11,36,40	60,872,187,446	43,990,595,300
Other current assets	12,24	460,549,966,669	251,384,015,953
Inventories	13	764,008,204,421	784,627,907,130
Assets held for sale		-	45,603,508,001
		<u>2,190,050,693,971</u>	<u>2,179,447,196,813</u>
Non-current assets			
Trade and other receivables	7,8,36,40	18,850,513,845	16,302,352,671
Financial assets at fair value through profit or loss	7,9,40	16,663,391,126	15,245,595,744
Financial assets at fair value through other comprehensive income	7,9,40	78,859,360	78,859,360
Other financial assets	5,7,10,11,36,40	30,724,693,251	36,738,843,773
Investments in subsidiaries and associates	14,36,37	4,384,437,993,053	4,363,062,012,319
Investment property	15	23,211,630,226	20,162,796,933
Property, plant and equipment	16,37	1,151,086,408,390	1,074,373,048,660
Intangible assets	17	62,808,140,504	69,354,660,048
Right-of-use assets	41	51,044,369,317	-
Other non-current assets	12	2,338,352,693	3,511,511,001
		<u>5,741,244,351,765</u>	<u>5,598,829,680,509</u>
Total assets		<u>₩ 7,931,295,045,736</u>	<u>₩ 7,778,276,877,322</u>
Liabilities			
Current liabilities			
Trade and other payables	7,18,36,40	₩ 447,451,420,157	₩ 584,106,730,599
Borrowings and debentures	7,19,37,40	1,216,296,375,686	1,119,852,340,558
Other financial liabilities	7,11,20,40,41	120,723,367,633	63,660,702,401
Other current liabilities	21,24	1,082,677,191,590	958,890,444,631
Provisions	23	19,790,926,705	7,779,749,889
Current tax liabilities	34	18,844,028,165	21,905,907,806
Liabilities in disposal groups held for sale		-	6,989,493,793
		<u>2,905,783,309,936</u>	<u>2,763,185,369,677</u>
Non-current liabilities			
Trade and other payables	7,18,36,40	5,317,516,012	5,589,071,004
Borrowings and debentures	7,19,37,40	1,020,658,566,132	1,075,432,295,217
Other financial liabilities	7,11,20,36,37,40,41	40,652,576,364	48,273,034,746
Net defined benefit liabilities	22	311,638,905,000	276,784,491,204
Provisions	23	56,264,966,424	38,648,384,647
Deferred tax liabilities	34	167,030,920,907	177,419,001,513
		<u>1,601,563,450,839</u>	<u>1,622,146,278,331</u>
Total liabilities		<u>4,507,346,760,775</u>	<u>4,385,331,648,008</u>
Equity			
Share capital	25	489,550,145,000	489,550,145,000
Capital surplus	25	583,642,691,204	583,642,691,204
Capital adjustments	26	(20,751,089,414)	(20,751,089,414)
Retained earnings	28	2,371,506,538,171	2,340,503,482,524
Total equity		<u>3,423,948,284,961</u>	<u>3,392,945,229,314</u>
Total liabilities and equity		<u>₩ 7,931,295,045,736</u>	<u>₩ 7,778,276,877,322</u>

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

Hanwha Corporation
Separate Statements of Comprehensive Income
Years Ended December 31, 2019 and 2018

<i>(in Korean won)</i>	Notes	2019	2018
Revenue	4,24,29,36	₩ 4,433,163,050,685	₩ 5,224,247,718,824
Cost of sales	24,29,31,36	<u>3,936,392,567,822</u>	<u>4,600,976,818,326</u>
Gross profit		496,770,482,863	623,270,900,498
Selling and administrative expenses	30,31	<u>307,821,699,361</u>	<u>323,388,506,778</u>
Operating profit		188,948,783,502	299,882,393,720
Other income	7,32,36	154,899,211,567	284,451,429,086
Other expenses	7,32,36	189,417,556,376	220,216,862,790
Finance income	7,33	36,345,916,517	55,783,137,961
Finance costs	7,33	<u>72,164,844,385</u>	<u>78,642,284,373</u>
Profit before income tax		118,611,510,825	341,257,813,604
Income tax expense	34	<u>18,341,657,002</u>	<u>56,736,781,642</u>
Profit for the year		<u>₩ 100,269,853,823</u>	<u>₩ 284,521,031,962</u>
Other comprehensive loss			
<i>Items that will not be reclassified to profit or loss</i>			
Remeasurements of net defined benefit liability		<u>(7,181,373,176)</u>	<u>(13,929,366,565)</u>
Other comprehensive loss for the year, net of tax		<u>(7,181,373,176)</u>	<u>(13,929,366,565)</u>
Total comprehensive income for the year		<u>₩ 93,088,480,647</u>	<u>₩ 270,591,665,397</u>
Earnings per share			
Basic earnings per ordinary share	35	₩ 1,199	₩ 3,898
Basic earnings per preferred share	35	1,249	3,948

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

Hanwha Corporation
Separate Statements of Changes in Equity
Years Ended December 31, 2019 and 2018

(in Korean won)

	Share capital	Capital surplus	Capital adjustments	Accumulated other comprehensive income (loss)	Retained Earnings	Total
Balance at January 1, 2018	₩ 489,550,145,000	₩ 600,706,089,476	₩ (20,751,089,414)	₩ (580,898,660)	₩ 2,145,459,059,611	₩ 3,214,383,306,013
changes in accounting policies	-	-	-	580,898,660	(19,271,548,384)	(18,690,649,724)
Dividends paid	-	-	-	-	(56,275,694,100)	(56,275,694,100)
Profit for the year	-	-	-	-	284,521,031,962	284,521,031,962
Remeasurements of net defined benefit liability	-	-	-	-	(13,929,366,565)	(13,929,366,565)
Transfer of business	-	(17,063,398,272)	-	-	-	(17,063,398,272)
Balance at December 31, 2018	<u>₩ 489,550,145,000</u>	<u>₩ 583,642,691,204</u>	<u>₩ (20,751,089,414)</u>	<u>₩ -</u>	<u>₩ 2,340,503,482,524</u>	<u>₩ 3,392,945,229,314</u>
Balance at January 1, 2019	₩ 489,550,145,000	₩ 583,642,691,204	₩ (20,751,089,414)	₩ -	₩ 2,340,503,482,524	₩ 3,392,945,229,314
Dividends paid	-	-	-	-	(62,085,425,000)	(62,085,425,000)
Profit for the year	-	-	-	-	100,269,853,823	100,269,853,823
Remeasurements of net defined benefit liability	-	-	-	-	(7,181,373,176)	(7,181,373,176)
Balance at December 31, 2019	<u>₩ 489,550,145,000</u>	<u>₩ 583,642,691,204</u>	<u>₩ (20,751,089,414)</u>	<u>₩ -</u>	<u>₩ 2,371,506,538,171</u>	<u>₩ 3,423,948,284,961</u>

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

Hanwha Corporation
Separate Statements of Cash Flows
Years Ended December 31, 2019 and 2018

<i>(in Korean won)</i>	Note	2019	2018
Cash flows from operating activities			
Cash generated from operations	38	₩ 228,722,826,810	₩ 326,212,582,596
Income taxes paid		<u>(29,311,797,599)</u>	<u>(84,921,015,955)</u>
Net cash inflow from operating activities		<u>199,411,029,211</u>	<u>241,291,566,641</u>
Cash flows from investing activities			
Decrease in short-term financial instruments		56,986,357,358	16,631,124,334
Increase in short-term financial instruments		(49,173,074,050)	(43,748,020,400)
Proceeds from disposal of financial assets at fair value through profit or loss		33,205,513	1,367,902,311
Acquisition of financial assets at fair value through profit or loss		(1,512,320,000)	(5,379,467,902)
Proceeds from disposal of investments in subsidiaries and associates		45,128,521,163	115,464,858,031
Acquisition of investments in subsidiaries and associates		(47,050,452,665)	(894,214,907)
Decrease in long-term financial instruments		2,000,000,000	3,000,000
Increase in long-term financial instruments		(1,600,000,000)	(5,458,148,476)
Decrease in short-term loans		100,000,000	-
Increase in short-term loans		(2,899,944,113)	-
Decrease in long-term loans		1,497,766,277	2,181,961,841
Increase in long-term loans		(417,009,536)	(1,150,000,000)
Decrease in other receivables		-	44,733,044,072
Decrease in leasehold deposits		5,541,896,655	5,974,371,207
Increase in leasehold deposits		(2,958,874,449)	(4,562,924,523)
Decrease in other financial assets		-	593,105,486
Increase in receipt of government grants		-	4,402,276,375
Repayment of receipt of government grants		-	(1,268,846,128)
Proceeds from disposal of investment property		-	90,397,500
Acquisition of investment property		-	(149,917,611)
Proceeds from disposal of property, plant and equipment		3,351,554,869	2,900,759,104
Acquisition of property, plant and equipment		(145,577,115,488)	(87,161,799,272)
Proceeds from disposal of intangible assets		33,419,697	641,980,069
Acquisition of intangible assets		(9,257,280,505)	(28,995,147,628)
Transfer of business		(8,543,000,000)	236,134,000,000
Business combination		-	(36,056,724,848)
Business division		-	3,700,000,000
Interests received		5,214,521,113	2,834,492,930
Dividends received		30,591,771,542	53,023,897,531
Net cash inflow (outflow) from investing activities		<u>(118,510,056,619)</u>	<u>275,851,959,096</u>
Cash flows from financing activities			
Increase in short-term borrowings		685,578,109,025	214,260,028,988
Repayment of short-term borrowings		(946,681,886,336)	(218,921,241,129)
Repayment of current portion of long-term borrowings		(150,466,607,200)	(239,972,708,185)
Increase in long-term borrowings		202,234,310,200	23,347,836,000
Issuance of debentures		448,356,882,682	318,600,960,000
Repayment of debentures		(200,000,000,000)	(380,000,000,000)
Increase in leasehold deposits received		2,097,633,953	624,381,447
Decrease in leasehold deposits received		(55,506,920)	(536,770,980)
Increase in receipt of government grants		75,434,889	-
Repayment of receipt of government grants		(32,693,319)	-
Decrease in lease payable		(22,238,032,839)	-
Interests paid		(70,475,729,401)	(77,274,246,529)
Dividends paid		(62,085,425,000)	(56,275,694,100)
Net cash outflow from financing activities		<u>(113,693,510,266)</u>	<u>(416,147,454,488)</u>
Net increase (decrease) in cash and cash equivalents		(32,792,537,674)	100,996,071,249
Cash and cash equivalents at the beginning of the financial year		<u>355,313,528,972</u>	<u>254,317,457,723</u>
Cash and cash equivalents at the end of the year in the separate statement of financial position		<u>₩ 322,520,991,298</u>	<u>₩ 355,313,528,972</u>

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

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

1. General Information

Hanwha Corporation (the "Company") was established on October 28, 1952, and is engaged in the manufacturing and selling of explosives and trading business. The Company has manufacturing facilities in the cities of Yeosu, Daejeon, Boeun, Gumi, Changwon, Asan and several business offices.

On June 24, 1976, the Company listed its stock on the Korea Exchange. Through several times of capital increase, the share capital of the Company as at December 31, 2019, amounted to ₩ 489,550 million. As at December 31, 2019, the Company's major shareholders consist of the following:

	Ordinary share (Number of shares)	Preferred share (Number of shares)	Total (Number of shares)	Percentage of ownership (%)
Kim Seung-Youn	16,977,949	1,470,000	18,447,949	18.84
Kim Dong-Kwan	3,330,000	860,654	4,190,654	4.28
H-Solution	3,150,000	1,101,450	4,251,450	4.34
Cheonan Bukil Institute and others	5,093,548	10,402	5,103,950	5.21
Treasury share	5,880,000	-	5,880,000	6.01
Others	40,527,238	19,508,788	60,036,026	61.32
	<u>74,958,735</u>	<u>22,951,294</u>	<u>97,910,029</u>	<u>100.00</u>

2. Significant Accounting Policies

2.1 Basis of Preparation

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

Certain information attached to the Korean language financial statements, but not required for a fair presentation of the Group's financial position, financial performance or cash flows, is not presented in the accompanying consolidated financial statements.

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

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

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

- Certain financial assets and liabilities (including derivative instruments), certain classes of property, plant and equipment and investment property – measured at fair value
- assets held for sale – measured at fair value less costs to sell, and
- defined benefit pension plans – plan assets measured at fair value

The preparation of financial statements requires the use of critical accounting estimates. Management also needs to exercise judgement in applying the Company's accounting policies. The areas involving a higher degree of judgment or complexity, or areas where assumptions and estimates are significant to the separate financial statements are disclosed in Note 3.

2.2 New and amended standards adopted by the Company

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

- Enactment of Korean IFRS 1116 *Leases*

Korean IFRS 1116 *Leases* supersedes Korean IFRS 1017 *Leases*. Under the new standard, with implementation of a single lease model, lessee is required to recognize assets and liabilities for all lease which lease term is over 12 months and underlying assets are not low value assets. A lessee is required to recognize a right-of-use asset and a lease liability representing its obligation to make lease payments.

With implementation of Korean IFRS 1116 *Lease*, the Company has changed accounting policy. The Company has adopted Korean IFRS 1116 retrospectively, as permitted under the specific transitional provisions in the standard, and recognized the cumulative impact of initially applying the standard as at January 1, 2019, the date of initial application. The Company has not restated comparatives for the 2018 reporting period. The impact of the adoption of the leasing standard and the new accounting policies are disclosed in Note 41.

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

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

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

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

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

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

The amendments clarify that an entity shall apply Korean IFRS 1109 to financial instruments in an associate or joint venture to which the equity method is not applied. The amendments also clarify that Korean IFRS 1109 requirements are applied to long-term interests that form part of the entity's net investment in an associate or joint venture before applying the impairment requirements of Korean IFRS 1028. The amendment does not have a significant impact on the financial statements.

- Enactment to Interpretation of Korean IFRS 2123 *Uncertainty over Income Tax Treatments*

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

- Annual Improvements to Korean IFRS 2015 – 2017 Cycle:

· Amendments to Korean IFRS 1103 *Business Combination*

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

· Amendments to Korean IFRS 1111 *Joint Agreements*

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

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

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

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

- Korean IFRS 1023 *Borrowing Costs*

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

2.3 New standards and interpretations not yet adopted by the Company

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

- Amendments to Korean IFRS 1001 *Presentation of Financial Statements* and Korean IFRS 1008 *Accounting Policies, Changes in Accounting Estimates and Errors – Definition of Material*

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

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

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

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

2.4 Business Combination

Acquisitions of businesses are accounted for applying the acquisition method. The consideration transferred in a business combination is measured at fair value, which is calculated as the sum of the fair values of the assets transferred by the Company, the liabilities incurred by the Company to the former owners of the acquiree and the equity interests issued by the Company in exchange for control of the acquiree. Acquisition-related costs are generally recognized in profit or loss as incurred.

At the acquisition date, the identifiable assets acquired and the liabilities assumed are recognized at their acquisition-date fair values, except that:

- Deferred tax assets or liabilities and liabilities or assets related to employee benefit arrangements are recognized and measured in accordance with Korean IFRS 1012 and Korean IFRS 1019, respectively;
- Liabilities or equity instruments related to share-based payment arrangements of the acquiree or share-based payment arrangements of the Company entered into to replace share-based payment arrangements of the acquiree are measured in accordance with Korean IFRS 1102 at the acquisition date.
- Assets (or disposal groups) that are classified as held for sale in accordance with Korean IFRS 1105 are measured in accordance with that standard.

Goodwill is measured as the excess of the sum of: 1) the consideration transferred and 2) the fair value of the acquirer's previously held equity interest in the acquiree (if any) over the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed. If, after reassessment, the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed exceeds the sum of: 1) the consideration transferred and 2) the fair value of the acquirer's previously held interest in the acquiree (if any), the excess is recognized immediately in profit or loss as a gain from a bargain purchase.

When the consideration transferred by the Company in a business combination includes assets or liabilities resulting from a contingent consideration arrangement, the contingent consideration is measured at its acquisition-date fair value and included as part of the consideration transferred in a business combination. Changes in the fair value of the contingent consideration that qualify as measurement-period adjustments are adjusted retrospectively, with corresponding adjustments against goodwill. Measurement-period adjustments are adjustments that arise from additional information obtained during the 'measurement period' (which cannot exceed one year from the acquisition date) about facts and circumstances that existed at the acquisition date.

The subsequent accounting for changes in the fair value of the contingent consideration that do not qualify as measurement-period adjustments depends on how the contingent consideration is classified. Contingent consideration that is classified as equity is not remeasured at subsequent reporting dates and its subsequent settlement is accounted for within equity. Contingent consideration is remeasured at fair value at each reporting date and changes in fair value shall be recognised in profit or loss.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

When a business combination is achieved in stages, the Company's previously held equity interest in the acquiree is remeasured to fair value at the acquisition date and the resulting gain or loss, if any, is recognized in profit or loss (if applicable, other comprehensive income). Amounts arising from interests in the acquiree prior to the acquisition date that have previously been recognized in other comprehensive income are reclassified to profit or loss where such treatment would be appropriate if those interests were disposed of.

If the initial accounting for a business combination is incomplete by the end of the reporting period in which the combination occurs, the Company reports provisional amounts for the items for which the accounting is incomplete. Those provisional amounts are adjusted during the measurement period (see above), or additional assets or liabilities are recognized, to reflect new information obtained about facts and circumstances that existed at the acquisition date that, if known, would have affected the amounts recognized at that date.

2.5 Investments in Subsidiaries, Associates and Joint Ventures

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

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

The financial statements of the Company are the separate financial statements prepared in accordance with Korean IFRS 1027 *Separate Financial Statements*. Investments in subsidiaries and associates are recognized at cost method. Moreover, dividend income from subsidiaries and associates is recognized as profit when the Company's right to receive dividend payments is established.

The requirements of Korean IFRS 1036 are applied to determine whether it is necessary to recognize any impairment loss with respect to the Company's investment in an associate or a joint venture. When necessary, the entire carrying amount of the investment (including goodwill) is tested for impairment in accordance with Korean IFRS 1036 as a single asset by comparing its recoverable amount (higher of value in use and fair value less costs of disposal) with its carrying amount. Any impairment loss recognized is not allocated to any asset, including goodwill that forms part of the carrying amount of the investment. Any reversal of that impairment loss is recognized in accordance with Korean IFRS 1036 to the extent that the recoverable amount of the investment subsequently increases.

2.6 Goodwill

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

For the purpose of impairment testing, goodwill is allocated to each of the Company's cash-

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

generating units ("CGUs") (or group of CGUs) that is expected to benefit from the synergies of the combination.

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

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

2.7 Revenue Recognition

The Company has applied Korean IFRS 1115. According to Korean IFRS 1115, all types of contracts are recognized by applying a five-step revenue recognition model (① Contract Identification — ② Performance Obligations Identification — ③ Transaction Price Calculation — ④ Transaction Price Allocations to Performance Obligations — ⑤ Revenue Recognition When Satisfied with Performance Obligations).

(1) Identify performance obligations

1. Point in time

The Company recognizes revenue when the goods or services are transferred to the customer. In addition, the Company exports a variety of finished goods or merchandises by Incoterms Group C condition (CIF and others). Since the seller provides logistics service after passing the control to the customer, the Company identifies the relative logistics service (including insurance) as separate performance obligation.

2. Overtime

Under Korean IFRS 1115, if performance obligations satisfy one or more of the three condition of paragraph 35, performance obligations would be identified as over-time, otherwise as point in time. The time of revenue recognition can be changed if the Company's performance obligations satisfy the three condition of paragraph 35.

(2) Allocate transaction price

The Company allocates the transaction price to the separate performance obligations in one contract based on the relative stand-alone selling price of each separate performance obligation. For estimating stand-alone selling price of each performance obligation, the Company uses the method of 'Market price adjustment approach' and others.

(3) Variable transaction price

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

The price the customer promises due to the return right granted by the Company in accordance with the contract of sale of the goods with the customer may change. In accordance with Korean IFRS 1115, the variable cost is estimated using a method that expects to be able to better anticipate the consideration to be entitled to the right to receive the expected or probable price of the right to receive the right. It recognizes revenue by including the variable price in the transaction price only to the extent that it is highly unlikely that it will carry out a significant portion of the cumulative revenue amount that has already been recognized.

2.8 Leases

(1) Application of modified retrospective approach

The Company has changed its accounting policy for leases. The impact of the new accounting policies is disclosed in Note 41.

As at December 31, 2018, leases of property, plant and equipment where the Company, as lessee, had substantially all the risks and rewards of ownership were classified as finance leases. Finance leases were capitalized at the lease's inception at the fair value of the leased property or, if lower, the present value of the minimum lease payments. The corresponding lease payments, net of finance charges, were included in other financial liabilities. Each lease payment was allocated between the liability and finance cost. The finance cost was charged to profit or loss over the lease period so as to produce a constant periodic rate of interest on the remaining balance of the liability for each period. The property, plant and equipment acquired under finance leases were depreciated over the asset's useful life, or over the shorter of the asset's useful life and the lease term if there is no reasonable certainty that the Company will obtain ownership at the end of the lease term.

Leases in which a significant portion of the risks and rewards of ownership were not transferred to the Company as lessee were classified as operating leases. Payments made under operating leases (net of any incentives received from the lessor) were charged to profit or loss on a straight-line basis over the period of the lease.

(2) Lessee accounting

The Company leases various offices, warehouses and cars. Lease contracts are typically made for fixed periods of 1 to 10 years, but may have extension options as described in (3) below.

Contracts may contain both lease and non-lease components. However, the Company applies the practical expedient which has elected not to separate non-lease components from lease components, and instead account for each lease component and any associated non-lease components as a single lease component.

Lease terms are negotiated on an individual basis and contain a wide range of different terms and conditions. The lease agreements do not impose any covenants, but leased assets may not be used as security for borrowing purposes.

Until the 2018 financial year, leases of property, plant and equipment were classified as either

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

finance or operating leases. Payments made under operating leases (net of any incentives received from the lessor) were charged to profit or loss on a straight-line basis over the period of the lease.

From January 1, 2019, leases are recognized as a right-of-use asset and a corresponding liability at the date at which the leased asset is available for use by the Company.

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

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

Lease liability measurement also includes payments to be made in option periods if the lessee is reasonably certain to exercise an option to extend the lease.

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

To determine the incremental borrowing rate, the Company:

- where possible, uses recent third-party financing received by the individual lessee as a starting point, adjusted to reflect changes in financing conditions since third party financing was received, and
- makes adjustments specific to the lease, for example term, country, currency and security

The Company is exposed to potential future increases in variable lease payments based on an index or rate, which are not included in the lease liability until they take effect. When adjustments to lease payments based on an index or rate take effect, the lease liability is reassessed and adjusted against the right-of-use asset.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

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

- the amount of the initial measurement of lease liability
- any lease payments made at or before the commencement date less any lease incentives received
- any initial direct costs, and
- restoration costs

The right-of-use asset is depreciated over the shorter of the asset's useful life and the lease term on a straight-line basis. If the Company is reasonably certain to exercise a purchase option, the right-of-use asset is depreciated over the underlying asset's useful life.

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

(3) Extension and termination options

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

2.9 Foreign Currency Translation

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

Foreign currency transactions are translated into the functional currency using the exchange rates at the dates of the transactions. At the end of each reporting period, monetary items denominated in foreign currencies are retranslated at the rates prevailing at that date. Non-monetary items carried at fair value that are denominated in foreign currencies are retranslated at the rates prevailing at the date when the fair value was determined. Non-monetary items that are measured in terms of historical cost in a foreign currency are not retranslated.

2.10 Borrowing Costs

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

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

To the extent that variable-rate borrowings are used to finance a qualifying asset and are hedged in an effective cash flow hedge of interest rate risk, the effective portion of the derivative is recognized in other comprehensive income and reclassified to profit or loss when the qualifying asset impacts profit or loss. To the extent that fixed-rate borrowings are used to finance a qualifying asset and are hedged in an effective fair value hedge of interest rate risk, the capitalized borrowing costs reflect the hedged interest rate.

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

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

2.11 Government Grants

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

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

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

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

2.12 Employee Benefits and Termination Benefits

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

For defined benefit retirement benefit plans, the cost of providing benefits is determined using the projected unit credit method, with actuarial valuations being carried out at the end of each reporting period. Remeasurement, comprising the actuarial gains and losses, the effect of the changes to the asset ceiling (if applicable) and the return on plan assets (excluding interest), is reflected immediately in the separate statements of financial position with a charge or credit recognized in other comprehensive income in the period in which it occurs. Remeasurement recognized in other comprehensive income is reflected immediately in retained earnings and will not be reclassified to profit or loss. Past service costs are recognized in profit or loss on the earlier of (1) the date of the plan amendment or curtailment and (2) the date that the Company recognizes restructuring-related costs. The Company recognized gains and losses on the

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

settlement of a defined benefit plan when the settlement occurs.

Net interest is calculated by applying the discount rate to the net defined benefit liability or asset. Defined benefit costs are composed of service cost (including current service cost, past service cost as well as gains and losses on curtailments and settlements), net interest expense (income) and remeasurement.

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

The post-employment benefit obligation recognized in the separate statements of financial position represents the actual deficit or surplus in the Company's defined benefit plans. Any surplus resulting from this calculation is limited to the present value of any economic benefits available in the form of refunds from the plans or reductions in future contributions to the plans.

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

2.13 Current and Deferred Tax

Income tax expense represents the sum of the current tax and deferred tax.

(1) Current tax

The tax currently payable is based on taxable profit for the year. Taxable profit differs from profit reported in the separate statements of comprehensive income because of items of income or expense that are taxable or deductible in other years and items that are non taxable or deductible. The Company's liability for current tax is calculated using tax rates that have been enacted or substantively enacted by the end of the reporting period.

A provision is recognized for those matters for which the tax determination is uncertain, but it is considered probable that there will be a future outflow of funds to a tax authority. The provisions are measured at the best estimate of the amount expected to become payable. The assessment is based on the judgement supported by previous experience in respect of such activities and in certain cases based on specialist independent tax advice.

(2) Deferred tax

Deferred tax is the tax expected to be payable or recoverable on differences between the carrying amounts of assets and liabilities in the financial statements and the corresponding tax bases used in the computation of taxable profit, and is accounted for using the liability method. Deferred tax liabilities are generally recognized for all taxable temporary differences. Deferred tax assets are generally recognized for all deductible temporary differences to the extent that it is probable that taxable profits will be available against which those deductible temporary differences can be utilized. Such deferred tax assets and liabilities are not recognized if the temporary difference

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

arises from goodwill or from the initial recognition (other than in a business combination) of other assets and liabilities in a transaction that affects neither the taxable profit nor the accounting profit.

Deferred tax liabilities are recognized for taxable temporary differences associated with investments in subsidiaries and associates, and interests in joint ventures, except where the Company is able to control the reversal of the temporary difference and it is probable that the temporary difference will not reverse in the foreseeable future. Deferred tax assets arising from deductible temporary differences associated with such investments and interests are only recognized to the extent that it is probable that there will be sufficient taxable profits against which to utilize the benefits of the temporary differences and they are expected to reverse in the foreseeable future.

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

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

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

Deferred tax assets and liabilities originated from investment properties are measured under the assumption that the book amount of investment properties is to be retrieved by sales. Therefore, if there is no solid evidence to state otherwise, the measurement of deferred tax assets and liabilities reflect the tax effect from sale of investment properties. However, if the sole purpose of the investment properties is to earn economic value overtime through depreciation rather than selling, above assumption does not meet.

(3) Current and deferred taxes for the year

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

2.14 Property, Plant and Equipment

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

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

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

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

	Useful lives
Buildings	20 - 40 years
Structures	20 - 40
Machinery	4 - 15
Vehicles	5 - 12
Tools and equipment	5 - 6

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

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

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

2.15 Investment Property

Investment properties are properties held to earn rentals or for capital. Investment properties are measured initially at cost, including transaction costs. Subsequent to initial recognition, investment properties are reported at cost, less accumulated depreciation and accumulated impairment losses.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

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

While land is not depreciated, all other investment property is depreciated based on the respective assets' estimated useful lives ranging from 20-40 years using the straight-line method.

The estimated useful lives, residual values and depreciation method are reviewed at the end of each reporting period, with the effect of any changes in estimate accounted for on a prospective basis.

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

2.16 Intangible Assets

(1) Intangible assets acquired separately

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

	Useful lives
Industrial property right	7 – 10 years
Development costs	3 – 5
Others	5 – 30

(2) Internally generated intangible assets - research and development expenditure

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

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

The amount initially recognized for internally generated intangible assets is the sum of the expenditure incurred from the date when the intangible asset first meets the recognition criteria.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

Where no internally generated intangible asset can be recognized, development expenditure is recognized in profit or loss in the period in which it is incurred.

Subsequent to initial recognition, internally generated intangible assets are reported at cost, less accumulated amortization and accumulated impairment losses.

(3) Intangible assets acquired in a business combination

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

(4) Derecognition of intangible assets

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

(5) Patent and Trademark

Patent and trademark are initially recognized at cost and amortized using the straight-line method over the estimated useful lives.

2.17 Impairment of Tangible and Intangible Assets Other Than Goodwill

At the end of each reporting period, the Company reviews the carrying amounts of its tangible and intangible assets to determine whether there is any indication that those assets have suffered an impairment loss. If any such indication exists, the recoverable amount of the asset is estimated in order to determine the extent of the impairment loss (if any). When it is not possible to estimate the recoverable amount of an individual asset, the Company estimates the recoverable amount of the CGU to which the asset belongs. Where a reasonable and consistent basis of allocation can be identified, corporate assets are also allocated to individual CGUs; otherwise, they are allocated to the smallest group of CGUs for which a reasonable and consistent allocation basis can be identified.

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

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

Where an impairment loss subsequently reverses, the carrying amount of the asset (or the CGU) is increased to the revised estimate of its recoverable amount so that the increased carrying

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

amount does not exceed the carrying amount that would have been determined had no impairment loss been recognized for the asset (or the CGU) in prior years. A reversal of an impairment loss is recognized immediately in profit or loss.

2.18 Inventories

Inventories are stated at the lower of cost or net realizable value. Cost of inventories is measured using the specific identification method or the moving-weighted average method, and consists of the purchase price, cost of conversion and other costs incurred in bringing the inventories to their present location and condition. Net realizable value represents the estimated selling price for inventories, less all estimated costs of completion and costs necessary to make the sale.

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

2.19 Provisions

Provisions are recognized when the Company has a present obligation (legal or constructive) as a result of a past event, it is probable that the Company will be required to settle the obligation and a reliable estimate can be made of the amount of the obligation.

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

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

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

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

2.20 Financial Assets

All regular way purchases or sales of financial assets are recognized and derecognized on a trade-date basis. Regular way purchases or sales are purchases or sales of financial assets that require delivery of assets within the time frame established by regulation or convention in the marketplace.

All recognized financial assets are measured subsequently in their entirety at either amortized cost or fair value depending on the classification of the financial assets.

(1) Classification of financial assets

Debt instruments that meet the following conditions are measured subsequently at amortized cost:

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

Debt instruments that meet the following conditions are measured subsequently at FVTOCI:

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

By default, all other financial assets are measured subsequently at FVTPL. Despite the foregoing, the Company may make the following irrevocable election or designation at initial recognition of a financial asset:

- The Company may irrevocably elect to present subsequent changes in fair value of an equity investment in other comprehensive income if certain criteria are met (see (1-3) below).
- The Company may irrevocably designate a debt investment that meets the amortized cost or FVTOCI criteria as measured at FVTPL if doing so eliminates or significantly reduces an accounting mismatch (see (1-4) below).

1-1) Amortized cost and effective interest method

The effective interest method is a method of calculating the amortized cost of a debt instrument and allocating interest income over the relevant period. For financial assets other than purchased or originated credit-impaired financial assets (i.e., assets that are credit impaired on initial recognition), the effective interest rate is the rate that exactly discounts estimated future cash receipts (including all fees and points paid or received that form an integral part of the effective interest rate, transaction costs and other premiums or discounts), excluding ECLs, through the expected life of the debt instrument, or, where appropriate, a shorter period, to the gross carrying

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

amount of the debt instrument on initial recognition. For purchased or originated credit-impaired financial assets, a credit-adjusted effective interest rate is calculated by discounting the estimated future cash flows, including ECLs, to the amortized cost of the debt instrument on initial recognition.

The amortized cost of a financial asset is the amount at which the financial asset is measured at initial recognition, minus the principal repayments, plus the cumulative amortization using the effective interest method of any difference between that initial amount and the maturity amount, adjusted for any loss allowance. The gross carrying amount of a financial asset is the amortized cost of the financial asset before adjusting for any loss allowance.

Interest income is recognized using the effective interest method for debt instruments measured subsequently at amortized cost and at FVTOCI. For financial assets other than purchased or originated credit-impaired financial assets, interest income is calculated by applying the effective interest rate to the gross carrying amount of a financial asset, except for financial assets that have subsequently become credit impaired (see below). For financial assets that have subsequently become credit impaired, interest income is recognized by applying the effective interest rate to the amortized cost of the financial asset. If, in subsequent reporting periods, the credit risk on the credit impaired-financial instrument improves so that the financial asset is no longer credit impaired, interest income is recognized by applying the effective interest rate to the gross carrying amount of the financial asset.

For purchased or originated credit-impaired financial assets, the Company recognizes interest income by applying the credit-adjusted effective interest rate to the amortized cost of the financial asset from initial recognition. The calculation does not revert to the gross basis even if the credit risk of the financial asset subsequently improves so that the financial asset is no longer credit impaired.

Interest income is recognized in profit or loss and is included in the "finance income - interest income according to the effective interest rate method" line item (Note 33).

1-2) Debt instruments classified as at FVTOCI

Fair value is determined using the valuation techniques described in Note 40. The corporate bonds are initially measured at fair value plus transaction costs. Subsequently, changes in the carrying amount of these corporate bonds as a result of foreign exchange gains and losses, impairment gains or losses and interest income calculated using the effective interest method are recognized in profit or loss. The amounts that are recognized in profit or loss are the same as the amounts that would have been recognized in profit or loss if these corporate bonds had been measured at amortized cost. All other changes in the carrying amount of these corporate bonds are recognized in other comprehensive income and accumulated under the heading of investments revaluation reserve. When these corporate bonds are derecognized, the cumulative gains or losses previously recognized in other comprehensive income are reclassified to profit or loss.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

1-3) Equity instruments designated as at FVTOCI

On initial recognition, the Company may make an irrevocable election (on an instrument-by-instrument basis) to designate investments in equity instruments as at FVTOCI. Designation at FVTOCI is not permitted if the equity investment is held for trading or if it is a contingent consideration recognized by an acquirer in a business combination.

A financial asset is held for trading if:

- it has been acquired principally for the purpose of selling in the near term;
- on initial recognition, it is part of a portfolio of identified financial instruments that the Company manages together and has evidence of a recent actual pattern of short-term profit taking; or
- it is a derivative (except for a derivative that is a financial guarantee contract or a designated and effective hedging instrument).

Investments in equity instruments at FVTOCI are initially measured at fair value plus transaction costs. Subsequently, they are measured at fair value, with gains and losses arising from changes in fair value recognized in other comprehensive income and accumulated in the investments revaluation reserve. The cumulative gain or loss is not reclassified to profit or loss on disposal of the equity investments, instead it is transferred to retained earnings.

Dividends on these investments in equity instruments are recognized in profit or loss in accordance with Korean IFRS 1109, unless the dividends clearly represent a recovery of part of the cost of the investment. Dividends are included in the 'finance income' line item (Note 33) in profit or loss.

1-4) Financial assets at FVTPL

Financial assets that do not meet the criteria for being measured at amortized cost or FVTOCI are measured at FVTPL. Specifically:

- Investments in equity instruments are classified as at FVTPL, unless the Company designates an equity investment that is neither held for trading nor a contingent consideration arising from a business combination as at FVTOCI on initial recognition (see (1-3) above).
- Debt instruments that do not meet the amortized cost criteria or the FVTOCI criteria (see (1-1) and (1-2) above) are classified as at FVTPL. In addition, debt instruments that meet either the amortized cost criteria or the FVTOCI criteria may be designated as at FVTPL upon initial recognition if such designation eliminates or significantly reduces a measurement or recognition inconsistency (so called 'accounting mismatch') that would arise from measuring assets or liabilities or recognizing the gains and losses on them on different bases

Financial assets at FVTPL are measured at fair value at the end of each reporting period, with any fair value gains or losses recognized in profit or loss to the extent they are not part of a designated hedging relationship. The net gain or loss recognized in profit or loss includes dividends earned on the financial asset in the 'other non-operating income and expenses.' Meanwhile, interests on

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

financial assets at FVTPL are recognized in 'finance income-other' (Note 33). The fair value is determined as described in Note 40.

(2) Foreign exchange gains and losses

The carrying amount of financial assets that are denominated in a foreign currency is determined in that foreign currency and translated at the spot rate at the end of each reporting period. Specifically:

- For financial assets measured at amortized cost that are not part of a designated hedging relationship, exchange differences are recognized in profit or loss in the 'other non-operating gains and losses' line item.
- For debt instruments measured at FVTOCI that are not part of a designated hedging relationship, exchange differences on the amortized cost of the debt instrument are recognized in profit or loss in the 'other non-operating gains and losses.' Other exchange differences are recognized in other comprehensive income in the investments revaluation reserve:
- For financial assets measured at FVTPL that are not part of a designated hedging relationship, exchange differences are recognized in profit or loss in the 'other non-operating gains and losses' line item.
- For equity instruments measured at FVTOCI, exchange differences are recognized in other comprehensive income in the investments revaluation reserve.

(3) Impairment of financial assets

The Company recognizes a loss allowance for ECLs on investments in debt instruments that are measured at amortized cost or at FVTOCI, lease receivables, trade receivables and contract assets, as well as on financial guarantee contracts. The amount of ECLs is updated at each reporting date to reflect changes in credit risk since initial recognition of the respective financial instrument.

The Company always recognizes lifetime ECL for trade receivables, contract assets and lease receivables. The ECLs on these financial assets are estimated using a provision matrix based on the Company's historical credit loss experience, adjusted for factors that are specific to the debtors, general economic conditions and an assessment of both the current as well as the forecast direction of conditions at the reporting date, including time value of money where appropriate.

For all other financial instruments, the Company recognizes lifetime ECL when there has been a significant increase in credit risk since initial recognition

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

3-1) Significant increase in credit risk

In assessing whether the credit risk on a financial instrument has increased significantly since initial recognition, the Company compares the risk of a default occurring on the financial instrument at the reporting date with the risk of a default occurring on the financial instrument at the date of initial recognition. In making this assessment, the Company considers both quantitative and qualitative information that is reasonable and supportable, including historical experience and forward-looking information that is available without undue cost or effort.

In particular, the following information is taken into account when assessing whether credit risk has increased significantly since initial recognition:

- an actual or expected significant deterioration in the financial instrument's external (if available) or internal credit rating;
- significant increases in credit risk on other financial instruments of the same debtor

Despite the foregoing, the Company assumes that the credit risk on a financial instrument has not increased significantly since initial recognition if the financial instrument is determined to have low credit risk at the reporting date. A financial instrument is determined to have low credit risk if: (1) the financial instrument has a low risk of default, (2) the debtor has a strong capacity to meet its contractual cash flow obligations in the near term, and (3) adverse changes in economic and business conditions in the longer term may, but will not necessarily, reduce the ability of the borrower to fulfil its contractual cash flow obligations.

The Company regularly monitors the effectiveness of the criteria used to identify whether there has been a significant increase in credit risk and revises them as appropriate to ensure that the criteria are capable of identifying significant increase in credit risk before the amount becomes past due.

3-2) Definition of loss event

The Company assumes to be a loss event when debtor fails to perform contractual agreements in the past experience for the purpose of internal managing credit risk.

3-3) Credit-impaired financial assets

Financial assets are impaired when detrimental evidences show that the present value of estimated future cash flow decreases. These evidences include, but not limited to:

- significant financial difficulty of issuer or obligor; or
- a breach of contract, such as a default or delinquency in interest or principal payments;

3-4) Write-off policy

The Company writes off financial assets when the assets are determined to be no longer recoverable by borrower's financial difficulty, such as bankruptcy. Financial assets written-off can

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

be object of collectable process with adequate legal procedure.

3-5) Measurement and recognition of ECLs

The measurement of ECLs is a function of the probability of default, loss-given default (i.e., the magnitude of the loss if there is a default) and the exposure at default. The assessment of the probability of default and loss-given default is based on historical data adjusted by forward-looking information as described above. As for the exposure at default, for financial assets, this is represented by the assets' gross carrying amount at the reporting date; for financial guarantee contracts, the exposure includes the amount drawn down as at the reporting date.

For financial assets, the ECL is estimated as the difference between all contractual cash flows that are due to the Company in accordance with the contract and all the cash flows that the Company expects to receive, discounted at the original effective interest rate.

For a financial guarantee contract, as the Company is required to make payments only in the event of a default by the debtor in accordance with the terms of the instrument that is guaranteed, the expected loss allowance is the expected payments to reimburse the holder for a credit loss that it incurs, less any amounts that the Company expects to receive from the holder, the debtor or any other party.

The Company recognizes an impairment gain or loss in profit or loss for all financial instruments with a corresponding adjustment to their carrying amount through a loss allowance account, except for investments in debt instruments that are measured at FVTOCI, for which the loss allowance is recognized in other comprehensive income and accumulated in the investment revaluation reserve, and does not reduce the carrying amount of the financial asset in the separate statements of financial position.

(4) Derecognition of financial assets

The Company derecognizes a financial asset only when the contractual rights to the cash flows from the asset expire, or when it transfers the financial asset and substantially all the risks and rewards of ownership of the asset to another entity. If the Company neither transfers nor retains substantially all the risks and rewards of ownership and continues to control the transferred asset, the Company recognizes its retained interest in the asset and an associated liability for amounts it may have to pay. If the Company retains substantially all the risks and rewards of ownership of a transferred financial asset, the Company continues to recognize the financial asset and also recognizes a collateralized borrowing for the proceeds received.

On derecognition of a financial asset measured at amortized cost, the difference between the asset's carrying amount and the sum of the consideration received and receivable is recognized in profit or loss. In addition, on derecognition of an investment in a debt instrument classified as at FVTOCI, the cumulative gain or loss previously accumulated in the investments revaluation reserve is reclassified to profit or loss. In contrast, on derecognition of an investment in equity instrument, which the Company has elected on initial recognition to measure at FVTOCI, the cumulative gain or loss previously accumulated in the investments revaluation reserve is not reclassified to profit or loss, but is transferred to retained earnings.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

2.21 Financial Liabilities and Equity Instruments

(1) Classification as debt or equity

Debt and equity instruments are classified as either financial liabilities or as equity in accordance with the substance of the contractual arrangement and the definitions of a financial liability and an equity instrument.

(2) Equity instruments

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

Repurchase of the Company's own equity instruments is recognized and deducted directly in equity. No gain or loss is recognized in profit or loss on the purchase, sale, issue or cancellation of the Company's own equity instruments.

(3) Compound instruments

The component parts of compound instruments are classified separately as financial liabilities and equity in accordance with the substance of the contractual arrangements and the definitions of a financial liability and equity instrument. At the date of issue, the fair value of the liability component is estimated using the prevailing market interest rate for a similar non-convertible instrument. The conversion option classified as equity is determined by deducting the amount of the liability component from the fair value of the compound instrument as a whole. This is recognized and included in equity, net of income tax effects, and is not subsequently remeasured.

(4) Financial liability

All financial liabilities are measured subsequently at amortized cost using the effective interest method or at FVTPL. However, financial liabilities that arise when a transfer of a financial asset does not qualify for derecognition or when the continuing involvement approach applies, and financial guarantee contracts are issued by the Company, are measured in accordance with the specific accounting policies set out below.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

(5) Financial liabilities at FVTPL

Financial liabilities are classified as at FVTPL when a financial liability is a contingent consideration that may be paid by an acquirer as part of a business combination to which Korean IFRS 1103 applies or held for trading, or it is designated as at FVTPL.

A financial liability is classified as held for trading if:

- it has been acquired principally for the purpose of repurchasing in the near term;
- on initial recognition, it is part of a portfolio of identified financial instruments that the Company manages together and has a recent actual pattern of short-term profit taking; or
- it is a derivative that is not designated and effective as a hedging instrument.

A financial liability other than a financial liability held for trading or a contingent consideration that may be paid by an acquirer as part of a business combination may be designated as at FVTPL upon initial recognition if:

- such designation eliminates or significantly reduces a measurement or recognition inconsistency that would otherwise arise;
- the financial liability forms part of a group of financial assets or financial liabilities or both, which is managed and its performance is evaluated on a fair value basis, in accordance with the Company's documented risk management or investment strategy, and information about the grouping is provided internally on that basis; or
- it forms part of a contract containing one or more embedded derivatives, and Korean IFRS 1109 permits the entire combined contract (asset or liability) to be designated as at FVTPL.

Financial liabilities at FVTPL are measured at fair value, with any gains or losses arising on changes in fair value recognized in profit or loss to the extent that they are not part of a designated hedging relationship (see Hedge accounting policy). The net gain or loss recognized in profit or loss incorporates any interest paid on the financial liability and is included in the 'other income or expenses' line item in separate statements of comprehensive income.

However, for financial liabilities that are designated as at FVTPL, the amount of change in the fair value of the financial liability that is attributable to changes in the credit risk of that liability is recognized in other comprehensive income, unless the recognition of the effects of changes in the liability's credit risk in other comprehensive income would create or enlarge an accounting mismatch in profit or loss. The remaining amount of change in the fair value of liability is recognized in profit or loss. Changes in fair value attributable to a financial liability's credit risk that are recognized in other comprehensive income are not subsequently reclassified to profit or loss; instead, they are transferred to retained earnings upon derecognition of the financial liability.

Gains or losses on financial guarantee contracts issued by the Company that are designated by the Company as at FVTPL are recognized in profit or loss.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

(6) Financial liabilities measured subsequently at amortized cost

Financial liabilities that are not (1) contingent consideration of an acquirer in a business combination, (2) held for trading or (3) designated as at FVTPL are measured subsequently at amortized cost using the effective interest method.

The effective interest method is a method of calculating the amortized cost of a financial liability and allocating interest expense over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash payments, including all fees and points paid or received (that form an integral part of the effective interest rate) transaction costs and other premiums or discounts through the expected life of the financial liability, or (where appropriate) a shorter period, to the net carrying amount on initial recognition.

(7) Financial guarantee contracts

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

Financial guarantee contract liabilities are initially measured at their fair values and, if not designated as at FVTPL, are subsequently measured at the higher of:

- the amount of loss allowance, as determined in accordance with Korean IFRS 1109 (see “Financial assets” above) or
- the amount initially recognized, less cumulative amortization recognized in accordance with Korean IFRS 1115.

(8) Foreign exchange gains and losses

For financial liabilities that are denominated in a foreign currency and are measured at amortized cost at the end of each reporting period, the foreign exchange gains and losses are determined based on the amortized cost of the instruments. These foreign exchange gains and losses are recognized in the ‘other income or expenses’ line item in separate statements of comprehensive income for financial liabilities that are not part of a designated hedging relationship. For those which are designated as a hedging instrument for a hedge of foreign currency risk, foreign exchange gains and losses are recognized in other comprehensive income and accumulated in a separate component of equity.

The fair value of financial liabilities denominated in a foreign currency is determined in that foreign currency and translated at the spot rate at the end of the reporting period. For financial liabilities that are measured as at FVTPL, the foreign exchange component forms part of the fair value gains or losses and is recognized in profit or loss for financial liabilities that are not part of a designated hedging relationship.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

(9) Derecognition of financial liabilities

The Company derecognizes financial liabilities when, the Company's obligations are discharged, cancelled or have expired. The difference between the carrying amount of the financial liability derecognized and the consideration paid and payable is recognized in profit or loss.

When the Company exchanges with the existing lender one debt instrument for another one with substantially different terms, such exchange is accounted for as an extinguishment of the original financial liability and the recognition of a new financial liability. Similarly, the Company accounts for substantial modification of terms of an existing liability or part of it as an extinguishment of the original financial liability and the recognition of a new liability.

2.22 Derivative Financial Instruments

The Company enters into a variety of derivative financial instruments to manage its exposure to interest rate and foreign exchange rate risk, including foreign exchange forward contracts, interest rate swaps and cross-currency swaps.

Derivatives are initially recognized at fair value at the date the derivative contract is entered into and are subsequently remeasured to their fair value at the end of each reporting period. The resulting gain or loss is recognized in profit or loss immediately, unless the derivative is designated and effective as a hedging instrument; in such case, the timing of the recognition in profit or loss depends on the nature of the hedge relationship.

A derivative with a positive fair value is recognized as a financial asset, and a derivative with a negative fair value is recognized as a financial liability. The Company does not offset a derivative financial instrument unless there is a legal right or intention to offset. A derivative is presented as a non-current asset or a non-current liability if the remaining maturity of the instrument is more than 12 months and it is not expected to be realized or settled within 12 months. Other derivatives are presented as current assets or current liabilities.

The Company recognizes changes in the fair value of derivatives that are designated as hedging instruments and changes in the fair value of the hedged item in profit or loss.

2.23 Accounting related to the Greenhouse Gas Emission Rights Cap and Trade Scheme

The Company classifies the emission rights as intangible assets. Emission rights allowances the government allocated free of charge are measured at nil, and emission rights allowances purchased are measured at cost, which the Company paid to purchase the allowances. If emission rights the government allocated free of charge are sufficient to settle the emission rights allowances allotted for vintage year, the emission liabilities are measured at nil. However, for the emission liabilities that exceed the allowances allocated free of charge, the shortfall is measured at best estimate at the end of the reporting period.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

2.24 Approval of Issuance of the Financial Statements

The separate financial statements 2019 were approved for issue by the Board of Directors on February 25, 2020 and are subject to change with the approval of shareholders at their Annual General Meeting.

3. Critical Accounting Estimates and Assumptions

In the application of the Company accounting policies, which are described in Note 2, management is required to make judgments, estimates and assumptions about the carrying amounts of assets and liabilities that are not readily apparent from other sources. The estimates and associated assumptions are based on historical experience and other factors that are considered to be relevant. Actual results may differ from these estimates.

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

(1) Important decision applied in accounting policies

1) Capitalization of borrowing costs

As noted in Note 2, the Company capitalizes borrowing costs related to the acquisition, construction or production of the qualifying assets as part of the cost of such assets.

2) Evaluation of business model

The classification and measurement of financial assets is based on contractual cash flow characteristics and business model (see Note 2 'Financial Assets' section). The business model is determined to reflect how groups of financial assets are managed together to meet specific business objectives. These assessments include judgements that reflect all relevant evidence. The relevant evidences include how the performance of an asset is assessed and measured, risks that could affect the performance of an asset, and the way those risks are managed, and compensation of the asset manager. When a financial asset measured at amortized cost or FVTOCI was derecognized before maturity, the Company observed to determine whether if it is consistent with the objective of the business model for financial asset management. Observations are part of our ongoing assessment of whether the business model for the remaining financial assets is appropriate and if not appropriate, there has been a change in the business model and a consequent change in the classification of financial assets. No such changes were required during the indicated period.

3) Significant increase in credit risk

As described in Note 2, the loss allowance is measured for assets that have significant increase in ECLs for the whole period or have been impaired since initial recognition. Korean IFRS 1109 does not define what constitutes a significant increase in credit risk. When assessing whether the credit

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

risk of an asset has increased significantly, the Company considers forward-looking information that is quantitatively and qualitatively reasonable and supported.

(2) Key sources of estimation uncertainty

1) Income tax

The income is subject to income taxes based on tax laws and interpretations of tax authorities in numerous jurisdictions. There are many transactions and calculations for which the ultimate tax determination is uncertain.

2) Fair value of financial instruments

The fair value of financial instruments that are not traded in an active market is determined by using valuation techniques. The Company uses its judgment to select a variety of methods and make assumptions that are mainly based on market conditions existing at the end of each reporting period (Note 40).

3) Impairment of financial assets

The provisions for impairment for financial assets are based on assumptions about risk of default and expected loss rates. The Company uses judgement in making these assumptions and selecting the inputs to the impairment calculation based on the Company's past history, existing market conditions as well as forward looking estimates at the end of each reporting period (Note 40).

4) Net defined benefit liabilities

The present value of net defined benefit liability depends on a number of factors that are determined on an actuarial basis using a number of assumptions including the discount rate (Note 22).

5) Uncertainty on the estimation of the total construction revenue and total construction cost

Although total contract revenue is measured based on the contract amount initially agreed, measurement of contract revenue is subject to various uncertainties related to the outcome of future events. This is because as the contract is executed, it may decrease depending on the change of construction, compensation, incentives or delayed completion due to the Company's reasons.

The amount of construction revenues is affected by the progress measured based on the cumulative incurred contract costs. Total contract costs are based on future estimates of material costs, labor costs, overhead costs, etc. There are uncertainties that may change.

6) Provision

The Company has recorded provision for product warranties and construction warranties at the end of each reporting period. These provisions are based on estimates based on historical

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

experience and forecasts of future events. However, there may be a significant difference between past events and forecasts, and there are uncertainties that may cause significant differences between the estimates based on future events and actual events.

7) Impairment of non-financial assets

The Company assesses the existence of impairment on all non-financial assets at the end of each reporting period. For intangible assets with indefinite useful lives, impairment tests are carried out annually or in the event of impairment. For other non-financial assets, the Company carries out impairment tests when there are indications that the carrying amount will not be recoverable. To determine the use value, management must estimate future cash flows from the asset or CGU and choose an appropriate discount rate.

8) Setting allowance for bad debts for trade receivables

In order to estimate the impairment loss on trade receivables, the Company estimates the amount of credit loss based on the age of the current receivables, past credit experience and other economic environment factors.

9) Lease

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

For leases of warehouses, retail stores and equipment, the following factors are normally the most relevant:

- If there are significant penalties to terminate (or not extend), the Company is typically reasonably certain to extend (or not terminate).
- If any leasehold improvements are expected to have a significant remaining value, the Company is typically reasonably certain to extend (or not terminate).
- Otherwise, the Company considers other factors including historical lease durations and the costs and business disruption required to replace the leased asset.

Most extension options in offices and vehicles leases have not been included in the lease liability, because the Company could replace the assets without significant cost or business disruption.

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

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

4. Segment Information

(1) The Company's reportable segments and details are as follows:

Business section	Main business
Explosives and production	Manufacturing and selling of explosive (Defense products, Industrial explosive and others)
Trading and retails	Trading and retails
Machinery and production	Manufacturing and selling of machine tool and industrial machinery

(2) A profit or loss by each segment for the years ended December 31, 2019 and 2018, is as follows:

(in thousands of Korean won)

	2019			
	Explosives and production	Trading and retails	Machinery and production	Total
Total segment revenue	₩ 1,865,495,787	₩ 1,924,207,012	₩ 655,270,080	₩ 4,444,972,879
(-) Intersegment revenue	(1,847,223)	(9,898,310)	(64,295)	(11,809,828)
Revenue from external customers	1,863,648,564	1,914,308,702	655,205,785	4,433,163,051
Operating profit	127,699,998	30,827,648	30,421,138	188,948,784
Finance costs	(38,067,160)	(36,754,263)	(13,857,507)	(88,678,930)
Profit (loss) for the year	<u>₩ 89,632,838</u>	<u>₩ (5,926,615)</u>	<u>₩ 16,563,631</u>	<u>₩ 100,269,854</u>

(in thousands of Korean won)

	2018			
	Explosives and production	Trading and retails	Machinery and production	Total
Total segment revenue	₩ 2,151,550,442	₩ 2,137,711,022	₩ 970,608,236	₩ 5,259,869,700
(-) Intersegment revenue	(2,022,513)	(12,026,695)	(21,572,773)	(35,621,981)
Revenue from external customers	2,149,527,929	2,125,684,327	949,035,463	5,224,247,719
Operating profit	224,490,489	21,180,137	54,211,768	299,882,394
Finance income (costs) and others	(14,321,845)	(14,600,972)	13,561,455	(15,361,362)
Profit for the year	<u>₩ 210,168,644</u>	<u>₩ 6,579,165</u>	<u>₩ 67,773,223</u>	<u>₩ 284,521,032</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(3) Segment assets and liabilities as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019			
	Explosives and production	Trading and retails	Machinery and production	Total
Total assets	₩ 6,960,256,944	₩ 523,001,369	₩ 448,036,733	₩ 7,931,295,046
Total liabilities	3,576,748,748	654,699,583	275,898,430	4,507,346,761

(in thousands of Korean won)

	2018			
	Explosives and production	Trading and retails	Machinery and production	Total
Total assets	₩ 6,556,560,703	₩ 586,793,752	₩ 634,922,422	₩ 7,778,276,877
Total liabilities	3,198,282,761	710,399,732	476,649,155	4,385,331,648

(4) Details of acquisition costs of non-current asset and depreciation costs for the years ended December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	Depreciation and amortization costs		Acquisition costs of non-current assets	
	2019	2018	2019	2018
Explosive and production	₩ 76,625,957	₩ 68,209,143	₩ 170,823,819	₩ 96,006,036
Trading and retails	10,829,376	2,152,714	38,263,765	1,991,363
Machinery and production	6,789,030	15,743,809	6,171,554	30,907,439
	₩ 94,244,363	₩ 86,105,666	₩ 215,259,138	₩ 128,904,838

In addition to the depreciation and amortization costs stated above, the Company recognized ₩ 29,611 million and ₩ 15,497 million as impairment loss of non-current asset for the years ended December 31, 2019 and 2018, respectively. The impairment loss per segment is as follows:

(in thousands of Korean won)

	2019	2018
Explosive and production	₩ 4,829,880	₩ 7,690,471
Trading and retails	24,533,472	6,699,415
Machinery and production	247,967	1,107,323
	₩ 29,611,319	₩ 15,497,209

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(5) Breakdown of the revenue of the Company for the years ended December 31, 2019 and 2018, from all geographic areas, is as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Domestic	₩	2,742,051,146	₩	3,120,414,943
USA		121,083,371		244,984,602
Asia		1,392,040,628		1,586,687,756
Others		177,987,906		272,160,418
	₩	<u>4,433,163,051</u>	₩	<u>5,224,247,719</u>

(6) Total revenue (2019: ₩ 4,433,163 million and 2018: ₩ 5,224,248 million) includes sales of the biggest customer (2019: ₩ 755,944 million and 2018: ₩ 877,146 million). No single customer accounts for more than 10% of revenue for the years ended December 31, 2019 and 2018.

5. Restricted-to-use and Secured Financial Assets

Restricted-to-use and secured financial assets as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	Description	2019		2018	
Short-term financial instruments	National projects and others	₩	3,976,783	₩	2,959,735
Long-term financial instruments	Guarantees for deposit for opening of checking account and others		497,415		496,084
		₩	<u>4,474,198</u>	₩	<u>3,455,819</u>

6. Cash and Cash Equivalents

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

<i>(in thousands of Korean won)</i>	2019		2018	
Cash on hand	₩	5,000	₩	5,000
Cash in bank		3,012,111		5,423,154
Other cash and cash equivalents		319,503,880		349,885,375
	₩	<u>322,520,991</u>	₩	<u>355,313,529</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

7. Financial Instruments by Category

(1) Categorizations of financial assets as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019					
	Financial assets at amortized cost	Financial assets at fair value through profit or loss	Hedging derivative financial instruments	Debt instruments at fair value through other comprehensive income	Equity instruments at fair value through other comprehensive income	Total
Current assets:						
Cash and cash equivalents	₩ 322,520,991	₩ -	₩ -	₩ -	₩ -	₩ 322,520,991
Trade and other receivables	545,650,698	36,448,646	-	-	-	582,099,344
Other financial assets	37,246,641	11,085,204	12,540,342	-	-	60,872,187
	<u>905,418,330</u>	<u>47,533,850</u>	<u>12,540,342</u>	<u>-</u>	<u>-</u>	<u>965,492,522</u>
Non-current assets:						
Trade and other receivables	18,850,514	-	-	-	-	18,850,514
Financial assets at fair value through profit or loss	-	16,663,391	-	-	-	16,663,391
Financial assets at fair value through other comprehensive income	-	-	-	-	78,859	78,859
Other financial assets	30,724,693	-	-	-	-	30,724,693
	<u>49,575,207</u>	<u>16,663,391</u>	<u>-</u>	<u>-</u>	<u>78,859</u>	<u>66,317,457</u>
	<u>₩ 954,993,537</u>	<u>₩ 64,197,241</u>	<u>₩ 12,540,342</u>	<u>₩ -</u>	<u>₩ 78,859</u>	<u>₩ 1,031,809,979</u>

(in thousands of Korean won)

	2018					
	Financial assets at amortized cost	Financial assets at fair value through profit or loss	Hedging derivative financial instruments	Debt instruments at fair value through other comprehensive income	Equity instruments at fair value through other comprehensive income	Total
Current assets:						
Cash and cash equivalents	₩ 355,313,529	₩ -	₩ -	₩ -	₩ -	₩ 355,313,529
Trade and other receivables	683,427,288	15,100,353	-	-	-	698,527,641
Other financial assets	39,946,737	3,293,976	749,882	-	-	43,990,595
	<u>1,078,687,554</u>	<u>18,394,329</u>	<u>749,882</u>	<u>-</u>	<u>-</u>	<u>1,097,831,765</u>
Non-current assets:						
Trade and other receivables	16,302,353	-	-	-	-	16,302,353
Financial assets at fair value through profit or loss	-	15,245,596	-	-	-	15,245,596
Financial assets at fair value through other comprehensive income	-	-	-	-	78,859	78,859
Other financial assets	36,353,100	385,744	-	-	-	36,738,844
	<u>52,655,453</u>	<u>15,631,340</u>	<u>-</u>	<u>-</u>	<u>78,859</u>	<u>68,365,652</u>
	<u>₩ 1,131,343,007</u>	<u>₩ 34,025,669</u>	<u>₩ 749,882</u>	<u>₩ -</u>	<u>₩ 78,859</u>	<u>₩ 1,166,197,417</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(2) Categorizations of financial liabilities as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019			
	Financial liabilities at amortized cost	Financial liabilities at fair value through profit or loss	Hedging derivative financial instruments	Total
Current liabilities:				
Trade and other payables	₩ 447,451,420	₩ -	₩ -	₩ 447,451,420
Borrowings and debentures	1,216,296,376	-	-	1,216,296,376
Other financial liabilities	45,492,562	50,636,891	8,191,006	104,320,459
	<u>1,709,240,358</u>	<u>50,636,891</u>	<u>8,191,006</u>	<u>1,768,068,255</u>
Non-current liabilities:				
Trade and other payables	5,317,516	-	-	5,317,516
Borrowings and debentures	1,020,658,566	-	-	1,020,658,566
Other financial liabilities	3,954,641	409,866	-	4,364,507
	<u>1,029,930,723</u>	<u>409,866</u>	<u>-</u>	<u>1,030,340,589</u>
	<u>₩ 2,739,171,081</u>	<u>₩ 51,046,757</u>	<u>₩ 8,191,006</u>	<u>₩ 2,798,408,844</u>

(in thousands of Korean won)

	2018			
	Financial liabilities at amortized cost	Financial liabilities at fair value through profit or loss	Hedging derivative financial instruments	Total
Current liabilities:				
Trade and other payables	₩ 584,106,731	₩ -	₩ -	₩ 584,106,731
Borrowings and debentures	1,119,852,341	-	-	1,119,852,341
Other financial liabilities	61,756,310	1,154,510	749,882	63,660,702
	<u>1,765,715,382</u>	<u>1,154,510</u>	<u>749,882</u>	<u>1,767,619,774</u>
Non-current liabilities:				
Trade and other payables	5,589,071	-	-	5,589,071
Borrowings and debentures	1,075,432,295	-	-	1,075,432,295
Other financial liabilities	4,909,701	43,363,334	-	48,273,035
	<u>1,085,931,067</u>	<u>43,363,334</u>	<u>-</u>	<u>1,129,294,401</u>
	<u>₩ 2,851,646,449</u>	<u>₩ 44,517,844</u>	<u>₩ 749,882</u>	<u>₩ 2,896,914,175</u>

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

(in thousands of Korean won)

	2019		2018	
Financial assets at amortized cost:				
Loss on transactions	₩	(2,344,954)	₩	(1,851,504)
Interest income		5,614,808		2,758,857
Gain on valuation		13,839,096		14,197,687
Gain (loss) on foreign currency translation		(638,703)		743,434

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Gain (loss) on foreign currency transaction	12,669,014	(3,904,697)
Financial assets and liabilities at fair value through profit or loss:		
Loss on transactions	(23,194,215)	(21,391,923)
Gain (loss) on valuation	11,146,104	(7,926,892)
Dividend income	4,511	4,830
Hedging derivative financial instruments:		
Gain (loss) on valuation	(3,841,670)	364,703
Financial assets at fair value through other comprehensive income:		
Loss on transactions	-	(11,185)
Interest income	29	383
Dividend income	170	170
Financial liabilities at amortized cost:		
Interest expenses	(70,340,686)	(78,642,284)
Gain on foreign currency translation	397,168	-
Loss on foreign currency transaction	(17,677,745)	-

8. Trade and Other Receivables

(1) Details of trade and other receivables as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019		2018	
	Current	Non-current	Current	Non-current
Trade receivables	₩ 573,220,583	₩ 45,006,243	₩ 683,215,679	₩ 63,432,672
Less: Present value discounts	-	-	-	(4,494)
Less: Provisions for impairment	(4,524,813)	(26,236,181)	(1,437,928)	(47,125,825)
Other receivables	14,952,697	504,331	22,492,100	703,083
Less: Provisions for impairment	(1,549,123)	(423,879)	(5,742,210)	(703,083)
	<u>₩ 582,099,344</u>	<u>₩ 18,850,514</u>	<u>₩ 698,527,641</u>	<u>₩ 16,302,353</u>

(2) Credit risk and Provisions for impairment

The Company always recognizes lifetime ECL for trade receivables. The ECLs on these trade receivables are estimated using a provision matrix based on the adjusted for factors that are specific to the debtors, past default experiences of the debtor, general economic conditions and an assessment of both the current as well as the forecast direction of conditions at the reporting date, including time value of money where appropriate.

The Company recognizes allowance for bad debt individually, if there is a sign that the debtor undergoes bankruptcy or experiencing significant financial problem. There is no change in assessment method or assumption for the year ended in December 31, 2019.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Judging from the past ECL experience, clients do not show different aspects of loss. Therefore, the Company's provision matrix based on past overdue history does not differentiate clients.

1) Changes in provisions for impairment of trade and other receivables for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Beginning balance	₩	55,009,046	₩	128,265,691
Increase in loss allowance recognized in profit or loss during the year		7,090,955		5,490,663
Decrease in loss allowance recognized in profit or loss during the year		(20,648,855)		(34,469,315)
Receivables written off during the year as uncollectible ¹		(8,717,150)		(43,632,222)
Transfer of business		-		(737,718)
Replacement of prepayment		-		91,947
Ending balance	₩	<u>32,733,996</u>	₩	<u>55,009,046</u>

¹ After the verdict was met, provision for impairment recognized with the law suit for acquiring shares of Daewoo Shipbuilding & Marine Engineering Co., Ltd., was written off.

2) Impairment loss recognized for the years ended December 31, 2019 and 2018, is as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Impairment loss				
- Decrease in loss allowance recognized in profit or loss during the year	₩	(13,557,900)	₩	(28,978,652)

(3) The aging analysis of the trade and other receivables as at December 31, 2019 and 2018, is as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Receivables not past due	₩	<u>480,722,591</u>	₩	<u>538,451,185</u>
		480,722,591		538,451,185
Past due but not impaired				
Less than 3 months		77,287,651		135,192,419
Between 3 months and 6 months		19,130,833		10,024,105
Between 6 months and 1 year		9,640,471		23,054,656
More than 1 year		<u>11,455,502</u>		<u>9,434,174</u>
		<u>117,514,457</u>		<u>177,705,354</u>
Impaired				

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Less than 3 months	3,922,937	43,909
Between 3 months and 6 months	965,464	222,177
Between 6 months and 1 year	2,649,619	283,953
More than 1 year	27,908,786	53,136,956
	<u>35,446,806</u>	<u>53,686,995</u>
	₩ 633,683,854	₩ 769,843,534

(4) Details of transferred financial assets that are not derecognized in their entirety as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	Trade receivables	
	2019	2018
Book amount of transferred financial assets	₩ 53,988,047	₩ 78,853,986
Related liabilities ¹	(53,988,047)	(78,853,986)

¹ The Company transferred trade receivables to banks and collected cash. The Company has responsibility of recourse as at December 31, 2019. In addition, the related liabilities are recognized as collateralized borrowing (Note 19).

9. Financial Assets

(1) Details of financial assets measured at fair value through profit or loss as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019	2018
Equity securities		
Beneficiary certificate ¹	₩ 72,770	₩ 104,925
Unlisted securities	2,000,000	2,000,000
Debt securities		
Capital contribution	14,590,621	13,140,671
	<u>₩ 16,663,391</u>	<u>₩ 15,245,596</u>

¹ The fair value of beneficiary certificate is determined using valuation techniques performed by independent external institution.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(2) Details of financial assets measured at fair value through other comprehensive income as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Equity securities ¹				
Unlisted securities	₩	78,859	₩	78,859

¹ The Company irrevocably classified equity securities which purpose is not held for trading but strategic investment as financial assets measured at fair value through other comprehensive income on the initial date of application.

(3) Fair value of some financial assets measured by fair value through other comprehensive income, with not enough information to be measured reliably, or too broad to evaluate in scale, is measured by its acquisition cost.

10. Other Financial Assets

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

<i>(in thousands of Korean won)</i>	2019		2018	
	Current	Non-current	Current	Non-current
Long and short-term financial instruments	₩ 33,749,134	₩ 3,697,415	₩ 38,762,417	₩ 6,896,084
Loans ¹	2,799,944	6,185,807	503,145	6,259,594
Guarantee	86,344	20,841,471	306,249	23,197,422
Derivative financial instruments	23,625,546	-	4,043,858	385,744
Others ²	611,219	-	374,926	-
	<u>₩ 60,872,187</u>	<u>₩ 30,724,693</u>	<u>₩ 43,990,595</u>	<u>₩ 36,738,844</u>

¹ It consists of loans to affiliates, general customers and employees. The interest rate is 0%-24% (Note 36).

² Others consist of project deposits, government grants and accrued revenues.

(2) Impairment on other financial assets

When management recognizes ECL, not only the bankruptcy history and financial status of the counterparty, but also reports disclosed by economic and financial experts are taken into consideration. Also various sources of information from renowned institute are used when deriving possibility of default and its expected amounts of loss during the evaluation period.

For the year ended in December 31, 2019, there are no significant changes in method or assumption related to evaluating provision for impairment on other financial assets.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(3) There are no changes in ECL of each financial assets for the year ended December 31, 2019.

11. Derivative Financial Instruments

(1) Details of derivative financial assets as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019		2018	
	Current	Non-current	Current	Non-current
Currency forward	₩ 11,085,204	₩ -	₩ 3,293,976	₩ 13,953
Commodity future	12,540,342	-	749,882	-
Interest swap	-	-	-	371,791
	<u>₩ 23,625,546</u>	<u>₩ -</u>	<u>₩ 4,043,858</u>	<u>₩ 385,744</u>

(2) Details of derivative financial liabilities as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019		2018	
	Current	Non-current	Current	Non-current
Currency forward	₩ 1,168,179	₩ -	₩ 1,154,509	₩ 2,277
Currency swap	-	111,064	-	-
Interest swap	84,376	298,802	-	-
Commodity futures	12,540,342	-	749,882	-
Shareholders' agreement (Note 37)	45,035,000	-	-	43,361,057
	<u>₩ 58,827,897</u>	<u>₩ 409,866</u>	<u>₩ 1,904,391</u>	<u>₩ 43,363,334</u>

12. Other Assets

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

(in thousands of Korean won)

	2019		2018	
	Current	Non-current	Current	Non-current
Advance payments	₩ 341,861,253	₩ -	₩ 142,410,137	₩ -
Prepaid expenses	9,674,451	2,338,353	8,075,939	3,511,511
Contract assets ¹	105,378,269	-	100,776,940	-
Others	3,635,994	-	121,000	-
	<u>₩ 460,549,967</u>	<u>₩ 2,338,353</u>	<u>₩ 251,384,016</u>	<u>₩ 3,511,511</u>

¹Due from customers.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(2) Details of changes in loss allowance of contract asset for the year ended December 31, 2019, are as follows:

<i>(in thousands of Korean won)</i>	2019	
Beginning balance	₩	13,601,823
Impairment		-
Reversal		(38,524)
Write-off		(10,668,592)
Ending balance	₩	<u>2,894,707</u>

13. Inventories

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

<i>(in thousands of Korean won)</i>	2019		2018	
Finished goods	₩	63,352,486	₩	82,782,702
Less: Valuation allowance		(8,610,022)		(1,579,479)
Merchandise		130,894,157		131,021,944
Less: Valuation allowance		(10,096,652)		(2,586,511)
Work in progress		292,850,842		376,488,494
Less: Valuation allowance		(1,989,812)		(955,020)
Raw materials		265,318,893		143,392,096
Less: Valuation allowance		(3,110,839)		(3,106,527)
Materials in transit		35,399,151		59,170,208
	₩	<u>764,008,204</u>	₩	<u>784,627,907</u>

14. Investments in Subsidiaries and Associates

(1) Details of investments in subsidiaries and associates as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Investments in subsidiaries	₩	4,374,131,374	₩	4,355,744,923
Investments in associates		10,306,619		7,317,089
	₩	<u>4,384,437,993</u>	₩	<u>4,363,062,012</u>

As at December 31, 2019, some of the investments in subsidiaries and associates are provided as collaterals in relation to the payment of stock acquisition and others (Note 37).

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(2) Changes in investments in subsidiaries and associates for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019	2018
Beginning	₩ 4,363,062,012	₩ 4,448,442,938
Acquisitions	86,613,616	894,215
Disposals	(40,704,163)	(77,019,958)
Impairment ¹	(27,664,002)	(12,991,563)
Reversal ²	3,130,530	3,736,380
Ending	<u>₩ 4,384,437,993</u>	<u>₩ 4,363,062,012</u>

¹ The Company recognized impairment on investments in respect of Hanwha Hong Kong Co., Ltd, Hanwha International (Shanghai) Co., Ltd. and others due to their accumulated losses for the year ended December 31, 2019.

² The Company reversed some of the impairments recognized in investments of PT. Nantoy Bara Lestari for the year ended December 31, 2019.

(3) Details of investments in subsidiaries as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	Location	Main business	Percentage of ownership (%)	2019	2018
Hanwha Engineering and Construction Corp.	Korea	Construction	95.24	₩ 1,258,727,142	₩ 1,258,727,142
Hanwha International (Shanghai) Co., Ltd. ^{1,2}	China	Trading	33.33	-	-
Hanwha Life Insurance Co., Ltd. ¹	Korea	Life insurance	18.15	913,982,783	913,982,783
Hanwha Eagles Professional Baseball Club ^{1,2}	Korea	Sport club	40.00	-	-
Hanwha Aerospace Co., Ltd. ¹	Korea	Manufacturing	33.03	825,203,555	825,203,555
Hanwha Chemical Co., Ltd. ^{1,3}	Korea	Chemical	36.62	972,076,247	972,076,247
Hanwha TechM Co., Ltd. ⁷	Korea	Investment	100.00	11,176,035	12,176,035
Hanwha Hotels & Resorts Co., Ltd.	Korea	Accommodation	50.62	219,213,158	219,213,158
Hanwha Agritech Ltd. ²	Hongkong	Wholesale	100.00	-	-
Hanwha Europe GmbH	Germany	Trading	100.00	17,859,217	17,859,217
Hanwha Holdings	USA	Holding	0.58	1,408,267	1,408,267

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(USA) Inc. ¹		company				
Hanwha Hong Kong Co.,Ltd. ⁴	Hongkong	Trading	100.00	6,409,038		-
Hanwha International India PVT., LT	India	Trading	99.99	169,296		169,296
Hanwha Machinery Corp.	USA	Holding company	100.00	44,141,351		44,141,351
Hanwha Mining Services Australia	Australia	Gunpowder services and explosives and blasting	100.00	33,355,442		33,355,442
Hanwha Mining Services Chile SPA ⁴	Chile	Gunpowder services and explosives and blasting	100.00	2,821,301		1,088,088
Hanwha Mining Service USA Inc. ⁵	USA	Gunpowder services and explosives and blasting	100.00	2,249,000		-
Hanwha International Peru S.A.C.	Peru	Trading	99.00	415,702		415,702
Hanwha Q CELLS Japan Co., Ltd.	Japan	Trading	100.00	43,501,824		43,501,824
Hanwha Resources (Canada) Ltd. ^{2,4}	Canada	Resource development	100.00	-		-
Hanwha Resources(USA) Corporation ¹	USA	Resource development	20.00	396,681		396,681
Hanwha Singapore Pte. Ltd. ²	Singapore	Trading	100.00	-		-
Hanwha TechM Hungary Zrt.	Hungary	Rent, utility supply	97.21	4,708,446		4,708,446
PT. Hanwha Mining Services Indonesia ⁶	Indonesia	Gunpowder services and explosives and blasting	99.80	11,206,464		2,211,264
PT. Bara Bumi International	Indonesia	Coal sales	99.60	272,505		272,505
S&P World Networks DMCC	UAE	Trading	100.00	4,837,920		4,837,920
				₩ 4,374,131,374	₩	4,355,744,923

¹ Although the Company owns less than 50% of ownership of Hanwha Chemical Corporation and Hanwha Aerospace Co., Ltd. in consideration of ownership owned by the Company's subsidiaries and their participation rate in shareholders' meetings, the Company has power to govern those entities. Additionally, in consideration of ownership owned by the Company's subsidiaries, the Company owns more than 50% of ownership of Hanwha International (Shanghai) Co., Ltd., Hanwha Holdings (USA), Inc., Hanwha Resources (USA) corporation and Hanwha Eagles Professional Baseball Club. Hence, they are classified as investments in subsidiaries. Considering ownership owned by Engineering and Construction Corp., a subsidiary of the Company, and

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

treasury share held by Hanwha Life Insurance Co., Ltd., the Company has control over Hanwha Life Insurance Co., Ltd. because it holds more than 50% of the voting rights and can exercise majority voting rights in the decision-making process.

² Impairment for the entire book amount is recognized for the year ended December 31, 2019.

³ 10,900,832 ordinary shares of Hanwha Chemical Co., Ltd. owned by the Company are pledged as collaterals in relation to the issuance of redeemable convertible preferred shares of Hanwha Engineering and Construction Corp (Note 37).

⁴ Additional contribution and impairment losses were recognized for the years ended December 31, 2019.

⁵ It was newly established for the year ended December 31, 2019.

⁶ Additional contribution was made for the year ended December 31, 2019.

⁷ Capital reduction by cash distribution was carried out for the year ended December 31, 2019.

(4) Details of investments in associates as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	Location	Main business	Percentage of ownership (%)		2019	2018
RFtron Co., Ltd. ³	Korea	Manufacturing	29.98	₩	-	₩ -
KoreaRasLaffan LNG ¹	United Kingdom	Resource development	3.00		1,297,532	1,297,532
Ningbo Zhonghua Jian Hanwha Chemical	China	Chemical	25.00		551,857	551,857
PT. Nantoy Bara Lestari ²	Indonesia	Mining	45.00		6,866,910	3,736,380
Hulin Yuandongyuanda Biomass Cogeneration Co., Ltd.	China	New renewable energy	29.00		1,590,320	1,590,320
Bio Green Technology Sdn Bhd. ³	Malaysia	New renewable energy	36.00		-	-
MK Food System Co., Ltd. ⁴	Korea	Food	33.89		-	141,000
				₩	<u>10,306,619</u>	₩ <u>7,317,089</u>

¹ Since the Company has the right to exercise significant influence by appointing an executive, classified as investments in associates.

² Reversal for the some book amount is recognized for the years ended December 31, 2019 and 2018.

³ Impairment for the entire book amount is recognized for the year ended December 31, 2019.

⁴ It was sold for the year ended December 31, 2019.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(5) Fair values of major marketable investments in subsidiaries as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019		2018	
	Book amount	Fair value	Book amount	Fair value
Hanwha Chemical Co., Ltd.	₩ 972,076,247	₩ 1,122,441,685	₩ 972,076,247	₩ 1,202,828,756
Hanwha Life Insurance Co., Ltd.	913,982,783	364,056,000	913,982,783	665,072,000
Hanwha Aerospace Co., Ltd.	825,203,555	602,495,795	825,203,555	558,662,293

15. Investment Property

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

(in thousands of Korean won)

	2019		
	Cost	Accumulated depreciation	Book amount
Land	₩ 8,056,614	₩ -	₩ 8,056,614
Buildings	19,654,725	(4,499,726)	15,154,999
Structures	103,197	(103,180)	17
	<u>₩ 27,814,536</u>	<u>₩ (4,602,906)</u>	<u>₩ 23,211,630</u>

(in thousands of Korean won)

	2018		
	Cost	Accumulated depreciation	Book amount
Land	₩ 4,477,892	₩ -	₩ 4,477,892
Buildings	19,654,725	(3,969,837)	15,684,888
Structures	103,197	(103,180)	17
	<u>₩ 24,235,814</u>	<u>₩ (4,073,017)</u>	<u>₩ 20,162,797</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

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

(in thousands of Korean won)

	2019					
	Beginning	Acquisitions	Disposals	Depreciation	Others ¹	Ending
Land	₩ 4,477,892	₩ -	₩ -	₩ -	₩ 3,578,722	₩ 8,056,614
Buildings	15,684,888	-	-	(529,889)	-	15,154,999
Structures	17	-	-	-	-	17
	<u>₩ 20,162,797</u>	<u>₩ -</u>	<u>₩ -</u>	<u>₩ (529,889)</u>	<u>₩ 3,578,722</u>	<u>₩ 23,211,630</u>

¹ Others include transfer from property, plant and equipment.

(in thousands of Korean won)

	2018					
	Beginning	Acquisitions	Disposals	Depreciation	Others ¹	Ending
Land	₩ 1,306,498	₩ 34	₩ (63,384)	₩ -	₩ 3,234,744	₩ 4,477,892
Buildings	2,394,910	149,883	-	(77,282)	13,217,377	15,684,888
Structures	8,600	-	-	(8,583)	-	17
	<u>₩ 3,710,008</u>	<u>₩ 149,917</u>	<u>₩ (63,384)</u>	<u>₩ (85,865)</u>	<u>₩ 16,452,121</u>	<u>₩ 20,162,797</u>

The entire depreciation is included in 'Selling and administrative expenses.'

(3) The Company assesses that the difference between fair value and book amount of investment property would not have any material impact.

(4) During the year ended December 31, 2019, rental income earned from investment property is ₩ 3,935 million (2018: ₩ 275 million).

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

16. Property, Plant and Equipment

(1) Details of property, plant and equipment as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019				
	Cost	Accumulated depreciation	Accumulated impairment	Government grants	Book amount
Land	₩ 377,139,630	₩ -	₩ -	₩ (778,275)	₩ 376,361,355
Buildings	562,650,866	(132,875,991)	(3,824,603)	(525,012)	425,425,260
Structures	150,254,265	(91,675,481)	-	(8,687)	58,570,097
Machinery	407,519,435	(304,924,771)	(415,174)	(51,024)	102,128,466
Vehicles	30,785,819	(23,095,385)	-	-	7,690,434
Tools and equipment	119,973,831	(86,045,146)	(10,799)	(423)	33,917,463
Construction in progress	144,971,947	-	-	-	144,971,947
Others	2,021,387	-	-	-	2,021,387
Mining properties in development	12,682,010	-	(12,682,010)	-	-
	<u>₩ 1,807,999,190</u>	<u>₩ (638,616,774)</u>	<u>₩ (16,932,586)</u>	<u>₩ (1,363,421)</u>	<u>₩ 1,151,086,409</u>

(in thousands of Korean won)

	2018				
	Cost	Accumulated depreciation	Accumulated impairment	Government grants	Book amount
Land	₩ 377,903,211	₩ -	₩ -	₩ (778,275)	₩ 377,124,936
Buildings	541,443,244	(120,169,276)	(215,831)	(539,408)	420,518,729
Structures	151,573,906	(88,833,733)	(228,480)	(9,259)	62,502,434
Machinery	425,159,019	(322,517,386)	(3,579,406)	(71,068)	98,991,159
Vehicles	30,030,570	(21,377,869)	-	-	8,652,701
Tools and equipment	141,323,248	(107,363,011)	(10,799)	(2,964)	33,946,474
Construction in progress	70,615,229	-	-	-	70,615,229
Others	2,021,387	-	-	-	2,021,387
Mining properties in development	12,682,010	-	(12,682,010)	-	-
	<u>₩ 1,752,751,824</u>	<u>₩ (660,261,275)</u>	<u>₩ (16,716,526)</u>	<u>₩ (1,400,974)</u>	<u>₩ 1,074,373,049</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

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

(in thousands
of Korean won)

	2019						
	Beginning	Acquisitions	Disposals	Depreciation	Impairment	Others ¹	Ending
Land	₩ 377,124,935	₩ 1,522,447	₩ (1,021,790)	₩ -	₩ -	₩ (1,264,237)	₩ 376,361,355
Buildings	420,518,729	11,206,897	(2,449,790)	(14,378,849)	(3,824,603)	14,352,876	425,425,260
Structures	62,502,434	971,854	(9,833)	(4,676,136)	-	(218,222)	58,570,097
Machinery	98,991,159	25,701,476	(910,774)	(26,341,666)	(408,989)	5,097,260	102,128,466
Vehicles	8,652,700	1,656,726	(105,893)	(2,868,070)	-	354,971	7,690,434
Tools and equipment	33,946,475	8,763,997	(210,653)	(12,046,870)	-	3,464,514	33,917,463
Construction in progress	70,615,229	100,645,799	-	-	-	(26,289,081)	144,971,947
Others	2,021,387	-	-	-	-	-	2,021,387
	<u>₩ 1,074,373,048</u>	<u>₩ 150,469,196</u>	<u>₩ (4,708,733)</u>	<u>₩ (60,311,591)</u>	<u>₩ (4,233,592)</u>	<u>₩ (4,501,919)</u>	<u>₩ 1,151,086,409</u>

¹ Others include transfer of construction in progress to original account and transfer from intangible asset.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(in thousands
of Korean
won)

		2018								
		Beginning	Acquisitions	Disposals	Depreciation	Impairment	Others ¹	Business acquisition	Business transfer	Ending
Land	₩	397,295,332	₩ -	₩ (778,303)	₩ -	₩ -	₩ (2,217,314)	₩ -	₩ (17,174,779)	₩ 377,124,936
Buildings		463,233,498	3,426,675	(1,706,074)	(15,375,276)	(215,831)	(9,511,383)	-	(19,332,880)	420,518,729
Structures		67,884,130	858,710	(77,308)	(5,269,523)	(228,480)	1,291,036	-	(1,956,131)	62,502,434
Machinery		137,869,270	16,316,547	(449)	(31,236,160)	(954,012)	(9,863,875)	2,776,363	(15,916,525)	98,991,159
Vehicles		10,716,868	1,038,446	(79,275)	(2,966,714)	-	166,589	1	(223,214)	8,652,701
Tools and equipment		34,522,768	10,478,691	(36,038)	(12,949,299)	-	4,483,938	720,216	(3,273,802)	33,946,474
Construction in progress		21,710,539	66,628,439	-	-	-	(16,129,043)	352,420	(1,947,126)	70,615,229
Others		2,021,387	-	-	-	-	-	-	-	2,021,387
		<u>₩ 1,135,253,792</u>	<u>₩ 98,747,508</u>	<u>₩ (2,677,447)</u>	<u>₩ (67,796,972)</u>	<u>₩ (1,398,323)</u>	<u>₩ (31,780,052)</u>	<u>₩ 3,849,000</u>	<u>₩ (59,824,457)</u>	<u>₩ 1,074,373,049</u>

¹ Others include transfer of construction in progress to original account and transfer from intangible asset. Also, ₩ 18,735 million reclassified as assets held for sale is included.

Depreciation expense of ₩ 52,388 million (2018: ₩ 59,443 million) is included in 'cost of sales' and ₩ 7,924 million (2018: ₩ 8,354 million) in 'selling and administrative expenses'.

Property, plant and equipment are provided as collateral for borrowings as at December 31, 2019 (Note 37).

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

17. Intangible Assets

(1) Details of intangible assets as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019				
	Cost	Accumulated amortization	Accumulated impairment	Government grants	Book amount
Development costs	₩ 80,165,142	₩ (50,060,712)	₩ (8,380,110)	₩ -	₩ 21,724,320
Membership rights	24,476,001	-	(307,100)	-	24,168,901
Other intangible assets	81,351,497	(63,028,969)	(1,407,608)	-	16,914,920
Exploration rights and development rights	3,927,104	-	(3,927,104)	-	-
Exploration mining areas	9,856,870	-	(9,856,870)	-	-
	<u>₩ 199,776,614</u>	<u>₩ (113,089,681)</u>	<u>₩ (23,878,792)</u>	<u>₩ -</u>	<u>₩ 62,808,141</u>

(in thousands of Korean won)

	2018				
	Cost	Accumulated amortization	Accumulated impairment	Government grants	Book amount
Development costs	₩ 78,858,598	₩ (45,505,582)	₩ (7,535,854)	₩ -	₩ 25,817,162
Membership rights	24,619,081	-	(408,179)	-	24,210,902
Other intangible assets	79,429,760	(58,695,553)	(1,407,611)	-	19,326,596
Exploration rights and development rights	3,927,104	-	(3,927,104)	-	-
Exploration mining areas	9,856,870	-	(9,856,870)	-	-
	<u>₩ 196,691,413</u>	<u>₩ (104,201,135)</u>	<u>₩ (23,135,618)</u>	<u>₩ -</u>	<u>₩ 69,354,660</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

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

(in thousands
of Korean
won)

	2019						
	Beginning	Acquisitions	Disposals	Amortization	Impairment	Others ¹	Ending
Development costs	₩ 25,817,161	₩ 3,670,921	₩ -	₩ (5,247,997)	₩ (844,255)	₩ (1,671,510)	₩ 21,724,320
Membership rights	24,210,901	-	(42,000)	-	-	-	24,168,901
Others	19,326,597	4,106,506	(200,414)	(6,319,657)	-	1,888	16,914,920
	<u>₩ 69,354,659</u>	<u>₩ 7,777,427</u>	<u>₩ (242,414)</u>	<u>₩ (11,567,654)</u>	<u>₩ (844,255)</u>	<u>₩ (1,669,622)</u>	<u>₩ 62,808,141</u>

¹ Others include transfer of construction in progress to original account and transfer to property, plant and equipment.

(in thousands
of Korean
won)

	2018								
	Beginning	Acquisitions	Disposals	Amortization	Impairment	Others ¹	Business acquisition	Business transfer	Ending
Development costs	₩ 54,130,780	₩ 19,534,214	₩ -	₩ (7,299,567)	₩ (1,107,323)	₩ (400,460)	₩ -	₩ (39,040,482)	₩ 25,817,162
Membership rights	24,370,902	-	(160,000)	-	-	-	-	-	24,210,902
Others	27,215,632	9,578,982	(552,284)	(10,923,261)	-	(3,081,279)	103,040	(3,014,234)	19,326,596
	<u>₩ 105,717,314</u>	<u>₩ 29,113,196</u>	<u>₩ (712,284)</u>	<u>₩ (18,222,828)</u>	<u>₩ (1,107,323)</u>	<u>₩ (3,481,739)</u>	<u>₩ 103,040</u>	<u>₩ (42,054,716)</u>	<u>₩ 69,354,660</u>

¹ Others include transfer of construction in progress to original account and transfer to property, plant and equipment. Also, ₩ 50 million reclassified as assets held for sale is included

Amortization of ₩ 6,554 million (2018: ₩ 8,994 million) is included in 'cost of sales' and ₩ 5,014 million (2018: ₩ 9,229 million) in 'selling and administrative expenses'.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(3) Details of intangible assets with indefinite useful life as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Goodwill	₩	433,000	₩	433,000
Membership rights		24,168,901		24,210,902
	₩	<u>24,601,901</u>	₩	<u>24,643,902</u>

(4) Research and development costs recognized in costs for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Cost of sales	₩	24,205,144	₩	38,309,022
Selling and administrative expenses		33,592,498		14,121,614
	₩	<u>57,797,642</u>	₩	<u>52,430,636</u>

18. Trade and Other Payables

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

<i>(in thousands of Korean won)</i>	2019		2018	
	Current	Non-current	Current	Non-current
Trade payables	₩ 313,993,119	₩ 61,700	₩ 379,702,885	₩ -
Other payables	133,458,301	5,255,816	204,403,846	5,589,071
	<u>₩ 447,451,420</u>	<u>₩ 5,317,516</u>	<u>₩ 584,106,731</u>	<u>₩ 5,589,071</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

19. Borrowings and Debentures

(1) Borrowings and debentures as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
	Current	Non-current	Current	Non-current
Short-term borrowings	₩ 508,182,010	₩ -	₩ 769,484,837	₩ -
Long-term borrowings	183,827,260	252,665,253	150,466,608	234,270,203
Debentures	524,734,000	770,000,000	200,000,000	843,543,000
Less: Discount on debentures	(446,895)	(2,006,687)	(99,104)	(2,380,908)
	<u>₩ 1,216,296,375</u>	<u>₩ 1,020,658,566</u>	<u>₩ 1,119,852,341</u>	<u>₩ 1,075,432,295</u>

(2) Details of short-term borrowings as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	Creditor	Interest rate (%)	2019	2018
Collateralized borrowings ¹	Shinhan Bank and others	0.45 ~ 4.33	₩ 53,988,047	₩ 78,853,986
USANCE	Shinhan Bank and others	2.12 ~ 2.21	61,193,963	126,630,851
General borrowings	Korea Development Bank and others	2.30 ~ 3.13	393,000,000	564,000,000
			<u>₩ 508,182,010</u>	<u>₩ 769,484,837</u>

¹ The Company transferred trade receivables to banks and received cash. This transaction is accounted for as a collateralized borrowing (Note 8).

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(3) Details of long-term borrowings as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	Creditor	Interest rate (%)	Repayment terms	2019	2018
Loan for industrial facilities	Korea Development Bank and others	1.66 ~ 3.13	Partial repayment	₩ 82,723,770	₩ 33,625,000
Defense industry loans	NH Bank	1.66 ~ 2.00	Partial repayment	44,034,743	46,111,811
Loan for facilities in foreign currency	KOOKMIN BANK, TOKYO BRANCH	3.49	Repayment at due date	34,734,000	-
General loan (long-term)	Korea EXIM Bank and others	2.54 ~ 3.06	Partial repayment	155,000,000	225,000,000
	Shinhan Bank and others	2.11 ~ 3.08	Repayment at due date	120,000,000	80,000,000
	Total			436,492,513	384,736,811
	Less: Current portion			(183,827,260)	(150,466,608)
	Net amount			<u>₩ 252,665,253</u>	<u>₩ 234,270,203</u>

The Company provides property, plant and equipment and others as collateral in respect of the above short-term and long-term borrowings (Note 37).

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

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

<i>(in thousands of Korean won)</i>	Latest maturity date	Interest rate (%)	2019	2018
214th Public subscription bond	2019-02-17	3.05	₩ -	₩ 100,000,000
215th Public subscription bond	2019-07-05	2.97	-	100,000,000
216th Public subscription bond	2020-03-09	3.29	150,000,000	150,000,000
217th Public subscription bond	2020-06-07	2.67	100,000,000	100,000,000
218th Public subscription bond	2020-08-31	2.56	100,000,000	100,000,000
219th FRN Privately placed bond	2020-10-19	3M LIBOR + 0.95	34,734,000	33,543,000
220th Public subscription bond	2020-11-09	3.14	140,000,000	140,000,000
221st Public subscription bond	2021-02-08	2.93	100,000,000	100,000,000
222nd Public subscription bond	2021-04-13	2.78	100,000,000	100,000,000
223rd Public subscription bond	2021-11-02	2.55	120,000,000	120,000,000
224th Public subscription bond	2022-02-01	2.25	150,000,000	-
225-1st Public subscription bond	2022-04-18	2.14	70,000,000	-
225-2nd Public subscription bond	2024-04-18	2.35	80,000,000	-
226-1st Public subscription bond	2022-09-17	1.93	90,000,000	-
226-2nd Public subscription bond	2024-09-13	2.19	60,000,000	-
			1,294,734,000	1,043,543,000
	Less: Present value discounts		(2,453,582)	(2,480,012)
	Less: Current portion (including discount on bonds)		(524,287,105)	(199,900,896)
	Net amount		₩ 767,993,313	₩ 841,162,092

The Company provides property, plant and equipment and others as collateral in respect of the above debentures (Note 37).

(5) Principal repayment yearly plans of borrowings and debentures by the due date as at December 31, 2019, are as follows:

<i>(in thousands of Korean won)</i>	Less than 1 year	Between 1 year and 2 years	Between 2 and 3 years	More than 3 years	Total
Borrowings	₩ 692,009,270	₩ 25,358,313	₩ 213,456,003	₩ 13,850,937	₩ 944,674,523
Debentures	524,734,000	320,000,000	310,000,000	140,000,000	1,294,734,000
	₩ 1,216,743,270	₩ 345,358,313	₩ 523,456,003	₩ 153,850,937	₩ 2,239,408,523

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

20. Other Financial Liabilities

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

(in thousands of Korean won)

	2019		2018	
	Current	Non-current	Current	Non-current
Derivative financial instruments	₩ 58,827,897	₩ 409,866	₩ 1,904,391	₩ 43,363,334
Deposits received	543,296	3,954,641	377,935	2,078,555
Accrued expenses	44,070,886	-	60,448,999	-
Financial guarantee contract liabilities ¹	878,381	-	791,648	-
Lease payable	16,402,908	36,288,069	137,729	2,831,146
	<u>₩ 120,723,368</u>	<u>₩ 40,652,576</u>	<u>₩ 63,660,702</u>	<u>₩ 48,273,035</u>

¹ The Company offers payment guarantees on loans of Hanwha Q CELLS Japan Co., Ltd., and this payment guarantee complies with the definition of the financial guarantee contract under Korean IFRS 1109 *Financial Instruments* (Note 36).

21. Other Current Liabilities

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

(in thousands of Korean won)

	2019	2018
Advances receivable	₩ 899,262,524	₩ 797,844,327
Unearned revenues	870,492	889,888
Withholdings	28,149,388	31,261,474
Contract liabilities ¹	154,394,788	128,894,756
	<u>₩ 1,082,677,192</u>	<u>₩ 958,890,445</u>

¹ Due to customers for contract work.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

22. Post-employment Benefits

(1) Details of net defined benefit liabilities as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019	2018
Present value of defined benefit obligations	₩ 333,738,738	₩ 301,011,889
Fair value of plan assets	(22,099,833)	(24,227,398)
	<u>₩ 311,638,905</u>	<u>₩ 276,784,491</u>

(2) Movements in the defined benefit obligations for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019	2018
Beginning balance	₩ 301,011,889	₩ 316,440,764
Current service cost	39,241,022	39,740,445
Interest expense	11,289,276	13,295,590
Remeasurements:		
Actuarial gain from change in demographic assumptions	(2,244,709)	-
Actuarial loss from change in financial assumptions	1,065,538	16,927,143
Actuarial loss from experience adjustments	10,070,607	1,214,543
Actuarial loss arising from changes in adjustment of retirement age	146,691	-
Increase due to business combination	-	1,627,446
Decrease due to curtailment or liquidation	-	(36,784,845)
Payments from plans:		
Benefit payments	(24,076,009)	(57,803,552)
Others (including transfer in/out of affiliates)	(2,765,567)	6,354,355
Ending balance	<u>₩ 333,738,738</u>	<u>₩ 301,011,889</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

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

<i>(in thousands of Korean won)</i>	2019		2018	
Beginning balance	₩	24,227,398	₩	9,592,553
Interest income		866,464		384,108
Remeasurements:				
Return on plan assets (excluding amounts included in interest income)		(419,357)		(234,787)
Increase due to business combination		-		1,412
Decrease due to curtailment or liquidation		-		(29,474)
Contributions by the employer		3,062		16,230,308
Payments from plans:				
Benefit payments		(1,089,432)		(1,716,722)
Others (including transfer in/out of affiliates)		(1,488,302)		-
Ending balance	₩	<u>22,099,833</u>	₩	<u>24,227,398</u>

(4) Amounts recognized in the separate statements of comprehensive income for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Current service cost	₩	39,241,022	₩	39,740,445
Interest expense		11,289,276		13,295,590
Interest income of plan assets		(866,464)		(384,108)
Expense included in employee benefit	₩	<u>49,663,834</u>	₩	<u>52,651,927</u>

Amount of ₩ 36,342 million (2018: ₩ 40,056 million) is included in 'cost of manufacturing' and ₩ 13,322 million (2018: ₩ 12,596 million) in 'selling and administrative expenses'.

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

<i>(in percentage, %)</i>	2019	2018
Discount rate	3.09% ~ 3.59%	3.20% ~ 3.85%
Salary growth rate	4.07% ~ 5.10%	4.47% ~ 5.21%

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(6) The sensitivity of the defined benefit obligation to changes in the principal assumptions is:

(in thousands of Korean won)

	Impact on defined benefit obligation		
	Changes in assumption	Increase in assumption	Decrease in assumption
Discount rate	1%	₩ (34,407,195)	₩ 40,950,732
Salary growth rate	1%	40,964,707	(35,037,231)

Decrease in corporate bond yield, which is discount rate, causes value of debt securities to increase. Although this will be partially offset, the Company is exposed to significant risk by increase in the value of defined benefit obligations.

The above sensitivity analysis is based on a change in an assumption while holding all other assumptions constant. In practice, these changes with some of the assumptions correlated. The sensitivity of the defined benefit obligations in respect of changes in principal actuarial assumptions is calculated using the projected unit credit method; the same method applied when calculating the defined benefit obligations recognized in the separate statements of financial position. The methods and types of assumptions used in preparing the sensitivity analysis did not change compared to the previous year.

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

(in thousands of Korean won)

	2019		2018	
	Amount	Composition	Amount	Composition
Principal guaranteed financial instruments	₩ 21,805,093	98.67%	₩ 23,891,546	98.61%
Transferred to National Pension Fund	294,740	1.33%	335,852	1.39%
	<u>₩ 22,099,833</u>	<u>100.00%</u>	<u>₩ 24,227,398</u>	<u>100.00%</u>

(8) The weighted average duration of the defined benefit obligation is 6.97 ~ 12.73 years.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

23.Provisions

(1) Details of provisions as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019		2018	
	Current	Non-current	Current	Non-current
Provision for construction warranties	₩ 105,722	₩ 1,734,174	₩ -	₩ 552,928
Provision for construction losses	-	21,247,119	-	17,389,433
Others ¹	19,685,205	33,283,674	7,779,750	20,706,024
	<u>₩ 19,790,927</u>	<u>₩ 56,264,967</u>	<u>₩ 7,779,750</u>	<u>₩ 38,648,385</u>

¹ The Company has some offset order's obligations when exporting, and the related-penalty costs are estimated and reflected in the separate financial statements.

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

(in thousands of Korean won)

	2019			
	Provision for construction warranties	Provision for construction losses	Others	Total
Beginning	₩ 552,928	₩ 17,389,433	₩ 28,485,774	₩ 46,428,135
Increase	3,626,198	12,523,975	33,599,270	49,749,443
Used during year	(2,339,229)	(8,243,452)	(8,785,187)	(19,367,868)
Reversal	-	(422,838)	(330,979)	(753,817)
Ending	<u>₩ 1,839,897</u>	<u>₩ 21,247,118</u>	<u>₩ 52,968,878</u>	<u>₩ 76,055,893</u>

(in thousands of Korean won)

	2018				
	Provision for product warranties	Provision for construction warranties	Provision for construction losses	Others	Total
Beginning	₩ 4,586,174	₩ 391,727	₩ 20,411,936	₩ 20,307,669	₩ 45,697,506
Increase	231,755	1,579,809	15,145,507	15,361,891	32,318,962
Used during year	(234,382)	(1,418,608)	(12,347,959)	(5,599,689)	(19,600,638)
Reversal	(4,133,055)	-	(612,366)	(122,071)	(4,867,492)
Held-for-sale	-	-	-	(71,156)	(71,156)
Business acquisition	-	-	418,384	878,362	1,296,746
Business transfer	(450,492)	-	(5,626,069)	(2,269,232)	(8,345,793)
Ending	<u>₩ -</u>	<u>₩ 552,928</u>	<u>₩ 17,389,433</u>	<u>₩ 28,485,774</u>	<u>₩ 46,428,135</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

24. Construction Contract

(1) Changes in construction contract balance for the year ended December 31, 2019, are as follows:

(in thousands of Korean won)

	2019			
	Beginning	Changes ¹	Recognized construction revenue	Ending
Industrial machinery	₩ 368,684,684	₩ 471,572,503	₩ (432,440,896)	₩ 407,816,291
Domestic construction	1,591,318	49,766,922	(35,978,068)	15,380,172
Defense	303,068,826	152,873,344	(145,777,414)	310,164,756
	<u>₩ 673,344,828</u>	<u>₩ 674,212,769</u>	<u>₩ (614,196,378)</u>	<u>₩ 733,361,219</u>

¹ Increased amount caused by new contracts is ₩ 650,578 million and amount of effect caused by changes in the size of construction is ₩ 23,635 million for the year of 2019.

(2) Details of accumulated contract gains and losses in relation to construction contract in progress as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019			
	Accumulated contract revenue	Accumulated contract cost of sales	Accumulated profit or loss	Advances receivable
Industrial machinery	₩ 717,707,068	₩ 621,640,380	₩ 96,066,688	₩ 21,816,878
Domestic construction	47,301,171	49,974,878	(2,673,707)	130,000
Defense	511,832,970	608,247,668	(96,414,698)	-
	<u>₩ 1,276,841,209</u>	<u>₩ 1,279,862,926</u>	<u>₩ (3,021,717)</u>	<u>₩ 21,946,878</u>

(in thousands of Korean won)

	2018			
	Accumulated contract revenue	Accumulated contract cost of sales	Accumulated profit or loss	Advances receivable
Industrial machinery	₩ 694,072,884	₩ 606,628,412	₩ 87,444,472	₩ 11,953,654
Domestic construction	4,831,682	4,123,657	708,025	-
Defense	587,373,171	664,649,529	(77,276,358)	-
Aerospace	112,217,046	101,101,223	11,115,823	47,702,439
	<u>₩ 1,398,494,783</u>	<u>₩ 1,376,502,821</u>	<u>₩ 21,991,962</u>	<u>₩ 59,656,093</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(3) Details of contract assets and contract liabilities as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019		2018	
	Contract assets ¹	Contract liabilities	Contract assets ¹	Contract liabilities
Industrial machinery	₩ 69,192,007	₩ 36,007,377	₩ 72,642,548	₩ 61,745,563
Domestic construction	3,349,089	189,115	4,631,682	-
Defense	32,837,173	117,389,102	23,502,710	65,743,294
Aerospace	-	-	2,894,707	890,827
	₩ 105,378,269	₩ 153,585,594	₩ 103,671,647	₩ 128,379,684

¹ Recognized as other current assets on the separate statements of financial position.

(4) Amount of effect on current and future profits and losses caused by changes in defense and industrial machinery in progress for the year ended December 31, 2019, is as follows:

(in thousands of Korean won)

	2019						
	Changes in estimated total contract revenue	Changes in estimated total contract cost of sales	Effect on current profit or losses	Effect on future profits and losses	Changes in contract assets	Changes in contract liabilities	Provision for construction losses
Industrial machinery	₩ (10,937,375)	₩ (19,339,005)	₩ 5,142,747	₩ 3,258,883	₩ 20,397,736	₩ 15,254,989	₩ 61,579
Domestic construction ¹	-	-	-	-	-	-	253,226
Defense	8,989,441	21,404,788	(12,255,914)	(159,434)	7,491,005	19,746,919	19,817,123
	₩ (1,947,934)	₩ 2,065,783	₩ (7,113,167)	₩ 3,099,449	₩ 27,888,741	₩ 35,001,908	₩ 20,131,928

¹ A new contract has been made and there are no changes in contract revenue and estimated costs for the year ended December 31, 2019.

(5) There is no construction contract in progress, and the amount of contract revenue is more than 5% of total revenue as at December 31, 2019 and 2018.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

25. Share Capital and Capital Surplus

(1) Share capital as at December 31, 2019 and 2018, is as follows:

<i>(in thousands of Korean won and in number of shares)</i>	Number of authorized shares	Number of shares issued	Par value (in Korean won)	2019	2018
Ordinary shares		74,958,735	5,000 ₩	374,793,675	₩ 374,793,675
1 st preferred shares ¹	200,000,000	479,294	5,000	2,396,470	2,396,470
3 rd preferred shares ²		22,472,000	5,000	112,360,000	112,360,000
				<u>₩ 489,550,145</u>	<u>₩ 489,550,145</u>

¹ The 1st preferred share, which is non-cumulative, is eligible to receive cash dividends, if declared, equal to that declared for ordinary shares plus an additional 1%.

² In October 2016, the Company increased paid-in capital as preferred share without voting rights (22,472,000 shares).

(2) Capital surplus as at December 31, 2019 and 2018, is as follows:

<i>(in thousands of Korean won)</i>	2019	2018
Share premium	₩ 342,536,029	₩ 342,536,029
Revaluation reserve	67,357,029	67,357,029
Other capital surplus	173,749,633	173,749,633
	<u>₩ 583,642,691</u>	<u>₩ 583,642,691</u>

26. Capital Adjustment

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

<i>(in thousands of Korean won)</i>	2019	2018
Treasury share ¹	₩ (20,751,089)	₩ (20,751,089)

¹ As at December 31, 2019 and 2018, the number of treasury shares is unchanged at 5,800,000 shares. Treasury shares do not have voting rights according to the commercial law.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

27. Accumulated Other Comprehensive Income

Details of accumulated other comprehensive income as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Beginning	₩	-	₩	(580,899)
Gain and loss on valuation of available-for-sale financial assets		-		-
Effect of the initial application of Korean IFRS 1109		-		580,899
Ending	₩	-	₩	-

28. Retained Earnings and Dividends

(1) Details of retained earnings as at December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Legal reserves				
Earned profit reserves ¹	₩	59,300,000	₩	53,000,000
Discretionary reserves				
Research and development reserves ²		-		13,333,333
Other discretionary reserves		1,217,800,000		1,217,800,000
		<u>1,217,800,000</u>		<u>1,231,133,333</u>
Retained earnings before appropriation				
Carryforward reserves and others		1,094,406,538		1,056,370,149
	₩	<u>2,371,506,538</u>	₩	<u>2,340,503,482</u>

¹ The Commercial Code of the Republic of Korea requires the Company to appropriate for each financial period, as a legal reserve, an amount equal to a minimum of 10% of cash dividends paid until such reserve equals 50% of its issued share capital. The reserve is not available for cash dividends payment, but may be transferred to share capital or used to reduce accumulated deficit in accordance with a resolution of the shareholders' meeting.

² The Company appropriates a certain portion of its retained earnings as reserves for research and development, which are provided in order to obtain tax benefits under the Special Tax Treatment Control Law. Among these reserves, the reversed amount according to the terms of related tax laws may be distributed.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(2) Appropriation of retained earnings

The appropriation of retained earnings for the year ended December 31, 2019, is expected to be appropriated at the shareholders' meeting on March 25, 2020. The appropriation date for the year ended December 31, 2018, was March 27, 2019.

<i>(in thousands of Korean won)</i>	2019	2018
Retained earnings available for appropriation		
Unappropriated retained earnings carried over from prior year	₩ 1,001,318,057	₩ 805,050,032
Accumulative effects due to changes in accounting policies	-	(19,271,548)
Remeasurements of net defined benefit liabilities	(7,181,373)	(13,929,367)
Profit for the year	100,269,854	284,521,032
	<u>1,094,406,538</u>	<u>1,056,370,149</u>
Transfers such as discretionary reserves		
Research and development reserves	-	13,333,333
	<u>-</u>	<u>13,333,333</u>
Appropriation of retained earnings		
Earned profit reserves	6,600,000	6,300,000
Dividends (Cash dividend per share (%):		
Ordinary share: ₩ 700 (14%) (2018: ₩ 700 (14%))	65,568,585	62,085,425
1 st preferred share: ₩ 750 (15%) (2018: ₩ 750 (15%))		
3 rd preferred share: ₩ 750 (15%) (2018: ₩ 595 (11.9%))		
	<u>72,168,585</u>	<u>68,385,425</u>
Unappropriated retained earnings to be carried forward	<u>₩ 1,022,237,953</u>	<u>₩ 1,001,318,057</u>

(3) Dividends

The dividends paid in 2019 and 2018 were ₩ 62,085 million (₩ 700 per ordinary share, ₩ 750 per 1st preferred share and ₩ 595 per 3rd preferred share) and ₩ 56,276 million (₩ 600 per ordinary share, ₩ 650 per 1st preferred share and ₩ 646 per 3rd preferred share), respectively. Dividends for the year ended December 31, 2019, of ₩ 700 per ordinary share, ₩ 750 per 1st preferred share and ₩ 750 3rd preferred share, amounting to a total dividend of ₩ 65,569 million, are to be proposed at the annual general shareholders' meeting on March 25, 2020. Separate financial statements as of December 31, 2019, do not reflect these dividends payable.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

29. Revenue and Cost of Sales

(1) Details of revenue for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019	2018
Finished goods	₩ 1,533,590,403	₩ 2,080,817,073
Merchandise	2,015,904,353	2,231,348,846
Construction	432,641,366	427,902,742
Service and others	451,026,928	484,179,058
	<u>₩ 4,433,163,050</u>	<u>₩ 5,224,247,719</u>

<i>(in thousands of Korean won)</i>	2019	2018
Recognizing profit on certain point		
Finished goods	₩ 1,532,823,490	₩ 2,037,088,351
Merchandise	2,015,898,473	2,231,334,846
Service and others	69,580,763	240,167,543
	<u>₩ 3,618,302,726</u>	<u>₩ 4,508,590,740</u>

Recognizing profit over certain point		
Finished goods	₩ 766,913	₩ 43,728,722
Merchandise	5,880	14,000
Construction	432,641,366	427,902,742
Service and others	381,446,165	244,011,515
	<u>₩ 814,860,324</u>	<u>₩ 715,656,979</u>

(2) Details of cost of sales for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019	2018
Finished goods	₩ 1,257,934,999	₩ 1,702,244,492
Merchandise	1,909,137,650	2,123,428,806
Construction	371,223,021	360,261,115
Service and others	398,096,897	415,042,405
	<u>₩ 3,936,392,567</u>	<u>₩ 4,600,976,818</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

30. Selling and Administrative Expenses

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

<i>(in thousands of Korean won)</i>	2019	2018
Salaries	₩ 94,681,332	₩ 100,869,932
Post-employment benefits ¹	13,521,677	12,807,693
Employee benefits	13,564,636	13,892,673
Rental expenses	1,330,365	15,105,302
Depreciation of property, plant and equipment	7,923,331	8,353,534
Depreciation of investment property	529,888	85,865
Amortization	5,014,003	9,228,506
Depreciation of right-of-use assets	14,856,882	-
Taxes and dues	3,880,992	3,138,574
Advertising expenses	2,776,573	3,825,807
Outsourcing fees	8,336,149	8,058,855
Freight expenses	16,310,087	16,182,152
Sales commission expenses	17,566,434	24,013,810
Commission expenses	27,000,940	25,811,717
Others	80,528,411	82,014,087
	<u>₩ 307,821,700</u>	<u>₩ 323,388,507</u>

¹ Voluntary retirement benefits of ₩ 93 million (2018: ₩ 211 million) and expense recognized in relation to defined contribution plan of ₩ 107 million (2018: nil) are included in 'post-employment benefits'.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

31. Breakdown of Expenses by Nature

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

<i>(in thousands of Korean won)</i>	2019	2018
Changes in inventories ¹	₩ 142,593,769	₩ (255,276,677)
Raw materials used	1,265,649,001	1,674,314,378
Merchandise purchased	1,877,677,083	2,151,573,539
Salaries and wages	422,229,368	481,657,413
Employee benefits	63,146,805	67,163,844
Rental expenses	3,717,796	20,333,018
Depreciation of property, plant and equipment	60,311,591	67,796,972
Depreciation of investment property	529,888	85,865
Amortization	11,567,654	18,222,828
Depreciation of right-of-use assets	21,835,230	-
Taxes and dues	7,615,348	7,034,955
Research and development expenses	57,797,642	52,430,636
Commission expenses	55,713,418	54,283,129
Others	253,829,673	584,745,425
	<u>₩ 4,244,214,266</u>	<u>₩ 4,924,365,325</u>

¹ Changes of raw materials were excluded.

32. Other Income and Expenses

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

<i>(in thousands of Korean won)</i>	2019	2018
Gain on foreign currency transaction and translation	₩ 48,984,941	₩ 41,836,282
Gain on valuation of financial assets measured at fair value through profit or loss	137,901	298,878
Gain on disposal of financial assets measured at fair value through profit or loss	-	80,000
Gain on valuation of derivatives	23,242,079	5,415,773
Gain on transaction of derivatives	27,012,036	48,056,752
Gain on disposal of investments in subsidiaries and associates	1,454,796	53,796,591
Reversal of impairment loss on investments in subsidiaries and associates	3,130,530	3,736,380
Reversal of other impairment loss	647,541	28,882,238
Others	50,289,388	102,348,535
	<u>₩ 154,899,212</u>	<u>₩ 284,451,429</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(2) Details of other expenses for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019	2018
Loss on foreign currency transaction and translation	₩ 54,235,207	₩ 44,997,545
Loss on valuation of financial assets measured at fair value through profit or loss	198,841	448
Loss on disposal of financial assets measured at fair value through profit or loss	502	1,640
Loss on disposal of financial assets measured at fair value through other comprehensive income	-	11,185
Loss on valuation of derivatives	15,876,705	13,276,391
Loss on transaction of derivatives	50,205,749	69,527,036
Loss on disposal of investments in subsidiaries and associates	-	15,683,095
Impairment loss on investments in subsidiaries and associates	27,664,002	12,991,563
Other impairment loss	554,079	1,369,523
Others	40,682,471	62,358,437
	<u>₩ 189,417,556</u>	<u>₩ 220,216,863</u>

33. Finance Income and Costs

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

<i>(in thousands of Korean won)</i>	2019	2018
Interest income according to the effective interest rate method		
Long-term trade receivables	₩ 4,494	₩ 13,868
Loans	-	11,686
Interest income - others		
Cash and cash equivalents, advance deposit and others	5,395,345	2,624,451
Loans	214,672	107,290
Others	326	1,945
Dividend income	30,731,080	53,023,898
	<u>₩ 36,345,917</u>	<u>₩ 55,783,138</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

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

<i>(in thousands of Korean won)</i>	2019	2018
Interest expense		
Borrowings and debentures ¹	₩ 70,316,466	₩ 78,408,527
Others	1,848,379	233,757
	<u>₩ 72,164,845</u>	<u>₩ 78,642,284</u>

¹ During the year ended December 31, 2019, the Company has capitalized borrowing costs on qualifying assets. The capitalization rate of borrowings used to determine the amount of borrowing costs to be capitalized is 2.85% (2018: 2.94%).

34. Income Tax Expense

(1) Income tax expense for the years ended December 31, 2019 and 2018, consists of the following

<i>(in thousands of Korean won)</i>	2019	2018
Current tax:		
Current tax on profits for the year	₩ 24,846,024	₩ 47,827,965
Adjustments in respect of prior years	6,299,133	(19,504,810)
Total current tax	<u>31,145,157</u>	<u>28,323,155</u>
Deferred tax:		
Increase (decrease) of temporary differences	(12,803,500)	28,413,627
Total deferred tax	<u>(12,803,500)</u>	<u>28,413,627</u>
Income tax expense	<u>₩ 18,341,657</u>	<u>₩ 56,736,782</u>

(2) An explanation of the relationship between income tax expense and profit before tax for the years ended December 31, 2019 and 2018, is as follows:

<i>(in thousands of Korean won)</i>	2019	2018
Profit before tax	₩ 118,611,511	₩ 341,257,814
Tax calculated at domestic tax rates applicable to profits in the respective countries	28,241,986	82,122,391
Tax effects:		
Income not subject to tax	(12,814,071)	(7,206,111)
Expenses not deductible for tax purposes	3,580,834	12,030,935
Tax credit and tax reduction	(4,722,845)	(4,663,319)
Unrecognized deferred tax	16,227,267	-

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Adjustment in respect of prior years		<u>(12,171,514)</u>		<u>(25,547,114)</u>
Income tax expense	₩	18,341,657	₩	56,736,782
Effective tax rate		15.46%		16.63%

(3) The income taxes charged or credited directly to equity for the years ended December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019			2018		
	Before tax	Tax effect	After tax	Before tax	Tax effect	After tax
Gain (loss) on valuation of available-for-sale securities	₩ -	₩ -	₩ -	₩ -	₩ -	₩ -
Remeasurements	<u>(9,457,483)</u>	<u>2,276,110</u>	<u>(7,181,373)</u>	<u>(18,376,473)</u>	<u>4,447,106</u>	<u>(13,929,367)</u>
	₩ (9,457,483)	₩ 2,276,110	₩ (7,181,373)	₩ (18,376,473)	₩ 4,447,106	₩ (13,929,367)

(4) The analysis of deferred tax assets and liabilities as at December 31, 2019 and 2018, is as follows:

(in thousands of Korean won)

	2019	2018
Deferred tax assets		
Deferred tax asset to be recovered after more than 12 months	₩ 164,893,021	₩ 107,370,048
Deferred tax asset to be recovered within 12 months	<u>70,036,732</u>	<u>65,221,099</u>
	<u>234,929,753</u>	<u>172,591,147</u>
Deferred tax liabilities		
Deferred tax liability to be recovered after more than 12 months	(400,520,725)	(348,588,812)
Deferred tax liability to be recovered within 12 months	<u>(1,439,949)</u>	<u>(1,421,337)</u>
	<u>(401,960,674)</u>	<u>(350,010,149)</u>
Deferred tax assets (liabilities), net	₩ (167,030,921)	₩ (177,419,002)

(5) Changes in deferred income tax for the years ended December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019	2018
Beginning	₩ (177,419,002)	₩ (147,634,673)
Deferred income tax charged to statement of comprehensive income	8,111,972	(34,231,435)
Tax charged or credited directly to equity	<u>2,276,110</u>	<u>4,447,106</u>
Ending	₩ (167,030,920)	₩ (177,419,002)

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(6) The movements in deferred tax assets and liabilities for the years ended December 31, 2019 and 2018, without taking into consideration the offsetting of balances within the same tax jurisdiction, are as follows:

(in thousands of Korean won)

		2019			
		Beginning	comprehensive income	Equity	Ending
Deferred tax assets					
Provision for performance incentive	₩	6,412,487	₩ (2,387,105)	₩ -	₩ 4,025,382
Allowance for bad debt		6,659,589	(441,969)	-	6,217,620
Remeasurements		23,417,558	-	2,276,110	25,693,668
Government grants		702,479	610,832	-	1,313,311
Defined benefit obligations		50,201,958	5,321,726	-	55,523,684
Others		85,197,076	16,387,971	-	101,585,047
	₩	<u>172,591,147</u>	₩ <u>19,491,455</u>	₩ <u>2,276,110</u>	₩ <u>194,358,712</u>
Deferred tax liabilities					
Interest on construction borrowings	₩	(1,073,839)	₩ 829	₩ -	₩ (1,073,010)
Investment in subsidiaries and associates		(212,354,801)	(12,644,391)	-	(224,999,192)
Revaluation surplus		(39,939,605)	13,318	-	(39,926,287)
Gain on business spin-off		(38,198,132)	-	-	(38,198,132)
Other capital surplus		(28,610,751)	-	-	(28,610,751)
Others		(29,833,021)	1,250,760	-	(28,582,261)
	₩	<u>(350,010,149)</u>	₩ <u>(11,379,484)</u>	₩ -	₩ <u>(361,389,633)</u>

(in thousands of Korean won)

		2018			
		Beginning	comprehensive income	Equity	Ending
Deferred tax assets					
Gain on real estate	₩	171,645	₩ (171,645)	₩ -	₩ -
Provision for performance incentive		4,514,558	1,897,929	-	6,412,487
Allowance for bad debt		28,801,827	(22,142,238)	-	6,659,589
Remeasurements		18,970,452	-	4,447,106	23,417,558
Government grants		1,601,922	(899,443)	-	702,479
Defined benefit obligations		58,002,277	(7,800,319)	-	50,201,958
Others		79,889,438	5,307,638	-	85,197,076
	₩	<u>191,952,119</u>	₩ <u>(23,808,078)</u>	₩ <u>4,447,106</u>	₩ <u>172,591,147</u>
Deferred tax liabilities					
Interest on construction borrowings	₩	(1,075,498)	₩ 1,659	₩ -	₩ (1,073,839)
Investment in subsidiaries and associates		(212,354,801)	-	-	(212,354,801)
Revaluation surplus		(39,946,920)	7,315	-	(39,939,605)
Gain on business spin-off		(38,198,132)	-	-	(38,198,132)

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Other capital surplus	(28,610,751)	-	-	(28,610,751)
Reserve for research and human resource development	(806,667)	806,667	-	-
Others	(18,594,023)	(11,238,998)	-	(29,833,021)
	<u>₩ (339,586,792)</u>	<u>₩ (10,423,357)</u>	<u>₩ -</u>	<u>₩ (350,010,149)</u>

35. Earnings per Share

(1) Profits attributable to ordinary shares and 1st preferred shares for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>		2019		2018
Profit for the year	₩	100,269,854	₩	284,521,032
Dividend to third preferred share		<u>(16,854,000)</u>		<u>(13,370,840)</u>
Profit attributable to ordinary shares and first preferred shares	₩	<u>83,415,854</u>	₩	<u>271,150,192</u>

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

<i>(in thousands of Korean won)</i>		2019		2018	
		Ordinary shares	1st preferred shares ²	Ordinary shares	1st preferred shares ²
Profit attributable to equity holders of the Company	₩	82,817,272	₩ 598,582	₩ 269,258,015	₩ 1,892,177
Weighted-average number of ordinary shares in issue		<u>69,078,735</u>	<u>479,294</u>	<u>69,078,735</u>	<u>479,294</u>
Basic earnings per share ¹ (in Korean won)	₩	<u>1,199</u>	₩ <u>1,249</u>	₩ <u>3,898</u>	₩ <u>3,948</u>

¹ Basic earnings per share from continuing operations of 2019 and 2018 are identical to basic earnings per share.

² Preferred shares were issued under the former commercial law before amendments in 1997. These preferred shares hold the same priority as ordinary shares in terms of dividends payout and distribution of residual- properties, thus earnings per share were calculated accordingly. Dividends are paid by adding 1% of par value of ordinary shares to dividends per ordinary shares.

(3) For the years ended December 31, 2019 and 2018, there was no adjustment for number of ordinary shares in issue. Thus, the weighted-average number of ordinary shares in issue is identical to the number of issued shares at the beginning.

(4) The Company did not issue potential ordinary shares. Therefore, basic earnings per share are identical to diluted earnings per share.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

36.Related Party Transactions

(1) The Company has no parent company as at December 31, 2019 and 2018.

(2) Details of subsidiaries list as at December 31, 2019 and 2018, are as follows:

	Percentage of ownership (%)		Location	Closing month	Main business
	2019	2018			
Gyeonggi Yongin Techno Valley Co., Ltd.	80.00	80.00	Korea	December	Real estate business
Gimhae Techno Valley Co., Ltd.	80.00	80.00	Korea	December	Real estate business
Agricultural Corporation Company Green Tomorrow	90.00	90.00	Korea	December	Processing and distribution of agricultural, livestock and forest products
Data Analytics Lab Co., Ltd.	100.00	100.00	Korea	December	Management consulting
H-P&D Co., Ltd. (Formerly, Lake Park-H Co., Ltd.)	100.00	100.00	Korea	December	Real estate development
Seosan Techno Valley Co., Ltd.	65.00	65.00	Korea	December	Real estate development and supply
Anseong Techno Valley Co., Ltd.	80.00	-	Korea	December	Real estate development and supply
Asan Techno Valley Co., Ltd.	100.00	100.00	Korea	December	Real estate business
Yangju Ecotec Co., Ltd.	100.00	100.00	Korea	December	Construction and operation of sewage treatment plant
Yeosu Sea World Corporation	100.00	100.00	Korea	December	Aquarium
H Valley Co., Ltd.	100.00	100.00	Korea	December	Sale and trading of real estate
Eco E&O	100.00	100.00	Korea	December	Sewage treatment and environmental pollution prevention facility
Ilsan Seaworld, Co., Ltd	99.11	99.11	Korea	December	Aquarium
YoungAm TechnoSolar Co., Ltd	100.00	100.00	Korea	December	Photovoltaic business
YoungAm HaeOReumSolar Co., Ltd	100.00	100.00	Korea	December	Photovoltaic business
Hi-pass Solar Co., Ltd	100.00	100.00	Korea	December	Photovoltaic business
HaeSaRang Solar Co., Ltd	100.00	100.00	Korea	December	Photovoltaic business
KAES Co., Ltd.	100.00	100.00	Korea	December	Machine manufacturing
Hanwha 63 City Co., Ltd.	100.00	100.00	Korea	December	Real estate management service and others
Hanwha Galleria Co., Ltd.	100.00	100.00	Korea	December	Department store and

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

						wholesale/retail
Hanwha Galleria Timeworld Co., Ltd.	85.45	69.45	Korea	December		Department store
Hanwha Engineering and Construction Corp.	100.00	100.00	Korea	December		Civil engineering, housing construction, industrial equipment and others
Hanwha Finance Asset Co., Ltd.	100.00	100.00	Korea	December		Insurance brokerage
Hanwha City Development Co., Ltd.	100.00	100.00	Korea	December		Sale and trading of real estate and others
Hanwha Defense Systems Corp. (Formerly, Hanwha Land Systems Co., Ltd.) ⁶	100.00	100.00	Korea	December		Military equipment
Hanwha Life Asset Co., Ltd.	100.00	100.00	Korea	December		Insurance agency and brokerage
Hanwha B&B Co., Ltd.	100.00	100.00	Korea	December		Food and wholesale/retail
Hanwha Life Insurance Co., Ltd. ¹	44.99	44.99	Korea	December		Life insurance
Hanwha General Insurance Co., Ltd.	51.36	51.36	Korea	December		Insurance and pension services
Hanwha Life Insurance Investigation & Adjusting	100.00	100.00	Korea	December		Insurance and pension services
Hanwha Systems Co., Ltd. ³	48.99	52.91	Korea	December		Gunpowder services
Hanwha Estate Co., Ltd.	100.00	100.00	Korea	December		Business facilities management and business support
Hanwha Aerospace Co., Ltd. ³	33.34	33.03	Korea	December		Manufacturing of aircraft engine and parts
Hanwha Station Development Co., Ltd.	67.25	67.25	Korea	December		Leasing service
Hanwha Eagles Professional Baseball Club Co., Ltd.	90.00	90.00	Korea	December		Operation of sports club
Hanwha Asset Management Co., Ltd.	100.00	100.00	Korea	December		Asset management
Hanwha Savings Bank Co., Ltd.	100.00	100.00	Korea	December		Deposit and savings import business / Financial loan
Hanwha Precision Machinery Co., Ltd.	100.00	100.00	Korea	December		Manufacturing and sale of Chip Mounter and others
Hanwha Q CELLS & Advanced Materials Co., Ltd.	100.00	-	Korea	December		Synthetic resin processing and others
Hanwha Global Asset Corporation (Formerly, Hanwha Q CELLS & Advanced Materials Co., Ltd.) ⁸	100.00	100.00	Korea	December		Synthetic resin processing and others

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Hanwha Compound Corporation Co., Ltd.	100.00	100.00	Korea	December	Manufacturing and sale of packaging materials
Hanwha Chemical Co., Ltd. ³	36.62	36.26	Korea	December	Manufacturing of synthetic resin and other petrochemical products
Hanwha Chemical Overseas Holdings, Co., Ltd.	100.00	100.00	Korea	December	Holding company
HIS Co.,Ltd (Formerly, Hanwha Q Cell Co., Ltd.)	100.00	100.00	Korea	December	Development, manufacturing and sale of solar cell (including module) and photovoltaic power generation system
Hanwha TechM Co., Ltd.	100.00	100.00	Korea	December	Domestic and foreign securities investment
Hanwha Techwin Co., Ltd.	100.00	100.00	Korea	December	Manufacturing of broadcasting and wireless communication equipment
Hanwha Investment & Securities Co., Ltd. ³	45.24	32.23	Korea	December	Financial investment
Hanwha Power System Co., Ltd.	100.00	100.00	Korea	December	Manufacturing and sale of compressor, generator and gas turbine
Hanwha Hotel & Resort Inc.	99.32	99.32	Korea	December	Condominium operation
Hanwha Techwin Tianjin Opto-Electronic Co., Ltd.	95.00	95.00	China	December	Manufacturing and sale of CCTV and others
Hanwha Investment Management Limited	100.00	100.00	China	December	Investment management
Hanwha Chemical Trading (Shanghai) Co., Ltd.	100.00	100.00	China	December	Trading
Hanwha International Trading (Shanghai) Co., Ltd.	100.00	100.00	China	December	Trading
Foodist Food Culture (Shanghai) Co., Ltd.	100.00	100.00	China	December	Group meal and catering services
Hanwha TechM (Suzhou) Co., Ltd.	100.00	100.00	China	December	Production of machine tools and power train
Hanwha Commercial Equipment Co., Ltd.	100.00	100.00	China	December	Sale of compressor and industrial equipment
Acropark Golf Corp.	100.00	100.00	Japan	December	Golf course and resort business
Alkin Enerji uretim Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
Aslan Gunes Enerjisi A.s.	100.00	100.00	Turkey	December	Photovoltaic power generation
Avenir el Divisadero SpA	100.00	100.00	Chile	December	EPC Construction
Blue Albatross FZE	100.00	100.00	UAE	December	Trading

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Eagle Petroleum Monterey, LLC	100.00	100.00	USA	December	Resource development
Eagle Petroleum, LLC	100.00	100.00	USA	December	Resource development
Elcin Enerji uretim Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
EMBR PTY LTD	100.00	100.00	Australia	December	Supply of gunpowder products and services
Fior Gunes Enerjisi Anonim sirketi	100.00	100.00	Turkey	December	Photovoltaic power generation
Fnt Gida Turizm Ic Ve Dis Ticaret Sanayi Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
Garnet Solar Power Generation 1, LLC	100.00	100.00	USA	December	Photovoltaic business
Hanwha Advanced Materials America LLC	100.00	100.00	USA	December	Manufacturing of automobile parts
Hanwha Advanced Materials Beijing Co., Ltd.	100.00	100.00	China	December	Manufacturing of automobile part materials
Hanwha Advanced Materials Chongqing Co.,Ltd.	100.00	100.00	China	December	Manufacturing of automobile materials
Hanwha Advanced Materials Europe, s.r.o.	100.00	100.00	Czech Republic	December	Manufacturing of automobile part materials
Hanwha Advanced Materials Germany GmbH	100.00	100.00	Germany	December	Manufacturing of automobile parts
Hanwha Advanced Materials Holdings USA Inc.	100.00	100.00	USA	December	Holding company
Hanwha Advanced Materials Holdings USA LLC	100.00	100.00	USA	December	Holding company
Hanwha Advanced Materials Mexico S. De R.L. De C.V.	100.00	100.00	Mexico	December	Manufacturing of automobile parts
Hanwha Advanced Materials Shanghai Co., Ltd.	100.00	100.00	China	December	Manufacturing
HANWHA AERO ENGINES.,LTD	100.00	100.00	Vietnam	December	Manufacturing of aircraft parts
Hanwha America Development Inc.	100.00	100.00	USA	December	Real estate business
Hanwha America Development LLC.	100.00	100.00	USA	December	Real estate development
Hanwha Asset Management (USA) Ltd.	100.00	100.00	USA	December	Domestic and foreign securities investment
HANWHA ASSET MANAGEMENT PTE. LTD.	100.00	100.00	Singapore	December	Asset management
Hanwha AZDEL, Inc.	100.00	100.00	USA	December	Manufacturing of automobile parts

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Hanwha Canada Development Inc.	100.00	100.00	Canada	December	Oil business
Hanwha Chemical (Ningbo) Co., Ltd.	100.00	100.00	China	December	Compound manufacturing
Hanwha Chemical (Thailand) Co.,Ltd.	99.99	99.99	Thailand	December	Compound manufacturing
HANWHA CHEMICAL INDIA PRIVATE LIMITED	99.99	99.99	India	December	Sale and purchase of petrochemicals and photovoltaic products
Hanwha Chemical Malaysia Sdn. Bhd.	100.00	100.00	Malaysia	December	Sale of petrochemicals
Hanwha Europe GmbH	100.00	100.00	Germany	December	Trading
Hanwha Holdings(USA), Inc.	100.00	100.00	USA	December	Holding company
Hanwha Hong Kong Co., Ltd.	100.00	100.00	Hong Kong	December	Trading
Hanwha International (S) Pte Ltd.	100.00	100.00	Singapore	December	Trading
Hanwha International Corp.	100.00	100.00	USA	December	Holding company
HANWHA INTERNATIONAL INDIA PVT., LT	99.99	99.99	India	December	Trading
Hanwha International LLC.	100.00	100.00	USA	December	Trading
Hanwha International Peru S.A.C.	100.00	100.00	Peru	December	Gunpowder services and explosives and blasting
Hanwha Life Insurance Company Limited. (Vietnam)	100.00	100.00	Vietnam	December	Life insurance
Hanwha Machinery Americas, Inc.	100.00	100.00	USA	December	Sale of machine tool
Hanwha Machinery Corporation	100.00	100.00	USA	December	Holding company
Hanwha Mining Services Australia Pty., Ltd	100.00	100.00	Australia	December	Gunpowder services and explosives and blasting
Hanwha Mining Services Chile SpA	100.00	100.00	Chile	December	Gunpowder services and explosives and blasting
Hanwha Parcel O LLC	100.00	100.00	USA	December	Real estate development
Hanwha Power Systems Americas, Inc.	100.00	100.00	USA	December	Sale of compressor and service materials
Hanwha Power Systems (Shanghai) Co.,LTD	100.00	100.00	China	December	Sale of compressor and service materials
Hanwha Power Systems Service Middle East LLC ²	49.00	49.00	UAE	December	Sale of compressor and service materials
Hanwha Property USA LLC	100.00	100.00	USA	December	Real estate business
Hanwha PVPLUS LLC	100.00	100.00	USA	December	Photovoltaic power generation investment
Hanwha Q CELLS America Inc.	100.00	100.00	USA	December	Sale of photovoltaic products
Hanwha Q CELLS America Project Holdings	100.00	100.00	USA	December	Photovoltaic project investment

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Hanwha Q CELLS Americas Holdings. Corp.	100.00	100.00	USA	December	Photovoltaic business
Hanwha Q CELLS Australia Holdings Pty Ltd	100.00	100.00	Australia	December	Photovoltaic business
Hanwha Q CELLS Australia Pty Ltd.	100.00	100.00	Australia	December	Sale of photovoltaic products
Hanwha Q CELLS Canada, Inc	100.00	100.00	Canada	December	Photovoltaic business
Hanwha Q CELLS Canada, Corp.	100.00	100.00	Canada	December	Sale of photovoltaic products
Hanwha Q CELLS Chile SpA	100.00	100.00	Chile	December	Construction and sale of photovoltaic power generation system
Hanwha Q CELLS Co., Ltd.(Formerly, Hanwha Solar Holdings Co.,Ltd) ⁷	100.00	100.00	United Kingdom	December	Manufacturing and sale of photovoltaic products
Hanwha Q CELLS(Qidong) Co., Ltd.	100.00	100.00	China	December	Manufacturing of silicon ingot
Hanwha Q CELLS France SAS	100.00	100.00	France	December	Photovoltaic business
Hanwha Q CELLS Gmbh	100.00	100.00	Germany	December	Manufacturing of photovoltaic products
Hanwha Q CELLS Hong Kong Limited	100.00	100.00	Hong Kong	December	Investment and international supply
Hanwha Q CELLS Investment Co., Ltd.	100.00	100.00	United Kingdom	December	Holding company
Hanwha Q CELLS Japan Co., Ltd.	100.00	100.00	Japan	December	Trading
Hanwha Q CELLS Japan Power Solutions Co.,Ltd.	100.00	100.00	Japan	December	Design of photovoltaic power plant
Hanwha Q CELLS Malaysia Sdn. Bhd.	100.00	100.00	Malaysia	December	Manufacturing of photovoltaic products
Hanwha Q CELLS Peru S.A.C	99.99	99.99	Peru	December	Photovoltaic power generation
HANWHA Q CELLS SOLAR POWER SDN. BHD.	100.00	100.00	Malaysia	December	EPC business
Hanwha Q CELLS Solar Technology Australia Pty Ltd.	100.00	100.00	Australia	December	Photovoltaic business
Hanwha Q CELLS Technology Co., Ltd	100.00	100.00	China	December	Manufacturing of silicon ingot
Hanwha Q CELLS Til Til Uno SPA	100.00	100.00	Chile	December	Construction and sale of photovoltaic system
Hanwha Q CELLS Turkey	100.00	100.00	Turkey	December	Construction and sale of photovoltaic power generation system
Hanwha Q CELLS USA, INC.	100.00	100.00	USA	December	Photovoltaic business
Hanwha Q CELLS(Nantong) Co., Ltd.	100.00	100.00	China	December	Manufacturing and sale of photovoltaic products
Hanwha Resources	100.00	100.00	Canada	December	Resource development

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(Canada) Ltd.						
Hanwha Resources (USA) Corporation	100.00	100.00	USA	December	Resource development	
Hanwha Saudi Contracting Co., Ltd.	100.00	100.00	Saudi Arabia	December	Construction	
Hanwha Singapore Pte. Ltd.	100.00	100.00	Singapore	December	Trading	
Hanwha Solar Electric Power Engineering Co., Ltd.	100.00	100.00	China	December	Construction of photovoltaic power generation facilities	
Hanwha Solar Engineering R&D center Co., Ltd.	100.00	100.00	China	December	Research and development of photovoltaic products	
Hanwha Solar Power Kitsuki G.K. ²	1.00	1.00	Japan	December	Photovoltaic power generation	
Hanwha SolarOne (Laiyang) Co., Ltd	100.00	100.00	China	December	Photovoltaic business	
Hanwha SolarOne (Rugao) Co., Ltd	100.00	100.00	China	December	Photovoltaic business	
Hanwha SolarOne GmbH	100.00	100.00	Germany	December	Sale of photovoltaic products	
Hanwha SolarOne Investment Holding Ltd.	100.00	100.00	United Kingdom	December	Holding company	
Hanwha SolarOne Power Generation (Wuxi) Co., Ltd.	100.00	100.00	China	December	Photovoltaic business	
Hanwha Solarone(beipiao)Co.,Ltd	100.00	100.00	China	December	Sale of compressor and service materials	
Hanwha Systems Japan Co., Ltd.	100.00	100.00	Japan	December	Integrated advisory, construction and management of computer systems	
Hanwha Q CELLS Technology (Shanghai) Co., Ltd.	100.00	100.00	China	December	Sale of photovoltaic products	
Hanwha Techm Hungary Zrt.	97.21	97.21	Hungary	December	Leasing service of real estate and supply of utilities	
Hanwha TechM USA LLC	100.00	100.00	USA	December	Manufacturing of automobile parts	
Samsung Opto-Electronics America, Inc.	100.00	100.00	USA	December	Sale of CCTV and others	
Hanwha Techwin Automation Americas, Inc.	100.00	100.00	USA	December	Sale and others	
HANWHA TECHWIN AUTOMATION VIETNAM CO.,LTD	100.00	100.00	Vietnam	December	Sale	
Hanwha Techwin Europe Limited	100.00	100.00	United Kingdom	December	Sale of CCTV	
Hanwha Techwin Middle East FZE	100.00	100.00	UAE	December	Sale	

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Hanwha Techwin Security Vietnam	100.00	100.00	Vietnam	December	Manufacturing
Hanwha Village Market, LLC	100.00	100.00	USA	December	Real estate development
Hanwha West Properties LLC	100.00	100.00	USA	December	Real estate development
Hiprom Enerji Yatirimlari A.s.	100.00	100.00	Turkey	December	Photovoltaic power generation
HMS AUSTRALIA OPERATIONS PTY LTD	100.00	100.00	Australia	December	Gunpowder services and explosives and blasting
HMS AUSTRALIA PROPERTY HOLDINGS PTY LTD	100.00	100.00	Australia	December	Land leasing service
HQC Rock River Solar Holdings LLC	100.00	100.00	USA	December	Photovoltaic business
HQC Rock River Solar Power Generation Station LLC	100.00	100.00	USA	December	Photovoltaic business
Huoqiu Hanrui New Energy Power Generation co. Ltd	100.00	100.00	China	December	Photovoltaic business
HW SOLAR POWER 3 G.K.	100.00	100.00	Japan	December	Photovoltaic power generation
HW SOLAR POWER 6 G.K.	100.00	100.00	Japan	December	Photovoltaic power generation
HW SOLAR POWER 8 G.K. ²	0.66	0.66	Japan	December	Photovoltaic power generation
Kartal Enerji uretim Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
KMPT Solarpark Verwaltung GmbH	100.00	100.00	Germany	December	Photovoltaic business
Sociedade Poente Deslumbrante Lda.	100.00	-	Germany	December	Photovoltaic business
Las Coronadas Hive SL	100.00	-	Germany	December	Photovoltaic business
Guadajoz Hive SL	100.00	-	Germany	December	Photovoltaic business
Agenor Hive SL	100.00	-	Germany	December	Photovoltaic business
Don Rodrigo Hive SL	100.00	-	Germany	December	Photovoltaic business
Laheeb Al-Ezdihar	100.00	100.00	Iraq	December	Trading
LDE Corporation PTY LTD	100.00	100.00	Australia	December	Mine development
LDE HOLDINGS PTY LTD	100.00	100.00	Australia	December	Holding company
LENEX Co.,Ltd.	100.00	100.00	Japan	December	Sale of photovoltaic products
LLP Zharyk Zol Company 2007	100.00	100.00	Kazakhstan	December	Investment of real estate (SPC)
Lodz Solar Sp. z o.o.	100.00	100.00	Poland	December	EPC construction
Marel Bilisim Muhendislik Enerji Insaat Iletisim Turizm Gida San. Ve Dis Tic. Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
Maxxsol 01 srl	100.00	100.00	Italy	December	Photovoltaic power generation

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Mazovia Solar 1 Sp. Z o.o.	100.00	100.00	Poland	December	EPC Construction
Mazovia Solar 2 Sp. Z o.o.	100.00	100.00	Poland	December	EPC Construction
Mazovia Solar 3 Sp. Z o.o.	100.00	100.00	Poland	December	EPC Construction
Meva Muhendislik Bilisim Enerji Insaat Iletisim Turizm San. Ve Dis Tic. Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
Moravia Enerji Sanayi ve Ticaret Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
Mutlak Enerji uretim Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
Nantong Hanwha Import & Export Co., Ltd.	100.00	100.00	China	December	Sale of photovoltaic products
PT. Bara Bumi International	100.00	100.00	Indonesia	December	Coal sales
PT. Hanwha Life Insurance Indonesia	99.61	99.61	Indonesia	December	Life insurance
PT. Hanwha Mining Services Indonesia	100.00	100.00	Indonesia	December	Gunpowder services and explosives and blasting
PV Vallendar Uno SpA	100.00	100.00	Chile	December	Holding company (SPC)
S&P World Networks DMCC	100.00	100.00	UAE	December	Trading
Sema Enerji uretim Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
Serimer Optik Medikal Kirtasiye Temizlik Insaat Ithalat Ihracat Sanayi Tic. Ltd. sti.	100.00	100.00	Turkey	December	Photovoltaic power generation
SFH Solarpark GmbH	100.00	100.00	Germany	December	Photovoltaic business
QSUN Poland Sp. z o.o.	100.00	100.00	Poland	December	Photovoltaic business
QSUN 1	100.00	100.00	Poland	December	Photovoltaic business
QSUN 2	100.00	100.00	Poland	December	Photovoltaic business
QSUN 3	100.00	100.00	Poland	December	Photovoltaic business
QSUN 4	100.00	100.00	Poland	December	Photovoltaic business
QSUN 5	100.00	100.00	Poland	December	Photovoltaic business
QSUN 6	100.00	100.00	Poland	December	Photovoltaic business
QSUN 7	100.00	100.00	Poland	December	Photovoltaic business
QSUN 8	100.00	100.00	Poland	December	Photovoltaic business
QSUN 9	100.00	100.00	Poland	December	Photovoltaic business
QSUN 10	100.00	100.00	Poland	December	Photovoltaic business
QSUN 11	100.00	100.00	Poland	December	Photovoltaic business
QSUN 12	100.00	100.00	Poland	December	Photovoltaic business
QSUN 13	100.00	100.00	Poland	December	Photovoltaic business
QSUN 14	100.00	100.00	Poland	December	Photovoltaic business
QSUN 15	100.00	100.00	Poland	December	Photovoltaic business
QSUN 16	100.00	100.00	Poland	December	Photovoltaic business
QSUN 17	100.00	100.00	Poland	December	Photovoltaic business

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

QSUN 18	100.00	100.00	Poland	December	Photovoltaic business
QSUN 19	100.00	100.00	Poland	December	Photovoltaic business
TAWASUL AL-EZDIHAR Co., Ltd	100.00	100.00	Iraq	December	Trading
Techwin Engineering Center	100.00	100.00	Japan	December	Research and development of industrial equipment
Tecsol Srl	100.00	100.00	Italy	December	Photovoltaic power generation
Toprakkale Altyapi ve Malzeme Hizmetleri A.s.	100.00	100.00	Turkey	December	Photovoltaic power generation
Ulu Gunes Enerjisi Anonim sirketi	100.00	100.00	Turkey	December	Photovoltaic power generation
Universal Bearings LLC.	100.00	100.00	USA	December	Bearing manufacturing
Uno Enerji A.s.	100.00	100.00	Turkey	December	Photovoltaic power generation
World corporation	100.00	100.00	Saipan	December	Hotel business
WSE Bradley Road Ltd	100.00	100.00	United Kingdom	December	Photovoltaic power generation
Hanwha Q CELLS USA Corp.	100.00	100.00	USA	December	Photovoltaic business
HSESM American Union LLC	100.00	100.00	USA	December	Photovoltaic business
HSESM PlanadaES LLC	100.00	100.00	USA	December	Photovoltaic business
HSESM LeGrandUHS LLC	100.00	100.00	USA	December	Photovoltaic business
HQ MEX, LLC	100.00	100.00	Mexico	December	Photovoltaic business
HQ MEXICO HOLDINGS S DE RL DE CV	100.00	100.00	Mexico	December	Photovoltaic business
HQ MEXICO Solar I S DE RL DE CV	100.00	100.00	Mexico	December	Photovoltaic business
HQ MEXICO Solar II S DE RL DE CV	100.00	100.00	Mexico	December	Photovoltaic business
Kalaeloa Renewable Energy Park, LLC	100.00	100.00	USA	December	Photovoltaic business
HSEA HVES, LLC	100.00	100.00	USA	December	Photovoltaic business
Solar Monkey 1, LLC	100.00	100.00	USA	December	Photovoltaic business
Solar Monkey 2, LLC	100.00	100.00	USA	December	Photovoltaic business
HQC Maywood, LLC	100.00	100.00	USA	December	Photovoltaic business
Hanwha Q CELLS EPC USA, LLC	100.00	100.00	USA	December	Photovoltaic business
Hanwha Q CELLS Servicios Comerciales, S DE RL DE CV	100.00	100.00	Mexico	December	Photovoltaic business
Recon Co., Ltd. ⁵	-	-	Korea	February	Other finance business
KB Hotels&Resorts 1st LLC ⁵	-	-	Korea	November	Other finance business
HANWHA MINING SERVICE USA INC.	100.00	-	USA	December	Gunpowder services and explosives and blasting
HANWHA DEFENSE	100.00	-	Australia	December	Military equipment

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

AUSTRALIA PTY LTD					
Hanwha Systems Vietnam Co., Ltd.	100.00	-	Vietnam	December	Integrated advisory, construction and management of computer systems
Q CELLS DO BRASIL CONSULTORIA EMPRESARIAL LTDA	100.00	-	Brazil	December	Photovoltaic business
Elektrownia Fotowoltaiczna Kreznica Okragla Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
QSUN 20 Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
HW SOLAR POWER 14 G.K.	100.00	-	Japan	December	Photovoltaic business
LENEX Electric Power G.K.	100.00	-	Japan	December	Photovoltaic business
Carrot Co.,Ltd.	51.60	-	Korea	December	Insurance and pension services
PLAZA Development & Company	100.00	-	Korea	December	Retail of souvenirs, folk crafts and decorative products
Hanwha Estate Service Co.,Ltd.	100.00	-	Korea	December	Business facilities management and business support services
Hanwha Aerospace USA ⁹	100.00	-	USA	December	Manufacturing of aircraft engine and parts
EDAC Technologies Intermediate Company	100.00	-	USA	December	Manufacturing of aircraft engine and parts
Hanwha Aerospace USA LLC	100.00	-	USA	December	Manufacturing of aircraft engine and parts
EBTEC Corporation	100.00	-	USA	December	Manufacturing of aircraft engine and parts
APEX Machine Tool Company, Inc.	100.00	-	USA	December	Manufacturing of aircraft engine and parts
Gros-lte Industries Inc.	100.00	-	USA	December	Manufacturing of aircraft engine and parts
EDAC ND, Inc	100.00	-	USA	December	Manufacturing of aircraft engine and parts
HANWHA POWER SYSTEMS VIETNAM COMPANY LIMITED	100.00	-	Vietnam	December	Manufacturing and sale of compressor, generator and gas turbine
Sunrise Solar	100.00	-	Korea	December	Photovoltaic business
QSUN 23 Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
Elektrownia OZE 3 Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
Sunwolt Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
Silesian Sun Energy Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
QSUN 26 Sp. z o.o.	100.00	-	Poland	December	Photovoltaic business

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

SPP Wytwarzanie 18 sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
SPP Wytwarzanie 31 sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
SPP Wytwarzanie 33 sp. z o.o.	100.00	-	Poland	December	Photovoltaic business
PV Jagodne Sp. z.o.o.	100.00	-	Poland	December	Photovoltaic business
INCOGNITWORLD, LDA.	100.00	-	Portugal	December	Photovoltaic business
Pinetree Securities Corporation (Formerly, HFT Securities Corporation)	98.38	-	Vietnam	December	Stock brokerage
Hanwha Development USA Inc	100.00	-	USA	December	Real estate development and supply
Summit Apollo Eleven	100.00	-	Japan	December	Condominium operation
HHR Development B	100.00	-	Japan	December	Condominium operation
HaeOREumSolar Co., Ltd	100.00	-	Korea	December	Photovoltaic power generation
ARBECA SOLAR SLU	100.00	-	Turkey	December	Photovoltaic business
REUS SOLAR SLU	100.00	-	Turkey	December	Photovoltaic business
CASTELLNOU SOLAR SLU	100.00	-	Turkey	December	Photovoltaic business
VECIANA SOLAR SLU	100.00	-	Turkey	December	Photovoltaic business
CASTELLDANS SOLAR SLU	100.00	-	Turkey	December	Photovoltaic business
Malhada Green S.A	100.00	-	Turkey	December	Photovoltaic business
Aceka 2 Gunes Enerjisi A.S.	100.00	-	Turkey	December	Photovoltaic power generation
Aceka 3 Gunes Enerjisi A.S.	100.00	-	Turkey	December	Photovoltaic power generation
Bilgidar 2 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December	Photovoltaic power generation
Buselik 2 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December	Photovoltaic power generation
Buselik 3 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December	Photovoltaic power generation
Dimetoka 2 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December	Photovoltaic power generation
Dimetoka 3 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December	Photovoltaic power generation
Isfahan 3 Gunes Enerjisi Limited Sirketi	100.00	-	Turkey	December	Photovoltaic power generation
Onan 2 Gunes Enerji Uretim A.S.	100.00	-	Turkey	December	Photovoltaic power generation
Onan 3 Gunes Enerji Uretim A.S.	100.00	-	Turkey	December	Photovoltaic power generation
Jeju Ocean Science Museum Corporation	89.90	29.90	Korea	December	Operation of botanical garden and zoo
Beneficiary certificates					

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Hanwha Global Infrastructure Strategy Fund III	88.00	-	Korea	December	Special Asset Collective Investment Vehicle
Hanwha The 3rd Gyeongin highway Fund 1 ⁴	48.19	-	Korea	December	Special Asset Collective Investment Vehicle
Great opportunity Co., Ltd ⁵	-	-	Korea	December	Special Purpose Company
YJ Asan 1 ⁵	-	-	Korea	December	Special Purpose Company
YJ Asan 2 ⁵	-	-	Korea	December	Special Purpose Company
HSF 19th Co., Ltd ⁵	-	-	Korea	December	Special Purpose Company
Purple tip 1 Co., Ltd ⁵	-	-	Korea	December	Special Purpose Company
Small Giants New Renewable Energy Innovation Fund	99.00	100.00	Korea	December	Investment Fund
ChungNam-Hanwha Small & Medium Company Growth Fund	66.67	66.67	Korea	December	Investment Fund
Hanwha Global Business Fund	100.00	100.00	Korea	December	Investment Fund
2018 Hanwha New Industry Global Plus-up Fund	60.00	60.00	Korea	December	Investment Fund
Kyobo AXA Bong-dam Song-san Highway Private Investment Trust	85.21	85.21	Korea	December	Special Asset Collective Investment Vehicle
Loyal MJ 1st Co., Ltd ⁵	-	-	Korea	December	Special Purpose Company
Loyal MJ 2nd Co., Ltd ⁵	-	-	Korea	December	Special Purpose Company
Mirae Asset UK Gas Infra Private special asset Investment Trust No.1	83.78	83.78	Korea	April, October	Special Asset Collective Investment Vehicle
Mirae Asset Global Renewable Energy Private Special Asset Investment Trust No.2	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Mirae Asset Maps Global New Recycling Energy Private special asset Investment Trust No. 1	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Blackrock Global Total Solution Investment Trust No.1	100.00	100.00	Korea	April	Security Collective Investment Vehicle
Samsung VLCC Private Investment Trust No.1	68.40	68.39	Korea	February, May, August, November	Special Asset Collective Investment Vehicle
Shining Clear Co., Ltd. ⁵	-	-	Korea	December	Liquidation of Loans receivable (SPC)
Simone Global Venture	100.00	100.00	Korea	May	Special Asset Collective

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Private Investment Special No.1					Investment Vehicle
Shinhan BNPP Global Solar Energy Private Equity Special Asset Investment Trust	100.00	100.00	Korea	The end of each quarter	Special Asset Collective Investment Vehicle
Shinhan BNPP Seoul-Munsan Expressway Private Special Asset Investment Trust	93.33	93.33	Korea	December	Special Asset Collective Investment Vehicle
Asia Pacific 45 Vessel Investment Co., Ltd. ⁵	-	-	Korea	December	Vessels Investment Company
HSF 8th Co., Ltd. ⁵	-	-	Korea	September	Liquidation of Loans receivable (SPC)
YJ Deoksookoong Co., Ltd ⁵	-	-	Korea	September	Liquidation of Loans receivable (SPC)
Aegis KORIF Private real estate Trust 17-1	100.00	100.00	Korea	September	Security Collective Investment Vehicle
Aegis KORIF Private real estate Trust 17-2	100.00	100.00	Korea	September	Security Collective Investment Vehicle
Aegis KORIF Private real estate Trust 17-3	100.00	100.00	Korea	September	Security Collective Investment Vehicle
Aegis KORIF Private real estate Trust 17-4	100.00	100.00	Korea	September	Security Collective Investment Vehicle
Invest Blue 1st Co., Ltd. ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)
InvestCity 3rd Co., Ltd. ⁵	-	-	Korea	December	Liquidation of Loans receivable (SPC)
Invest ST The First Co., Ltd. ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)
Pine Tree sol Three Private equity investment Trust No.3	100.00	99.08	Korea	The end of each quarter	Real Estate Collective Investment Vehicle
Pine Tree sol Three Private equity investment Trust No.5	97.09	97.09	Korea	The end of each quarter	Real Estate Collective Investment Vehicle
Pine Tree sol Three Private equity investment Trust No.6-2	98.04	98.04	Korea	March, June, September, December	Real Estate Collective Investment Vehicle
Poong Cheon 2nd ⁵	-	-	Korea	May	Liquidation of Beneficiary certificates (SPC)
Phoenix Kyomoon 1st Co., Ltd. ⁵	-	-	Korea	October	Liquidation of Loans receivable (SPC)
Phoenix SN 2nd Co., Ltd. ⁵	-	-	Korea	October	Liquidation of Loans receivable (SPC)
Phoenix Yeondong 3rd Co., Ltd. ⁵	-	-	Korea	May	Liquidation of Loans receivable (SPC)
Phoenix Yulbuk 1st Co., Ltd. ⁵	-	-	Korea	April	Special Purpose Company (SPC)

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Phoenix Tangjung 1st Co., Ltd. ⁵	-	-	Korea	March	Liquidation of Loans receivable (SPC)
Hana Daol HW Landchip Private real estate feeder investment Trust No.1	98.00	98.00	Korea	26 th of each quarter	Real Estate Collective Investment Vehicle
Hanwha ASIA OPPORTUNITY Private Investment Trust No.1	100.00	100.00	Korea	May	Special Asset Collective Investment Vehicle
Hanwha GLOBAL CORPORATE PE STRATEGY Private Investment Trust No.2	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Hanwha GLOBAL CORPORATE PE STRATEGY Private Investment Trust No.1	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Hanwha GLOBAL CREDIT STRATEGY Private Investment Trust No.1	100.00	100.00	Korea	The end of each quarter	Security Collective Investment Vehicle
Hanwha GLOBAL INFRASTRUCTURE STRATEGY No.2	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Hanwha GLOBAL INFRASTRUCTURE STRATEGY No.1	100.00	100.00	Korea	December	Special Asset Collective Investment Vehicle
Hanwha GLOBAL REAL ESTATE STRATEGY Private Investment Trust No.1	100.00	100.00	Korea	December	Real Estate Collective Investment Vehicle
Hanwha GLOBAL REAL ESTATE STRATEGY Private Investment Trust No.2	100.00	100.00	Korea	December	Real Estate Collective Investment Vehicle
Hanwha Prudential U.S. Real Estate Debt	100.00	100.00	Korea	September	Real Estate Collective Investment Vehicle
Hanwha Lifestyle Private Investment Trust No.1	100.00	100.00	Korea	April	Special Asset Collective Investment Vehicle
Hanwha Vietnam OPPORTUNITY Private Investment Trust No.1	100.00	100.00	Korea	The end of each quarter	Security Collective Investment Vehicle
Hanwha Solar Development Private Investment Trust No.2 ⁴	50.00	50.00	Korea	December	Special Asset Collective Investment Vehicle
Hanwha AI Global Choice Private Investment Trust No.1	100.00	100.00	Korea	April	Security Collective Investment Vehicle
Hanwha AI Global Choice Private Investment Trust No.2	99.00	100.00	Korea	December	Security Collective Investment Vehicle
Hanwha CONSUMER CREDIT Private Investment Trust No.1	100.00	100.00	Korea	March, June, September, December	Special Asset Collective Investment Vehicle

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Hanwha DEBT STRATEGY Real Estate Trust No.6	100.00	100.00	Korea	March	Special Asset Collective Investment Vehicle
Hanwha LIFEPLUSTDF2020 equity investment Trust C-F	100.00	99.22	Korea	December	Special Asset Collective Investment Vehicle
Hanwha LIFEPLUSTDF2025 equity investment Trust C-F	100.00	99.47	Korea	December	Special Asset Collective Investment Vehicle
Hanwha LIFEPLUSTDF2030 equity investment Trust C-F	100.00	99.22	Korea	December	Special Asset Collective Investment Vehicle
Hanwha LIFEPLUSTDF2035 equity investment Trust C-F	100.00	99.52	Korea	December	Special Asset Collective Investment Vehicle
Hanwha LIFEPLUSTDF2040 equity investment Trust C-F	100.00	99.74	Korea	December	Special Asset Collective Investment Vehicle
Hanwha LIFEPLUSTDF2045 equity investment Trust C-F	100.00	99.63	Korea	December	Special Asset Collective Investment Vehicle
Hanwha LTI Private equity investment Trust No.2[Infra]	90.57	90.57	Korea	The end of each quarter, June	Special Asset Collective Investment Vehicle
Hanwha LTI Infra Private equity investment Trust No.1	100.00	100.00	Korea	The end of each quarter, July	Special Asset Collective Investment Vehicle
Hanwha Gwangju Ringroad special asset investment trust(Infra) ⁴	50.00	50.00	Korea	The end of each quarter, June	Special Asset Collective Investment Vehicle
Hanwha Global Real Asset Investment Trust C-F	95.33	99.57	Korea	December	Special Asset Collective Investment Vehicle
Hanwha Global Security Investment Trust for corporation only(Bond)C	97.76	95.22	Korea	December	Security Collective Investment Vehicle
Hanwha Vietnam Regend Security Investment trust(Stock) C-F	93.61	100.00	Korea	June	Security Collective Investment Vehicle
Hanwha Asian Regend Security Investment trust(Stock) C-F	87.13	100.00	Korea	November	Security Collective Investment Vehicle
Hanwha Asian Regend 4th Industrial Revolution Investment trust(Stock) C-F	86.66	88.80	Korea	December	Security Collective Investment Vehicle
Hanwha Korea Regend 4th Industrial Revolution Investment trust(Stock) C-F	58.20	57.93	Korea	December	Security Collective Investment Vehicle
Hanwha Korea Regend Security Investment trust(Stock) C-F ⁴	81.52	49.87	Korea	December	Security Collective Investment Vehicle
Hanwha Photovoltaics Private Investment Trust	50.00	50.00	Korea	December	Special Asset Collective Investment Vehicle

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

No.1(Power Generation Facility) ⁴						
Hanwha Tricircle Infra Special Asset No.1	100.00	100.00	Korea	The end of each quarter, June	Special Asset Collective Investment Vehicle	
Hanwha Tricircle Infra Special Asset No.3	95.00	95.00	Korea	The end of each quarter, July	Special Asset Collective Investment Vehicle	
Hanwha Environment Love Private Investment Trust No.1 ⁴	50.00	50.00	Korea	The end of each quarter, June	Special Asset Collective Investment Vehicle	
Hanwha Environment Love Private Investment Trust No.2 ⁴	40.30	40.30	Korea	The end of each quarter, July	Special Asset Collective Investment Vehicle	
Hanwha AF ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
Hanwha AF ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
Eui-wang Landmark 1 ⁵	-	-	Korea	December	Liquidation of Loans receivable (SPC)	
Invest H 1 ⁵	-	-	Korea	December	Liquidation of Loans receivable (SPC)	
KB Sunjin Asia Real Asset Credit Professional Investment Type Private Equity Fund	93.40	-	Korea	April	Special Asset Collective Investment Vehicle	
DB Exchangeable Bond Professional Investment Type Private Equity Fund	62.50	-	Korea	April	Special Asset Collective Investment Vehicle	
Daishin Asia Direct Lending Professional Investment Type Private Equity Fund	88.71	-	Korea	May	Special Asset Collective Investment Vehicle	
HSF 12th Co., Ltd ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
Invest Industry 1 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
Invest Urge1 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
Great Banwol ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
Shinsegye1 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
First M No.9 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)	
First M No.10 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates	

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

					(SPC)
Hyundai invest global infra Special Asset Investment Trust 15	100.00	-	Korea	December	Special Asset Collective Investment Vehicle
Hanwha DEBT STRATEGY Private Special Asset Investment Trust Security 16	50.90	-	Korea	December	Special Asset Collective Investment Vehicle
Hanwha Solar 4 Co., Ltd ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)
Newstar central valley 1 ⁵	-	-	Korea	December	Liquidation of Beneficiary certificates (SPC)
JR Professional Investment Criminal Real Estate Investment Trust 15	63.13	-	Korea	December	Special Asset Collective Investment Vehicle
KOTAM Aircraft Private Special Asset Investment Trust Security 2	50.10	-	Korea	December	Special Asset Collective Investment Vehicle
ARIRANG US s-term A- rated corporate debts	65.22	-	Korea	December	Special Asset Collective Investment Vehicle
ARIRANG US L-term A- rated corporate debts	62.50	-	Korea	December	Special Asset Collective Investment Vehicle
Hanwha asia reits realestate reinvest fund (Reits-indirect type) C-F	100.00	-	Korea	December	Real Estate Collective Investment Vehicle

¹ Considering the situation where the feasibility of a potential voting rights is remote, the Company is considered to have control since it is able to exercise the majority of voting rights in its decision-making process as the percentage of voting rights exceeds 50%.

² Although the percentage of ownership is less than 50%, the Company is considered to have control since it is able to exercise the majority of voting rights in its decision-making process as the percentage of voting rights exceeds 50%.

³ Although the percentage of ownership is less than 50%, the Company is considered to have control as the majority of the remaining shareholders are widely dispersed, each holding less than 1% of ownership, and the Company is able to exercise its majority voting rights in the decision-making process considering the past attendance rate at the General Meeting.

⁴ Although the percentage of ownership does not exceed 50%, it is included in the subsidiary in accordance with Korean IFRS 1110, taking into account the percentage of ownership and the de facto agent relationship.

⁵ Although the Company does not have ownership interest, it is included in the scope of consolidation, considering contractual arrangements, exposures to variable returns and others.

⁶ Hanwha Land Systems Co., Ltd. merged Hanwha Defense Systems Corp. and changed its name to Hanwha Defense Systems Corp. for the year ended December 31, 2019.

⁷ Hanwha Solar Holdings Co., Ltd. merged Hanwha Q CELLS Co., Ltd. and changed its name to Hanwha Q CELLS Co., Ltd. for the year ended December 31, 2019.

⁸ Hanwha Q CELLS & Advanced Materials Co., Ltd. changed its name to Hanwha Global Asset Corporation and spun off Hanwha Q CELLS & Advanced Materials Co., Ltd. for the year ended

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

December 31, 2019.

⁹ Hanwha Aerospace USA acquired 100% of shares of EDAC Technologies Holding Company and changed its name for the year ended December 31, 2019.

(3) The Company's related parties as at December 31, 2019, are as follows:

Classification	Name of entity
Domestic affiliates	Yeochun NCC Co., Ltd., Hanwha General Chemical Co., Ltd. and others
Overseas affiliates	Bio Green Technology Sdn Bhd. and others
Large-scale business group affiliates ¹	H-Solution Co., Ltd. (Formerly, Hanwha S&C Co., Ltd.), Hanwha Energy Corp., Hanwha Total Petrochemical Co., Ltd. and others

¹ Large-scale business group affiliateS (other related parties) do not correspond to the related parties defined in paragraph 9 of Korean IFRS 1024. However, the large-scale business group affiliates designated by the Fair Trade Commission are classified as related parties in accordance with the resolution of the Securities and Futures Commission and in accordance with the substantive relationship stipulated in paragraph 10 of Korean IFRS 1024.

(4) Outstanding balances arising from sales/purchases of goods and services with related parties, including large-scale business group affiliates, as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019				
	Receivables			Payables	
	Trade receivables	Loans ³	Other receivables	Trade payables	Other payables
Subsidiaries, associates and joint ventures					
Hanwha Engineering and Construction Corp.	₩ 2,187,021	₩ -	₩ 884,372	₩ 1,447,959	₩ -
Hanwha Estate Co., Ltd	35,221	-	-	-	512,858
Yeochun NCC Co., Ltd.	148,980	-	-	19,788,798	-
Hanwha Life Insurance Co., Ltd.	134,738	-	22,902,185	-	24,444,241
Hanwha General Insurance Co., Ltd.	201,689	-	95,000	-	657,610
Hanwha System Co., Ltd.	163,164	-	638,360	1,309,296	6,792,223
Hanwha Aerospace Co., Ltd.	328,103	-	18,885,387	3,077,829	248,669
Hanwha Precision Machinery Co., Ltd.	178,527	-	511	705,410	2,140,578
Hanwha Defense Systems Corp.	2,431,573	-	2,605,311	39,558,034	6,517,908
Hanwha General Chemical Co., Ltd.	9,394	-	-	386,194	-
Hanwha Q Cells &	33,879,851	-	6,459,827	-	292,565

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Advanced Materials Corporation ⁴					
Hanwha Chemical Co., Ltd.	278,091	-	5,909,558	2,859,465	1,328,352
Hanwha Investment & Securities Co., Ltd.	57,259	-	-	-	-
Hanwha Hotel & Resort Inc.	2,653,696	-	23,967,851	-	773,036
Hanwha International Trading (Shanghai) Co., Ltd. ¹	4,169,574	-	901	-	-
Hanwha TechM (Suzhou) Co., Ltd.	1,131,952	-	-	-	88,761
Bio Green Technology Sdn Bhd. ²	-	463,120	-	-	-
Hanwha Chemical (Ningbo) Co., Ltd.	2,306	-	-	-	-
Hanwha Europe GmbH	7,570,926	-	2,523,040	2,039,460	428,022
Hanwha International (S) Pte Ltd.	2,076,857	-	-	-	-
Hanwha International LLC.	2,433,969	-	9,769,768	743,659	897,802
Hanwha Q CELLS Co., Ltd. (Qidong)	5,944,744	-	1,128,917	-	4,745,449
Hanwha Q CELLS EPC USA, LLC	17,274,376	-	-	-	1,260,761
Hanwha Q CELLS Japan Co., Ltd.	474,253	-	-	280,357	149,241
Hanwha Q CELLS Malaysia Sdn. Bhd.	5,299,937	-	2,714,228	-	1,389,347
S&P World Networks DMCC	1,788,484	-	-	1,709,466	1,065,048
Others	3,073,215	64,430	778,271	12,078,840	5,994,095
Large-scale business group affiliates					
Hanwha Energy Co., Ltd.	586,638	-	-	-	-
H-Solution Co., Ltd.	103	-	-	-	-
Hanwha Total Co., Ltd.	7,318,611	-	2,974,767	8,247,319	426
SIT Co., Ltd.	250	-	-	2,454,131	-
Others	908	-	-	-	-
	<u>₩ 101,834,410</u>	<u>₩ 527,550</u>	<u>₩ 102,238,254</u>	<u>₩ 96,686,217</u>	<u>₩ 59,726,992</u>

¹ As at December 31, 2019, the Company set up a full provision against the receivables.

² As at December 31, 2019, the Company set up a full provision against the loan.

³ Accrued revenue for the loan is included.

⁴ Hanwha Q CELLS & Advanced Materials Co., Ltd. changed its name to Hanwha Global Asset Corporation and spun off Hanwha Q CELLS & Advanced Materials Co., Ltd. for the year ended December 31, 2019.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(in thousands of Korean won)

	2018									
	Receivables				Payables					
	Trade receivables	Loans ⁴	Other receivables	Trade payables	Other payables					
Subsidiaries, associates and joint ventures										
Hanwha Engineering and Construction Corp.	₩	1,064,873	₩	-	₩	25,935	₩	3,951,451	₩	138,872
Hanwha Estate Co., Ltd		30,948		-		-		-		460,116
Yeochoon NCC Co., Ltd.		2,610,947		-		-		22,276,888		-
Hanwha Defense Systems Corp.		6,410,803		-		12,691,861		7,248,989		3,669,566
Hanwha Life Insurance Co., Ltd.		114,339		-		23,105,794		-		116,387
Hanwha General Insurance Co., Ltd.		107,118		-		100,040		-		128,412
Hanwha System Co., Ltd. ¹		268,225		-		463,743		2,044,150		5,060,740
Hanwha Aerospace Co., Ltd. (Formerly, Hanwha Techwin Co., Ltd.)		303,304		-		6,460,465		23,495,919		3,758,209
Hanwha Precision Machinery Co., Ltd.		25,499		-		176,873		-		4,813,686
Hanwha Land Systems Co., Ltd.		483,145		-		89,039		-		47,000
Hanwha Q Cells & Advanced Materials Corporation (Formerly, Hanwha Advanced Materials Corporation)		492,280		-		36,966,259		500,340		775,793
Hanwha Chemical Co., Ltd.		178,681		-		-		10,610,636		1,628,280
Hanwha Investment & Securities Co., Ltd.		56,565		-		-		-		-
Hanwha Hotel & Resort Inc.		305,186		-		22,517,693		-		786,151
Hanwha International Trading (Shanghai) Co., Ltd. ²		22,862,549		-		-		-		-
Hanwha TechM (Suzhou) Co., Ltd.		1,836,131		-		137,632		-		47,436
Bio Green Technology Sdn Bhd. ³		-		623,621		444,407		91,130		-
Hanwha Chemical (Ningbo) Co., Ltd.		2,918		-		-		-		-
Hanwha Europe GmbH		12,644,930		-		1,385,632		1,785,654		316,377
Hanwha Hong Kong Co., Ltd.		40,072,737		-		-		1,223,778		164,702
Hanwha International LLC.		2,144,259		-		11,218,800		2,483,206		225,636

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Hanwha Machinery Americas, Inc.	15,986,333	-	-	-	223,620
Hanwha Q CELLS Co., Ltd. (Qidong)	3,511,522	-	-	-	541,927
Hanwha Q CELLS EPC USA, LLC	18,370,666	-	-	-	14,053,620
Hanwha Q CELLS Japan Co., Ltd.	2,172,845	-	-	354,555	144,625
Hanwha Q CELLS Malaysia Sdn. Bhd.	3,711,969	-	-	-	3,614,894
HANWHA TECHM USA LLC	653,620	-	-	-	55,195
S&P World Networks DMCC	3,373,164	-	-	28,168,286	1,112,022
Others	1,515,364	59,530	870,739	612,262	1,909,196
Large-scale business group affiliates					
Hanwha Energy Co., Ltd.	531,220	-	-	-	79,906
H-Solution Co., Ltd.	163	-	-	-	-
Hanwha Total Co., Ltd.	5,261,815	-	1,954,571	4,480,321	-
SIT Co., Ltd.	250	-	-	446,931	-
Others	45,846	-	-	-	-
	<u>₩ 147,150,214</u>	<u>₩ 683,151</u>	<u>₩ 118,609,483</u>	<u>₩ 109,774,496</u>	<u>₩ 43,872,368</u>

¹ During the year ended December 31, 2018, Hanwha System Co., Ltd. merged Hanwha S&C Co., Ltd.

² As at December 31, 2018, the Company set up a full provision against the receivables.

³ As at December 31, 2018, the Company set up a full provision against the loan.

⁴ Accrued revenue for the loan is included.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

(5) Sales and purchases with related parties, including large-scale business group affiliates, for the years ended December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019						
	Sales and others			Purchases and others			
	Sales	Disposal of fixed assets	Other gains	Purchases	Acquisition of fixed assets	Acquisition of right-of-use assets	Other expenses
Subsidiaries, associates and joint ventures							
Hanwha Engineering and Construction Corp.	₩ 26,238,499	₩ -	₩ 7,601	₩ -	₩ -	₩ -	₩ -
Hanwha Estate Co., Ltd.	361,115	-	-	5,428,320	-	-	-
Yeochun NCC Co., Ltd.	460,278	-	-	178,820,401	-	-	-
Hanwha Life Insurance Co., Ltd.	42,239,709	-	383,524	1,868,720	-	2,567,468	-
Hanwha General Insurance Co., Ltd.	25,299,629	-	322,908	5,055,596	-	670,861	-
Hanwha System Co., Ltd.	9,195,689	-	-	47,190,392	-	-	-
Hanwha Aerospace Co., Ltd.	4,547,870	-	-	92,833,712	6,622	137,123	-
Hanwha Precision Machinery Co., Ltd.	4,305,474	-	-	2,823,052	-	-	-
Hanwha Defense Systems Corp.	21,293,957	-	-	58,183,547	-	-	91,600
Hanwha General Chemical Co., Ltd.	5,315,396	-	-	3,689,028	-	-	-
Hanwha Q Cells & Advanced Materials Corporation ¹	14,900,395	-	-	-	-	-	-
Hanwha Global Asset Corporation (Formerly, Hanwha Q Cells & Advanced Materials Corporation) ¹	45,859,798	-	-	987,637	-	-	-
Hanwha Chemical Co., Ltd.	26,970,877	-	-	75,657,547	-	-	-
Hanwha Investment & Securities Co., Ltd.	7,008,339	-	-	-	-	-	-
Hanwha Hotel & Resort Inc.	13,093,707	31,093	-	11,329,077	3,164,966	-	-

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

Hanwha International Trading (Shanghai) Co., Ltd.	-	-	38,836	-	-	-	-
Hanwha TechM (Suzhou) Co., Ltd.	48,789	-	-	1,139,545	-	-	-
Bio Green Technology Sdn Bhd.	-	-	51,808	-	-	-	-
Hanwha Chemical (Ningbo) Co., Ltd.	2,344	-	-	-	-	-	-
Hanwha Europe GmbH	17,613,354	-	167,351	30,394,789	-	-	-
Hanwha International (S) Pte Ltd.	15,805,040	-	-	10,189	-	-	-
Hanwha International LLC.	10,897,921	-	-	49,171,664	-	-	-
Hanwha Q CELLS Co., Ltd. (Qidong)	59,803,312	-	-	-	-	-	-
Hanwha Q CELLS EPC USA, LLC	16,972,542	-	-	-	-	-	-
Hanwha Q CELLS Japan Co., Ltd.	6,921,967	-	338,752	1,977,245	-	-	-
Hanwha Q CELLS Malaysia Sdn. Bhd.	30,467,717	-	-	-	-	-	-
HANWHA TECHM USA LLC	55,501	-	-	368,727	-	-	-
S&P World Networks DMCC	64,330,562	-	553,786	13,699,721	-	-	-
Others	17,812,082	-	2,647,466	127,716,949	-	-	-
Large-scale business group affiliates							
Hanwha Energy Co., Ltd.	4,716,250	-	-	-	-	-	-
H-Solution Co., Ltd.	4,590	-	-	-	-	-	-
Hanwha Total Co., Ltd.	65,898,524	-	-	87,083,401	-	-	-
SIT Co., Ltd.	5,850	-	-	2,560,228	-	-	-
Others	9,558	-	-	-	-	-	-
	<u>₩ 558,456,635</u>	<u>₩ 31,093</u>	<u>₩ 4,512,032</u>	<u>₩ 797,989,487</u>	<u>₩ 3,171,588</u>	<u>₩ 3,375,452</u>	<u>₩ 91,600</u>

¹ Hanwha Q CELLS & Advanced Materials Co., Ltd. changed its name to Hanwha Global Asset Corporation and spun off Hanwha Q CELLS & Advanced Materials Co., Ltd. for the year ended December 31, 2019.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(in thousands of Korean won)

2018

	Sales and others			Purchases and others		
	Sales	Disposal of fixed assets	Other gains	Purchases	Acquisition of fixed assets	Other expenses
Subsidiaries, associates and joint ventures						
Hanwha Engineering and Construction Corp.	₩ 17,395,914	₩ 23,577	₩ -	₩ -	₩ -	₩ -
Hanwha Estate Co., Ltd.	258,700	-	-	8,083,990	-	-
Yeochun NCC Co., Ltd.	2,802,593	-	-	195,463,306	-	-
Hanwha Defense Systems Corp. ¹	14,647,214	-	-	32,256,143	-	36,768,769
Hanwha Life Insurance Co., Ltd.	59,181,536	185,544	136,830	10,271,579	-	-
Hanwha General Insurance Co., Ltd.	25,181,957	-	209,120	4,560,406	-	2
Hanwha System Co., Ltd.	9,444,711	-	-	30,464,238	-	-
Hanwha Aerospace Co., Ltd. (Formerly, Hanwha Techwin Co., Ltd.) ²	5,161,210	-	164,034,822	83,797,831	-	-
Hanwha Precision Machinery Co., Ltd. ³	1,734,406	-	65,374,314	-	-	-
Hanwha Land Systems Co., Ltd.	5,351,689	-	-	172,623	-	-
Hanwha Q Cell Co., Ltd.	1,526,106	-	5,560	4,980	-	-
Hanwha Q Cells & Advanced Materials Corporation (Formerly, Hanwha Advanced Materials Corporation)	4,491,986	77,908	-	714,714	-	-
Hanwha Chemical Co., Ltd.	17,813,007	174,268	-	110,015,437	-	-
Hanwha Q Cell Korea Co., Ltd.	85,917,418	-	-	-	-	-
Hanwha Investment & Securities Co., Ltd.	6,524,640	-	-	-	-	-
Hanwha Hotel & Resort Inc.	4,983,366	13,326	-	13,279,781	12,174,044	2,420
Hanwha TechM (Suzhou) Co., Ltd.	4,790,187	-	4,844	785,911	-	-
Bio Green Technology Sdn Bhd.	-	-	31,121	673,675	-	-
Hanwha Chemical (Ningbo) Co., Ltd.	2,943	-	-	3,073,792	-	-
Hanwha Europe GmbH	41,698,363	-	111,678	22,032,533	-	3,406
Hanwha Hong Kong Co., Ltd.	22,867,365	-	205,025	4,740,388	-	-

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Hanwha International (S) Pte Ltd.	57,959,697	-	-	48,957	-	-
Hanwha International LLC.	15,426,391	-	5,363	58,051,768	-	-
Hanwha Machinery Americas, Inc.	34,264,844	-	83,257	6,174	-	-
Hanwha Q CELLS Co., Ltd. (Qidong)	19,928,491	-	-	-	-	-
Hanwha Q CELLS EPC USA, LLC	22,428,513	-	-	-	-	-
Hanwha Q CELLS Japan Co., Ltd.	8,545,290	-	190,225	2,952,894	-	-
Hanwha Q CELLS Malaysia Sdn. Bhd.	16,559,361	-	-	-	-	-
HANWHA TECHM USA LLC	4,098,947	-	-	98,690	-	-
S&P World Networks DMCC	44,787,134	-	190,801	34,283,732	-	-
Others	18,144,473	8,201	2,098,057	16,652,657	2,434,514	222
Large-scale business group affiliates						
Hanwha Energy Co., Ltd.	4,015,197	-	-	32,802	-	-
H-Solution Co., Ltd.	6,165	-	-	-	-	-
Hanwha S&C Co., Ltd.	1,534,894	-	-	17,252,422	-	-
Hanwha Total Co., Ltd.	37,986,923	-	5,560	102,663,462	-	-
SIT Co., Ltd.	5,950	-	-	3,116,456	-	-
Others	1,818,580	-	-	6,306	-	-
	<u>₩ 619,286,161</u>	<u>₩ 482,824</u>	<u>₩ 232,686,577</u>	<u>₩ 755,557,647</u>	<u>₩ 14,608,558</u>	<u>₩ 36,774,819</u>

¹ During the year ended December 31, 2018, the Company acquired guidance and laser business (system) from Hanwha Defense Systems Corp. for ₩ 36,800 million.

² During the year ended December 31, 2018, the Company transferred its aerospace business to Hanwha Aerospace Co., Ltd. for ₩ 163,100 million.

³ During the year ended December 31, 2018, the Company transferred its precision machinery business to Hanwha Precision Machinery Co., Ltd. for ₩ 64,500 million.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(6) The Company paid ₩ 16,254 million as plan asset to Hanwha Life Insurance Co., Ltd., Hanwha General Insurance Co., Ltd. and others, subsidiaries of the Company, and also carries commercial general liability insurance and others at the subsidiaries.

(7) Changes in loans to related parties, including large-scale business group affiliates, for the years ended December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019				
	Beginning	Increase	Decrease	Others ¹	Ending
Associates					
Bio Green Technology Sdn Bhd. ²	₩ 623,621	₩ -	₩ (118,728)	₩ (41,773)	₩ 463,120
Subsidiaries					
PT. Bara Bumi International	59,530	-	-	4,900	64,430

¹ Others include accrued interest income and fluctuation of foreign exchange rate.

² As at December 31, 2019, the Company set up a full provision against the loans.

(in thousands of Korean won)

	2018				
	Beginning	Increase	Decrease	Others ¹	Ending
Associates					
Bio Green Technology Sdn Bhd. ³	₩ 568,926	₩ 31,399	₩ -	₩ 23,296	₩ 623,621
Subsidiaries					
Amru and Hanwha International ²	7,751	-	-	(7,751)	-
PT. Bara Bumi International	54,421	2,775	-	2,334	59,530

¹ Others include accrued interest income and fluctuation of foreign exchange rate.

² During the year ended December 31, 2018, due to the sale of its stake, the entity was excluded from the related parties.

³ As at December 31, 2018, the Company set up a full provision against the loans.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(8) Changes in lease liabilities for related parties, including large-scale business group affiliates, for the year ended December 31, 2019, are as follows:

(in thousands of Korean won)

	2019			
	Beginning ¹	Increase ²	Decrease	Ending
Hanwha Life Insurance Co., Ltd.	₩ 30,090,326	₩ 3,347,651	₩ (9,058,787)	₩ 24,379,190
Hanwha General Insurance Co., Ltd.	56,182	690,088	(126,596)	619,674
Hanwha Defense Systems Corp.	3,381,227	87,656	(1,100,430)	2,368,453
Hanwha Chemical Co., Ltd.	3,314,575	46,013	(3,360,588)	-
Hana Daol HW Landchip Private real estate feeder investment Trust No.1	3,629,278	101,651	(622,271)	3,108,658
Hanwha Aerospace Co., Ltd.	-	143,606	(69,300)	74,306

¹ The effect of initial application of Korean IFRS 1116 is reflected.

² Newly acquired lease liabilities and the effect of interest expense related to lease liabilities during the year ended December 31, 2019, are included.

(9) Equity contributions in cash to related parties, including large-scale business group affiliates, for the years ended December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	Equity contributions in cash	
	2019	2018
Subsidiaries		
Hanwha Mining Services Chile SpA	₩ 1,733,213	₩ 880,030
Hanwha Mining Services USA Inc.	2,249,000	-
Hanwha Hong Kong Co., Ltd.	28,352,400	-
Hanwha Resources (Canada) Ltd.	15,172	14,185
Hanwha International(Shanghai) Co., Ltd.	5,705,468	-
PT. Hanwha Mining Services Indonesia	8,995,200	-

(10) Payment guarantees to related parties, including large-scale business group affiliates, as at December 31, 2019, are as follows:

(in Japanese yen, Euro, Australian dollars and US dollars)

Guarantees received	Breakdown of guarantee	Amount	
Hanwha Q CELLS Japan Co., Ltd.	Payment certification of debts	JPY	3,800,000,000
	Payment certification of debts	USD	12,000,000
Hanwha Hong Kong Co., Ltd.	Payment certification of debts	USD	59,000,000

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Hanwha Europe GmbH	Payment certification of debts	USD	15,000,000
	Payment certification of debts	EUR	8,000,000
S&P World Networks DMCC	Payment certification of debts	USD	70,000,000
PT. Hanwha Mining Services Indonesia	Payment certification of debts	USD	13,000,000
Hanwha Mining Services Australia PTY Ltd	Payment certification of debts	AUD	41,000,000
LDE Corporation PTY Ltd.	Payment certification of debts	AUD	15,000,000
Hanwha International (Shanghai) Co., Ltd.	Payment certification of debts	USD	10,000,000

(11) The key management compensation for the years ended December 31, 2019 and 2018, consists of the following:

<i>(in thousands of Korean won)</i>		2019		2018
Salaries and other short-term employee benefits	₩	23,546,289	₩	26,211,983
Post-employment benefits		4,929,214		4,397,385
Other long-term benefits		10,103		6,692

37. Commitment and Contingencies

(1) The outstanding borrowing agreements with banks as at December 31, 2019, are as follows:

(in thousands of Korean won and in US dollars, Euro)

	Financial institution	Limit	
		Currency	Amount
Bank overdraft	Woori Bank	KRW	8,000,000
	KEB Hana bank	KRW	3,000,000
Letter of credit for import	Woori Bank	USD	32,000,000
	Korea Development Bank	USD	90,000,000
	Shinhan Bank	USD	120,000,000
	KEB Hana bank	USD	80,000,000
	Nonghyup Bank	USD	40,000,000
	Kookmin Bank	USD	40,000,000
	Industrial Bank of Korea	EUR	9,000,000
Comprehensive limit in foreign currency	Suhyup Bank	USD	30,000,000
	Industrial and Commercial Bank of China	USD	10,000,000
Purchasing bill of exchange	Shinhan Bank	USD	54,700,000
	KEB Hana bank	USD	25,000,000
	Nonghyup Bank	USD	25,000,000
	Kookmin Bank	USD	30,000,000

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Local letter of credit	KEB Hana bank	KRW	30,000,000
	Shinhan Bank	KRW	45,000,000
Other notes discounted	Woori Bank	KRW	300,000,000
Limit loan	KEB Hana bank	KRW	50,000,000
	Shinhan Bank	KRW	30,000,000
	Korea Development Bank	KRW	50,000,000
	Kookmin Bank	KRW	100,000,000
	Industrial and Commercial Bank of China	KRW	40,000,000
	Nova Scotia Bank	KRW	30,000,000
	Nonghyup Bank	KRW	10,000,000
	Suhyup Bank	KRW	10,000,000
	Daegu Bank	KRW	10,000,000
	Contracted notes-discounted	KEB Hana bank	USD
Suhyup Bank		USD	20,000,000
Shinhan Bank		KRW	20,000,000

(2) As at December 31, 2019, five blank promissory notes and one blank check have been provided as collaterals for short-term and long-term debts, agreements for discounting notes receivable and performance guarantees and others, respectively.

(3) As at December 31, 2019, there are no agreed payment guarantees for non-related parties.

(4) Payment guarantees that are provided for the Company as at December 31, 2019, are as follows:

(in thousands of Korean won and in US dollars)

Contract content	Guarantor	Insurance limit	
Performance guarantees and others	Seoul Guarantee Insurance Co., Ltd.	KRW	394,169,442
	Korea Defense Industry association	KRW	1,649,590,824
	First Abu Dhabi Bank	USD	83,600,000
Guarantees for FRN	Shinhan Bank	USD	30,000,000
Payment guarantee in foreign currency	The Export-Import Bank of Korea	USD	95,000,000
	Woor Bank	USD	30,000,000
	KEB Hana bank	USD	46,044,040

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(5) Assets that are provided as collateral for the Company's liabilities as at December 31, 2019, are as follows:

(in thousands of Korean won)

	Mortgagee	Mortgage amount	Classification
Boeun and Onsan Factory	Korea Development Bank	KRW 150,000,000	Collateral for borrowing limit
Daejeon Factory	Korea Development Bank	KRW 77,000,000	Collateral for borrowing limit
Gumi Factory	Korea Development Bank	KRW 20,000,000	Collateral for borrowing limit
Banghyun R&D Center	Korea Development Bank	KRW 96,000,000	Collateral for borrowing limit
Investments in associates and others ¹	Korea Development Bank and others	KRW 369,610,826	Collateral for borrowing limit and performance of contract
Fixed deposit	Seoul Guarantee Insurance Co., Ltd. and others	KRW 1,428,049	License acquisition and others

¹ 10,900,832 ordinary shares of Hanwha Chemical Co., Ltd. owned by the Company are pledged as collaterals in relation to the issuance of redeemable convertible preferred shares of Hanwha Engineering and Construction Corp., and 4,000,000 ordinary shares of Hanwha Engineering & Construction Corp. owned by the Company are pledged as collaterals for the borrowings. Also, 400,000 ordinary shares of ShinYoung Portu co., Ltd and 65,518 ordinary shares of Korea Defense Industry Association are provided as collaterals for performance guarantees.

(6) As at December 31, 2019, the Company has pending lawsuits, 20 cases as a defendant claiming total of ₩ 63,043 million and 6 cases as a plaintiff claiming total of ₩ 8,003 million. The Company is expecting the results of the litigation will not have a material impact on its separate financial statements. As at December 31, 2019, the outcome of the above cases cannot be reasonably estimated.

(7) The Company has entered into a contract to receive brand royalties with pricing based on the sales and advertising expenses for some affiliated companies over the use of 'Hanwha' brand.

(8) The Company entered into shareholders' agreement with Recon Co., Ltd., a preferred share investor, in relation to the issuance of redeemable convertible preferred shares of Hanwha Engineering and Construction Corp. The details of the contract are as follows:

(a) Shareholders' agreement

Details

Settlement With respect to the entire shares of the redeemable convertible preferred shares, the amount equal to the net sale price, less the initial issue price will be settled in cash on June 26, 2020. If the settlement amount is positive, the investors make payment to the Company, but if the settlement amount is negative, the Company makes payment to

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

the investors.

Early settlement	The investors can claim a settlement before the settlement date in case the following circumstances arise. Calculation of the settlement amount is same as the below. - Hanwha Engineering and Construction Corp. is unable to pay the dividend determined for the redeemable convertible preferred share to Recon Co., Ltd. - Rehabilitation, bankruptcy, workout or at the commencement of other similar proceedings for Hanwha Engineering and Construction Corp. - Credit rating of Hanwha Engineering and Construction Corp. is degraded to a rating equal to or below BBB- Early.
Appraisal rights	Until June 26, 2020, the Company has a right to purchase all or part of the redeemable convertible preferred shares held by the investors on 25th of each month. The price determined by sum of issue price and commission rate varies with exercise time. (It cannot be issued after commencement of the settlement procedure.)
Collateral	10,900,832 shares of Hanwha Chemical Co., Ltd. owned by the Company are provided as collateral for guarantees on performance of the settlement.

(b) Redeemable convertible preferred shares

Details of the redeemable convertible preferred shares issued by Hanwha Engineering and Construction Corp. as at December 31, 2019, are as follows:

	Details
Purpose of the issuance	Securing liquidity and improving financial structure
Type of the issued shares	Non-cumulative non-participating preferred share
Total number of shares issued	1,434,406 shares (1,913,800 shares are issued and 479,394 shares were redeemed)
Issue price per share	₩209,000
Voting right	No voting right
Rate of dividend	2017–2020: 3.17%, 8.23%, 3.73% and 0%, respectively, After 2021: Preferred dividend could be changed according to the method or procedure allowed by the statute.
Redemption right	i) Redemption: Hanwha Engineering and Construction Corp. has a right to request a redemption of all or part of the preferred shares, assuming that distributable income is available (Notice date: March 24, 2020/ Redemption date: June 26, 2020). ii) Redemption after maturity: Hanwha Engineering and Construction Corp. has a right to redeem all or part of the preferred shares every year, assuming that distributable income is available.
Conversion right	i) Conversion right: Preferred shareholders and publishing

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

- company have conversion right.
ii) Exercise date: Until June 26, 2024, on 26th of each month.
iii) Conversion rate: 5 ordinary shares per 1 preferred share

38. Cash Flow Information

(1) Details of cash generated from operations for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019		2018	
Profit for the year	₩	100,269,854	₩	284,521,032
Addition of expenses not involving cash outflows:				
Other long-term payroll		8,898,979		5,438,199
Post-employment benefit		49,913,588		52,651,927
Depreciation of investment property		529,888		85,865
Depreciation of property, plant and equipment		60,311,591		67,796,972
Amortization		11,567,654		18,222,828
Depreciation of right-of-use assets		21,835,230		-
Impairment loss		6,916,394		15,282,924
Other impairment loss		554,079		1,369,523
Loss on valuation of inventories		17,392,090		3,388,603
Obsolescence loss on inventory		10,758,429		-
Product warranties cost		-		231,755
Loss on foreign currency translation		5,940,186		5,391,390
Loss on valuation of derivatives		15,876,705		13,276,391
Loss on valuation of financial assets at fair value through profit or loss		198,841		448
Loss on disposal of financial assets at amortized cost		2,344,954		1,851,504
Impairment loss on investments in subsidiaries and associates		27,664,002		12,991,563
Loss on disposal of investments in subsidiaries and associates		-		15,683,095
Loss on disposal of financial assets at fair value through profit or loss		502		1,640
Loss on disposal of financial assets at fair value through other comprehensive income		-		11,185
Impairment loss on property, plant and equipment		4,233,592		1,398,323
Impairment loss on intangible assets		844,255		1,107,323
Loss on disposal of property, plant and equipment		2,909,667		761,482
Loss on disposal of intangible assets		208,994		77,824
Interest expense		72,164,844		78,642,284
Income tax expense		18,341,657		56,736,782
Provision cost for construction warranties		-		1,579,809

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Other provision cost	40,850,464	25,069,200
Others	135	24,500
	<u>380,256,720</u>	<u>379,073,339</u>
Deduction of revenues not involving cash inflows:		
Gain on foreign currency translation	5,698,651	6,133,378
Gain on valuation of derivatives	23,242,079	5,415,774
Reversal of impairment loss	20,662,028	1,967,895
Reversal of other impairment loss	647,541	28,882,238
Reversal of loss on valuation of inventories	1,812,303	488,169
Gain on valuation of financial assets at fair value through profit or loss	137,901	298,878
Gain on disposal of financial assets at fair value through profit or loss	-	80,000
Gain on disposal of investments in subsidiaries and associates	1,454,796	53,796,591
Reversal of investments in subsidiaries and associates	3,130,530	3,736,380
Gain on disposal of investment property	-	27,013
Gain on disposal of property, plant and equipment	1,552,489	984,794
Gain on disposal of intangible assets	-	7,519
Reversal of provisions	753,816	734,437
Reversal of provision for product warranties	-	4,133,055
Interest income	5,614,837	2,759,240
Dividend income	30,731,080	53,023,898
Guarantee fee received	1,745,580	1,766,416
Others	144,213	18,381,100
Gain from business transfer	-	73,229,394
	<u>(97,327,844)</u>	<u>(255,846,169)</u>
Changes in working capital:		
Trade and other receivables	121,911,530	(234,093,361)
Other financial assets	(8,398,087)	14,959,087
Other current assets	(209,285,541)	1,861,093
Inventories	(5,718,514)	(6,806,854)
Other non-current assets	1,173,158	1,247,090
Trade and other payables	(125,903,074)	(24,090,939)
Other financial liabilities	(6,360,026)	8,535,206
Other liabilities	119,713,067	236,781,076
Defined benefit liabilities	(22,240,547)	(60,173,650)
Provisions	(19,367,869)	(19,754,367)
	<u>(154,475,903)</u>	<u>(81,535,619)</u>
Cash generated from operations	<u>₩ 228,722,827</u>	<u>₩ 326,212,583</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(2) Details of significant non-cash transaction for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019	2018
Transfer of construction in progress	₩ 26,246,665	₩ 14,207,715
Change of payables by acquiring property, plant and equipment	(4,892,081)	(11,585,710)
Change of payables by acquiring intangible assets	1,479,854	(118,048)
Transfer of long-term borrowings to current portion	183,827,260	151,217,146
Transfer of debentures to current portion	524,386,209	200,125,666
Initial recognition of right-of-use assets	61,114,219	-
Transfer of assets held for sale to investments in associates	39,563,163	-
Transfer of derivatives to current portion	43,361,057	-

(3) Changes in liabilities arising from financing activities for the years ended December 31, 2019 and 2018, are as follows:

<i>(in thousands of Korean won)</i>	2019			
	Beginning	Changes resulting from financing activities	Others ¹	Ending
Bank borrowings	₩ 1,154,221,647	₩ (209,336,074)	₩ (211,050)	₩ 944,674,523
Debentures	1,041,062,988	248,356,883	2,860,547	1,292,280,418
Deposits	2,456,489	2,042,127	(679)	4,497,937
Government grants	1,015,812	42,741	-	1,058,553
Lease payable	2,968,875	(22,238,033)	71,960,136	52,690,978
Liabilities resulting from financing activities	₩ 2,201,725,811	₩ 18,867,644	₩ 74,608,954	₩ 2,295,202,409

¹ Others include changes arising from adoption of Korean IFRS 1116 *Leases*, interest expense and gain and loss on foreign currency translation.

<i>(in thousands of Korean won)</i>	2018			
	Beginning	Changes resulting from financing activities	Others ¹	Ending
Bank borrowings	₩ 1,376,272,712	₩ (221,286,084)	₩ (764,981)	₩ 1,154,221,647
Debentures	1,099,436,694	(61,399,040)	3,025,334	1,041,062,988
Deposits	2,686,879	87,611	(318,000)	2,456,490

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Liabilities resulting from financing activities	₩ 2,478,396,285	₩ (282,597,513)	₩ 1,942,353	₩ 2,197,741,125
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¹ Others include interest expense and gain and loss of foreign currency translation.

39. Green House Gas Emission and Emission Liabilities

(1) Amount of free allocated gas emission (second planned period 2018-2020) as at December 31, 2019, is as follows:

<i>(Unit: KAU)</i>	Free allocated gas emission
2018	34,721
2019	34,721
2020	34,721
	104,163

(2) Changes in amount of emission and book amount for the year ended December 31, 2019, are as follows:

<i>(Unit: KAU, in thousands of Korean won)</i>	2019	
	Quantity	Book amount
Beginning	-	₩ -
Free allocation	34,721	-
Additional allocation	4,127	-
Used ¹	(33,000)	-
Others	-	-
Ending	5,848	₩ -

¹ The used amount for the year ended December 31, 2019 (33,000 KAU), is unverified externally.

Meanwhile, certain gas emissions are not provided as collateral as at December 31, 2019.

Hanwha Corporation

Notes to the Separate Financial Statements

December 31, 2019 and 2018

40. Risk Management

(1) Financial risk management

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

1) Market risk

① Foreign exchange risk

The Company operates internationally and is exposed to foreign exchange risk arising from various currency exposures, primarily with respect to the U.S. dollar, the Euro and the Japanese yen. Foreign exchange risk arises from future commercial transactions and recognized assets and liabilities. The Company chooses a hedging policy based on the nature of each company's business and the risks of exchange rate fluctuation. In addition, the Company evaluates, manages and reports the risks of exchange rate fluctuation by the managing system of receivables and payables to the management periodically.

The impacts of weakened/strengthened Korean won by 10% against foreign currencies, with all other variables held constant, on the profit before income tax for the year ended December 31, 2019, are as follows:

<i>(in thousands of Korean won)</i>	10% increase		10% decrease	
USD	₩	3,818,068	₩	(3,818,068)
EUR		792,358		(792,358)
JPY		(67,541)		67,541

The above sensitivity analysis is performed based on monetary assets and liabilities denominated in a currency that is not the Company's functional currency.

② Interest rate risk

The Company's interest rate risk mainly arises through borrowings. Borrowings issued at variable rates expose the Company to cash flow interest rate risk. Also, fixed-rate borrowings expose the Company to fair value interest rate risk. The Company analyzes and manages its interest rate exposure through various manners, such as to share excess cash within the Company to minimize external borrowings, to avoid high-rate borrowings, to reform capital structure, to manage an appropriate ratio of fixed-rate borrowings and variable-rate borrowings and to monitor a fluctuation of domestic and foreign interest rates.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

The impact of 1% high/low interest rate (on floating-rate borrowings), with all other variables held constant, on the Company's profit before income tax for the year ended December 31, 2019, would have been ₩ 3,471 million lower/higher.

2) Credit risk

Credit risk is managed on a group basis. Credit risk arises from cash and cash equivalents, derivative financial instruments and deposits with banks and financial institutions, as well as credit exposures to wholesale and retail customers, including outstanding receivables and committed transactions. In order to manage credit risk, the Company opens and maintains its business only with customers whose credit qualities exceed a required minimum rating and periodically reevaluates credit qualities of customers to amend a credit limit, if necessary. As at December 31, 2019, management does not expect any losses from non-performance by counterparties. As at December 31, 2019, the maximum exposure to credit risk related to financial guarantees provided by the Company to related parties is ₩ 303,417 million (Note 36).

3) Liquidity risk

The Company monitors rolling forecasts of its liquidity requirements to ensure it has sufficient cash to meet operational needs while maintaining sufficient headroom on its undrawn committed borrowing facilities at all times. The Company's treasury department invests surplus cash in time deposits and interest-bearing money market deposits, choosing instruments with appropriate maturities or sufficient liquidity to provide sufficient headroom.

Details of the Company's liquidity risk analysis as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019				
	Less than 3 months	Between 3 months and 1 year	Between 1 year and 5 years	More than 5 years	Total
Bank borrowings ¹	₩ 212,983,498	₩ 493,868,320	₩ 254,565,684	₩ 7,700,683	₩ 969,118,185
Debentures ¹	158,549,218	394,666,321	796,173,025	-	1,349,388,564
Trade and other payables	431,014,422	16,436,999	5,317,516	-	452,768,937
Other financial liabilities ²	37,974,022	859,866	3,954,641	-	42,788,529
Lease liabilities ³	5,073,642	12,789,057	29,503,315	10,940,704	58,306,718
Derivative financial liabilities ⁴	13,620,479	45,211,709	409,866	-	59,242,054

¹ Cash flows of bank borrowings and debentures included interest expenses.

² Cash flows of other financial liabilities excluded interest expenses from borrowings and derivatives.

³ Cash flows of lease liabilities included interest expenses.

⁴ Cash flows of derivative financial instruments included time value and others.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(in thousands of Korean won)

	2018				
	Less than 3 months	Between 3 months and 1 year	Between 1 year and 5 years	More than 5 years	Total
Bank borrowings ¹	₩ 338,937,437	₩ 600,858,010	₩ 238,169,983	₩ -	₩ 1,177,965,430
Debentures ¹	107,627,870	119,857,346	867,523,611	-	1,095,008,827
Trade and other payables	545,683,435	38,423,295	5,589,071	-	589,695,801
Other financial liabilities ²	54,398,152	1,010,655	3,341,135	2,922,960	61,672,902
Derivative financial liabilities ³	1,907,592	-	43,363,457	-	45,271,049

¹ Cash flows of bank borrowings and debentures included interest expenses.

² Cash flows of other financial liabilities excluded interest expenses from borrowings and derivatives.

³ Cash flows of derivative financial instruments included time value and others.

Additionally, the Company has provided payment guarantees for borrowings of subsidiaries (Note 36).

(2) Capital risk management

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

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

The gearing ratios as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)	2019	2018
Total borrowings	₩ 2,236,954,942	₩ 2,195,284,636
Less: Cash and cash equivalents	(322,520,991)	(355,313,529)
Net debt (A)	1,914,433,951	1,839,971,107
Total equity (B)	3,423,948,285	3,392,945,229
Total capital (C=A+B)	₩ 5,338,382,236	₩ 5,232,916,336
Gearing ratio (A/C) (%)	35.86%	35.16%

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(3) Fair value measurement

There are no significant changes in business and economic environments that affect financial instruments of the Company for the year ended December 31, 2019.

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

(in thousands of Korean won)

	2019		2018	
	Carrying amount	Fair value	Carrying amount	Fair value
Financial assets				
Cash and cash equivalents	₩ 322,520,991	₩ 322,520,991	₩ 355,313,529	₩ 355,313,529
Financial assets at fair value through profit or loss (non-current)	16,663,391	16,663,391	15,245,596	15,245,596
Financial assets at fair value through other comprehensive income (non-current)	78,859	78,859	78,859	78,859
Derivative financial instruments (current)	23,625,546	23,625,546	4,043,858	4,043,858
Derivative financial instruments (non-current)	-	-	385,744	385,744
Trade and other receivables (current) ¹	582,099,344	582,099,344	698,527,641	698,527,641
Trade and other receivables (non-current)	18,850,514	18,850,514	16,302,353	16,302,353
Other financial assets (current) ²	37,246,641	37,246,641	39,946,737	39,946,737
Other financial assets (non-current) ²	30,724,693	30,724,693	36,353,100	36,353,100
	<u>₩ 1,031,809,979</u>	<u>₩ 1,031,809,979</u>	<u>₩ 1,166,197,417</u>	<u>₩ 1,166,197,417</u>
Financial liabilities				
Trade and other payables (current)	₩ 447,451,420	₩ 447,451,420	₩ 584,106,731	₩ 584,106,731
Trade and other payables (non-current)	5,317,516	5,317,516	5,589,071	5,589,071
Borrowings and debentures (current) ³	1,216,296,376	1,216,296,376	1,119,852,341	1,119,852,341
Borrowings and debentures (current) ⁴	1,020,658,566	1,018,442,485	1,075,432,295	1,054,714,466
Derivative financial instruments (current)	58,827,897	58,827,897	1,904,391	1,904,391
Derivative financial instruments (non-current)	409,866	409,866	43,363,334	43,363,334
Other financial liabilities (current) ²	61,895,471	61,895,471	61,756,311	61,756,311
Other financial liabilities (non-current) ²	40,242,710	40,242,710	4,909,701	4,909,701
	<u>₩ 2,851,099,822</u>	<u>₩ 2,848,883,741</u>	<u>₩ 2,896,914,175</u>	<u>₩ 2,876,196,346</u>

¹ The adoption of Korean IFRS 1115 has classified unbilled construction as other current assets.

² Derivative financial instruments are excluded.

³ Since the effect of discount is not significant in respect of current portion of borrowings and debentures, the difference between fair value and book amount is not important.

⁴ Fair value is calculated by reflecting credit rating and market interest rate.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

2) Assets measured at fair value are categorized within the fair value hierarchy, and the defined levels are as follows:

Significance of inputs	
Level 1	Quoted prices (unadjusted) in active markets for identical assets or liabilities
Level 2	Inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly (that is, prices) or indirectly (that is, derived from prices)
Level 3	Inputs for the asset or liability that are not based on observable market data (that is, unobservable inputs)

Fair value hierarchy classifications of the financial assets and financial liabilities that are measured at fair value as at December 31, 2019 and 2018, are as follows:

(in thousands of of Korean won)

	2019			
	Level 1	Level 2	Level 3	Total
Financial assets and liabilities that are measured at fair value				
Assets:				
Financial assets at fair value through profit or loss (non-current)	₩ -	₩ 72,770	₩ 16,590,621	₩ 16,663,391
Financial assets at fair value through other comprehensive income (non-current)	-	-	78,859	78,859
Derivative financial assets	-	23,625,546	-	23,625,546
	<u>₩ -</u>	<u>₩ 23,698,316</u>	<u>₩ 16,669,480</u>	<u>₩ 40,367,796</u>
Liabilities:				
Derivative financial liabilities	₩ -	₩ 14,202,763	₩ 45,035,000	₩ 59,237,763
	<u>₩ -</u>	<u>₩ 14,202,763</u>	<u>₩ 45,035,000</u>	<u>₩ 59,237,763</u>

(in thousands of of Korean won)

	2018			
	Level 1	Level 2	Level 3	Total
Financial assets and liabilities that are measured at fair value				
Assets:				
Financial assets at fair value through profit or loss (non-current)	₩ -	₩ 104,925	₩ 15,140,671	₩ 15,245,596
Financial assets at fair value through other comprehensive income (non-current)	-	-	78,859	78,859
Derivative financial assets	-	4,429,602	-	4,429,602
	<u>₩ -</u>	<u>₩ 4,534,527</u>	<u>₩ 15,219,530</u>	<u>₩ 19,754,057</u>
Liabilities:				
Derivative financial liabilities	₩ -	₩ 1,906,668	₩ 43,361,057	₩ 45,267,725
	<u>₩ -</u>	<u>₩ 1,906,668</u>	<u>₩ 43,361,057</u>	<u>₩ 45,267,725</u>

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

3) Gains and losses on valuation at the transaction date

In case the Company values derivative financial instruments using inputs not based on observable market data and the fair value calculated by the said valuation technique differs from the transaction price, then the fair value of the financial instruments is recognized as the transaction price. The difference between the fair value at initial recognition and the transaction price is deferred and amortized using a straight-line method by maturity of the financial instrument. However, in case inputs of the valuation techniques become observable in markets, the remaining deferred difference is immediately recognized in full as profit for the year.

4) Valuation techniques and inputs

Valuation techniques and inputs used for the fair value instruments categorized within Level 2 and Level 3 of the fair value hierarchy as at December 31, 2019 and 2018, are as follows:

(in thousands of Korean won)

	2019					
	Fair value	Level	Valuation techniques	Inputs and range	Range of inputs (weighted average)	
Financial assets at fair value through profit or loss:						
Gas emission funds (Note 9)	₩ 72,770	2	Market approach	Not applicable	Not applicable	
Equity investments (Note 9)	14,590,621	3	Asset approach	Net asset value	Estimated fair value increases (decreases) when net asset value increases (decreases)	
Unlisted Securities (Note 9)	2,000,000	3	Asset approach	Net asset value	Estimated fair value increases (decreases) when net asset value increases (decreases)	
Financial assets at fair value other comprehensive income:						
Unlisted Securities (Note 9)	78,859	3	Asset approach	Net asset value	Estimated fair value increases (decreases) when net asset value increases (decreases)	
Derivative financial assets:						
Commodity futures (Note 11)	12,540,342	2	Market approach ¹	Not applicable	Not applicable	
Currency forward (Note 11)	11,085,204	2	Market approach ²	Not applicable	Not applicable	
Interest rate swap (Note 11)	-	2	Market approach ³	Not applicable	Not applicable	
Derivative financial liabilities:						
Commodity futures (Note 11)	12,540,342	2	Market approach ¹	Not applicable	Not applicable	
Currency forward (Note 11)	1,168,179	2	Market approach ²	Not applicable	Not applicable	
Currency swap (Note 11)	111,064	2	Market approach ⁴	Not applicable	Not applicable	
Interest rate swap	383,177	2	Market approach ³	Not applicable	Not applicable	

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

(Note 11)

Shareholders' agreement (Note 11)	45,035,000	3	Discounted cash flow (DCF) ⁵	Fair value of redeemable convertible preferred share, Permanent growth rate used when calculating FV, Weighted Average Cost of Capital	When the basic asset price increases by ₩ 100, the contract's value decreases by ₩ 144 million
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(in thousands of Korean
won)

						2018
	Fair value	Level	Valuation techniques	Inputs and range	Range of inputs (weighted average)	
Financial assets at fair value						
through profit or loss:						
Gas emission funds (Note 9)	₩ 104,925	2	Market approach	Not applicable	Not applicable	
Equity investments (Note 9)	13,140,671	3	Asset approach	Net asset value	Estimated fair value increases (decreases) when net asset value increases (decreases)	
Unlisted Securities (Note 9)	2,000,000	3	Asset approach	Net asset value	Estimated fair value increases (decreases) when net asset value increases (decreases)	
Financial assets at fair value other comprehensive income:						
Unlisted Securities (Note 9)	78,859	3	Asset approach	Net asset value	Estimated fair value increases (decreases) when net asset value increases (decreases)	
Derivative financial assets:						
Commodity futures (Note 11)	749,882	2	Market approach ¹	Not applicable	Not applicable	
Currency forward (Note 11)	3,307,929	2	Market approach ²	Not applicable	Not applicable	
Interest rate swap (Note 11)	371,791	2	Market approach ³	Not applicable	Not applicable	
Derivative financial liabilities:						
Commodity futures (Note 11)	749,882	2	Market approach ¹	Not applicable	Not applicable	
Currency forward (Note 11)	1,156,786	2	Market approach ²	Not applicable	Not applicable	
Currency swap (Note 11)	-	2	Market approach ⁴	Not applicable	Not applicable	
Interest rate swap (Note 11)	-	2	Market approach ³	Not applicable	Not applicable	
Shareholders' agreement (Note 11)	43,361,057	3	Discounted cash flow (DCF) ⁵	Fair value of redeemable convertible preferred share, Permanent growth rate used when calculating FV, Weighted Average	When the basic asset price increases by ₩ 100, the contract's value decreases by ₩ 144 million	

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

Cost of Capital

¹ Fair value of commodity futures is stated at fair value, and their rights and duties are recognized as assets and liabilities, with any gains or losses arising on remeasurement recognized in profit or loss. Derivative contracts are entered into to hedge the risk of exchange rate risk and other price fluctuations. The Company delivers the amount of foreign currency that it has committed on the due date to the counterparty (financial institution), and receives the Korean won amount converted from the exchange rate at the time of contract from the counterparty.

² The fair value of the foreign currency forward contracts is measured principally on the basis of the forward exchange rates disclosed in the market at the end of the reporting period for the periods in which they are consistent with the remaining period of the currency forward. If the forward exchange rate of the period consistent with the remaining period of the forward exchange contract is not disclosed in the market, the Company measures its value according to the method below: The forward exchange rate is estimated by applying interpolation method with each period of forward rate disclosed in the market, and in this case, period similar to the remaining period of forward exchange contracts is used. The discount rate used to measure the fair value of the currency forward is determined using the yield curve derived from the interest rate disclosed in the market at the end of the reporting period.

³ The discount rates and the forward exchange rates used to measure the fair value of currency swaps are determined based on applicable yield curve derived from the market interest rates announced at December 31, 2019. The fair value of the currency swap is measured by discounting the future cash flows of the currency swap estimated based on the forward rate derived by the above method at an appropriate discount rate.

⁴ The discount rates and the forward interest rates used to measure the fair value of interest rate swaps are determined based on applicable yield curve derived from the market interest rates announced at December 31, 2019. The fair value of the interest rate swap is measured by discounting the future cash flows of the interest rate swap estimated based on the forward rate derived by the above method at an appropriate discount rate.

⁵ The Company shall have the right to request the purchase of shares at a fixed price at fixed time in accordance with the amendment between shareholders and shall have the obligation to pay a certain price at deducted stock trading price if Reacon Co., Ltd. demands settlement at fixed time, which is similar to the position of buying a call option (C) and selling a put option (P) of derivative instruments. Call options and put options to be evaluated are exercisable only at maturity. Because the basic asset price, exercise price and expiration date are the same, put-call parity was applied to calculate contract value between shareholders.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

41.Changes in Accounting Policies

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

For leases previously classified as ‘finance leases’, the Company recognized the carrying amount of the lease asset and lease liability immediately before transition as the carrying amount of the right-of-use asset and the lease liability at the date of initial application. The measurement principles of Korean IFRS 1116 are only applied after that date.

Details of lease liabilities as at January 1, 2019, are as follows:

<i>(in thousands of Korean won)</i>	2019
Operating lease commitments disclosed as at December 31, 2018	₩ 68,961,946
Discounted using the lessee’s incremental borrowing rate of at the date of initial application	64,656,972
Add: finance lease liabilities recognized as at December 31, 2018	2,968,875
Less: short-term leases not recognized as a liability	(2,018,545)
Less: low-value leases not recognized as a liability	(1,472,343)
Lease liability recognized as at January 1, 2019	64,134,959
Of which are:	
Current lease liabilities	21,191,196
Non-current lease liabilities	42,943,763
Total	₩ 64,134,959

(1) The separate statement of financial position shows the following amounts relating to leases:

<i>(in thousands of of Korean won)</i>	December 31, 2019	January 1, 2019
Right-of-use assets		
Properties (structures, land)	₩ 48,544,615	₩ 61,044,726
Vehicles	2,497,754	2,706,449
Others	2,000	7,596
	<u>₩ 51,044,369</u>	<u>₩ 63,758,771</u>

<i>(in thousands of of Korean won)</i>	December 31, 2019	January 1, 2019
Lease liabilities		
Current	₩ 16,402,909	₩ 21,191,196
Non-current	36,288,070	42,943,763

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

₩	52,690,979	₩	64,134,959
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(2) The separate statement of comprehensive income shows the following amounts relating to leases:

(in thousands of Korean won)

2019

Depreciation of right-of-use assets		
Properties (structures, land)	₩	19,812,030
Vehicles		2,015,604
Others		7,596
	₩	<u>21,835,230</u>
Interest expense relating to lease liabilities (included in finance cost)	₩	1,824,159
Expense relating to short-term leases and leases of low-value assets (included in cost of goods sold and selling and administrative expenses)		3,699,834

(3) Changes in right-of-use assets for the year ended December 31, 2019, are as follows:

(in thousands of Korean won)

2019

	Beginning	Effects of conversion	Acquisitions	Disposals	Depreciation	Others ¹	Ending
Land	₩ -	₩ 7,389,984	₩ -	₩ -	₩ (1,425,022)	₩ -	₩ 5,964,962
Structures	-	51,010,190	7,443,022	(131,103)	(18,387,008)	2,644,552	42,579,653
Vehicles	-	2,706,449	1,894,858	(87,949)	(2,015,604)	-	2,497,754
Others	-	7,596	2,000	-	(7,596)	-	2,000
	₩ -	₩ 61,114,219	₩ 9,339,880	₩ (219,052)	₩ (21,835,230)	₩ 2,644,552	₩ 51,044,369

¹ Others represent reclassification from property, plant and equipment to right-of-use assets due to changes in accounting policies as at January 1, 2019.

Depreciation expense of right-of-assets amounting to ₩ 6,978 million was charged to 'cost of sales' and ₩ 14,857 million to 'selling and administrative expenses'.

Hanwha Corporation
Notes to the Separate Financial Statements
December 31, 2019 and 2018

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

<i>(in thousands of Korean won)</i>	2019	
Beginning	₩	2,968,875
Changes in accounting policies		61,166,084
Acquisitions		9,332,480
Disposals		(362,586)
Interest expense		1,824,159
Payment		(22,238,033)
Ending	₩	<u>52,690,979</u>

(5) Maturity analysis of lease liabilities as at December 31, 2019, is as follows:

<i>(in thousands of Korean won)</i>	2019	
Less than 3 months	₩	4,151,405
Between 3 months and 1 year		12,251,503
Between 1 year and 5 years		26,704,352
More than 5 years		9,583,719
	₩	<u>52,690,979</u>

(6) The lessee's weighted average incremental borrowing rate applied to the lease liabilities on January 1, 2019 was 2.48~6.00%.

(7) The total cash outflow for leases in 2019 was ₩ 25,938 million.

42.Events after the Reporting Period

There are no events after the reporting period that have a material impact on the separate financial statements.