S-OIL Corporation and Subsidiaries

Consolidated Financial Statements December 31, 2022 and 2021

S-OIL Corporation and Subsidiaries

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December 31, 2022 and 2021

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Independent Auditor's Report

(English Translation of a Report Originally Issued in Korean)

To the Board of Directors and Shareholders of S-OIL Corporation

Opinion

We have audited the accompanying consolidated financial statements of S-OIL Corporation and its subsidiaries (collectively referred to as the "Group"), which comprise the consolidated statements of financial position as of December 31, 2022 and 2021, and the consolidated statements of comprehensive income, changes in equity and cash flows for the years then ended, and notes to the consolidated financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Group as of December 31, 2022 and 2021, and its consolidated financial performance and its consolidated cash flows for the years then ended in accordance with International Financial Reporting Standards as adopted by the Republic of Korea.

Basis for Opinion

We conducted our audits in accordance with Korean Standards on Auditing. Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Consolidated Financial Statements* section of our report. We are independent of the Group in accordance with the ethical requirements of the Republic of Korea that are relevant to our audit of the consolidated 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 consolidated financial statements of the current period. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

Related Party Transactions - Existence and Disclosure

Why it is determined to be a key audit matter

Sales and purchases transactions with related parties of the Group in 2022 are $\mbox{$W$}$ 9,607,464 million and $\mbox{$W$}$ 33,701,725 million, respectively. These amounts represent 23% of total sales and 88% of total purchases. We focused on the impact of these significant related party transactions on the consolidated financial statements. See Note 33 for details.

More specifically, sales transactions with Aramco Trading Company and its subsidiaries amount to $\mbox{$W$}$ 8,669,469 million and purchase transactions with Saudi Arabian Oil Company and Aramco Trading Company and its subsidiaries amount to $\mbox{$W$}$ 33,466,639 million. Given the significant size of transactions, we considered related party transactions with these particular related parties (existence and disclosure) as a key audit matter.

How our audit addressed the key audit matter

Our procedures with respect to existence and disclosure of sales and purchases from related parties include:

- · Obtaining an understanding and evaluating process and relevant controls relating to the related party transactions
- Performing external confirmation procedures and examining supporting documents, in a sample basis, to substantive test of sales and purchases at transaction level
- · Evaluating appropriateness of disclosure in accordance with the applicable financial reporting framework

Inventory Valuation

Why it is determined to be a key audit matter

Valuation allowance for inventories of ₩ 194,609 million and loss on valuation of inventories of ₩ 149,701 million were recognized as of and for the year ended December 31, 2022. See Note 12 for details.

In measuring allowance for inventories, significant management's estimates and judgment are made as to future estimated sales price. Given the size of the balance and the extent of judgment involved, we considered inventory valuation as a key audit matter.

How our audit addressed the key audit matter

Our procedures with respect to inventory valuation include:

- · Obtaining an understanding and evaluating process and relevant controls relating to the inventory valuation
- · Examining supporting documents for future estimated sales price which is one of the assumptions management used
- · Recalculating mathematical accuracy of allowance for inventories

Other Matter

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

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

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

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

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

Auditor's Responsibilities for the Audit of the Consolidated Financial Statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with 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 consolidated 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 consolidated financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- · Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Group's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.

- · Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.
- · Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the Group audit. We remain solely responsible for our audit opinion.

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

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

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

The engagement partner on the audit resulting in this independent auditor's report is Sung-Ki Jun, Certified Public Accountant.

Seoul, Korea March 16, 2023

This report is effective as of March 16, 2023, the audit report date. Certain subsequent events or circumstances, which may occur between the audit report date and the time of reading this report, could have a material impact on the accompanying consolidated financial statements and notes thereto. Accordingly, the readers of the audit report should understand that 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.

S-OIL Corporation and Subsidiaries Consolidated Statements of Financial Position December 31, 2022 and 2021

(In millions of Korean won)	Notes		2022		2021
Assets	Notes		2022		2021
Current assets					
Cash and cash equivalents	3,7,11	₩	1,310,326	₩	1,945,526
Trade receivables	3,8,11		2,303,579		1,970,996
Other receivables	3,8,11,35		136,358		124,776
Other current financial assets	3,4,9,11		151,011		11,051
Derivative financial instruments	3,4,10,11		16,343		1,248
Inventories	12		4,733,160		3,545,340
Other current assets	9		555,204		778,486
		-	9,205,981		8,377,423
Non-current assets					
Other receivables	3,8,11,35		87,786		80,501
Other non-current financial assets	3,4,9,11		71,422		69,440
Investments in joint venture and associates	13		36,002		37,823
Property, plant and equipment Intangible assets	6,14,16		9,588,032 106,418		9,564,839 108,370
Intaligible assets Investment property	6,15 37		136,065		136,065
Other non-current assets	9,35		209,202		275,369
Net defined benefit assets	20		172,227		43,405
The domination desired	20		10,407,154		10,315,812
Total assets		₩	19,613,135	₩	18,693,235
Liabilities					
Current liabilities					
Trade payables	3,11,17	₩	3,172,420	₩	3,075,770
Other payables	3,11,17,35		864,996		572,386
Borrowings	3,11,18		2,528,886		2,818,825
Derivative financial instruments	3,4,10,11		312		2,210
Current income tax liabilities			651,723		126,297
Provisions for other liabilities and charges	19		4,818		14,627
Contract liabilities	19		16,676		18,431
Other current liabilities	17		973,327		1,876,481
			8,213,158		8,505,027
Non-current liabilities	0.44.47.05		000 000		055.040
Other payables Borrowings	3,11,17,35 3,11,18		226,309 2,426,761		255,349 2,736,087
Deferred income tax liabilities	3,11,16		263,438		2,730,067
Deletted income tax habilities	30		2,916,508		3,200,166
Total liabilities		-	11,129,666	-	11,705,193
			, ,,,,,,,,,		,,
Equity	00		004.540		004 540
Share capital	22		291,512		291,512
Share premium Reserves	22 25		379,190 986,123		379,190 985,474
Treasury share	23 23		(1,876)		(1,876)
Retained earnings	23 24		6,828,520		5,333,742
Total equity	∠ ⊣		8,483,469		6,988,042
Total liabilities and equity		₩	19,613,135	₩	18,693,235
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The above consolidated statements of financial position should be read in conjunction with the accompanying notes.

S-OIL Corporation and Subsidiaries Consolidated Statements of Comprehensive Income Years Ended December 31, 2022 and 2021

(In millions of Korean won, except earnings per share data)	Notes	2022	2021
Sales	6	₩ 42,446,028	₩ 27,463,918
Cost of sales	26,31	(38,291,440)	(24,695,192)
Gross profit		4,154,588	2,768,726
Selling expenses Administrative expenses	27,31 27,31	(612,979) (136,443)	(507,903) (119,881)
Operating profit		3,405,166	2,140,942
Other income Other expenses Finance income Finance costs Share of net profit (loss) of joint venture and associates	28 28 29 29 13	1,147,592 (1,329,905) 432,487 (756,627) (171)	459,981 (494,023) 129,059 (359,726) 1,787
Profit before income tax		2,898,542	1,878,020
Income tax expense Profit for the year	30	<u>(794,155)</u> <u>2,104,387</u>	(499,479) 1,378,541
Other comprehensive income, net of tax Items that will not be reclassified to profit or loss Remeasurements of net defined benefit liabilities Gains on valuation of financial assets at fair value through other comprehensive income Items that may be subsequently reclassified to profit or loss Currency translation differences	20 25	7,516 385 264	36,466 6,884 191
Total other comprehensive income for the year		8,165	43,541
Total comprehensive income for the year		₩ 2,112,552	₩ 1,422,082
Earnings per share Basic and diluted earnings per ordinary share Basic and diluted earnings per preferred share	32 32	₩ 18,075 ₩ 18,100	₩ 11,840 ₩ 11,865

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

S-OIL Corporation and Subsidiaries Consolidated Statements of Changes in Equity Years ended December 31, 2022 and 2021

(In millions of Korean won)	Share Capital		Share Premium	Re	eserves		easury Share	Retained Earnings	To	tal Equity
Balance at January 1, 2021	₩ 291,51	2 ∀	₩ 379,190	₩	977,944	₩	(1,876)	₩ 4,035,707	₩	5,682,477
Profit for the year		<u> </u>						1,378,541		1,378,541
Other comprehensive income (loss)										
Gains on valuation of financial assets at fair value through other comprehensive income Reclassification due to disposal of financial assets at fair		-	-		6,884		-	-		6,884
value through other comprehensive income		-	-		455		-	(455)		-
Foreign currency translation adjustments		-	-		191		-	-		191
Remeasurements of net defined benefit liabilities								36,466		36,466
Other comprehensive income for the year					7,530			36,011		43,541
Total comprehensive income for the year					7,530			1,414,552		1,422,082
Transactions with owners										
Dividends paid for 2020		-	-		-		-	(96)		(96)
Interim Dividends paid for 2021	-	<u> </u>					-	(116,421)		(116,421)
Balance at December 31, 2021	₩ 291,51	2 ∀	₩ 379,190	₩	985,474	₩	(1,876)	₩ 5,333,742	₩	6,988,042

S-OIL Corporation and Subsidiaries Consolidated Statements of Changes in Equity Years ended December 31, 2022 and 2021

(In millions of Korean won)	_	hare apital		Share remium	Re	eserves		easury Share	Retained Earnings	To	tal Equity
Balance at January 1, 2022	₩	291,512	₩	379,190	₩	985,474	₩	(1,876)	₩ 5,333,742	₩	6,988,042
Profit for the year		-		-		-		-	2,104,387		2,104,387
Other comprehensive income (loss)											
Gains on valuation of financial assets at fair value through											
other comprehensive income		-		-		385		-	-		385
Foreign currency translation adjustments		-		-		264		-	-		264
Remeasurements of net defined benefit liabilities				_					7,516		7,516
Other comprehensive income for the year				_		649			7,516		8,165
Total comprehensive income for the year		<u>-</u>		-		649		-	2,111,903		2,112,552
Transactions with owners											
Dividends paid for 2021		-		-		-		-	(326,073)		(326,073)
Interim Dividends paid for 2022		<u>-</u>		-		<u>-</u>		-	(291,052)		(291,052)
Balance at December 31, 2022	₩	291,512	₩	379,190	₩	986,123	₩	(1,876)	₩ 6,828,520	₩	8,483,469

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

S-OIL Corporation and Subsidiaries Consolidated Statements of Cash Flows Years ended December 31, 2022 and 2021

(In millions of Korean won)	Notes		2022		2021
Cash flows from operating activities					
Cash generated from operations	34	₩	1,605,948	₩	1,660,093
Interest received	01		29,747		8,898
Interest paid			(143,102)		(111,174)
Income tax paid			(217,430)		(85,604)
Dividends received			3,758		4,952
Net cash inflow from operating activities			1,278,921		1,477,165
Cook flows from investing activities			_		_
Cash flows from investing activities Proceeds from disposal of property, plant and equipment			20.022		175,277
Proceeds from disposal of intangible assets			29,922 14		1,004
Disposal of financial assets at fair value through profit or			14		1,004
loss			100		
Disposal of financial assets at fair value through other			100		-
comprehensive income			56		_
Decrease in other receivables			18,372		21,001
Decrease in other financial assets			10,572		334,992
Purchase of property, plant and equipment	14		(598,755)		(271,967)
Purchase of intangible assets	15		(861)		(13,301)
Payments for acquisition of associate	13		(30.)		(8,200)
Purchase of financial assets at fair value through profit or					(0,=00)
loss	4		(700)		(2,981)
Purchase of financial assets at fair value through other			(/		(, ,
comprehensive income	4		(1,239)		-
Increase in other receivables			(12,817)		(4,366)
Increase in other current assets			(1,055)		(11,753)
Increase in other financial assets			(140,000)		-
Settlement of derivative assets and liabilities			(66,475)		(10,326)
Others			239		(12,798)
Net cash inflow (outflow) from investing activities			(773,199)		196,582
Cash flows from financing activities					
Proceeds from borrowings			279,139		458,602
Repayment of borrowings			(731,702)		(740,000)
Decrease in other payables			(71,880)		(68,217)
Dividends paid			(617,132)		(116,519)
Net cash outflow from financing activities			(1,141,575)		(466,134)
Net increase (decrease) in cash and cash equivalents			(635,853)		1,207,613
Cash and cash equivalents at the beginning of the year	7		1,945,526		737,439
Effects of exchange rate changes on cash and cash			, ,		, -
equivalents			653		474
Cash and cash equivalents at the end of the year	7	₩	1,310,326	₩	1,945,526

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

1. General Information

The general information of S-OIL Corporation (the "Company" or the "Parent Company") and its subsidiaries, S-International Ltd., North East Chemicals Co., Ltd. and S-OIL Singapore PTE. LTD. (the "Subsidiaries") (collectively referred to as the "Group") under Korean IFRS 1110 *Consolidated Financial Statements*, are as follows:

The Company

S-OIL Corporation was established in 1976 to manufacture and sell oil refining products, lube products and petrochemical products, and to import and export crude oil and products. In 1987, the Company listed its stock on the Korea Exchange. The Company's headquarters is located in Mapo-gu, Seoul, Korea.

As of December 31, 2022, the major shareholders of the Company and their respective shareholdings are as follows:

	2022				
Name of shareholders	Number of ordinary shares	Percentage of ownership (%)			
Aramco Overseas Co., B.V.	71,387,560	63.41			
Institutional and individual investors	41,195,232	36.59			
Total	112,582,792	100.00			

Consolidated Subsidiaries

Details of the consolidated subsidiaries as of December 31, 2022 and 2021, are as follows:

	Number of Shares	Location	Ownership interest held by the Group (%)	2021 Ownership interest held by the Group (%)	Main business	Closing Month
S-International Ltd.	10	Samoa	100	100	Purchasing and sales of crude oil and petroleum goods	December
S-OIL Singapore PTE. LTD.	1,200,000	Singapore	100	100	Lube base oil trading and overseas services	December

Summarized financial information for consolidated subsidiaries as of and for the years ended December 31, 2022 and 2021, is as follows:

(In millions of Korean won)				2022		
Subsidiary	Assets	Liabilities	Equity	Sales	Profit for the year	Total comprehensive income
S-International Ltd.	₩ 1,495	₩ -	₩ 1,495	₩ -	₩ 18	₩ 113
S-OIL Singapore PTE. LTD.	37,720	32,117	5,603	431,422	2,022	2,286
(In millions of Korean won)				2021		
					Profit for the	Total
Subsidiary	Assets	Liabilities	Equity	Sales	year	comprehensive income
S-International Ltd.	₩ 1,382	₩ -	₩ 1,382	₩ -	₩ 1	₩ 114
S-OIL Singapore PTE. LTD.	35,671	32,354	3,317	261,595	1,669	1,819

Changes in Scope for Consolidation

There are no changes in subsidiaries included or excluded in the consolidation for the year ended December 31, 2022.

2. Significant Accounting Policies

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

2.1 Basis of Preparation

The Group maintains its accounting records in Korean won and prepares statutory consolidated 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 consolidated financial statements have been condensed, restructured and translated into English from the Korean language consolidated 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 consolidated financial statements of the Group have been prepared in accordance with Korean IFRS. These are the standards, subsequent amendments and related interpretations issued by the International Accounting Standards Board (IASB) that have been adopted by the Republic of Korea.

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

- · Certain financial assets and liabilities (including derivative instruments), 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 consolidated financial statements requires the use of critical accounting estimates. Management also needs to exercise judgement in applying the Group's accounting policies. The areas involving a higher degree of judgment or complexity, or areas where assumptions and estimates are significant to the consolidated financial statements are disclosed in Note 5.

(1) New and amended standards adopted by the Group

The Group has applied the following standards and amendments for the first time for their annual reporting period commencing January 1, 2022.

- Amendment to Korean IFRS 1116 *Lease* - Covid-19 - Related Rent Concessions beyond June 30, 2021

The application of the practical expedient, a lessee may elect not to assess whether a rent concession occurring as a direct consequence of the COVID-19 pandemic is a lease modification, is extended to lease payments originally due on or before June 30, 2022. A lessee shall apply the practical expedient consistently to eligible contracts with similar characteristics and in similar circumstances. The amendment does not have a significant impact on the consolidated financial statements.

- Amendments to Korean IFRS 1103 *Business Combination* - Reference to the Conceptual Framework

The amendments update a reference of definition of assets and liabilities to be recognized in a business combination in revised Conceptual Framework for Financial Reporting. However, the amendments add an exception for the recognition of liabilities and contingent liabilities within the scope of Korea IFRS 1037 *Provisions, Contingent Liabilities and Contingent Assets*, and Korean IFRS 2121 *Levies*. The amendments also clarify that contingent assets should not be recognized at the acquisition date. The amendment does not have a significant impact on the consolidated financial statements.

- Amendments to Korean IFRS 1016 Property, Plant and Equipment - Proceeds before intended use

The amendments prohibit an entity from deducting from the cost of an item of property, plant and equipment any proceeds from selling items produced while the entity is preparing the asset for its intended use. Instead, the entity will recognize the proceeds from selling such items, and the costs of producing those items, in profit or loss. The amendment does not have a significant impact on the consolidated financial statements.

- Amendments to Korean IFRS 1037 *Provisions, Contingent Liabilities and Contingent Assets* - Onerous Contracts : Cost of Fulfilling a Contract

The amendments clarify that the direct costs of fulfilling a contract include both the incremental costs of fulfilling the contract and an allocation of other costs directly related to fulfilling contracts when assessing whether the contract is onerous. The amendment does not have a significant impact on the consolidated financial statements.

- Amendments improvements to Korean IFRS 2018-2020

Annual improvements of Korean IFRS 2018-2020 Cycle should be applied for annual periods beginning on or after January 1, 2022, and earlier application is permitted. The amendment does not have a significant impact on the consolidated financial statements.

 Korean IFRS 1101 First time Adoption of Korean International Financial Reporting Standards – Subsidiaries that are first-time adopters

- Korean IFRS 1109 Financial Instruments Fees related to the 10% test for derecognition of financial liabilities
- · Korean IFRS 1041 Agriculture Measuring fair value
- (2) New standards and interpretations not yet adopted by the Group

The following new accounting standards and interpretations have been published that are not mandatory for December 31, 2022 reporting periods and have not been early adopted by the Group.

- Amendments to Korean IFRS 1001 *Presentation of Financial Statements -* Classification of Liabilities as Current or Non-current

The amendments clarify that liabilities are classified as either current or non-current, depending on the substantive rights that exist at the end of the reporting period. Classification is unaffected by the likelihood that an entity will exercise right to defer settlement of the liability or the expectations of management. Also, the settlement of liability includes the transfer of the entity's own equity instruments, however, it would be excluded if an option to settle them by the entity's own equity instruments if compound financial instruments is met the definition of equity instruments and recognized separately from the liability. The amendments should be applied for annual periods beginning on or after January 1, 2024, and earlier application is permitted. The Group is in review for the impact of these amendments on the consolidated financial statements.

- Korean IFRS 1001 Presentation of Financial Statements - Disclosure of Accounting Policies

The amendments to Korean IFRS 1001 define and require entities to disclose their material accounting policies. The amendments should be applied for annual periods beginning on or after January 1, 2023, and earlier application is permitted. The Group is in review for the impact of these amendments on the consolidated financial statements.

- Korean IFRS 1008 Accounting policies, changes in accounting estimates and errors - Definition of Accounting Estimates

The amendments define accounting estimates and clarify how to distinguish them from changes in accounting policies. The amendments should be applied for annual periods beginning on or after January 1, 2023, and earlier application is permitted. The Group does not expect that these amendments have a significant impact on the consolidated financial statements.

- Korean IFRS 1012 *Income Taxes* - Deferred Tax related to Assets and Liabilities arising from a Single Transaction

The amendments include an additional condition to the exemption to initial recognition of an asset or liability that a transaction does not give rise to equal taxable and deductible temporary differences at the time of the transaction. The amendments should be applied for annual periods beginning on or after January 1, 2023, and earlier application is permitted. The Group does not expect that these amendments have a significant impact on the consolidated financial statements.

- New Standard: Korean IFRS 1117 Insurance Contract

Korean IFRS 1117 *Insurance Contracts* replaces Korean IFRS 1104 *Insurance Contracts*. This Standard estimates future cash flows of an insurance contract and measures insurance liabilities using discount rates applied with assumptions and risks at the measurement date. The entity recognizes insurance revenue on an accrual basis including services (insurance coverage) provided to the policyholder by each annual period. In addition, investment components (Refunds due to termination/maturity) repaid to a policyholder even if an insured event does not occur, are excluded from insurance revenue, and insurance financial income or expense and the investment income or expense are presented separately to enable users of the information to understand the sources of income or expenses. This Standard should be applied for annual periods beginning on or after January 1, 2023, and earlier application is permitted for entities that applied Korean IFRS 1109 *Financial Instruments*. The Group does not expect that these amendments have a significant impact on the consolidated financial statements.

Further amendments made in December 2021 added a transition option that permits an entity to apply an optional classification overlay in the comparative period(s) presented on initial application of Korean IFRS 1117. The classification overlay applies to all financial assets, including those held in respect of activities not connected to contracts within the scope of Korean IFRS 1117. It allows those assets to be classified in the comparative period(s) in a way that aligns with how the entity expects those assets to be classified on initial application of Korean IFRS 1109. The classification can be applied on an instrument-by-instrument basis.

- Korean IFRS 1001 *Presentation of Financial Statements* - Disclosure of gain or loss on valuation of financial liabilities subject to adjustment of exercise price

If the entire or a part of financial instrument, whose exercise price is subject to change due to the issuer's share price, is classified as a financial liability, the carrying amount of the financial liability and related gains and losses shall be disclosed. The amendments should be applied for annual periods beginning on or after January 1, 2023, and earlier application is permitted. The Group does not expect that these amendments have a significant impact on the consolidated financial statements.

2.2 Consolidation

The Group has prepared the consolidated financial statements in accordance with Korean IFRS 1110 *Consolidated Financial Statements.*

(1) Subsidiaries

Subsidiaries are all entities over which the Group has control. The Group controls an entity when the Group is exposed to, or has rights to, variable returns from its involvement with the entity and has the ability to affect those returns through its power to direct the activities of the entity. Subsidiaries are fully consolidated from the date on which control is transferred to the Group. They are deconsolidated from the date that control ceases.

The acquisition method of accounting is used to account for business combinations by the Group. The consideration transferred is measured at the fair values of the assets transferred, and identifiable assets acquired and liabilities and contingent liabilities assumed in a business combination are measured initially at their fair values at the acquisition date. The Group recognizes any non-controlling interest in the acquired entity on an acquisition-by-acquisition basis either at fair value or at the non-controlling interest's proportionate share of the acquired entity's net identifiable assets. All other non-controlling interests are measured at fair values, unless otherwise required by other standards. Acquisition-related costs are expensed as incurred.

The excess of consideration transferred, amount of any non-controlling interest in the acquired entity and acquisition-date fair value of any previous equity interest in the acquired entity over the fair value of the net identifiable assets acquired is recoded as goodwill. If those amounts are less than the fair value of the net identifiable assets of the business acquired, the difference is recognized directly in the profit or loss as a bargain purchase.

Intercompany transactions, balances and unrealized gains on transactions between group companies are eliminated. Accounting policies of subsidiaries have been changed where necessary to ensure consistency with the policies adopted by the Group.

(2) Associates

Associates are entities over which the Group has significant influence but not control or joint control. Investments in associates are accounted for using the equity method of accounting, after initially being recognized at cost. Unrealized gains on transactions between the Group and its associates are eliminated to the extent of the Group's interest in the associates. If the Group's share of losses of an associate equals or exceeds its interest in the associate (including long-term interests that, in substance, form part of the Group's net investment in the associate), the Group discontinues recognizing its share of further losses. After the Group's interest is reduced to zero, additional losses are provided for, and a liability is recognized, only to the extent that the Group has incurred legal or constructive obligations or made payments on behalf of the associate. If there is an objective evidence of impairment for the investment in the associate, the Group recognizes the difference between the recoverable amount of the associate and its book amount as impairment loss. If an associate uses accounting policies other than those of the Group for like transactions and events in similar circumstances, if necessary, adjustments shall be made to make the associate's accounting policies

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conform to those of the Group when the associate's financial statements are used by the entity in applying the equity method.

(3) Joint Arrangements

A joint arrangement, wherein two or more parties have joint control, is classified as either a joint operation or a joint venture. A joint operator recognizes its direct right to the assets, liabilities, revenues and expenses of joint operations and its share of any jointly held or incurred assets, liabilities, revenues and expenses. Interests in joint ventures are accounted for using the equity method, after initially being recognized at cost in the consolidated statement of financial position.

2.3 Foreign Currency Translation

(1) Functional and presentation currency

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

(2) Transactions and balances

Foreign currency transactions are translated into the functional currency using the exchange rates at the dates of the transactions. Foreign exchange gains and losses resulting from the settlement of such transactions and from the translation of monetary assets and liabilities denominated in foreign currencies at year end exchange rates are generally recognized in profit or loss.

Non-monetary items that are measured at fair value in a foreign currency are translated using the exchange rates at the date when the fair value was determined. Translation differences on assets and liabilities carried at fair value are reported as part of the fair value gain or loss. For example, translation differences on non-monetary assets and liabilities such as equities held at fair value through profit or loss are recognized in profit or loss as part of the fair value gain or loss and translation differences on non-monetary assets such as equities held at fair value through other comprehensive income are recognized in other comprehensive income.

(3) Translation to presentation currency

The results and financial position of subsidiary that have a functional currency different from the presentation currency are translated into the presentation currency of as follows:

- assets and liabilities for each statement of financial position presented are translated at the closing rate at the end of the reporting period,
- · income and expenses for each statement of profit or loss are translated at average exchange rates,
- equity is translated at the historical exchange rate, and

· all resulting exchange differences are recognized in other comprehensive income.

2.4 Financial Assets

(1) Classification

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

- those to be measured at fair value through profit or loss,
- those to be measured at fair value through other comprehensive income, and
- those to be measured at amortized cost.

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

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

For investments in equity instruments that are not held for trading, this will depend on whether the Group has made an irrevocable election at the time of initial recognition to account for the equity investment at fair value through other comprehensive income. Changes in fair value of non-designated equity investment are recognized in profit or loss.

(2) Measurement

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

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

A. Debt instruments

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

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

B. Equity instruments

The Group subsequently measures all equity investments at fair value. Where the Group's management has elected to present fair value gains and losses on equity investments, which held for long-term investment or strategic purpose, in other comprehensive income, there is no subsequent reclassification of fair value gains and losses to profit or loss following the derecognition of the investment. Dividend income from such investments continue to be recognized in profit or loss as 'other income' when the right to receive payments is established.

Changes in the fair value of financial assets at fair value through profit or loss are recognized in 'other income and expenses' in the statement of profit or loss as applicable. Impairment loss (reversal of impairment loss) on equity investments measured at fair value through other comprehensive income are not reported separately from other changes in fair value.

(3) Impairment

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

(4) Recognition and derecognition

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

(5) Offsetting of financial instruments

Financial assets and liabilities are offset and the net amount reported in the statements of financial position where there is a legally enforceable right to offset the recognized amounts and there is an intention to settle on a net basis or realize the assets and settle the liability simultaneously. The legally enforceable right must not be contingent on future events and must be enforceable in the normal course of business and in the event of default, insolvency or bankruptcy of the Group or the counterparty.

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2.5 Derivative Instruments

Derivatives are initially recognized at fair value on the date when a derivative contract is entered into and are subsequently remeasured at their fair value at the end of each reporting period. Changes in the fair value of any derivative instrument that does not qualify for hedge accounting are recognized immediately in profit or loss within 'other income or other expenses' based on the nature of transactions.

The Group applies cash flow hedge accounting to hedge the foreign currency risk associated with forecast sale. The effective portion of changes in the fair value of derivatives that are designated and qualify as cash flow hedges is recognized in the cash flow hedge reserve within equity, limited to the cumulative change in fair value (present value) of the hedged item (the present value of the cumulative change in the future expected cash flows of the hedged item) from the inception of the hedge. The ineffective portion is recognized in 'other income or other expenses'.

When forward contracts are used to hedge the foreign currency risk associated with forecast sale, the Group generally designates only the change in fair value of the forward contract related to the spot element as the hedging instrument. Gains or losses relating to the effective portion of the change in the spot element of the forward contracts are recognized in the cash flow hedge reserve within equity. Amounts accumulated in equity are reclassified to 'sale' in the periods when the hedged item affects profit or loss.

2.6 Inventories

Inventories are stated at the lower of cost and net realizable value. Cost is determined using the first-in, first-out (FIFO) method except for in-transit inventories which are determined using the specific identification method and supplies which are determined using the moving weighted average method.

2.7 Property, Plant and Equipment

Property, plant and equipment are stated at historical cost less accumulated depreciation and accumulated impairment losses. Historical cost includes expenditure that is directly attributable to the acquisition of the items.

Depreciation of all property, plant and equipment, except for land and catalysts, is calculated using the straight-line method to allocate their cost or revalued amounts, net of their residual values, over their estimated useful lives as follows:

Buildings Structures Machinery and equipment Vehicles Other property, plant and equipment Catalysts Estimated useful lives
20 - 40 years
20 - 40 years
15 - 30 years
5 years
3 - 5 years
Units-of-production method

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

2.8 Borrowing Costs

General and specific borrowing costs that are directly attributable to the acquisition, construction or production of a qualifying asset are capitalized during the period of time that is required to complete and prepare the asset for its intended use or sale. Investment income earned on the temporary investment of specific borrowings on qualifying assets is deducted from the borrowing costs eligible for capitalization. Other borrowing costs are expensed in the period in which they are incurred.

2.9 Intangible Assets

Goodwill is measured as described in Note 2.2 (1), and carried at cost less accumulated impairment losses

Intangible assets, except for goodwill, are initially recognized at its historical cost and carried at its cost less accumulated amortization and accumulated impairment losses. Membership rights that have an indefinite useful life are not subject to amortization because there is no foreseeable limit to the period over which the assets are expected to be utilized. The Group amortizes intangible assets with a limited useful life using the straight-line method over the following periods:

Estimated useful lives

Facility usage rights
Other intangible assets

Periods with exclusive supply rights or contract periods 5 years

2.10 Investment Property

Investment property is property (including the right-of-use asset) held to earn rentals or for capital appreciation or both. An investment property is measured initially at its cost. An investment property is measured after initial measurement at depreciated cost (less any accumulated impairment losses). After recognition as an asset, investment property is carried at cost less accumulated depreciation and impairment losses. The investment property held by the Group is land.

2.11 Impairment of Non-financial Assets

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

2.12 Financial Liabilities

(1) Classification and measurement

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

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

(2) Derecognition

Financial liabilities are removed from the consolidated statement of financial position when it is extinguished; for example, when the obligation specified in the contract is discharged or cancelled or expired or when the terms of an existing financial liability are substantially modified.

2.13 Current Tax and Deferred Tax

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

The current tax is measured at the amount expected to be paid to the taxation authorities, using the tax rates (and tax laws) that have been enacted or substantively enacted by the end of the reporting period.

Management periodically evaluates positions taken in tax returns with respect to situations in which applicable tax regulation is subject to interpretation. The Group recognizes current income tax on the basis of amounts expected to be paid to the tax authorities.

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

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

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

2.14 Post-employment Benefits

The Group operates both defined contribution and defined benefit pension plans.

For defined contribution plans, the Group pays contribution to publicly or privately administered pension insurance plans on mandatory, contractual or voluntary basis. The Group has no further payment obligation once the contribution have been paid. The contribution are recognized as employee benefit expense when they are due.

A defined benefit plan is a pension plan that is not a defined contribution plan. Generally, post-employment benefits are payable after the completion of employment, and the benefit amount depended on the employee's age, periods of service or salary levels. The liability recognized in the consolidated statement of financial position in respect of defined benefit pension plans is the present value of the defined benefit obligation at the end of the reporting period less the fair value of plan assets. The defined benefit obligation is calculated annually by independent actuaries using the projected unit credit method. The present value of the defined benefit obligation is determined by discounting the estimated future cash outflows using interest rates of high-quality corporate bonds that are denominated in the currency in which the benefits will be paid, and that have terms approximating to the terms of the related obligation. Remeasurement gains and losses arising from experience adjustments and changes in actuarial assumptions are recognized in the period in which they occur, directly in other comprehensive income.

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

2.15 Provisions

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

2.16 Customer Loyalty Program

The award credits ("points") provide the customers with benefits that they would not have if there is no contract entered into. Accordingly, providing points to customers is a separate performance obligation. Transaction price per performance obligation is allocated based on relative stand-alone selling price of goods and points. The management estimates the stand-alone selling price of points based on discounts to be provided when the points are redeemed and the probability of redemption from past experience. Stand-alone selling price of goods are estimated based on the retail price.

2.17 Share Capital

Ordinary shares and preferred shares that are not mandatorily redeemable are classified as equity.

Where the Company purchases its own equity share capital (treasury share), the consideration paid, including any directly attributable incremental costs is deducted from equity attributable to the subsequently reissued, any consideration received is included in equity attributable to the Company's equity holders.

2.18 Revenue Recognition

The Group manufactures and sells oil refining products, lube products and petrochemical products, and imports and exports crude oil and products. Revenue from the sale of goods is recognized when the Group sells a product to the customer based on the contract.

The Group estimates an amount of variable consideration by using the expected value which the Group expects to better predict the amount of consideration. The Group recognize revenue with transaction price including variable consideration only to the extent that it is highly probable that a significant reversal in the amount of cumulative revenue recognized will not occur when the refund period has lapsed. The refund liability is measured at the amount of consideration received for which the Group does not expect to be entitled.

The transaction price in an arrangement must be allocated to each separate performance obligation based on the relative stand-alone selling prices of the goods or services being provided to a customer. The Group determines the stand-alone selling price for each separate performance obligation by using 'adjust market assessment approach'. In limited circumstances, the Group plans to use 'expected cost plus a margin approach' to estimate expected cost plus a reasonable margin.

A gross contract liability (refund liability) for the expected refunds to customers is recognized and sales are adjusted. At the same time, the Group has a right to collect the product from the customer when the customer exercises the right of return and recognizes an asset and adjusts cost of sales. Right to collect the product from the customer is measured by previous book amount of the product less cost to collect the product.

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2.19 Lease

(1) Lessor

Lease income from operating leases where the Group is a lessor is recognized in income on a straightline basis over the lease term. Initial direct costs incurred in obtaining an operating lease are added to the carrying amount of the underlying asset and recognized as expense over the lease term on the same basis as lease income. The respective leased assets are included in the statement of financial position based on their nature.

(2) Lessee

The Group leases vessels, storage facilities, sites for gas station and charging station and other facilities and machinery. Lease contracts are made for fixed periods of 1 to 20 years, but may have extension options.

Contracts may contain both lease and non-lease components. The Group allocates the consideration in the contract to the lease and non-lease components based on their relative stand-alone prices.

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.

The Group determines the lease term as the non-cancellable period of a lease, together with periods covered by an option to extend the lease if the lessee is reasonably certain to exercise that option. When the lessee and the lessor each has the right to terminate the lease without permission from the other party, the Group should consider a termination penalty in determining the period for which the contract is enforceable.

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 of the commencement date
- Amounts expected to be payable by the Group (the lessee) under residual value guarantees
- The exercise price of a purchase option if the Group (the lessee) is reasonably certain to exercise that option, and
- Payments of penalties for terminating the lease, if the lease term reflects the Group (the lessee) exercising that option

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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 Group:

- 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 Group 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.

Each lease payment is allocated between the liability and finance cost. The finance cost is charged to profit or loss over the lease period so as to produce a constant periodic rate of interest on the remaining balance of the liability for each period.

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 Group is reasonably certain to exercise a purchase option, the right-of-use asset is depreciated over the underlying asset's useful life of 1 to 20 years.

Payments associated with short-term leases 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 others.

2.20 Dividends

Dividends paid to the Group's shareholders is recognized as a liability in the consolidated financial statements in the period in which the dividends are approved by the Group's shareholders.

2.21 Earnings per Share

Basic earnings per share is calculated by dividing the profit attributable to equity holders of the Group by the weighted average number of ordinary shares in issue during the year. Basic earnings per preferred share is also calculated by dividing the profit attributable to participating shares with right to participate in distribution of earnings by the weighted average number of preferred shares in issue during the year.

2.22 Segment Reporting

Information of each operating segment is reported in a manner consistent with the internal business segment reporting provided to the chief operating decision-maker. The chief operating decision-maker, who is responsible for allocating resources and assessing performance of the operating segments, has been identified as the Board of Directors that makes strategic decisions.

2.23 Greenhouse Gas Emission Permits and Obligations

With enforcement of *The Act on the Allocation and Trading of Greenhouse Gas Emission Permits*, emission permits that are allocated free of charge from the government are measured at zero, and emission permits purchased are recognized at acquisition cost by including any directly attributable costs incurred during the normal course of business. Emission permits are carried at cost less accumulated impairment losses, and those to be submitted to the government within one year from the end of reporting period are classified as current assets.

Emission obligation is a present obligation of submitting the allowances to the government. Emissions obligations are measured as the sum of the carrying amount of the allocated allowances that will be submitted to the government and the best estimate of expenditure required to settle the obligation at the end of reporting period for any excess emission. The emission obligations to be settled within one year from the end of the reporting period are classified as current liabilities.

The Group derecognizes the emission permits when the emission allowance is disposed or submitted to the government or becomes unable to be disposed or submitted, and accordingly, the future economic benefits are no longer expected to be probable. The Group derecognizes the emission obligations when the Group submits the emission permits to the government. The emission permits and emission obligations are classified as intangible assets and provisions, respectively, in the statement of financial position.

2.24 Approval of Issuance of the Consolidated Financial Statements

The issuance of the consolidated financial statements for the year 2022 of the Group was approved by the Board of Directors on March 7, 2023, which is subject to change with the approval of shareholders at the general shareholders' meeting.

3. Financial Risk Management

3.1 Financial Risk Factors

The Group's activities expose it to a variety of financial risks: market risk, credit risk and liquidity risk. The Group's overall risk management program focuses on the unpredictability of financial markets and seeks to minimize any adverse effects on the financial performance of the Group.

Risk management is carried out by each relevant department under policies approved by the Board of Directors. The Group identifies, evaluates and hedges financial risks in close co-operation with the Group's operating units.

(1) Market risk

a. Foreign exchange risk

The Group operates internationally and is exposed to foreign exchange risk arising from foreign currency transactions, primarily with respect to the US dollar. Foreign exchange risk arises when future commercial transactions, recognized asset and liabilities are presented in currencies other than the functional currency.

The purpose of foreign exchange risk management is to maximize the Group's value by minimizing the uncertainty and volatility of foreign exchange gains and losses from foreign exchange rate fluctuations.

The Group maintains foreign exchange risk management system to offset foreign exchange effects arising from recognized income/expense and assets/liabilities.

As of December 31, 2022, if the Korean won had weakened or strengthened by 10% against the foreign currencies with all other variables held constant, profit for the year would have been decreased or increased by \$\psi\$ 239,767 million (2021: \$\psi\$ 223,972 million) in relation to foreign currency-denominated trade receivables, trade payables, and usance borrowings. However, the Group's foreign exchange risk is controlled effectively as the above foreign exchange risk has offsetting effect with other foreign exchange effects affecting operating income.

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The Group's financial instruments denominated in major currencies as of December 31, 2022 and 2021, are converted into Korean won as follows:

(In millions of K	(orean won)		2022		2021
Trade receivab	les				
KRW		₩	599,931	₩	418,969
USD			1,672,046		1,530,260
EUR			26,019		17,670
AUD			5,583		4,097
	Total	₩	2,303,579	₩	1,970,996
Trade payables	3				
KRW		₩	91,223	₩	123,140
USD			3,080,210		2,951,608
JPY			987		1,022
	Total	₩	3,172,420	₩	3,075,770
Borrowings					
KRW		₩	3,016,525	₩	3,195,991
USD			1,939,122		2,358,921
	Total	₩	4,955,647	₩	5,554,912

b. Product margin risk

The Group is exposed to product margin risk arising from difference in timing of purchase and sale. The purpose of product margin risk management is to maximize the Group's value by minimizing the uncertainty of volatility of product margin.

In order to minimize the product margin risk, the Group tries to sell products produced within the month. For the products that need to be stored for a longer period, the Group secures the product margin by executing product swap to mitigate a risk of future price fluctuation.

c. Interest rate risk

Interest rate risk is defined as the risk that the interest income or expenses arising from deposits and borrowings will fluctuate because of changes in future market interest rate. The interest rate risk mainly arises on floating rate deposits and borrowings. As a result, the Group is exposed to cash flow interest rate risk.

The objective of interest rate risk management lies in maximizing the Group's value by minimizing uncertainty caused by fluctuations in interest rates and minimizing net interest expense.

There is no impact on the Group's equity and profit for the year as of and for the years ended December 31, 2022 and 2021, when the interest rate has increased or decreased by 100 basis point with all other variables held constant.

d. Price risk of financial assets at fair value through other comprehensive income and financial assets at fair value through profit or loss

The Group is exposed to equity securities price risk arises from investments held by the Group that are classified as financial assets at fair value through other comprehensive income and financial assets at fair value through profit or loss in the consolidated statement of financial position. To manage its price risk arising from investments in equity securities, the Group diversifies its portfolio.

The table below summarizes the impact of increases or decreases of these two indexes on the Group's total comprehensive income for the year. The analysis is based on the assumption that the equity indexes has increased/decreased by 10% with all other variables held constant, and that all the Group's equity instruments moved in line with the indexes.

(In millions of Korean won)	2	022	2	2021
Unlisted stocks	₩	4,048	₩	3,948
Fund and others		1,129		1,085
	₩	5,177	₩	5,033

(2) Credit risk

a. Risk management

Credit risk arises from receivables, cash and cash equivalents, derivative financial instruments and deposits with banks and financial institutions. For banks and financial institutions, only independently rated parties with high ratings are accepted. If customers are independently rated, these ratings are used. If there is no independent rating, the credit quality of the customer is evaluated taking into account its financial position, past experience and other factors.

Individual risk limits are set based on internal or external ratings in accordance with limits set by the Group. The utilization of credit limits is strictly executed.

The maximum exposure to credit risk as of December 31, 2022 and 2021, is as follows:

(In millions of Korean won)		2022		2021
Financial assets				
Cash and cash equivalents	₩	1,310,278	₩	1,945,481
Trade receivables		2,303,579		1,970,996
Other receivables		224,144		205,277
Other financial assets		151,026		11,074
Derivative financial assets		16,343		1,248
Total	₩	4,005,370	₩	4,134,076

With the exception of trade receivables and other receivables, none of financial assets is past due or impaired. There is no collateral held by the Group except for trade receivables and other receivables.

b. Impairment of financial assets

The Group has four types of financial assets that are subject to the expected credit loss model:

- trade receivables for sales of goods and provision of services,
- other receivables and other financial assets at amortized cost,
- · debt investments carried at fair value through other comprehensive income, and
- · lease receivables, which are subject to application of Korean IFRS 1116 *Leases*.

The identified impairment loss in lease receivables was immaterial. While cash equivalents are also subject to the impairment requirement, the identified impairment loss was immaterial.

(i) Trade receivables

The Group applies the simplified approach to measuring expected credit losses which uses a lifetime expected loss allowance for all trade receivables.

Expected credit losses are estimated based on the information that has impact on credit risk related to customers.

On that basis, the loss allowance as of December 31, 2022 and 2021, was determined as follows for both trade receivables:

llions of Korean won)			2021	
₩	2,307,132	₩	1,973,705	
	(3,553)		(2,709)	
₩	2,303,579	₩	1,970,996	
		(3,553)	₩ 2,307,132 ₩ (3,553)	

Changes in the loss allowance provision for trade receivables for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	Trade receivables			
	2	022		2021
Beginning balance	₩	2,709	₩	1,562
Increase in loss allowance recognized in profit or loss during the year		844		1,179
Receivables written off during the year as uncollectible		-		(32)
Ending balance	₩	3,553	₩	2,709

Trade receivables are written off when there is no reasonable expectation of recovery.

Impairment losses on trade receivables are presented as net impairment losses within impairment loss in the statement of comprehensive income. Subsequent recoveries of amounts previously written off are credited against the same line item.

(ii) Other receivables and other financial assets at amortized cost

There are no movements in loss allowance provision for other receivables and other financial assets at amortized cost for the year ended December 31, 2022.

All of the other receivables and other financial assets at amortized costs other than lease receivables are considered to have low credit risk, and the loss allowance recognized during the period was, therefore, limited to 12 months expected losses. Other instruments are considered to be low credit risk when they have a low risk of default and the issuer has a strong capacity to meet its contractual cash flow obligations in the near term. The Group applies the simplified approach to measuring expected credit losses which uses a lifetime expected loss allowance for all lease receivables.

(iii) Debt investments at fair value through other comprehensive income

Debt investments at fair value through other comprehensive income include government bonds, corporate bonds and trade receivables subject to be sold or discounted. The loss allowance for debt investments at fair value through other comprehensive income is recognized in profit or loss and reduces the fair value loss otherwise recognized in other comprehensive income.

All of the debt investments at fair value through other comprehensive income other than trade receivables subject to be sold or discounted are considered to have low credit risk, and the loss allowance recognized during the period was, therefore, limited to 12 months expected losses. Management considers 'low credit risk' for listed bonds to be an investment grade credit rating with at least one major rating agency. Other instruments are considered to be low credit risk when they have a low risk of default and the issuer has a strong capacity to meet its contractual cash flow obligations in the near term.

The Group applies the simplified approach to measure expected credit losses which uses a lifetime expected loss allowance for all trade receivables. There are no movements in loss allowance provision for other financial assets at fair value through other comprehensive income other than trade receivables subject to be sold or discounted for the year ended December 31, 2022.

c. Impairment loss

Following losses are recognized in profit or loss in relation to impaired financial assets for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	Trade receivables			
	2022			2021
Impairment loss	₩	844	₩	1,179

(3) Liquidity risk

Liquidity risk is defined as the risk that the Group is unable to meet its short-term payment obligations on time due to deterioration of its business performance.

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

Details of the Group's liquidity risk analysis as of December 31, 2022 and 2021, are as follows:

	2022				
(In millions of Korean won)	Less than 1 a 1 year ye		Over 2 years	Total	
Trade payables Other payables Borrowings	₩ 3,172,420 881,292 2,629,506	₩ - 67,807 687,357	₩ - 174,544 1,883,657	₩ 3,172,420 1,123,643 5,200,520	
Currency forward (gross) Inflow Outflow	(556,919) 542,588	- -		(556,919) 542,588	
Commodity Swap (net) Total	(1,731) ₩ 6,667,156	- ₩ 755,164	- ₩ 2,058,201	(1,731) ₩ 9,480,521	

	2021				
(In millions of Korean won)	Less than 1 year	Between 1 and 2 years	Over 2 years	Total	
Trade payables	₩ 3,075,770	₩ -	₩ -	₩ 3,075,770	
Other payables	584,441	82,165	187,585	854,191	
Borrowings	2,881,106	640,915	2,251,839	5,773,860	
Currency forward (gross)					
Inflow	(413,040)	-	-	(413,040)	
Outflow	412,031	-	-	412,031	
Commodity Swap (net)	1,969		<u> </u>	1,969	
Total	₩ 6,542,277	₩ 723,080	₩ 2,439,424	₩ 9,704,781	

The amounts disclosed in the above table are undiscounted cash flows.

3.2 Capital Risk Management

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

The Group monitors financial ratios, such as debt-to-equity ratio and net borrowings-to-equity ratio each month and implements required action plan to maintain or adjust the capital structure.

Debt-to-equity ratio and net borrowings-to-equity ratio as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	2022	2021
Interest bearing liabilities (A) ¹	₩ 5,219,303	₩ 5,841,904
Cash and cash equivalents and current financial deposits (B)	1,461,326	1,956,526
Net borrowings (C=A-B)	3,757,977	3,885,378
Equity (D)	8,483,469	6,988,042
Debt-to-equity ratio (A/D)	62%	84%
Net borrowings-to-equity ratio (C/D)	44%	56%

¹ Borrowings and lease liabilities are included.

4. Fair Value

4.1 Fair Value of Financial Instruments by Category

Carrying amount and fair value of financial instruments by category as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	2022			2021				
	Carrying		Fair		Carrying		Fair	
Financial assets	i	amount	V	alue	aı	mount		value
Financial assets at fair value through other comprehensive income Financial assets at fair value through	₩	55,859	₩	55,859	₩	54,517	₩	54,517
profit or loss		31,909		31,909		16,214		16,214
Total	₩	87,768	₩	87,768	₩	70,731	₩	70,731
Financial liabilities								
Derivative financial liabilities	₩	312	₩	312	₩	2,210	₩	2,210
Public bonds		3,016,525	2	2,782,974		3,195,991		3,157,469
Total	₩	3,016,837	₩ 2	2,783,286	₩	3,198,201	₩	3,159,679

Carrying amount of other financial assets and liabilities other than financial assets at fair value and derivative financial instruments and public bonds is a reasonable approximation of fair value.

4.2 Fair Value Hierarchy

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

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

Fair value hierarchy classifications of the financial instruments that are measured at fair value as of December 31, 2022, are as follows:

(In millions of Korean won)		Level 1		Level 2		Level 3		Total
Financial assets/liabilities that are measured at fair value								
Assets								
Financial assets at fair value through other comprehensive income								
Equity securities	₩	-	₩	-	₩	55,841	₩	55,841
Debt securities		18		-		-		18
Financial assets at fair value through profit or loss								
Derivative financial assets held for								
trading		-		16,343		-		16,343
Equity securities						15,566		15,566
Total	₩	18	₩	16,343	₩	71,407	₩	87,768
Liabilities								
Financial liabilities at fair value through profit or loss								
Derivative financial liabilities held for								
trading	₩	-	₩	312	₩	-	₩	312
Borrowings								
Public bonds		2,782,974		-		-		2,782,974
Total	₩	2,782,974	₩	312	₩	-	₩	2,783,286

Fair value hierarchy classifications of the financial instruments that are measured at fair value as of December 31, 2021, are as follows:

(In millions of Korean won)		Level 1		Level 2		Level 3		Total
Financial assets/liabilities that are measured at fair value								
Assets								
Financial assets at fair value through other comprehensive income								
Equity securities	₩	_	₩	-	₩	54,451	₩	54,451
Debt securities		66		-		-		66
Financial assets at fair value through profit or loss								
Derivative financial assets held for								
trading		-		1,248		-		1,248
Equity securities		<u>-</u>		_		14,966		14,966
Total	₩	66	₩	1,248	₩	69,417	₩	70,731
Liabilities								
Financial liabilities at fair value through profit or loss								
Derivative financial liabilities held for								
trading	₩	-	₩	2,210	₩	-	₩	2,210
Borrowings								
Public bonds		3,157,469		<u>-</u>				3,157,469
Total	₩	3,157,469	₩	2,210	₩	_	₩	3,159,679

4.3 Transfers between Fair Value Hierarchy Levels of Recurring Fair Value Measurements

The Group's policy is to recognize transfers between levels of the fair value at the end of the reporting period. There were no transfers between levels 1 and 2 for recurring fair value measurements during the year. Changes in level 3 for recurring fair value measurements for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022		2021
Beginning balance	₩	69,417	₩	58,500
Acquisition		1,935		2,981
Disposal		(100)		(1,534)
Total profit or loss				
Gains on valuation (other comprehensive income)		155		9,470
Ending balance	₩	71,407	₩	69,417

4.4 Valuation Technique and the Inputs

Valuation techniques and inputs used in levels 2 and 3 fair value measurements as of December 31, 2022 are as follows:

(1) Level 3

(In millions of Korean won)	Fair value	Level	Valuation techniques		Inputs	Range of inputs
Equity instruments at fair value through other comprehensive income						
Equity securities	₩ 55,841	3	Present valu technique	e i	Discount rate	9.92%
Financial assets at fair value through profit or loss			·			
Equity securities	15,566	3	Net asset val	ue (Discount rate	N/A
(2) Level 2						
(In millions of Korean won)			Fair value	Level	Valuation to	echniques
Financial assets at fair value profit or loss Currency forward Commodity swap	through		₩ 14,300 2,043	2 2	Present value Present value	•
Financial liabilities at fair va profit or loss Commodity swap	lue through	1	312	2	Present valu	·

4.5 Valuation Processes for Fair Value Measurements Categorized as Level 3

The accounting department of the Group that performs the fair value measurements required for financial reporting purposes, including Level 3 fair values. This department discusses valuation processes and result with the management.

4.6 Sensitivity Analysis for Recurring Fair Value Measurements Categorized as Level 3

Sensitivity analysis of financial instruments is performed to measure favorable and unfavorable changes in the fair value of financial instruments which are affected by the unobservable parameters, using a statistical technique. When the fair value is affected by more than two input parameters, the most favorable or most unfavorable amounts are presented. Changes in fair value of financial instruments categorized as level 3 subject to sensitivity analysis; such as, equity securities, are recognized in other comprehensive income or profit or loss.

5. Critical Accounting Estimates and Assumptions

The preparation of consolidated financial statements requires the Group to make estimates and assumptions concerning the future. Estimates and judgements are continually evaluated and are based on historical experience and other factors, including expectations of future events that are believed to be reasonable under the circumstances. The resulting accounting estimates will, by definition, seldom equal the related actual results.

5.1 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 20).

5.2 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 Group 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 4).

5.3 Income Taxes

The Group's taxable income generated from these operations are 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 (Note 30).

If certain portion of the taxable income is not used for investments or increase in wages or dividends, the Group is liable to pay additional income tax calculated based on the tax laws for the specified periods. Accordingly, the measurement of current and deferred income tax is affected by the tax effects. As the Group's income tax is dependent on the investments, increase in wages and dividends, there is an uncertainty measuring the final tax effects.

5.4 Estimated Goodwill Impairment

The recoverable amount of a cash generating unit (CGU) is determined based on value-in-use calculations (Note 15).

5.5 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).

Most extension options in offices and others have not been included in the lease liability, because the Group 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 Group 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.

In addition, the Group initially estimates and recognizes amounts expected to be payable under residual value guarantees as part of the lease liability. Typically, the expected residual value at lease commencement is equal to or higher than the guaranteed amount, and so the Group does not expect to pay anything under the guarantees.

5.6 Measurement of Net Realizable Value of Inventories

Inventories are measured at the lower of cost and net realizable value. It is required to estimate the expected selling price and the expected selling expenses in the measurement of the net realizable value. In these estimation processes, the management's judgments take an important role.

6. Operating Segment Information

The reportable operating segments of the Group are oil refining business, lube oil business and petrochemical business.

Financial information by operating segments as of and for the years ended December 31, 2022 and 2021, is as follows:

		2	022	
(In millions of Korean won)	Oil Refining Business	Lube Oil Business	Petrochemical Business	Total
Sales from external customers Inter-segment sales Total sales	₩ 34,004,929 <u>8,660,897</u> ₩ 42,665,826	₩ 3,415,563432,491₩ 3,848,054	₩ 5,025,5362,232,499₩ 7,258,035	₩ 42,446,028 11,325,887 ₩ 53,771,915
Operating profit (loss)	₩ 2,344,309	₩ 1,110,689	₩ (49,832)	₩ 3,405,166
Property, plant, equipment and intangible assets Depreciation and amortization	6,882,758	157,883	2,653,809	9,694,450
and others	400,962	12,647	172,718	586,327
		2	021	
(In millions of Korean won)	Oil Refining Business	Lube Oil Business	D21 Petrochemical Business	Total
Sales from external customers Inter-segment sales	Business ₩ 20,190,770 6,644,647	Lube Oil Business ₩ 2,615,788 208,994	Petrochemical Business ₩ 4,657,360 1,367,515	₩ 27,463,918 8,221,156
Sales from external customers	Business ₩ 20,190,770	Lube Oil Business ₩ 2,615,788	Petrochemical Business ₩ 4,657,360	₩ 27,463,918
Sales from external customers Inter-segment sales	Business ₩ 20,190,770 6,644,647	Lube Oil Business ₩ 2,615,788 208,994	Petrochemical Business ₩ 4,657,360 1,367,515	₩ 27,463,918 8,221,156
Sales from external customers Inter-segment sales Total sales	Business ₩ 20,190,770 6,644,647 ₩ 26,835,417	Lube Oil Business ₩ 2,615,788 208,994 ₩ 2,824,782	Petrochemical Business ₩ 4,657,360	₩ 27,463,918 8,221,156 ₩ 35,685,074

Sales by geographic region for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	2022		2022			2021
Korea	₩	19,075,141	₩	12,379,125		
Southeast Asia		7,326,491		3,957,421		
China		2,762,638		3,448,724		
America		2,531,523		1,737,423		
Japan		3,186,945		2,250,376		
Australia		3,566,443		1,680,580		
Europe		852,002		449,246		
Others		3,144,845		1,561,023		
Total	₩	42,446,028	₩	27,463,918		

Details of a customer, who contributes more than ten percent of the Group sales for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022		2021	Segments
Customer 1 ¹	₩	8,669,447	₩	4,939,187	Oil refining and petrochemical
					business

¹ Aramco Trading Company and Aramco Trading Singapore PTE. LTD. are related parties of the Group

7. Cash and Cash Equivalents

Cash and cash equivalents as of December 31, 2022 and 2021, consists of:

(In millions of Korean won)		2022		2021
Cash on hand	₩	48	₩	45
Checking accounts		8		1
Passbook accounts		7,546		4,634
Foreign currency deposits		232,969		854,726
Time deposits		635,000		946,000
Others		434,755		140,120
Total	₩	1,310,326	₩	1,945,526

Cash and cash equivalents presented in the consolidated statements of financial position and cash flows are identical as of December 31, 2022 and 2021.

8. Trade and Other Receivables

Trade and other receivables as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	20	22	20	21
	Current	Non-current	Current	Non-current
Trade receivables	₩ 2,307,132	₩ -	₩ 1,973,705	₩ -
Less : provision for impairment	(3,553)		(2,709)	
Trade receivables, net	2,303,579		1,970,996	
Other receivables				
Non-trade receivables	118,336	-	109,269	-
Accrued income	1,814	-	568	-
Loans	5,804	31,095	6,452	26,915
Lease receivables (Note 35)	10,404	27,418	8,487	25,816
Guaranty deposits		29,273		27,770
	136,358	87,786	124,776	80,501
Net book amount	₩ 2,439,937	₩ 87,786	₩ 2,095,772	₩ 80,501

The aging analysis of trade receivables as of December 31, 2022 and 2021, is as follows:

(In millions of Korean won)	2022			2021
Receivables not past due	₩ 2,302,002		₩	1,966,724
Up to one month		3,999		6,427
One to three months		631		158
Three to six months		17		12
Six to twelve months		81		-
Over one year		402		384
Total	₩	2,307,132	₩	1,973,705

As of December 31, 2022, trade receivables of \forall 959,773 million (2021: \forall 933,990 million) have collateral provided by customers. Among those trade receivables, \forall 3,578 million (2021: \forall 2,426 million) is past due but not impaired.

The aging analysis of other receivables as of December 31, 2022 and 2021, is as follows:

(In millions of Korean won)	2	2022	2021		
Receivables not past due	₩	224,144	₩	205,277	
Up to one month		-		-	
One to three months		-		-	
Three to six months		=_		-	
Total	₩	224,144	₩	205,277	

See Note 3.1 (2) b for the impairment of trade receivables, other financial assets at amortized cost and the Group's exposure to credit risk.

As of December 31, 2022, the balance of trade receivables that have been transferred but are not past due amounts to USD 171 million (2021: USD 192 million). As of December 31, 2022, the Group transferred the trade receivables to the BNP Paribas Bank and one other financial institution and derecognized the transferred receivables as all the risks and rewards are substantially transferred (Note 21).

The Group holds the trade receivables with the objective to collect the contractual cash flows and, therefore, the Group's business model for managing trade receivables is to collect the contractual cash flows. When discount agreements have been made on certain types of trade receivables, judgment on the business model is assessed. If selling price is infrequently observed or individually or collectively not significant, it is probable that the judgment is consistent with the business model with the objective of collecting the contractual cash flows. Portfolio for certain types of trade receivables which are discounted are classified as business model for selling or for collection of contractual cash flows, while undiscounted portfolio is classified as business model with the objective of collection of contractual cash flows are measured at fair value and gains or losses on valuation are recognized as other comprehensive income.

9. Other Financial Assets and Other Assets

9.1 Other financial assets fair value through profit or loss

Other financial assets fair value through profit or loss as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022		2021		
Non-current						
Fund and others	₩	15,566	₩	14,966		

9.2 Other financial assets at fair value through other comprehensive income

Other financial assets at fair value through other comprehensive income as of December 31, 2022 and 2021, are as follows:

(1) Equity investments at fair value through other comprehensive income

(In millions of Korean won)		2022		2021		
Non-current						
Non-listed equity securities	₩	55,841	₩	54,451		

As of December 31, 2022 and 2021, the fair value of unlisted equities is determined using discounted cash flow analysis based on the risk adjusted yield.

Upon disposal of these equity investments, any balance within the accumulated other comprehensive income for these equity investments is reclassified to retained earnings and is not reclassified to profit or loss.

(2) Debt investments at fair value through other comprehensive income

Debt investments at fair value through other comprehensive income comprise the following investments in bonds having solely payments of principal and interest:

(In millions of Korean won)	2022		2021	
Government bonds Current	₩	11	₩	51
Non-current		<u> </u>		15
Total	₩	18	₩	66

Upon disposal of these debt investments, any balance within the accumulated other comprehensive income for these debt investments is reclassified to profit or loss.

9.3 Other financial assets at amortized cost

Other financial assets at amortized cost as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	2022				2021							
	C	Current	Non-curr	rent		Total		Current	Non-c	urrent		Total
Short-term financial instruments (time deposits) ¹	₩	151,000	₩	-	₩	151,000	₩	11,000	₩	-	₩	11,000
Long-term deposit 1		-		8		8		-		8		8
		151,000		8		151,008		11,000		8		11,008
Less: provision for impairment		-		-		-		-		-		-
	₩	151,000	₩	8	₩	151,008	₩	11,000	₩	8	₩	11,008

¹ Short-term financial instruments include ₩ 4,627 million which are subject to restricted use in relation to contractual guarantee (Note 16). Long-term deposit of ₩ 8 million is subject to withdrawal restrictions.

Changes in financial assets at fair value through other comprehensive income for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022	2021		
Beginning balance	₩	54,517	₩	44,505	
Acquisition		1,243		959	
Disposal		(56)		(457)	
Other comprehensive income		155		9,510	
Ending balance		55,859		54,517	
Less: non-current portion		55,848		54,466	
Current portion	₩	11	₩	51	

Other assets as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		20	22		2021				
	Cui	Current		Non-current		Current		-current	
Advance payments	₩	566	₩	-	₩	777	₩	26,742	
Prepaid expenses		13,031		-		6,003		-	
Tax receivables	5	540,622		-	7	59,954		-	
Greenhouse gas emission permits (Note 36)		985		_		11,752		-	
Right-of-use assets (Note 35)		-	20	09,202		-		248,627	
	₩ 5	555,204	₩ 2	09,202	₩ 7	78,486	₩	275,369	

10. Derivative Financial Instruments

Details of derivative financial instruments as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		202	22	2021					
	Α	ssets	Liabilities		Α	ssets	Lia	Liabilities	
Trading purpose Forward foreign exchange Commodity swap	₩	14,300 2,043	₩	- 312	₩	1,174 74	₩	167 2,043	
· ,	₩	16,343	₩	312	₩	1,248	₩	2,210	

Derivatives financial instruments held for trading purposes are classified as current assets or liabilities.

11. Financial Instruments by Category

Carrying amounts of financial assets and liabilities by category as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)									
			Fin	ancial					
			asse	ts at fair					
	_			alue	assets at fair ensi value through		assets at fair Other value through financial		
	а	inancial ssets at mortized cost	com	rough other orehensi ncome					Total
Assets									
Cash and cash equivalents	₩	1,310,326	₩	-	₩	-	₩	-	₩1,310,326
Trade receivables		2,303,579		-		-		-	2,303,579
Other receivables		186,322		-		-		37,822	224,144
Other financial assets		151,008		55,859		15,566		-	222,433
Derivative financial instruments				-		16,343		_	16,343
Total	₩	3,951,235	₩	55,859	₩	31,909	₩	37,822	₩4,076,825

¹ Other financial assets represent lease receivables, which are not subject to financial asset categorizations.

(In millions of Korean won)	2022									
	lia	inancial bilities at ortized cost	liabilitie value t	ncial es at fair hrough or loss		r financial bilities ¹	Total			
Liabilities										
Trade payables	₩	3,172,420	₩	-	₩	-	₩ 3,172,420			
Other payables		827,649		-		263,656	1,091,305			
Borrowings		4,955,647		_		-	4,955,647			
Derivative financial instruments		-		312		-	312			
Total	₩	8,955,716	₩	312	₩	263,656	₩ 9,219,684			

¹ Other financial liabilities represent lease liabilities, which are not subject to financial liability categorizations.

(In millions of Korean won)									
			Fin	ancial					
			asse	ts at fair					
			٧						
	а	Financial Issets at mortized cost	com	rough other orehensi ncome	asse value	Financial assets at fair value through profit or loss		Other lancial ssets ¹	Total
Assets									
Cash and cash equivalents	₩	1,945,526	₩	-	₩	-	₩	-	₩1,945,526
Trade receivables		1,970,996		-		-		-	1,970,996
Other receivables		170,974		-		-		34,303	205,277
Other financial assets		11,008		54,517		14,966		-	80,491
Derivative financial instruments						1,248			1,248
Total	₩	4,098,504	₩	54,517	₩	16,214	₩	34,303	₩4,203,538

¹ Other financial assets represent lease receivables, which are not subject to financial asset categorizations.

(In millions of Korean won)	2021										
	lia	inancial bilities at ortized cost	liabiliti value	ancial es at fair through or loss		r financial bilities ¹	Total				
Liabilities											
Trade payables	₩	3,075,770	₩	-	₩	-	₩ 3,075,770				
Other payables		540,743		-		286,992	827,735				
Borrowings		5,554,912		-		-	5,554,912				
Derivative financial instruments		-		2,210		-	2,210				
Total	₩	9,171,425	₩	2,210	₩	286,992	₩ 9,460,627				

¹ Other financial liabilities represent lease liabilities, which are not subject to financial liability categorizations.

Net gains or losses on each category of financial instruments for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022		2021
Financial assets at amortized cost				
Interest income	₩	30,199	₩	8,476
Foreign currency gains		172,089		152,887
Provision for impairment		(844)		(1,179)
Assets and liabilities at fair value through profit or loss				
Derivative financial instruments gains (losses)		(49,482)		16,953
Financial assets at fair value through other comprehensive income				
Gains on valuation and disposal (other comprehensive income)		155		9,510
Interest income		1		2
Dividend income		2,108		1,152
Other financial assets				
Interest income		793		539
Financial liabilities at amortized cost				
Foreign currency losses		(505,287)	((464,484)
Interest expenses ¹		(144,644)	((103,098)
Other financial liabilities				
Interest expenses		(6,505)		(6,715)
Foreign currency losses		(5,634)		(9,738)

¹ Interest expenses exclude capitalized borrowing costs on qualifying assets.

12. Inventories

Inventories as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022			2021
Merchandise	₩	74,457		₩	36,603
Valuation allowance for merchandise		(636)			(102)
Finished goods		936,655			830,127
Valuation allowance for finished goods		(87,343)			(25,776)
Work in progress		758,427			506,049
Valuation allowance for work in progress		(75,479)			(12,618)
Raw materials and materials-in-transit		3,106,972			2,172,271
Valuation allowance for raw materials and materials-in-transit		(31,151)			(6,412)
Supplies		51,258	_		45,198
Total	₩	4,733,160	_	₩	3,545,340

Inventories cost that was recognized as cost of sales for the year ended December 31, 2022 amounted to $\mbox{$W$}$ 35,232,628 million (2021: $\mbox{$W$}$ 21,893,405 million). The Group recognized losses on valuation of inventories for $\mbox{$W$}$ 149,701 million for the year ended December 31, 2022 (2021: $\mbox{$W$}$ 37,693 million).

13. Investments in Joint venture and Associate

Details of joint venture and associate as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won, except number of shares)

•		Closing	Number of	Percentage of	Acq	Acquisition Cost		Book value			
Investee	Location	Month	Shares	Ownership (%)				Cost 2022		2022	
Joint venture ¹ S-OIL TOTAL Energies Lubricants Co., Ltd. Associate	Korea	December	3,500,001	50% plus one share	₩	20,134	₩	28,494	₩	29,690	
FCI Co., Ltd.	Korea	December	812,299	19.08%		8,200		7,508		8,133	
					₩	28,334	₩	36,022	₩	37,823	

¹ S-OIL TOTAL Lubricants Co., Ltd. changed its name to S-OIL Total Energies Lubricants Co., Ltd. during 2022. Although the Group owns more than 50% of voting rights of S-OIL TOTAL Energies Lubricants Co., Ltd., it is excluded from the consolidation subsidiaries as the Group is unable to exercise controls by virtue of an agreement with other investors.

Details of adjustments from financial information of joint venture and associate to the book value of investments in joint venture and associate for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Kor	rean won)	2022									
		Net assets at the end of the year	Percentage of ownership (%)		oup's hare	Unrea gain o and o	Book value				
Joint venture	S-OIL TOTAL Energies Lubricants Co., Ltd.	₩ 57,353	50% plus one share	₩	28,677	₩	(183)	₩ 28,494			
Associate	FCI Co., Ltd.	7,033	19.08%		1,342		6,166	7,508			
(In millions of Ko	rean won)			202	21						
		Net assets at the end of the year	Percentage of ownership (%)		oup's hare	Unrea gain o and o	r loss	Book value			
Joint venture	S-OIL TOTAL Lubricants Co., Ltd.	₩ 59,550	50% plus one share	₩	29,775	₩	(85)	₩ 29,690			
Associate	FCI Co., Ltd.	15,897	19.08%		3,033		5,100	8,133			

The table below provides summarized financial information for joint venture and associate as of and for the years ended December 31, 2022 and 2021.

(In millions of Korean won)	S-OIL TOTA Lubricants	•	FCI Co., Ltd.				
	2022	2021	2022	2021			
Current assets	₩ 128,282	₩ 100,455	₩ 4,082	₩ 15,026			
Non-current assets	31,811	34,518	9,003	6,168			
Total assets	₩ 160,093	₩ 134,973	₩ 13,085	₩ 21,194			
		_					
Current liabilities	₩ 94,451	₩ 66,759	₩ 1,534	₩ 794			
Non-current liabilities	8,289	8,664	4,518	4,503			
Total liabilities	₩ 102,740	₩ 75,423	₩ 6,052	₩ 5,297			
Total equity	₩ 57,353	₩ 59,550	₩ 7,033	₩ 15,897			
Sales	₩ 359,569	₩ 311,830	₩ -	₩ 2,819			
Operating profit (loss)	5,105	6,183	(9,242)	(470)			
Profit (loss) before income tax	1,958	4,497	(8,864)	(397)			
Profit (loss) for the year	1,227	3,439	(8,864)	(397)			
Total comprehensive income (loss) for the							
year	1,227	3,439	(8,864)	(397)			

Details of valuation of investments in joint venture and associate that are accounted for using the equity method for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	2022						2021								
	S-OIL TOTAL Energies Lubricants Co., Ltd.		FCI Co., Ltd.		Total		S-OIL TOTAL Lubricants Co., Ltd.		FCI Co., Ltd.		Total				
Beginning balance	₩	29,690	₩	8,133	₩	37,823	₩	31,636	₩	-	₩	31,636			
Acquisition		-		-		-		-		8,200		8,200			
Share of profit (loss)		551		(1,879)		(1,328)		1,720		(67)		1,653			
Unrealized gains (losses)		(97)		1,254		1,157		134		-		134			
Dividend received		(1,650)				(1,650)		(3,800)		_		(3,800)			
Ending balance	₩	28,494	₩	7,508	₩	36,002	₩	29,690	₩	8,133	₩	37,823			

14. Property, Plant and Equipment

Changes in property, plant and equipment for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	on) 2022																	
							Macl	ninery and							Cor	nstruction-		
		Land	Вι	uildings	St	ructures	eq	uipment	Ve	hicles	C	Others	Ca	atalysts	in-	-progress		Total
At January 1, 2022																		
Acquisition cost	₩	1,760,455	₩	517,631	₩	1,967,025	₩	8,256,057	₩	11,264	₩	806,572	₩	776,048	₩	794,513	₩	14,889,565
Accumulated depreciation				(124,526)		(757,405)		(3,440,467)		(10,432)		(417,380)		(574,516)			(5,324,726)
Net book amount	₩	1,760,455	₩	393,105	₩	1,209,620	₩	4,815,590	₩	832	₩	389,192	₩	201,532	₩	794,513	₩	9,564,839
Changes during 2022																		
Beginning net book amount	₩	1,760,455	₩	393,105	₩	1,209,620	₩	4,815,590	₩	832	₩	389,192	₩	201,532	₩	794,513	₩	9,564,839
Additions		-		84		39		10		387		84,020		165,625		372,889		623,054
Transfers		-		2,190		15,198		10,148		7		104,112		19,600		(128,604)		22,651
Disposals		(11,681)		(658)		(2,647)		(725)		-		(449)		-		-		(16,160)
Depreciation		-		(13,103)		(74,726)		(206,446)		(391)		(117,987)		(167,439)		-		(580,092)
Impairment loss		-		(1,261)		-		(25,000)		-		-		-		-		(26,261)
Effect of foreign currency rate																		
changes		-		-		-				-		1						1
Ending net book amount	₩	1,748,774	₩	380,357	₩	1,147,484	₩	4,593,577	₩	835	₩	458,889	₩	219,318	₩	1,038,798	₩	9,588,032
At December 31, 2022																		
Acquisition cost	₩	1,748,774	₩	515,832	₩	1,971,815	₩	8,244,053	₩	10,163	₩	972,625	₩	961,274	₩	1,038,798	₩	15,463,334
Accumulated depreciation		-		(135,475)		(824,331)		(3,643,876)		(9,328)		(513,737)		(741,956)		-	(5,868,703)
Accumulated impairment																		
losses		-		-		-		(6,600)		-		-		-		-		(6,600)
Effect of foreign currency rate																		
changes		<u>-</u>										1						1
Net book amount	₩	1,748,774	₩	380,357	₩	1,147,484	₩	4,593,577	₩	835	₩	458,889	₩	219,318	₩	1,038,798	₩	9,588,032

				2021				
			Machinery and				Construction-	
Land	Buildings	Structures	equipment	Vehicles	Others	Catalysts	in-progress	Total
₩ 1,807,147	₩ 530,455	₩ 2,002,885	₩ 8,164,843	₩ 14,453	₩ 796,158	₩ 638,772	₩ 966,749	₩ 14,921,462
	(120,784)	(732,890)	(3,230,921)	(13,715)	(342,753)	(402,598)		(4,843,661)
₩ 1,807,147	₩ 409,671	₩ 1,269,995	₩ 4,933,922	₩ 738	₩ 453,405	₩ 236,174	₩ 966,749	₩ 10,077,801
₩ 1,807,147	₩ 409,671	₩ 1,269,995	₩ 4,933,922	₩ 738	₩ 453,405	₩ 236,174	₩ 966,749	₩ 10,077,801
-	100	283	1	434	46,333	116,813	112,544	276,508
7,706	1,144	15,516	91,620	-	1,643	21,578	(284,780)	(145,573)
(54,398)	(4,645)	(590)	-	-	(125)	(1,115)	-	(60,873)
	(13,165)	(75,584)	(209,953)	(340)	(112,064)	(171,918)		(583,024)
₩ 1,760,455	₩ 393,105	₩ 1,209,620	₩ 4,815,590	₩ 832	₩ 389,192	₩ 201,532	₩ 794,513	₩ 9,564,839
₩ 1,760,455	₩ 517,631	₩ 1,967,025	₩ 8,256,057	₩ 11,264	₩ 806,572	₩ 776,048	₩ 794,513	₩ 14,889,565
-	(124,526)	(757,405)	(3,440,467)	(10,432)	(417,380)	(574,516)	-	(5,324,726)
₩ 1,760,455	₩ 393,105	₩ 1,209,620	₩ 4,815,590	₩ 832	₩ 389,192	₩ 201,532	₩ 794,513	₩ 9,564,839
	₩ 1,807,147 ₩ 1,807,147 ₩ 1,807,147 - 7,706 (54,398) - ₩ 1,760,455 ₩ 1,760,455	₩ 1,807,147 ₩ 530,455 - (120,784) ₩ 1,807,147 ₩ 409,671 ₩ 1,807,147 ₩ 409,671 - 100 7,706 1,144 (54,398) (4,645) - (13,165) ₩ 393,105 ₩ 1,760,455 ₩ 517,631 - (124,526)	₩ 1,807,147 ₩ 530,455 ₩ 2,002,885 - (120,784) (732,890) ₩ 1,807,147 ₩ 409,671 ₩ 1,269,995 Ψ 1,807,147 ₩ 409,671 ₩ 1,269,995 - 100 283 7,706 1,144 15,516 (54,398) (4,645) (590) - (13,165) (75,584) ₩ 1,760,455 ₩ 393,105 ₩ 1,209,620 ₩ 1,760,455 ₩ 517,631 ₩ 1,967,025 - (124,526) (757,405)	Land Buildings Structures equipment ₩ 1,807,147 ₩ 530,455 ₩ 2,002,885 ₩ 8,164,843 - (120,784) (732,890) (3,230,921) ₩ 1,807,147 ₩ 409,671 ₩ 1,269,995 ₩ 4,933,922 - 100 283 1 7,706 1,144 15,516 91,620 (54,398) (4,645) (590) - - (13,165) (75,584) (209,953) ₩ 1,760,455 ₩ 393,105 ₩ 1,209,620 ₩ 4,815,590 ₩ 1,760,455 ₩ 517,631 ₩ 1,967,025 ₩ 8,256,057 - (124,526) (757,405) (3,440,467)	Land Buildings Structures Machinery and equipment Vehicles ₩ 1,807,147 ₩ 530,455 ₩ 2,002,885 ₩ 8,164,843 ₩ 14,453 - (120,784) (732,890) (3,230,921) (13,715) ₩ 1,807,147 ₩ 409,671 ₩ 1,269,995 ₩ 4,933,922 ₩ 738 - 100 283 1 434 7,706 1,144 15,516 91,620 - (54,398) (4,645) (590) - - - (13,165) (75,584) (209,953) (340) ₩ 1,760,455 ₩ 393,105 ₩ 1,209,620 ₩ 4,815,590 ₩ 832 W 1,760,455 ₩ 517,631 ₩ 1,967,025 ₩ 8,256,057 ₩ 11,264 - (124,526) (757,405) (3,440,467) (10,432)	Land Buildings Structures Machinery and equipment Vehicles Others ₩ 1,807,147 ₩ 530,455 ₩ 2,002,885 ₩ 8,164,843 ₩ 14,453 ₩ 796,158 - (120,784) (732,890) (3,230,921) (13,715) (342,753) ₩ 1,807,147 ₩ 409,671 ₩ 1,269,995 ₩ 4,933,922 ₩ 738 ₩ 453,405 - 100 283 1 434 46,333 7,706 1,144 15,516 91,620 - 1,643 (54,398) (4,645) (590) (125) - (13,165) (75,584) (209,953) (340) (112,064) ₩ 1,760,455 ₩ 393,105 ₩ 1,209,620 ₩ 4,815,590 ₩ 832 ₩ 389,192 W 1,760,455 ₩ 517,631 ₩ 1,967,025 ₩ 8,256,057 ₩ 11,264 ₩ 806,572 - (124,526) (757,405) (3,440,467) (10,432) (417,380)	Land Buildings Structures Machinery and equipment Vehicles Others Catalysts ₩ 1,807,147 ₩ 530,455 ₩ 2,002,885 ₩ 8,164,843 ₩ 14,453 ₩ 796,158 ₩ 638,772 - (120,784) (732,890) (3,230,921) (13,715) (342,753) (402,598) ₩ 1,807,147 ₩ 409,671 ₩ 1,269,995 ₩ 4,933,922 ₩ 738 ₩ 453,405 ₩ 236,174 - 100 283 1 434 46,333 116,813 7,706 1,144 15,516 91,620 - 1,643 21,578 (54,398) (4,645) (590) - - (125) (1,115) - (13,165) (75,584) (209,953) (340) (112,064) (171,918) ₩ 1,760,455 ₩ 393,105 ₩ 1,209,620 ₩ 4,815,590 ₩ 832 ₩ 389,192 ₩ 201,532 ₩ 1,760,455 ₩ 517,631 ₩ 1,967,025 ₩ 8,256,057 ₩ 11,264 ₩ 806,572 ₩ 776,048 - (124,526) (757,405) (3,440,467) (10,43	Land Buildings Structures Machinery and equipment Vehicles Others Catalysts Construction-in-progress ₩ 1,807,147 ₩ 530,455 ₩ 2,002,885 ₩ 8,164,843 ₩ 14,453 ₩ 796,158 ₩ 638,772 ₩ 966,749 - (120,784) (732,890) (3,230,921) (13,715) (342,753) (402,598) - ₩ 1,807,147 ₩ 409,671 ₩ 1,269,995 ₩ 4,933,922 ₩ 738 ₩ 453,405 ₩ 236,174 ₩ 966,749 - 100 283 1 434 46,333 116,813 112,544 7,706 1,144 15,516 91,620 - 1,643 21,578 (284,780) (54,398) (4,645) (590) - - (125) (1,115) - - (13,165) (75,584) (209,953) (340) (112,064) (171,918) - ₩ 1,760,455 ₩ 393,105 ₩ 1,296,025 ₩ 8,256,057 ₩ 11,264 ₩ 806,572 ₩ 776,048 ₩ 794,513 - (124,526) (757,405) (3,440,467) </td

Depreciation expense of \forall 546,784 million (2021: \forall 552,145 million) was charged to cost of sales, \forall 29,157 million (2021: \forall 26,786 million) to selling expenses and \forall 4,151 million (2021: \forall 4,093 million) to administrative expense.

As of December 31, 2022, a certain portion of property, plant and equipment is pledged as collateral for various borrowings and guarantees (Note 16).

During the year, the Group has capitalized borrowing costs amounting to \forall 6,353 million (2021: \forall 327 million) on property, plant and equipment that are qualifying assets. The capitalization rate of borrowings used to determine the amount of borrowing costs to be capitalized is 2.00% (2021: 1.45%) for general borrowings.

As of December 31, 2022, construction-in-progress consists of purchases related to facilities installation and land.

In relation to the fire incident of #2 Alkylation facilities at Onsan Plant in May 2022, the Group has estimated the amount of actual loss after the joint investigation by government departments. The Group recognized estimated loss amounting to \$\fomage\$ 25,000 million to the Group's property, plant and equipment due to the fire incident as impairment loss on property, plant and equipment. The estimated loss in the damage may change in the future. Meanwhile, the insurance coverage in relation to the fire incident will be recognized as profit when the right to receive is established.

15. Intangible Assets

Changes in intangible assets for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)						202	22					
	Facili	ity usage			Mon	nbership		ouse gas				
		ights	C	Others		ights		te 36)	Go	odwill		Total
At January 1, 2022												
Acquisition cost	₩	10,794	₩	113,500	₩	19,279	₩	13,275	₩	57,080	₩	213,928
Accumulated amortization		(7,271)		(96,520)		(1,785)		-		-		(105,576)
Effect of foreign currency rate												
changes		_		18								18
Net book amount	₩	3,523	₩	16,998	₩	17,494	₩	13,275	₩	57,080	₩	108,370
Changes during 2022										<u></u>		
Beginning net book amount	₩	3,523	₩	16,998	₩	17,494	₩	13,275	₩	57,080	₩	108,370
Additions		-		280		580		-		-		860
Transfers		-		3,147		-		256		-		3,403
Amortization		(492)		(5,742)		-		-		-		(6,234)
Effect of foreign currency rate												
changes		_		19						-		19
Ending net book amount	₩	3,031	₩	14,702	₩	18,074	₩	13,531	₩	57,080	₩	106,418
At December 31, 2022												
Acquisition cost	₩	10,794	₩	116,873	₩	19,859	₩	13,531	₩	57,080	₩	218,137
Accumulated amortization ¹		(7,763)		(102,207)		(1,785)		-		-		(111,755)
Effect of foreign currency rate												
changes				36								36
Net book amount	₩	3,031	₩	14,702	₩	18,074	₩	13,531	₩	57,080	₩	106,418

¹ The amounts include accumulated impairment losses.

(In millions of Korean won)						202	21					
							Greenh	ouse gas				
	Facili	ty usage										
	Rights		Others		rights		(Note 36)		Goodwill		Total	
At January 1, 2021												
Acquisition cost	₩	10,794	₩	101,611	₩	20,392	₩	-	₩	57,080	₩	189,877
Accumulated amortization		(6,753)		(82,204)		(2,150)						(91,107)
Net book amount	₩	4,041	₩	19,407	₩	18,242	₩	-	₩	57,080	₩	98,770
Changes during 2021												
Beginning net book amount	₩	4,041	₩	19,407	₩	18,242	₩	-	₩	57,080	₩	98,770
Additions		-		23		3		13,275		-		13,301
Transfers		-		4,875		-		-		-		4,875
Disposals		-		(4)		(751)		-		-		(755)
Amortization		(518)		(7,321)		-		-		-		(7,839)
Effect of foreign currency rate changes		-		18		-		-		-		18
Ending net book amount	₩	3,523	₩	16,998	₩	17,494	₩	13,275	₩	57,080	₩	108,370
At December 31, 2021										<u>.</u>		
Acquisition cost	₩	10,794	₩	113,500	₩	19,279	₩	13,275	₩	57,080	₩	213,928
Accumulated amortization ¹		(7,271)		(96,520)		(1,785)		-		-		(105,576)
Effect of foreign currency rate changes		-		18		-		-		-		18
Net book amount	₩	3,523	₩	16,998	₩	17,494	₩	13,275	₩	57,080	₩	108,370

¹ The amounts include accumulated impairment losses.

The Group recognized total research and development costs of ₩ 17,353 million (2021: ₩ 14,250 million) as expenses.

16. Assets Pledged as Collateral

As of December 31, 2022, assets pledged as collateral are as follows:

(In millions of Korean won and millions of other foreign currencies)

Pledged Assets as Collateral	Secured Amount	Creditors	Related Borrowings/ Guarantees	Balance of Borrowings
Land, Buildings, BTX facilities and others	₩ 19,350 USD 144 FRF 155 JPY 11,781	The Korea Development Bank	Usance Borrowings and others	₩ 785,755 (USD 620)
Time deposits ¹	₩ 4,627	Korea Industrial Complex Corporation Total	Contractual Guarantee	₩ 785,755

¹ Short-term financial instruments include ₩ 4,627 million which are subject to restricted use in relation to contractual guarantee.

17. Trade Payables, Other Payables and Other Liabilities

Trade payables and other payables as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	202	2	2021					
	Current	Non-current	Current	Non-current				
Trade payables	₩ 3,172,420	₩ -	₩ 3,075,770	₩ -				
Other payables								
Non-trade payables	763,997	-	491,474	-				
Accrued expenses	21,438	-	8,435	-				
Dividend payables	53	-	60	-				
Lease liabilities (Note 35)	79,508	184,148	72,417	214,575				
Leasehold deposit received		42,161		40,774				
	864,996	226,309	572,386	255,349				
Total	₩ 4,037,416	₩ 226,309	₩ 3,648,156	₩ 255,349				

Other liabilities as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		20:	22 20				021		
	С	urrent	Non-cu	rrent		Current	Non-cur	rrent	
Advances from customers	₩	179,103	₩	-	₩	199,301	₩	-	
Withholdings		12,962		-		4,593		-	
Tax payables		781,262		-		1,672,587		-	
Total	₩	973,327	₩	-	₩	1,876,481	₩	-	

18. Borrowings

Details of borrowings as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022		2021
Current				
Banker's usance	₩	1,939,122	₩	2,358,921
Current maturities of debentures		589,764		459,904
		2,528,886		2,818,825
Non-current		_		
Debentures		2,426,761		2,736,087
Total	₩	4,955,647	₩	5,554,912

Details of carrying amount of borrowings as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	Creditor	Maturity date	Interest rates (%) Dec. 31, 2022	2022	2021
Short-term borrowings					
Banker's usance	The Korea Development Bank and others	Jan. 10, 2023 and others	3.66~5.28	₩ 1,939,122	₩ 2,358,921

Details of carrying amount of debentures as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	Issuance date	Maturity Date	Interest Rates (%) Dec. 31, 2022	2022	2021
Public bonds (45-3)	Aug. 28, 2012	Aug. 28, 2022	3.530	₩ -	₩ 50,000
Public bonds (46-3)	Jun. 26, 2014	Jun. 26, 2024	3.468	70,000	70,000
Public bonds (47-3)	Nov. 27, 2014	Nov. 27, 2024	2.990	130,000	130,000
Public bonds (48-2)	Oct. 29, 2015	Oct. 29, 2022	2.391	-	70,000
Public bonds (48-3)	Oct. 29, 2015	Oct. 29, 2025	2.657	100,000	100,000
Public bonds (49-2)	Apr. 18, 2016	Apr. 18, 2023	2.101	60,000	60,000
Public bonds (49-3)	Apr. 18, 2016	Apr. 18, 2026	2.225	60,000	60,000
Public bonds (50-2)	Sep. 2, 2016	Sep. 2, 2023	1.722	80,000	80,000
Public bonds (50-3)	Sep. 2, 2016	Sep. 2, 2026	1.932	60,000	60,000
Public bonds (51-1)	Feb. 22, 2017	Feb. 22, 2022	2.197	-	230,000
Public bonds (51-2)	Feb. 22, 2017	Feb. 22, 2024	2.438	110,000	110,000
Public bonds (51-3)	Feb. 22, 2017	Feb. 22, 2027	2.559	60,000	60,000
Public bonds (52-2)	Sep. 19, 2017	Sep. 19, 2022	2.317	-	110,000
Public bonds (52-3)	Sep. 19, 2017	Sep. 19, 2024	2.531	60,000	60,000
Public bonds (53-2)	Jul. 3, 2018	Jul. 3, 2023	2.617	110,000	110,000
Public bonds (53-3)	Jul. 3, 2018	Jul. 3, 2025	2.708	80,000	80,000
Public bonds (54-1)	Jun. 7, 2019	Jun. 7, 2024	1.762	110,000	110,000
Public bonds (54-2)	Jun. 7, 2019	Jun. 7, 2026	1.769	100,000	100,000
Public bonds (54-3)	Jun. 7, 2019	Jun. 7, 2029	1.860	190,000	190,000
Public bonds (55-1)	Nov. 4, 2019	Nov. 4, 2024	1.904	160,000	160,000
Public bonds (55-2)	Nov. 4, 2019	Nov. 4, 2026	1.926	40,000	40,000
Public bonds (55-3)	Nov. 4, 2019	Nov. 4, 2029	2.102	60,000	60,000
Public bonds (56-1)	Mar. 10, 2020	Mar. 10, 2025	1.492	440,000	440,000
Public bonds (56-2)	Mar. 10, 2020	Mar. 10, 2027	1.549	70,000	70,000
Public bonds (56-3)	Mar. 10, 2020	Mar. 10, 2030	1.648	170,000	170,000
Public bonds (57-1)	Aug. 28, 2020	Aug. 28, 2023	1.401	340,000	340,000
Public bonds (57-2)	Aug. 28, 2020	Aug. 28, 2025	1.639	40,000	40,000
Public bonds (57-3)	Aug. 28, 2020	Aug. 28, 2030	1.817	40,000	40,000
Public bonds (58-1)	Feb. 17, 2022	Feb. 17, 2027	2.951	160,000	-
Public bonds (58-2)	Feb. 17, 2022	Feb. 17, 2029	2.970	60,000	-
Public bonds (58-3)	Feb. 17, 2022	Feb. 17, 2032	3.179	60,000	-
Less: Present value discount			_	(3,475)	(4,009)
Sub total				3,016,525	3,195,991
Less: Current maturities			<u>-</u>	(589,764)	(459,904)
Total			<u>-</u>	₩ 2,426,761	₩ 2,736,087

As of December 31, 2022 and 2021, a certain portion of property, plant and equipment and others are pledged as collateral for various borrowings (Note 16).

19. Provisions and Contract Liabilities

Details and changes in provisions for other liabilities and charges for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)			2	022					20)21		
		onmental toration	E	vision for mission oligation	-	Total		onmental toration	En	vision for nission ligation	т	otal
Beginning balance	₩	2,875	₩	11,752	₩	14,627	₩	2,875	₩	-	₩	2,875
Additional provision		-		2,014		2,014		-		11,752		11,752
Used during year		<u>-</u>		(11,823)		(11,823)		_		<u>-</u>		<u>-</u>
Ending balance	₩	2,875	₩	1,943	₩	4,818	₩	2,875	₩	11,752	₩	14,627

Changes in contract liabilities for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	20	022		2021
Beginning balance	₩	18,431	₩	20,668
Additions		5,136		5,570
Used during year		(6,891)		(7,807)
Ending balance	₩	16,676	₩	18,431

Contract liabilities arise from customer loyalty program are adjusted from revenue.

20. Net Defined Benefit Assets/Liabilities

The majority of the plans are final salary pension plans, which provide benefit to employees in the form of a guaranteed level of pension payable for life. The level of benefits provided depends on employees' length of severance and their salary in the final years leading up to retirement. The majority of benefit payments are from trustee administered funds; however, there are also a number of unfunded plans. Plan assets held in trusts are governed by local regulations and practice in each country.

Details of net defined benefit liabilities (assets) recognized in the consolidated statements of financial position as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	2022		2021	
Present value of defined benefit obligations	₩	(464,076)	₩	(432,416)
Fair value of plan assets ¹		636,303		475,821
Net defined benefit assets	₩	172,227	₩	43,405

¹ The contributions to the National Pension Fund of ₩ 306 million are included in the fair value of plan assets as of December 31, 2022 (2021: ₩ 342 million).

Changes in the defined benefit obligations for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022		2021
Beginning balance	₩	432,416	₩	453,221
Current service cost		45,115		50,671
Past service cost		23,018		-
Interest expense		14,219		12,790
Remeasurements:				
Actuarial gains arising from change in financial assumptions		(54,738)		(26,412)
Actuarial gains arising from change in demographic assumptions		-		(4,893)
Actuarial losses (gains) from experience adjustments		36,551		(24,859)
Benefits payments		(32,517)		(28,110)
Foreign currency rate changes		12		8
Ending Balance	₩	464,076	₩	432,416

Changes in the fair value of plan assets for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022		2021
Beginning balance	₩	475,821	₩	450,608
Interest income		14,932		11,989
Remeasurements:				
Return on plan assets		(7,155)		(7,202)
Contributions		185,000		48,000
Benefits payments		(32,295)		(27,574)
Ending balance	₩	636,303	₩	475,821

Plan assets as of December 31, 2022 and 2021, consist of financial assets including deposits.

The significant actuarial assumptions as of December 31, 2022 and 2021, are as follows:

	2022	2021
Discount rate	5.80%	3.40%
Salary growth rate	6.03%	5.08%

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

	Changes in	Impact on defined benefit obligatio				
	assumption	2022	2021			
Salary growth rate	One percent increase One percent decrease	8.29% increase 7.27% decrease	9.22% increase 8.04% decrease			
Discount rate	One percent increase One percent decrease	7.08% decrease 8.20% increase	7.92% decrease 9.26% increase			

The above sensitivity analyses are based on a change in an assumption while holding all other assumptions constant. The sensitivity of the defined benefit obligation to changes in principal actuarial assumptions is calculated using the projected unit credit method, the same method applied when calculating the defined benefit obligations recognized on the consolidated statement of financial position. The methods and types of assumptions used in preparing the sensitivity analysis did not change compared to the prior period.

The Group reviews the funding level on an annual basis and has a policy of eliminating deficit from the fund.

The weighted average duration of the defined benefit obligation is 7.64 years and expected contributions to post-employment benefit plans for the year ending December 31, 2023 are \wfoat 80,504 million.

The expense and others recognized in the current period in relation to defined contribution plan was \forall 13,970 million (2021: \forall 11,519 million).

21. Contingencies and Commitments

As of December 31, 2022, the Group has overdraft agreements of up to \forall 23,000 million and USD 482 million with Shinhan Bank and three other banks and general loan agreements of up to \forall 14,750 million with Woori Bank.

As of December 31, 2022, the Group has banker's usance agreements and imported credit agreements of up to a maximum of USD 4,530 million with the Korea Development Bank and 15 other banks.

As of December 31, 2022, Shinhan Bank has provided guarantees up to \(\psi \) 30,000 million for the Group's obligation for repayment of remaining bonus points.

As of December 31, 2022, KEB Hana Bank has provided guarantees up to ₩ 3,063 million for the restoration responsibilities of Onsan National Industrial Complex.

As of December 31, 2022, the Group offered one blank check to Korea National Oil Corporation as payment guarantee.

As of December 31, 2022, the balance of trade receivables that have been transferred but are not past due amounts to USD 171 million (2021: USD 192 million). As of December 31, 2022, the Group transferred the trade receivables to the BNP Paribas Bank and one other financial institution and derecognized the transferred receivables as all the risks and rewards are substantially transferred (Note 8).

As of December 31, 2022, the Group has Stand-by credit line agreements with the Korea Development Bank and one other financial institution up to \forall 350,000 million and has imported credit agreements up to USD 50 million with Shinhan Bank and two other financial institutions.

As of December 31, 2022, the Group has been provided performance guarantee and others amounting to \forall 15,805 million by Seoul Guarantee Insurance.

As of December 31, 2022, there is no significant pending litigation.

As of December 31, 2022, the amount of commitment in relation to the Group's purchase of property, plant and equipment is $\mbox{$\mathbb{W}$}$ 144,789 million. In addition, as of December 31, 2022, in relation to the planned direct investment of $\mbox{$\mathbb{W}$}$ 7,678,000 million in the second phase of the petrochemical expansion project ("Shaheen Project"), the Group has an engineering, procurement and construction contract with Hyundai Engineering & Construction and two other companies.

22. Share Capital and Share Premium

Share capital and share premium as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won, except number of shares)	Number of issued ordinary shares	Number of issued preferred shares	Share capital (Ordinary share)	Share capital (Preferred share)	Share premium	Total
December 31, 2021	112,582,792	4,021,927	₩ 281,457	₩ 10,055	₩ 379,190	₩ 670,702
December 31, 2022	112,582,792	4,021,927	₩ 281,457	₩ 10,055	₩ 379,190	₩ 670,702

Under its Articles of Incorporation, the Company is authorized to issue 60 million cumulative, participating preferred shares that are non-voting and entitled to a minimum cash dividend at 9% of par value. As all of the preferred share as of December 31, 2022, was issued before March 27, 1998, it receives 1% more dividends over ordinary share under the Articles of Incorporation.

The Company is authorized to issue non-voting convertible share up to 4 million shares. Each share of this non-voting convertible share was converted to one ordinary share. As of December 31, 2022, there is no outstanding convertible share issued by the Company.

The Company may grant options to purchase the Company's ordinary share to key employees or directors. The grant limit of the options is 15% of outstanding shares and the options may be granted with the special resolution of the shareholders. As of December 31, 2022, no option has been granted.

The Company is authorized to issue 180,000,000 ordinary shares with a par value of $\mbox{$W$}$ 2,500 per share and 112,582,792 ordinary shares are issued. The Company is authorized to issue 60,000,000 preferred shares with par value of $\mbox{$W$}$ 2,500 per share and 4,021,927 preferred shares are issued.

23. Treasury Share

As of December 31, 2022, the Company holds 184,080 treasury share of preferred shares amounting to \forall 1,876 million and is deducted from shareholders' equity. The Company intends to dispose of the treasury share depending on the market conditions.

24. Retained Earnings

Retained earnings as of December 31, 2022 and 2021, consist of:

(In millions of Korean won)		2022	2021		
Legal reserve					
Earned surplus reserve ¹	₩	145,756	₩	145,756	
Discretionary reserve					
Reserve for improvement of financial structure		55,700		55,700	
Reserve for business rationalization		103,145		103,145	
Reserve for market development		3,703,698		2,731,898	
		3,862,543		2,890,743	
Revaluation reserve		984,648		984,648	
Retained earnings before appropriation		1,835,573		1,312,595	
	₩	6,828,520	₩	5,333,742	

¹ The Commercial Code of the Republic of Korea requires the Company to appropriate, as a legal reserve, an amount equal to a minimum of 10% of annual cash dividends paid, until such reserve equals 50% of its issued share capital. As the Company's reserve exceeds 50% of its issued share capital, additional reserve is unnecessary. The reserve is not available for cash dividends payment, but may be transferred to share capital or used to reduce accumulated deficit.

Year-end cash dividends for 2021 amounting to \forall 10,841 million for preferred share and \forall 315,232 million for ordinary share were paid out in April 2022 (Dividends paid in 2021: \forall 96 million for preferred share).

In accordance with the Articles of Incorporation, on August 4, 2022, the Board of Directors declared interim cash dividends of \forall 2,500 per share with dividend date on June 30, 2022.

(In millions of Korean won, except number of shares)	Number of shares		e capital nount	Dividend rate		Cash ridends
Ordinary shares	112,582,792	₩	281,457	100%	₩	281,457
Preferred shares ¹	3,837,847		9,595	100%		9,595
	116,420,639	₩	291,052		₩	291,052

¹ The number of treasury share are excluded from the number of shares issued.

A dividend in respect of the year ended December 31, 2022, of $\mbox{$W$}$ 3,025 per preferred share and $\mbox{$W$}$ 3,000 per ordinary share, amounting to total dividend of $\mbox{$W$}$ 349,358 million, is to be proposed to shareholders at the annual general meeting on March 28, 2023. These consolidated financial statements do not reflect this dividend payable.

25. Reserves

Changes in reserves for the years ended December 31, 2022 and 2021, are as follows:

					2	022				
(In millions of Korean won)	dis	ains on posal of ury share	on va fin asse value comp	s (losses) luation of ancial ts at fair through other rehensive come	compre	of other ehensive ne (loss) t venture	tran gains on f	ealized slation (losses) oreign eration		Total
Balance at January 1, 2022 Gains on valuation of	₩	952,311	₩	24,938	₩	(65)	₩	8,290	₩	985,474
financial assets at fair value through other comprehensive income		-		385		-		-		385
Foreign currency translation adjustments		-		-		-		264		264
Balance at December 31, 2022	₩	952,311	₩	25,323	₩	(65)	₩	8,554	₩	986,123
						2021				
Balance at January 1, 2021 Gains on valuation of	₩	952,311	₩	17,599	₩	(65)	₩	8,099	₩	977,944
financial assets at fair value through other comprehensive income Reclassification due to		-		6,884		-		-		6,884
disposal of financial assets at fair value through other comprehensive income		-		455		-		-		455
Foreign currency translation adjustments		-		-		-		191		191
Balance at December 31, 2021	₩	952,311	₩	24,938	₩	(65)	₩	8,290	₩	985,474

26. Cost of Sales

Cost of sales for the years ended December 31, 2022 and 2021, consists of:

(In millions of Korean won)		2022		2021
Beginning balance of merchandise and finished goods	₩	840,852	₩	468,384
Purchases of merchandise		3,048,297		2,174,333
Manufacturing cost for the year		38,240,985		25,343,364
Transfer from other accounts		4,469		2,681
Transfer to other accounts		(2,062,445)		(1,761,109)
Ending balance of merchandise and finished goods		(923,133)		(840,852)
Adjustments		(857,585)		(691,609)
Total	₩	38,291,440	₩	24,695,192

27. Selling and Administrative Expenses

Selling and administrative expenses for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	won) Selling expenses			/e expenses
,	2022	2021	2022	2021
Salaries	₩ 73,699	₩ 67,631	₩ 42,951	₩ 35,968
Post-employment benefits	11,969	12,236	6,209	6,665
Employee benefits	61,369	58,551	28,683	26,168
Training expenses	74	17	2,761	1,903
Travel expenses	2,708	1,628	1,078	402
Miscellaneous administrative				
expenses	153	166	461	442
Communication expenses	3,106	2,341	1,276	1,210
Vehicles maintenance expenses	401	371	265	239
Utility expenses	1,728	1,586	409	369
Rental expenses	2,476	2,498	1,359	1,261
Service expenses for oil storages	18,745	15,809	-	=
Service fees	13,139	12,088	949	892
Business promotion expenses	1,402	966	1,359	1,213
Export expenses	150,166	96,270	=	-
Repairs and maintenance				
expenses	6,472	4,422	891	810
Supplies expenses	298	220	1	1
Chemicals expenses	1,546	453	=	-
IT operating expenses	2,347	2,311	7,073	6,418
Professional service expenses	7,522	3,470	9,905	4,331
General service expenses	6,962	6,908	2,846	2,909
Promotional and advertising				
expenses	20,333	15,180	6,799	6,491
Freight expenses	177,299	153,528	-	-
Insurance premium	2,421	1,652	100	96
Taxes and dues	5,272	8,172	9,741	10,163
Depreciation expenses	29,157	26,786	4,151	4,093
Amortization expenses	803	836	3,018	3,901
Depreciation of right-of-use assets	10,240	10,354	3,104	3,205
Provision for impairment losses				
on receivables	844	1,179	-	-
Others	328	274	1,054	731
Total	₩ 612,979	₩ 507,903	₩ 136,443	₩ 119,881

28. Other Income and Expenses

Other income and expenses for the years ended December 31, 2022 and 2021, are as follows:

Other income

(In millions of Korean won)		2022		2021
Gains on disposal of property, plant and equipment	₩	9,942	₩	115,729
Dividend income		2,108		1,152
Gains on foreign currency transactions		812,079		195,096
Gains on foreign currency translation		141,786		10,411
Gains on derivative transactions		127,051		84,489
Gains on valuation of derivatives		16,343		1,248
Miscellaneous income		38,283		51,856
Total	₩	1,147,592	₩	459,981

Other expenses

(In millions of Korean won)		2022		2021
Losses on disposal of property, plant and equipment	₩	406	₩	1,325
Losses on reduction of property, plant and equipment		26,261		-
Donations		7,053		17,733
Losses on foreign currency transactions		1,016,985		374,093
Losses on foreign currency translation		71,728		22,836
Losses on derivative transactions		192,564		66,574
Losses on valuation of derivatives		312		2,210
Miscellaneous loss		14,596		9,252
Total	₩	1,329,905	₩	494,023

29. Finance Income and Costs

Finance income and costs for the years ended December 31, 2022 and 2021, consist of:

Finance income

(In millions of Korean won)	2022			2021
Interest income	₩	30,993	₩	9,017
Gains on foreign currency transactions		253,396		119,195
Gains on foreign currency translation		148,098		847
Total	₩	432,487	₩	129,059

Finance costs

(In millions of Korean won)	2022			2021
Interest expenses ¹	₩	151,149	₩	109,813
Losses on foreign currency transactions		605,228		224,433
Losses on foreign currency translation		250		25,480
Total	₩	756,627	₩	359,726

¹ Interest expenses exclude capitalized borrowing costs on qualifying assets (Note 14).

30. Tax Expense and Deferred Tax

Income tax expense for the years ended December 31, 2022 and 2021, consists of:

(In millions Korean won)	2	2022	2021		
Current tax					
Current tax on profit for the year	₩	749,936	₩	213,146	
Adjustments due to changes in estimates related to prior					
years		(7,108)			
Total current tax		742,828		213,146	
Deferred tax					
Changes in deferred tax due to temporary differences		51,327		286,333	
Income tax expense	₩	794,155	₩	499,479	

Reconciliation between actual income tax expense and amount computed by applying the statutory tax rates to profit before income tax for the years ended December 31, 2022 and 2021 are follows:

(In millions of Korean won)	2022			2021
Profit before income tax	₩	2,898,542	₩	1,878,020
Tax at statutory tax rates applicable to profits (losses) in the respective countries	₩	786,603	₩	505,893
Non-taxable income		(797)		(684)
Non-deductible expenses		5,939		18,736
Adjustments in respect of prior years		(7,108)		-
Tax credit and others		9,518		(24,466)
Income tax expense	₩	794,155	₩	499,479

The weighted average applicable tax rate of the Group was 27.14% (2021: 26.94%).

The tax effect relating to components of other comprehensive income (expenses) for the years ended December 31, 2022 and 2021, is as follows:

(In millions Korean won)	2022					
	Before Tax		Tax	k effect	Aft	er tax
Gains on valuation of financial assets at fair value through other comprehensive income	₩	155	₩	230	₩	385
Remeasurements of net defined benefit liabilities		11,032		(3,516)		7,516
Foreign currency translation adjustments		359		(95)		264
Total	₩	11,546	₩	(3,381)	₩	8 165
(In millions Korean won)			•	2021		
(a	Befo	ore Tax	Tax	k effect	Aft	ter tax
Gains on valuation of financial assets at fair value through other comprehensive income	₩	9,509	₩	(2,625)	₩	6,884
Remeasurements of net defined benefit liabilities		48,962		(12,496)		36,466
Foreign currency translation adjustments		264		(73)		191
Total	₩	58,735	₩	(15,194)	₩	43,541

The analysis of deferred tax assets and liabilities as of December 31, 2022 and 2021, is as follows:

(In millions of Korean won)	2022			2021	
Deferred tax assets					
Deferred tax asset to be recovered after more than 12 months	₩	39,978	₩	51,982	
Deferred tax asset to be recovered within 12 months		41,304		47,179	
		81,282		99,161	
Deferred tax liabilities				_	
Deferred tax liability to be recovered after more than 12 months		(306,223)		(274,247)	
Deferred tax liability to be recovered within 12 months		(38,497)		(33,644)	
		(344,720)		(307,891)	
Deferred tax liabilities, net	₩	(263,438)	₩	(208,730)	

Changes in deferred tax for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	2022			2021		
Beginning balance	₩	(208,730)	₩	92,797		
Deferred income tax charged to income		(51,327)		(286, 333)		
Deferred income tax charged to equity		(3,381)		(15,194)		
Ending balance	₩	(263,438)	₩	(208,730)		

Changes in deferred tax assets and liabilities for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	2022							
						Other		_
	Beginning		Statement of		comprehensive income		Ending Balance	
	E	Balance profit or loss						
Depreciation	₩	4,375	₩	(270)	₩	-	₩	4,105
Losses on impairment of investments		546		(16)		-		530
Salaries and wages payable		44,094		(2,791)		_		41,303
Bonus card point and etc.		8,994		(3,176)		-		5,818
Subsidiary and joint ventures		(1,037)		(20)		-		(1,057)
Losses on valuation of derivative instruments		520		(969)		-		(449)
Losses on impairment of property, plant and equipment		1,237		6,635		-		7,872
Customs duties receivable		(31,938)		(4,206)		-		(36,144)
Accrued interest income		(149)		(319)		-		(468)
Employee benefits		8,432		3,926		-		12,358
Revaluation of lands		(192,669)		6,362		-		(186,307)
Annual overhaul and others		(46,731)		(10,272)		-		(57,003)
Tax loss carryforwards and tax credits		2,562		(2,562)		-		-
Currency translation differences and share of other								
comprehensive income of associate and joint venture		(2,810)		83		(95)		(2,822)
Remeasurements of net defined benefit liabilities		4,879		(43,732)		(3,516)		(42,369)
Gains (losses) on valuation of financial assets at fair								
value through other comprehensive income		(9,035)		-		230		(8,805)
Total	₩	(208,730)	₩	(51,327)	₩	(3,381)	₩	(263,438)
			-					

(In millions of Korean won)	2021								
					(Other		_	
	Beginnin	g	Sta	tement of	comp	rehensive		Ending	
	Balance	•	pro	fit or loss	in	icome	E	Balance	
Depreciation	₩ 5	5,407	₩	(1,032)	₩	_	₩	4,375	
Losses on impairment of investments		960		(414)		-		546	
Salaries and wages payable	2	,900		41,194		-		44,094	
Bonus card point and etc.	6	,760		2,234		-		8,994	
Subsidiary and joint ventures	(1,	259)		222		-		(1,037)	
Losses on valuation of derivative instruments	1	,039		(519)		-		520	
Losses on impairment of property, plant and equipment	1	,218		19		-		1,237	
Customs duties receivable	(31	951)		13		-		(31,938)	
Accrued interest income		(110)		(39)		-		(149)	
Employee benefits	8	3,206		226		-		8,432	
Revaluation of lands	(202	,117)		9,448		-		(192,669)	
Annual overhaul and others	(68	266)		21,535		-		(46,731)	
Tax loss carryforwards and tax credits	350	,098		(347,536)		-		2,562	
Currency translation differences and share of other comprehensive income of associate and joint venture	(2,	485)		(252)		(73)		(2,810)	
Remeasurements of net defined benefit liabilities	28	3,647		(11,272)		(12,496)		4,879	
Gains (losses) on valuation of financial assets at fair value through other comprehensive income	(6,	250)		(160)		(2,625)		(9,035)	
Total	₩ 92	2,797	₩	(286,333)	₩	(15,194)	₩	(208,730)	

31. Breakdown of Expenses by Nature

Expenses by nature for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022		2021
Raw materials and merchandises used	₩	35,504,426	₩	22,461,945
Changes in inventories of finished goods, work in-progress and merchandise		(271,798)		(568,540)
Employee benefit expense		451,738		388,894
Utility expenses		1,709,813		1,548,909
Depreciation and amortization		586,326		590,863
Depreciation of right-of-use assets		63,526		60,940
Freight expenses		293,653		248,276
Advertising costs		13,181		10,511
Other expenses		689,997		581,178
Total cost of sales, selling and administrative expenses	₩	39,040,862	₩	25,322,976

32. Earnings per Share

Basic earnings per ordinary share is calculated by dividing the profit attributable to ordinary shareholders of the Group by the weighted average number of ordinary shares during the financial year. As the Group's preferred shares are participating shares with right to participate in distribution of earnings, earnings per share on preferred share is also calculated.

Basic earnings per ordinary share for the years ended December 31, 2022 and 2021, is calculated as follows:

(In millions of Korean won, except per share data)		2022		2021
Profit for the year	₩	2,104,388	₩	1,378,541
Adjustments:				
Dividends for preferred share		(96)		(96)
Additional dividends for preferred share		(69,369)		(45,441)
Profit attributable to ordinary share shareholders		2,034,923		1,333,004
Weighted average number of shares of ordinary share		112,582,792		112,582,792
Basic earnings per ordinary share	₩	18,075	₩	11,840

Basic earnings per preferred share for the years ended December 31, 2022 and 2021, is calculated as follows:

(In millions of Korean won, except per share data)		2022		2021
Profit attributable to preferred share shareholders	₩	69,465	₩	45,537
Weighted average number of shares of preferred share ¹		3,837,847		3,837,847
Basic earnings per preferred share	₩	18,100	₩	11,865

¹ The 184,080 treasury shares are excluded in calculating weighted average number of shares of preferred share.

As there are no dilutive items outstanding, diluted earnings per share is identical to basic earnings per share.

33. Related Party Transactions

Details of related parties as of December 31, 2022 and 2021, are as follows:

2022 2021

Ultimate parent company	Saudi Arabian Oil Company ¹	Saudi Arabian Oil Company ¹
Parent company	Aramco Overseas Co., B.V.	Aramco Overseas Co., B.V.
Joint venture	S-OIL TOTAL Energies Lubricants Co., Ltd. ²	S-OIL TOTAL Lubricants Co., Ltd. ²
Associate	FCI Co., Ltd.	FCI Co., Ltd.
Other related parties who have transactions with the Company	Aramco Trading Company ³	Aramco Trading Company ³
	Aramco Trading Singapore PTE. LTD.3	Aramco Trading Singapore PTE. LTD.3
	Aramco Asia Singapore PTE Limited ³	Aramco Asia Singapore PTE Limited ³
	Saudi Aramco Base Oil Company –	Saudi Aramco Base Oil Company –
	Luberef Saudi Arabia ³	Luberef Saudi Arabia ³
	Saudi Basic Industries Corporation ³	Saudi Basic Industries Corporation ³
	Aramco Trading Fujairah FZE ³	Aramco Trading Fujairah FZE ³
	-	Aramco Asia Japan K.K. ³
	Motiva Enterprises LLC ³	Motiva Enterprises LLC ³
	Motiva Trading LLC3	Motiva Trading LLC ³
	The National Shipping Company of	The National Shipping Company of
	Saudi Arabia ⁴	Saudi Arabia⁴
	Hyundai Oilbank Co., Ltd. ⁴	Hyundai Oilbank Co., Ltd. ⁴

¹ The ultimate parent of Aramco Overseas Co., B.V.

² S-OIL TOTAL Lubricants Co., Ltd., changed its name to S-OIL TOTAL Energies Lubricants Co., Ltd.

³ Subsidiaries of Saudi Arabian Oil Company.

⁴ Associates of Saudi Arabian Oil Company.

Significant transactions with related parties for the years ended December 31, 2022 and 2021, and the related receivables and payables as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	Sales and others					Purchases and others			
		2022		2021		2022	2021		
Ultimate parent company									
Saudi Arabian Oil Company ¹	₩	-	₩	-	₩	25,860,588	₩ 16,147,536		
Parent company									
Aramco Overseas Co., B.V.		-		_		58	977		
Joint venture									
S-OIL TOTAL Energies Lubricants Co., Ltd.		147,122		124,301		46,735	38,648		
Other related parties									
Aramco Trading Company		-		3,246		675,333	2,366,544		
Aramco Trading Singapore PTE. LTD.		3,669,469		4,935,989		5,847,512	1,285,918		
Hyundai Oilbank Co., Ltd. ²		679,024		517,845		781,702	451,667		
Others		764,768		306,259		1,280,499	668,797		
Total	₩1	0,260,383	₩	5,887,640	₩	34,492,427	₩ 20,960,087		
(In millions of Korean won)	Receivables and others				Payables a	nd others			
(III THIIIIONS OF NOTCOM WOLL)		2022	ana c	2021		2022	2021		
Ultimate parent company		2022		2021		2022	2021		
Saudi Arabian Oil Company ¹	₩	_	₩	_	₩	2,836,673	₩ 2,555,961		
Parent company						_,,	-,,		
Aramco Overseas Co., B.V.		_		_		_	_		
Joint venture									
S-OIL TOTAL Energies Lubricants Co.,									
Ltd.		13,485		5,813		3,803	3,201		
Other related parties									
Aramco Trading Company		_		_		_	149,025		
Aramco Trading Singapore PTE. LTD.		360,028		222,946		173,434	36,012		
Hyundai Oilbank Co., Ltd. ²		4,968		12,601		12,099	4,622		
Others		48,997		20,153		47,895	81,092		
	₩	427,478							

¹ The Group is under a long-term purchasing agreement with Saudi Arabian Oil Company in relation with crude oil purchase as of December 31, 2022.

Financial transactions with related parties for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	In	Investment in cash				Dividends	receive	Dividends paid		
	202	22	2	2021	20)22	20	21	2022	2021
Parent company										
Aramco Overseas Co., B.V.	₩	-	₩	-	₩	-	₩	-	₩ 380,226	₩ 71,748
Joint venture										
S-OIL TOTAL Energies		_				1.650		3.800		
Lubricants Co., Ltd.		-		-		1,030		3,000	-	-
Associate										
FCI Co., Ltd. ¹				8,200		-		-		
Total	₩	-	₩	8,200	₩	1,650	₩	3,800	₩ 380,226	₩ 71,748

¹ The Group acquired shares issued by FCl Co., Ltd., and classified it as an associate for the year

² This is the inventory exchange transaction and others with Hyundai Oilbank Co., Ltd.

ended December 31, 2021.

The compensation to key management for employee services for the years ended December 31, 2022 and 2021, consists of:

(In millions of Korean won)	2	022		2021
Short-term employee benefits	₩	1,811	₩	1,806
Post-employment benefits		200		202
Total	₩	2,011	₩	2,008

Key management consists of registered executive officers who have the authority and responsibility in the planning, directing and control over the Group's operations.

34. Cash Generated From Operations

Cash generated from operations for the years ended December 31, 2022 and 2021, is as follows:

(In millions of Korean won)		2022		2021
Profit for the year	₩	2,104,387	₩	1,378,541
Adjustments:				
Income tax expense		794,155		499,479
Depreciation expense of property, plant and equipment		580,092		583,024
Amortization expense		6,234		7,839
Depreciation of right-of-use assets		63,526		60,940
Post-employment benefits		67,420		51,472
Provision for impairment losses on receivables		844		1,179
Interest expense		151,149		109,813
Losses on foreign currency translation		71,978		48,316
Losses on derivative transactions		192,564		66,574
Losses on valuation of derivatives		312		2,210
Losses on disposal of property, plant and equipment		406		1,325
Impairment loss on property, plant and equipment		26,261		-
Losses on valuation of inventories		149,701		37,694
Share of net loss (profit) of joint venture and associates		171		(1,787)
Interest income		(30,993)		(9,017)
Gains on foreign currency translation		(289,884)		(11,162)
Gains on disposal of property, plant and equipment		(9,942)		(115,729)
Gains on derivative transactions		(127,051)		(84,489)
Gains on valuation of derivatives		(16,343)		(1,248)
Dividend income		(2,108)		(1,152)
Others		5,353		2,985
Changes in net working capital:				
Trade receivables		(386,249)		(772,205)
Other receivables		(9,528)		47,000
Other current assets		212,260		(419,065)
Inventories		(1,337,521)		(1,390,744)
Trade payables		221,313		1,066,234
Other payables		255,558		161,610
Other current liabilities		(903,153)		379,449
Net defined benefit liabilities		(185,222)		(48,508)
Provisions for other liabilities and charges		2,013		11,752
Contract liabilities		(1,755)		(2,237)
Cash generated from operations	₩	1,605,948	₩	1,660,093

Significant transactions not affecting cash flows for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	2022			2021		
Reclassification of construction in-progress to property, plant and equipment and intangible assets	₩	128,604	₩	284,780		
Current portion of long-term borrowings and debentures		589,660		459,793		
Current portion of long-term loans receivable		7,130		11,809		
Other payables related to acquisition of property, plant and equipment		17,944		4,213		
Acquisition of right-of-use assets		24,051		64,555		

Changes in liabilities arising from financing activities for the years ended December 31, 2022 and 2021, are as follows:

	Changes in non-cash transaction								
	Beginning balance	Cash flows from financing activities	Current portion	Interest expense	Increase in lease liabilities	Changes in foreign exchange rates	Reclassific- ation from retained earnings	Ending balance	
Short-term borrowings and banker's usance	₩ 2,358,921	₩ (271,702)	₩ -	₩ -	₩ -	₩ (148,097)	₩ -	₩ 1,939,122	
Current maturities of debentures	459,904	(460,000)	589,660	200	-	-	-	589,764	
Debentures	2,736,087	279,139	(589,660)	1,195	-	-	-	2,426,761	
Dividend payables	60	(617,132)	-	-	-	-	617,125	53	
Current other payables (lease liabilities)	72,417	(71,880)	78,971	-	-	-	-	79,508	
Other payables (lease liabilities)	214,575		(78,971)		42,861	5,683	-	184,148	
	₩ 5,841,964	₩(1,141,575)	₩ -	₩ 1,395	₩ 42,861	₩ (142,414)	₩ 617,125	₩ 5,219,356	

(In millions of Korean won) 2021

(III IIIIII OII OI I KOI OUII WOII)									
	Changes in non-cash transaction								
	Beginning balance	Cash flows from financing activities	Current portion	Interest expense	Increase in lease liabilities	Changes in foreign exchange rates	Reclassific- ation from retained earnings	Ending balance	
Short-term borrowings and banker's usance	₩ 1,875,586	₩ 458,602	₩ -	₩ -	₩ -	₩ 24,733	₩ -	₩ 2,358,921	
Current maturities of debentures	739,791	(740,000)	459,793	320	-	-	-	459,904	
Debentures	3,194,602	-	(459,793)	1,278	-	-	-	2,736,087	
Dividend payables	62	(116,519)	-	-	-	-	116,517	60	
Current other payables (lease liabilities)	55,056	(68,217)	85,578	-	-	-	-	72,417	
Other payables (lease liabilities)	208,426		(85,578)	-	81,989	9,738		214,575	
	₩ 6,073,523	₩ (466,134)	₩ -	₩ 1,598	₩ 81,989	₩ 34,471	₩ 116,517	₩ 5,841,964	

35. Leases

35.1 Amounts recognized in the consolidated statement of financial position

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

(In millions of Korean won)		2022	2021			
Right-of-use assets ¹						
Vessels	₩	90,861	₩	105,559		
Gas station and charging station		11,866		15,860		
Storage and other facilities		106,475		127,208		
	₩	209,202	₩	248,627		
(In millions of Korean won)		2022		2021		
Lease liabilities ²						
Current	₩	79,508	₩	72,417		
Non-current		184,148		214,575		
	₩	263,656	₩	286,992		
(In millions of Korean won)		2022		2021		
Lease receivables ³						
Current	₩	10,404	₩	8,487		
Non-current		27,418		25,816		
	₩	37,822	₩	34,303		

¹ Included in 'Other assets' in the consolidated statement of financial position.

² Included in 'Other payables' in the consolidated statement of financial position.

³ Included in 'Other receivables' in the consolidated statement of financial position.

35.2 Amounts recognized in the consolidated statements of comprehensive income

The consolidated statements of comprehensive income show the following amounts relating to leases:

(In millions of Korean won)		2022	2021		
Depreciation of right-of-use assets					
Vessels	₩	30,615	₩	30,571	
Gas station and charging station		4,967		5,245	
Storage and other facilities		27,944		25,124	
	₩	63,526	₩	60,940	
Interest expense relating to lease liabilities (included in finance cost)	₩	6,505	₩	6,715	
Interest income relating to lease receivables (included in finance income)		(793)		(539)	
Expense relating to short-term leases ¹		13,735		16,892	
Expense relating to leases of low-value assets that are not short-term leases ¹		441		743	
Expense relating to variable lease payments not included in lease liabilities ¹		82,788		65,637	
Foreign currency translation gains and losses for lease liabilities		5,634		9,738	

¹ Included in 'Cost of sales' and 'Selling and administrative expenses' in the consolidated statement of profit or loss.

Total cash outflow and inflow with respect to leases amount to \forall 175,350 million (2021: \forall 158,203 million) and \forall 10,594 million (2021: \forall 8,234 million), respectively in 2022.

35.3 Changes in asset and liabilities related to lease

Changes in right-of-use assets during the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022		2021
Beginning net book amount	₩	248,627	₩	244,969
Additions		24,052		64,555
Depreciation		(63,526)		(60,940)
Foreign currency rate changes		49		43
Ending net book amount	₩	209,202	₩	248,627

Changes in lease liabilities during the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	2022			2021		
Beginning net book amount	₩	286,992	₩	263,482		
Increase		42,861		81,989		
Interest expenses		6,505		6,715		
Foreign currency translation		5,634		9,738		
Foreign currency rate changes		49		-		
Repayments of lease liabilities		(78,385)		(74,932)		
Ending net book amount	₩	263,656	₩	286,992		

Changes in lease receivables during the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022	2021			
Beginning net book amount	₩	34,303	₩	23,493		
Additions		13,320		18,504		
Interest income		793		540		
Received		(10,594)		(8,234)		
Ending net book amount	₩	37,822	₩	34,303		

36. Greenhouse Gas Emission Permits and Obligations

Quantities of emission permits which are allocated free of charge for the 3rd plan period (2021~2025) as of December 31, 2022, are as follows:

(In thousands of tCO2-eq)	2021	2022	2023	2024	2025	Total
Allocation with free of charge	8,583	8,583	8,583	8,502	8,502	42,753

Changes in emission permits quantities and the carrying amounts for the years ended December 31, 2022 and 2021, are as follows.

(In millions of	2022														
Korean won, In	2	021	2	022	2	023	20	024	2025						
thousands of tCO2-eq)			Quantity	Amount	Quantity	Amount									
At January 1 Allocation with nil	172	₩ -	388	₩ 985	-	₩ -	-	₩ -	-	₩ -					
consideration 1	8,894	-	8,853	-	8,583	-	8,502	-	8,502	-					
Purchase ²	1,096	12,808	-	-	450	13,275	19	256	-	-					
Disposal ² Withdrawal to the	-	-	-	-	-	-	-	-	-	-					
government ³ Borrowing (carrying	(9,774)	(11,823)	(9,362)	(2,928)	-	-	-	-	-	-					
forward)							<u>-</u>								
At December 31	388	₩ 985	(121)	₩ (1,943)	9,033	₩ 13,275	8,521	₩ 256	8,502	₩ -					

¹ Additional allocation is included in allocation with nil consideration for the year 2022 and 2021.

² The quantity for swap is included in the purchase for the year 2021. In addition, the purchase for the year 2022 does not include the quantity 122 thousands of tCO2-eq (₩ 1,943 million) for the year 2022 that is expected to be purchased during 2023.

³ Withdrawal to the government for the year 2022 is an estimate as of December 31, 2022 and subject to change with the result of submission to government and purchase price of emission permits for submission of deficient amount.

(In millions of	2021											
Korean won, In	2020 2021 2022		022	20)23	2	024	2025				
thousands of tCO2-eq)	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
At January 1	1,437	₩ -	172	₩ -	-	₩ -	-	₩ -	-	₩ -	-	₩ -
Allocation with nil consideration ¹	6,588	-	8,583	-	8,583	-	8,583	-	8,502	-	8,502	-
Purchase ²	-	-	1,034	11,752	450	13,275	-	-	-	-	-	-
Disposal ²	(1,534)	(15,523)	-	-	-	-	-	-	-	-	-	-
Withdrawal to the government ³	(6,319)	-	(9,789)	(11,752)	-	-	-	-	-	-	-	-
Borrowing (carrying forward)	(172)			-	-	-	-					
At December 31		₩ -		₩ -	9,033	₩ 13,275	8,583	₩ -	8,502	₩ -	8,502	₩ -

¹ Additional allocation for the year ended December 31, 2021 is included.

² The quantity for swap and disposal of emission permits driven by the government's restriction on carry forward is included.

³ Withdrawal to the government for the year 2021 is an estimate as of December 31, 2021 and subject to change with the result of submission to government.

There are no emission permits pledged as collateral.

As of December 31, 2022, emission are estimated at 9,363 thousand tons (tCO2-eq).

Details of emission obligations for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won, In	20)22		2021			
thousands of tCO2-eq, except quantities)	Quantity	A	mount	Quantity	A	mount	
At January 1	1,035	₩	11,752	-	₩	-	
Addition	121		2,014	1,035		11,752	
Withdrawal	(1,035)		(11,823)	-		_	
At December 31	121	₩	1,943	1,035	₩	11,752	

37. Investment Property

Details of investment property as of December 31, 2022 and 2021, are as follows:

(In millions of Korean won)	millions of Korean won)			2022					2021						
		Cost	Accumulate depreciation			Book amount		Cost		mulated eciation			Book mount		
Land	₩	136,065	₩	-	₩	136,065	₩	136,065	₩	-	ł	₩	136,065		

Changes in investment property for the years ended December 31, 2022 and 2021, are as follows:

(In millions of Korean won)		2022		2021
Beginning balance	₩	136,065	₩	-
Transfer from property, plant and equipment ¹		_		136,065
Ending balance	₩	136,065	₩	136,065

¹ Reclassified from construction in progress to investment property.

There was no rental income generated from the investment property and no direct operating expenses related to the investment property were incurred during the year ended December 31, 2022.

Fair value of investment property as of December 31, 2022, is ₩ 210,200 million (2021: ₩ 193,128 million). The fair value of investment property was measured by reflecting the appraisal value of land in 2020, valuated by an independent appraisal firm that holds a publically certified professional qualification according to the Official Land Price Standards Act and subsequently reflecting the growth rate of official land value in 2021 and 2022, which is classified as Level 3 in the fair value hierarchy.